27th Congress, 3d Session. Doc. No. 133. Ho. of Reps. Executive.

SITE FOR A WESTERN ARMORY.

MESSAGE

FROM

THE PRESIDENT OF THE UNITED STATES,

TRANSMITTING

A letter from the Secretary of War, submitting a report of the board of officers appointed to select a site for a Western armory, together with a counter report from the Surgeon General.

February 9, 1843.

Referred to the Committee on Military Affairs.

To the House of Representatives:

In order to enable Congress to approve or disapprove the selection of a site for a Western armory, made by the board of commissioners appointed by me for that purpose, pursuant to the act of September 9, 1841, I transmit, herewith, their report and proceedings, as required by that act.

JOHN TYLER.

Washington, *February* 9, 1843.

War Department, *February* 8, 1843.

Sir: I have the honor to submit, herewith, the report of a majority of the board appointed by you to select a site for a Western armory; and, in doing so, deem it proper to express the high estimation which its perusal has produced, of the great industry, patient investigation, and admirable talent, with which the inquiry has been conducted.

It is my duty also to submit a counter report and accompanying papers, submitted by one of the members of the board, the Surgeon General.

I have the honor to be, sir, your obedient servant,

J. C. SPENCER.

To the President *of the United States.*

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REPORT

OF

THE BOARD OF OFFICERS

APPOINTED

TO SELECT A SUITABLE SITE FOR THE ESTABLISHMENT

OF A

NATIONAL ARMORY ON THE WESTERN WATERS:

TOGETHER WITH

AN ABSTRACT OF THE PROCEEDINGS OF THE BOARD,

Containing a series of Descriptive Memoirs on the several sites examined for that purpose.

ALSO,

AN APPENDIX,

Comprehending sundry memorials and other documents commendatory of the sites visited by the board.

GENERAL ORDERS, No. 63.

HEADQUARTERS OF THE ARMY,
Adjutant General's Office, Washington, October 15, 1841.

The following order has been received from the Department of War:

DEPARTMENT OF WAR, *October* 14, 1841.

In compliance with the provisions of an act of Congress approved September 9, 1841, the President directs the formation of a board of officers, for the purpose of selecting a suitable site on the Western waters for the establishment of a national armory.

The board will be composed as follows:

Brevet Brigadier General W. K. Armistead, *President.*
Surgeon General Thomas Lawson,
Lieutenant Colonel S. H. Long, Topographical Engineers, } *Members.*
William L. Henley, Esq., *Secretary.*

The board will assemble on or before the 1st of November next, at St. Louis, Missouri, where they will receive their instructions.

JOHN C. SPENCER,
Secretary of War.

By command of Major General Scott.

W. W. J. BLISS,
Acting Adjutant General.

General ARMISTEAD.

DEPARTMENT OF WAR, *October* 18, 1841.

GENTLEMEN: The following general instructions are communicated for your guidance in performing the duty assigned to you in the orders from this office of the 14th instant.

The authority for your appointment is contained in the following clause of an appropriation act, passed at the late session of Congress, viz:

For defraying the expenses of selecting a suitable site on the Western waters for the establishment of a national armory, a sum not exceeding $5,000 [is appropriated;] and the President of the United States is hereby authorized to cause such selection to be made, and to communicate all the proceedings which may be had thereon to the Congress of the United States, to be subject to its approval.

Your examinations for the above object are confined to no other geographical limits than those indicated in the act of appropriation, viz: that the armory shall be on the "Western waters"

With regard to local considerations, the first is obviously that of the capability of the site to furnish the necessary power for driving the machinery required in the manufacture of arms. This may be either water or steam power, the choice of one or the other being determined by the relative cost of using it.

The transportation of a given quantity of materials for the manufacture of arms, being much more expensive than that of the finished work produced from them, the facility of procuring such materials, and especially those which are required in the greatest proportion, (such as iron and coal,) is an important element in the selection of a site for an armory.

The healthfulness of the position is another consideration of great importance, with reference to the economy of production as well as to the efficiency of the establishment in supplying the wants of the country, even if the plain dictates of humanity could be neglected.

The resources of the adjacent country for furnishing the supplies necessary for the support of the persons employed at an armory will claim due attention. The actual facility which any site may afford for supplying workmen is not deemed to be of primary importance; as an establishment of this kind, in a position favorable for health and subsistence, will soon draw around it the requisite mechanics and persons of all classes concerned in its operations.

The situation of the armory should evidently be such as to admit of easy and cheap transportation to and from it, for the purpose of procuring supplies and of distributing arms to the Western States and Territories, and to the arsenals and other military posts within their limits.

No definite instructions can be given as to the extent of ground which should be set apart for an armory, as that will depend very much on the peculiar character of the site selected. Two plans have been proposed for such an establishment: one to make it capable of manufacturing the arms complete, as in the national armories at Springfield and Harper's Ferry; the other, to confine the work to stocking and assembling the parts of arms which would be procured in a finished state from private workshops; but, whichever of these plans may be followed in the first establishment of a Western armory, its site should possess all the local requisites for enabling the Government ultimately to render it complete in itself. For this purpose, there should be sufficient space for suitably arranging the necessary workshops, storehouses, and magazine, and also for erecting dwellings for the principal officers of the armory. If circumstances permit,

it will be advantageous for the United States to possess such a quantity of ground about the establishment as to prevent inconvenient intrusion from neighboring settlements; and the expediency of having iron and coal mines, especially the latter, within the precincts of the armory, is worthy of consideration.

In your report of the examinations which you are called upon to make, you will be pleased to arrange the information obtained in such a manner as to present a clear view of the whole subject, and you will designate the site for an armory which you may think entitled to preference, giving your reasons for the selection. You will annex to the report topographical sketches of the sites which chiefly recommend themselves to your notice, showing, as nearly as you can, the boundaries of the ground which it may be advantageous and practicable to purchase at each place; and you will state the price at which it may probably be obtained, to whom it belongs, and such other information on this subject as may appear to be useful for accomplishing the object in view.

In order to put the board in possession of all the information which has been obtained by the War Department on this subject, the reports of two previous examinations of sites for a Western armory have been handed to the Surgeon General, for the use of the board. One of these is the report of Commissioners McRae, Talcott, and Lee; the other a report by Major J. L. Smith, of the corps of engineers. These are accompanied by a report on the same subject, made by the Military Committee of the House of Representatives at the first session of the 24th Congress.

Your attention is also invited to the letters, herewith enclosed, from Mr. Hall, of Cincinnati, on behalf of a committee of citizens of that place, from the Hon. S. McRoberts, of Illinois, the Hon. Thomas H. Benton, of Missouri, and a committee of citizens of Rock island, Illinois.

It is desirable the report of the board should be received before the end of the month of May next, in order that the decision of the President may, if possible, be communicated to Congress in time to be acted on at its next session; but for this purpose it is not intended to urge undue haste in the discharge of the important duties committed to the board.

The appropriation for defraying the cost of this examination will be applicable to the payment of a per diem allowance of $1 25 to each of the members of the board, whilst employed on this service; to defraying the necessary contingent expenses for stationery, &c., and for the compensation of the secretary, who will be allowed $5 per day, and a mileage of ten cents, whilst travelling on duty.

The members of the board will receive from the Quartermaster's department the regular transportation allowance of officers travelling under orders, and a commutation for fuel and quarters at the usual rates.

The secretary of the board will disburse the contingent funds which will be advanced to him, as they may be wanted, on the requisition of the president of the board, and he will account for them in the usual manner.

You will keep this Department informed of your movements, in order that it may be known where letters will reach you.

Very respectfully, J. C. SPENCER.

Brigadier General W. K. ARMISTEAD,
Surgeon General THOMAS LAWSON,
Lieutenant Colonel S. H. LONG,
Board for selecting a site for a Western armory,
St. Louis, Missouri.

HARPER'S FERRY, *January* 28, 1843.

SIR: In obedience to your order of October 14, 1841, constituting "a board of officers for the purpose of selecting a suitable site on the Western waters for the establishment of a national armory," the undersigned, having been appointed members of that board, have now the honor to submit a report of their proceedings in relation to this service.

Subsequent instructions, under date of the 18th of the same month, were also communicated to the board, for their guidance in the discharge of the duties thus devolving upon them; agreeably to which, the leading objects claiming their attention were briefly as follows, viz:

1st. The selection of a site suitable for the purpose above mentioned, which must be on the "Western waters."

2d. A mechanical power, either of water or steam, sufficient "to drive the machinery required in the manufacture of arms," the choice between these two varieties of power being measurably governed by their relative cost.

3d. The facility of procuring the materials requisite in the fabrication of arms.

4th. The condition of the site, with respect to its healthfulness.

5th. The facility of procuring articles of subsistence and all other necessaries at the site.

6th. The facility for distributing arms throughout the Western States and Territories.

7th. A site of suitable aspect, and sufficiently spacious for the commodious arrangement of "the workshops, storehouses, magazines, dwellings," &c., of an armory.

8th. Topographical surveys and sketches of the principal sites, showing the extent, position, &c., of each.

9th. The reports of former commissioners appointed for the purpose of making a similar selection.

10th. Sundry memorials of committees and individuals, in various parts of the country, recommending different sites for examination.

We take this occasion to observe, in reference to the *suitableness* of a site, that, in addition to the requisites contained in our instructions, and briefly recapitulated in the foregoing statements, we have regarded the following conditions as indispensable, for reasons too obvious to need a rehearsal, viz: that the site should be accessible to steamboat navigation; that it should be entirely exempt and secure from overflows; and in case the power relied on for driving the machinery of the armory should be that of water, the circumstances attending its production and employment should be such as to render the power constant and secure as possible from all interruptions and other annoyances occasioned by back or flood water.

In the progress of the examinations and inquiries made by the board, the foregoing objects have been kept constantly in view, except in so far as relates to surveys and delineations of the sites examined, the execution of which was commenced at an early stage of the reconnoissance, but subsequently intermitted by reason of a suspension of the accounts covering the expenses that had already been incurred in making surveys and preparing drawings in illustration of the same.

On the first assembling of the board at St. Louis, two plans of operation were proposed for their consideration, viz:

1st. That the board visit and examine in succession such localities as

might be recommended to their consideration as sites for the armory, by memorials sanctioned by State Legislatures, city corporations, &c., together with such other positions as might come under their observation, provided the localities to be visited should appear, from representation or otherwise, to have well-grounded claims to their attention.

2d. That the board should first determine upon some point central to the region drained by the Western waters, and afterwards examine the country in all directions around it, with the view of discovering a site suitable for the armory at the least practicable distance from such central point.

The first proposition was preferred by a majority of the board, and the course of procedure therein suggested was accordingly adopted.

Whereupon, the board proceeded to the examination of the following sites and localities, which they visited in the order of their enumeration below:

1. At the Des Moines rapids, Illinois, on the Mississippi river.
2. At Rock island, Illinois, in the Mississippi river.
3. At lower rapids of Rock river, Illinois.
4. At upper rapids of Rock river, Illinois.
5. At Peru, on Illinois river, Illinois.
6. At Ottowa, on Illinois river, Illinois.
7. At Marseilles, on Illinois river, Illinois.
8. Near Alton, Illinois, on the Mississippi river—two sites.
9. Near Bellville, Illinois—several sites.
10. Near St. Louis, Missouri.
11. On Maramec river, Missouri.
12. Iron mountain and Pilot knob, Missouri.
13. Near St. Genevieve, Missouri—two sites.
14. At St. Mary's or Pratt's landing, Missouri.
15. Near Cape Girardeau, Missouri—two sites.
16. At Cairo, mouth of the Ohio river, Illinois.
17. Caledonia, Illinois—two sites.
18. Near Smithland, mouth of Cumberland river, Kentucky—two sites.
19. At the Narrows of Harpeth, Harpeth river, Tennessee.
20. Near Nashville, Tennessee—two sites.
21. At the falls of Caney fork, Tennessee—two sites.
22. At Stone Fort, head of Duck river, Tennessee.
23. At Paducah, mouth of Tennessee river, Kentucky.

The board were occupied in the examination of the localities above enumerated from the 1st of November, 1841, to the 28th of February, 1842; when they adjourned to the 1st of May following, the streams being generally too much flooded to admit of the requisite measurements and estimates of the water power at the several sites remaining to be examined. But the president of the board being required to attend as president of a general court martial, they did not reassemble till the 1st of July, 1842, when they proceeded to the examination of the following localities, viz:

24. Near Memphis, Tennessee, on the Mississippi river—two sites.
25. Near Fulton, Tennessee, first Chickasaw bluff.
26. At and near Fort Massac, Illinois, on the Ohio river—two sites.
27. Near Brownsport, Tennessee, on Tennessee river—two sites.
28. On Cypress creek, Alabama, near Florence.
29. On the Muscle shoals, Tennessee river, several localities.
30. At Mount Carmel, Illinois, on the Wabash river.
31. At Evansville, Indiana, on the Ohio river.

32. Near Louisville, Kentucky, at the falls of the Ohio river.
33. Near Cincinnati, Ohio, at North bend—two sites.
34. Near Portsmouth, Ohio, at the termination of the Ohio and Erie canal—three sites.
35. Near the mouth of Big Sandy river, Kentucky and Ohio—several localities.
36. Near Pittsburg, Pennsylvania—several sites.
37. On Big Beaver river, head of falls.
38. Near Wheeling, Virginia—several sites.
39. Near Zanesville, Ohio—three sites on Muskingum river.
40. Near Dayton, Ohio—two sites on Big Miami river.
41. At Hamilton, Ohio, on Big Miami river.
42. Near Newport, Kentucky, on Licking river.
43. Near Madison, Indiana, on Ohio river.
44. Near Frankfort, Kentucky, on Kentucky river.
45. Near New Albany, Indiana, on Ohio river.
46. On Green river, Kentucky—several localities.
47. At and near Caseyville, Kentucky—two sites.
48. Near Suck, on Tennessee river.

The board terminated their examinations of the foregoing localities late in October, and repaired to Harper's Ferry for the purpose of obtaining various desiderata relating to the expense of power, &c., at the United States armory at that place, and of preparing a report of their proceeding touching the objects of their appointment.

The results of the observations and inquiries made by the board in relation to the several localities designated in the foregoing list are exhibited in a corresponding series of descriptive memoirs, which we annex to this paper, and to which we beg leave to refer for the information we are able to give, respectively, concerning them.

Moreover, in order to present the views of others in reference to the same localities, we have subjoined, in the form of an appendix, the various memorials of committees and individuals which have been submitted to the board, for the purpose of exhibiting the claims and advantages of the several sites to which they respectively relate. To these also we beg leave to refer for numerous details of interesting intelligence concerning the localities in question.

In regard to the distinctions of Eastern and Western, as applied to different sections of the United States, the latter of which terms is used in the act of Congress authorizing the examination in which we have been engaged, it is proper that we should have some idea of their relative import. Accordingly, as no instructions in relation to this question have been given, and in order that we may have some definite views in reference to the same, we shall assume, as the most appropriate line of demarkation between the East and the West, a line or boundary commencing at the most southerly point of Cape Hatteras, and running thence in a straight direction, about north 30° west, passing near Richmond and Orange court-house, (Virginia,) Shelbysport, (Maryland,) to Pittsburg, (Pennsylvania;) and thence in a straight direction, about north 48° west, passing near Fairfield, Ohio, to Cleveland, on Lake Erie—the point at which the great canal of the State of Ohio, as also the canal communication from Big Beaver and the Muskingum navigation, have their joint termination at the lake shore. Such a boundary would leave within the Eastern department of the United

States a small corner of North Carolina, about one-fifth of Virginia, the whole of Maryland except a small corner, almost the whole of Pennsylvania, and a comparatively small triangle, containing about four counties, in the northeast angle of Ohio. This boundary is regarded as the most appropriate line of demarkation between the Eastern and Western departments of the United States, especially when viewed in its relations to the national armories already established in the East, and that now contemplated in the West.

The distance of Cleveland from Harper's Ferry, Virginia, by railroad, common road, river, and canal route, via Pittsburg, is 371 miles; and from Springfield, Massachusetts, by railroad, canal, and lake, via Albany and Buffalo, New York, is 656 miles.

The distance from Cape Hatteras to Harper's Ferry, by Atlantic ocean, Chesapeake bay, Potomac river, and canal, is 375 miles; and from the same point to Springfield, by Atlantic ocean, Long Island sound, and Connecticut river, is 575 miles.

In order more fully to illustrate the propriety of adopting such a boundary, we shall endeavor to exhibit the extent of frontiers, maritime and inland, for the defence and protection of which arms are required; and, with this object in view, shall regard the whole extent of our national frontiers as boundaries of three distinct departments of the country, viz:

1st. The Eastern department, to be supplied with arms from the armories already established;

2d. The Western department, to be supplied from the contemplated Western armory; and

3d. The Northern or Lake department, to be supplied in part from the Eastern and in part from the Western armories.

EASTERN DEPARTMENT.

The frontiers of this department are of the following character, and embrace the following distances, viz:

	Miles.
Atlantic frontier, from Cape Hatteras, N. C., to Eastport, Me. -	1,080
Maritime frontiers of Chesapeake, Delaware, and Penobscot bays, Long Island sound, &c. - - - -	1,150
Inland frontier, from Eastport to Ogdensburg - - -	860
Lake frontier, from Ogdensburg to Cleveland, including the coasts of Lake Champlain, &c. - - - -	660
Total amount of maritime and inland frontier of Eastern department - - - - - - -	3,750

WESTERN DEPARTMENT.

If we include in this department the whole of our Western country to the Pacific ocean, its frontiers will be as follows:

	Miles.
Atlantic coast, from Cape Hatteras to southern extremity of Florida - - - - - - -	960
Gulf coast, from southern extremity of Florida to mouth of Sabine river - - - - - - -	1,260
Pacific coast, from the 42d to the 54th degree of north latitude -	1,000

	Miles.
Inland frontier, bordering on Texas and New Mexico - -	1,450
Northern frontier of the United States, from Lake-of-the-Woods to the Pacific ocean - - - - - -	1,700
Total maritime and inland frontier of Western department -	6,370

This vast region, however, as above defined, is far more extensive than that believed to be comprehended within the purview of our instructions. The term "Western waters" was no doubt intended to apply to waters drained through or connected with the channel of the Mississippi, or rather to all streams entering the Gulf of Mexico, within the Gulf coast of the United States. Accordingly, a boundary less remote than the Pacific ocean must be sought for and substituted as the Western frontier of this department.

A line stretching from Fond-du-Lac, at the west end of Lake Superior, in a direction a little west of south, to Fort Towson, on Red river, seems to be more nearly assimilated to our Indian frontier in the West than any other direct line that can be assumed. A line much further to the westward, however, seems to comport far better with the prospects and future condition of the country, and we shall accordingly assume the hundredth meridian of west longitude from Greenwich, or the twenty-third from Washington, as the appropriate Western frontier of this department. This line of frontier commences at the northeast angle of Texas, on the Arkansas river, crosses the river Platte about 90 miles southwestward of the Pawnee villages, strikes the Missouri 20 or 30 miles above the Grand Detour, pursues its valley upwards to the uppermost Ricaree village, 60 or 70 miles below the Mandans, and meets the Northern boundary of the United States at or near the point where the latter is intersected by Moose river, or about 110 miles westward of Pembina, on Red river of Hudson's bay. The position of this frontier will of course be more than 300 miles westward of the States of Arkansas and Missouri and of the Iowa Territory, and a large portion of it within the limits of the sandy and inhospitable region called the American desert, which is not likely soon, if ever, to be inhabited by an agricultural population. Agreeably to this understanding of the subject, we shall substitute the following estimate of the frontiers of the Western department, instead of that previously exhibited.

	Miles.
Aggregate of Atlantic and Gulf coast, as before - - -	2,220
Inland frontier, bordering on Texas - - - -	950
Western frontier, from northeast corner of Texas, on Arkansas river, to Northern boundary of the United States - -	800
Northern frontier, from Moose river to Pembina, and thence to Fond-du-Lac, at west end of Lake Superior - -	400
Aggregate maritime and inland frontier of Western department	4,370

NORTHERN OR LAKE DEPARTMENT.

As before intimated, this department is to be regarded as common to both of the preceding departments; the facilities of intercommunication between it and each of the latter being nearly equal, while its proximity to the territory of a foreign Power, and its exposure to hostile incursions

from that quarter, render it unfit for the establishment of a national armory, within or near its precincts.

The frontiers of this department are as follows, viz:

	Miles.
Lake frontiers on Lakes Erie, Huron, Michigan, Superior, and Green bay, from Cleveland, on Lake Erie, to Fort William, on Lake Superior - - - - - -	2,200
Inland frontier, from Fort William to Lake-of-the-Woods, and thence to Pembina, on Red river of Hudson's bay - -	600
Total lake and inland frontier of Northern department - -	2,800

RECAPITULATION.

	Miles.
Aggregate maritime frontier of Eastern department - -	2,890
Aggregate maritime frontier of Western department - -	2,220
Aggregate lake frontier of Northern department - - -	2,200
Aggregate inland frontier of Eastern department - -	850
Aggregate inland frontier of Western department - -	2,150
Aggregate maritime, lake, and inland frontiers of the three departments - - - - - - - -	10,310

Having described the precincts of the Western department, which comprehends all the Western and Southwestern States and Territories of the Union, together with a vast district westward of Arkansas, Missouri, and Iowa, more than 300 miles wide and 1,100 miles long, and embraces, probably, the entire region through which the benefits accruing from the establishment of the Western armory are to be diffused, it remains for us to determine the point from which such a diffusion can be effected to the greatest advantage.

The various considerations claiming attention, on account of their being involved in this general view of the subject, are of the following import, and may be arranged in the following order, viz:

1. The geographical centre of the Western department.
2. The hydrographical or commercial centre of the same.
3. Centrality of position, with respect to the facilities of obtaining supplies of all kinds required at an armory, &c.
4. Centrality of position, with respect to the facilities presented thereat for the distribution of the arms produced at the same.

GEOGRAPHICAL CENTRE OF THE WESTERN DEPARTMENT.

From the geographical outline of this department, as already defined, we are prepared to determine its approximate geographical centre, which we shall attempt to do in the following manner:

In order to solve this question, we shall assume a series of lines diametrical and diagonal of the region included within the limits of the department, and ascertain, as nearly as practicable, the positions of their respective bisecting points. These lines and points are as follows, viz:

1. *A diametrical line*, extending from Cape Hatteras to the northeast angle of Texas, on the Arkansas river; length 1,400 miles. The position

of its bisecting point is 10 miles north of Hopkinsville, Kentucky, 92 miles eastward of the mouth of the Ohio river, and 59 miles south of the mouth of Green river.

2. *A diagonal line*, extending from Cleveland, on Lake Erie, which is at the extreme northeast angle of the department, to the mouth of Sabine river, on the Gulf of Mexico, the extreme southwest angle of the same; length 1,100 miles. The position of its bisecting point is 16 miles north-northwest of Perryville, Tennessee, 82 miles south-southeast of the mouth of the Ohio, and 87 miles southerly of the mouths of Tennessee and Cumberland rivers, being nearly equidistant from both.

3. *A diametrical line*, extending from the mouth of the Mississippi river, due north, to the nearest point on Lake Superior, (bay of Huron;) length 1,260 miles. The position of its bisecting point is 60 miles nearly due east of St. Genevieve, 56 miles due north of Caledonia, on the Ohio river, 15 miles from its mouth.

4. *A diagonal line*, extending from the most southerly extremity of Florida, or southeasterly extreme of the department, in a northwesterly direction, to the intersection of the northerly boundary by Moose river, the extreme northwest angle of the department; length 2,000 miles. The position of its bisecting point is near Caledonia, on the Ohio river, 15 miles above its mouth.

Hence it appears that all of the bisecting points, as above designated, are situated on the east of the Mississippi river, and on both sides of the Ohio river—two of the points being southwardly of the latter, one northwardly, and the remaining point on its margin, 15 miles above its mouth. By joining these several points by means of four right lines, we shall have a trapezium or quadrilateral figure, of the following description and dimensions, viz:

Its westerly side (which is nearly coincident with the meridian, passing northwardly from the mouth of the Mississippi river) will have an extent of 57 miles, its northeasterly side an extent of 110 miles, its southeasterly side an extent of 102 miles, and its southwesterly side an extent of 110 miles. The trapezium will embrace an area of 6,115 square miles. The geographical centre of this extensive area will be at a point on Clark's river, in Callaway county, in Kentucky, 6¼ miles north-northeast of Wadesborough, 25 miles southeast of Paducah, or the mouth of Tennessee river, 19 miles a little east of south from Smithland, or the mouth of Cumberland river, 6 miles from the nearest point on Tennessee river, 30 miles above its mouth, and 47 miles south, 78 degrees east, from the mouth of the Ohio river.

The geographical centre of the trapezium, as above pointed out, is to be regarded as the approximate geographical centre of the Western department which was to be determined.

HYDROGRAPHICAL OR COMMERCIAL CENTRE.

In connexion with our descriptive memoir relating to Cairo, at the mouth of the Ohio, (to which we beg leave respectfully to refer for numerous details of information in reference to the navigable waters of the Western country, which need not be repeated in this place,) a synopsis of the distances, extent, and character of the navigation on the Western waters was exhibited, in which we have the following summaries, viz:

	Miles.
Aggregate extent of steamboat navigation on the Mississippi and its tributaries, and other inland channels with which it is connected, *below* the mouth of the Ohio river - - -	3,990
Aggregate extent of steamboat navigation on the Mississippi and its tributaries, *above* the mouth of the Ohio river - -	3,924
Aggregate extent of steamboat navigation on the Ohio river and its tributaries - - - - - - - -	2,754

To this last may be added the extent of canal and slack-water navigation connected with the Ohio, a knowledge of which has been acquired since the preparation of the paper referred to, which is as follows, viz:

	Miles.	
Extent of artificial navigation on Monongahela river -	55	
Extent of artificial navigation on Allegany river - -	95	
Extent of artificial navigation on Big Beaver river, &c. -	105	
Extent of artificial navigation on Muskingum river and canal - - - - - - - -	90	
Extent of artificial navigation on Scioto river and Erie canal - - - - - - - -	309	
Extent of artificial navigation on Miami river and canal	93	
Aggregate extent of artificial navigation connected with the Ohio river - - - - - - - - -		747
Aggregate of steamboat and canal navigation on the Ohio and its tributaries - - - - - - - -		3,501

Hence it is manifest, without any further demonstration, that the centre of navigation of the Western waters, or the commercial centre of the West, is in the Mississippi river, at a point near, or rather a very little below, the mouth of the Ohio river.

CENTRALITY WITH RESPECT TO SUPPLIES OF ALL KINDS FOR AN ARMORY.

Under this head we have already advanced most of the appropriate information in our descriptions of sites on the Mississippi and Ohio, and their tributaries, above the commercial centre just designated; and to these we beg leave to refer for numerous details that need not again be repeated. We shall, however, add in this place a few remarks of a more general character and bearing than those contained in the papers referred to.

All supplies obtainable from the extensive district drained by the Ohio and its tributaries, which are inexpressibly abundant and multifarious, embracing all possible varieties that can be wanted at an armory, for subsistence, clothing, and manufactures, may be conveyed to the mouth of the Ohio river by *descending* navigation. The same is also true with respect to the Mississippi and its tributaries above the same point, except that the supplies derivable from this quarter are at present much more limited, both in variety and extent, on account of the newness of the country, the comparative paucity of its population, and the want of a practical development of its agricultural and mineral resources. At a future day, not far distant, no doubt can be entertained that the supplies to be derived from

these sources, and wafted downward to our commercial centre, will be no less ample and various (with the exception alone of the important article of cotton, which is raised in abundance on the Tennessee river) than those now derived from the prolific valley of the Ohio.

It is worthy of remark, that almost the whole of the coal, iron, and lead districts of the Western country are situated above the commercial centre above indicated.

Besides the coal districts of Pennsylvania and Virginia, large and exceedingly productive portions of which are included within the Western department, the coal fields of the State of Ohio are said to embrace an area of twelve thousand square miles; those of Kentucky, ten thousand square miles; those of Indiana, eight thousand square miles; those of Illinois, more than thirty thousand square miles; and those of Missouri, of at least five thousand square miles—amounting in the aggregate to more than sixty-five thousand square miles of coal districts, all situated above the mouth of the Ohio, and from all of which coal can of course be conveyed to our commercial centre by descending navigation. Cannel coal, apparently of an excellent quality, has been discovered in at least three distinct localities on the Western waters, viz: on the Osage river, in Missouri; on the Ohio river, near Caseyville, about one hundred miles above its mouth; and on Big Beaver river, within two miles of the Ohio.

Immense and inexhaustible beds of iron ore exist at innumerable points in the neighborhood of the Ohio river, and on all of its southern tributaries. The Licking, Kentucky, and Green rivers, are capable of affording immense supplies of this mineral. The Cumberland and Tennessee rivers, almost through their whole extent, and most of their tributaries, from their sources to their mouths, traverse a region incalculably rich in iron ore.

The iron produced from the ore found in the lower portions of these two rivers is thought to be equal to the best of foreign iron. The Iron mountain of Missouri, and other districts in that State, on the headwaters of the Maramec, Gasconade, Osage, and other streams, are also capable of yielding exhaustless supplies of this article. The iron with which the Western markets are at present supplied is derived principally from the Ohio, Cumberland, and Tennessee rivers.

The lead mines of Missouri, Iowa, Illinois, and Wisconsin, have yielded vast supplies of lead, and, as yet, exhibit no considerable signs of abatement in their future productiveness. Developments have recently been made in Illinois and Kentucky, near the Ohio river, and between Shawneetown and Paducah, which indicate the existence of lead in considerable abundance in this neighborhood.

Extensive beds of copper ore are said to exist in Missouri, at the sources of one of the tributaries of Black river. This mineral is also believed to be abundant in the northerly parts of Wisconsin, especially in the neighborhood of Lake Superior. It has been discovered in small quantities also at various other localities in the West.

Salt or brine springs occur at numerous points within the department. These are generally, if not invariably, found at or near the margins of coal districts, and in connexion with strata inferior to those of the coal measures.

These and various other mineral products, as well as the products of the soil, in their conveyance downward to Southern markets, must all pass the commercial centre above designated, and, by reason of their diversity and

abundance, may be afforded collectively, if not individually, at a cheaper rate at that point than at any other point on the Western waters.

In view of what has been advanced in the foregoing remarks, it is hardly necessary to add, that the point at which supplies of all kinds furnished by the Western country can be had in the greatest abundance and variety, and at the cheapest rates, is nearly or quite coincident with that designated as the commercial centre of the department. With respect to this point, it should moreover be observed, that in the event of a dearth in one portion of the vast region above it, and plenty in another, which is likely to be the case more or less frequently, supplies of provisions, &c., will be less likely to fail at a centrepot in its vicinity than at any other point.

CENTRALITY WITH RESPECT TO THE DISTRIBUTION OF ARMS.

The facts adduced with reference to the hydrographical or commercial centre of the department bear with equal force upon the subject now under consideration. Moreover, the facilities of obtaining supplies from different and distant parts of the country above that centre are obviously attended by corresponding facilities for the distribution of arms in the same directions. Under our present head, the number and character of the avenues through which the distribution can be made, together with the relative distances from the centre of distribution to remote points on or near the outline of the department, are entitled to some attention.

In connexion with our descriptions of sites at Cairo, Wheeling, Pittsburg, Muscle shoals, &c., we have exhibited, with as much accuracy as was attainable, the characters and condition of the Western rivers, with respect to their navigation; and to these we beg leave to refer for information on this subject. These streams will again be noticed, in so far as they constitute or are connected with the various avenues leading from the commercial centre to various points at or near the frontiers of the department, as exhibited in the following schedule, in which will also be included the probable average number of days required to effect the distribution in each direction:

Schedule.

Military posts, &c.	Miles.	Days.
To Fort Jackson, near the mouth of the Mississippi, by descending navigation	1,108	5½
To Natchitoches, on Red river, the point nearest Texas, by descending and ascending navigation	1,060	6¼
To Fort Towson, on Red river, by descending and ascending navigation	1,850	12
To Fort Gibson, on Arkansas river, by descending and ascending navigation	1,046	7½
To Batesville, on White river, by descending and ascending navigation	647	4¼
To Grand Detour, on Missouri river, by ascending navigation	1,343	11
To Fort Snelling, on the Mississippi river, by ascending navigation	940	8
To Fort Winnebago, on Wisconsin river, by ascending navigation	844	7¼
To Chicago, on Lake Michigan, by ascending navigation and canal*	556	5½
To Chicago, by central railroad of Illinois and Illinois and Michigan canal*	420	4½
To Maumee bay, on Lake Erie, by ascending navigation, via Wabash river and Wabash and Erie canal*	713	7½
To Maumee bay, by ascending navigation, via Ohio river, Miami canal, and Wabash and Erie canal*	776	8
To Cleveland, by ascending navigation, via Ohio river and Ohio and Erie canal	952	10
To Cleveland, by ascending navigation, via Ohio river and Big Beaver canal	1,107	10
To Pittsburg, by ascending navigation	996	8⅓
To Charleston, South Carolina, by ascending navigation in Tennessee river and by railroads*	1,014	7¾
To Savannah, Georgia, by ascending navigation in Tennessee river and by railroads*	994	7¾
To Appalachicola bay, by ascending navigation in Tennessee river, Western and Atlantic railroad, and by descending navigation in Chattahoochie river*	1,033	8½
To Mobile bay, by ascending navigation in Tennessee river, common road to Cotton Gin Port, and descending navigation in Tombeckbee river*	835	9½

NOTE.—The lines of communication marked thus, (*) so far as they depend on artificial works, are as yet incomplete; but they are now in the progress of being improved, and in the course of a few years will no doubt be passable throughout their whole extent.

The periods exhibited in the foregoing schedule as the number of days required for conveyances from the commercial centre to the several points designated therein, on the frontiers of the department, will no doubt be amply sufficient for the purpose, whenever the Western rivers are in a condition favorable for navigation by steamboats,—it being understood that no allowance has been made for detentions by low water, which will no doubt take place more or less frequently on most of the routes therein enumerated; nor for detentions occasioned by transhipments from one vehicle to another, whenever a change in the mode of conveyance is to be made.

The aggregate of the distances to the several frontier points designated in the schedule, after making appropriate deductions in all cases where a portion of the distance is common to any two or more routes, will stand as follows:

	Miles.
Aggregate distance on the Mississippi and its tributaries above the centre - - - - - - - -	2,535
Aggregate distance on the Mississippi and its tributaries below the centre - - - - - - - -	2,838
Aggregate distance on the Ohio and its tributaries above the centre, and on other streams within the department connected therewith - - - - - - - -	3,487

Agreeably to this showing, the point of centrality for the distribution of arms will be on the Ohio, at a considerable distance above its mouth.

MECHANICAL POWER REQUIRED FOR THE ARMORY.

Among the preliminaries regarded as governing principles in selecting a site for the armory is the practicability of obtaining "a mechanical power, either of water or of steam, sufficient to drive the machinery required in the manufacture of arms."

In order to satisfy themselves as to the extent or magnitude of the power actually employed for this purpose, the board instituted a course of observations at Harper's Ferry, by which they have been enabled to determine with considerable precision, and much satisfaction to themselves, the quantum of power required in manufacturing arms at the rate of 12,000 stands per year. We would, moreover, premise that the manner of employing the water power at this place is far from being uniform, systematic, or economical. In reference to the high breast or pitch back wheels, the heads above the points at which the water strikes the wheels generally occupy too great a proportion of the fall. The same is also true with respect to some of the undershot wheels. Much of the water employed on the tub wheels is wasted. The reaction wheel, in consequence of defects in its construction or the principle of its operation, or more probably to both, produces only about half the efficient action that ought to be realized from a well-constructed undershot wheel, with the same quantity of water and the same head and fall.

The following are the results of their observations and computations of the water expended and power produced on the several water wheels employed in the armory at that place, while in actual operation, and in the performance of their appropriate work.

Table 1.

No.	Character of wheels and purposes for which they are employed.	Supply of water in cubic feet per minute.	Efficient fall of water in feet.	Power produced in horses and parts.
	High breast or pitch back wheels.			
1	For driving the barrel turning, polishing, and cutting machines - - -	393.90	13.00	9.70
2	For driving turning lathes, drills, &c. -	603.80	11.88	13.60
3	For turning grindstones employed in grinding parts - - - - -	620.00	13.66	14.90
4	For driving bellows for 11 fires or forges -	344.25	13.22	6.90
	Undershot wheels.			
5	For drawing and bending scalps or barrel plates - - - - -	973.00	5.50	10.13
6	For drawing and forging parts - -	789.70	5.16	7.73
7	For driving stocking machinery, lathes, &c.	1,543.50	4.66	13.64
8	For forging and fluting bayonet blades -	381.90	3.16	2.28
9	For welding bayonet sockets - -	536.30	3.16	3.22
	Tub wheels.			
10 to 15	For driving six tub-wheels, all of the same size, employed in welding musket barrels - - - - - -	2,115.60	6.54	25.44
16	For driving the drilling, milling, and other machines - - - - -	278.50	4.08	2.15
17	For forging or drawing ramrods, &c. -	226.70	3.33	1.43
	Reaction wheels.			
18	For driving the machinery employed in boring musket barrels - - -	1,359.00	6.66	16.33
	Totals - - - - -	10,166.15	—	127.45

The quantities of water, and the power produced thereby, as exhibited in the foregoing table, in connexion with each wheel individually, and with the whole number of wheels collectively, with different heads and falls, varying from nine and a half to twenty feet, are, as nearly as could be ascertained by careful measurement and computation, the true quantities expended, and the actual power that ought to be produced, each and every wheel being in full action, or operating with that degree of efficiency required for the manufacture of 12,000 muskets in each year.

Although the arrangements for the production and employment of a water power for the uses of an armory may require all the wheels, &c., above noticed, together with the supply of water ascribed to each while in actual and efficient operation, yet it does not follow that the quantum of water and of power, as represented in the table, is to be regarded as the correct measure, either of the water actually expended or of the power actually applied, for most of the operations performed by the agency of the water are unavoidably subject to frequent intermissions, during which the expense of the water or power may and should be intermitted. In order to ascertain the extent of deductions that may fairly be made on th s account, or rather that we might arrive at safe conclusions with respect to the actual expense of power incident to the manufacture of muskets, a course of careful observations was taken, by the aid of a watch pointing seconds, for the purpose of determining the exact time occupied in executing such parts of the work, or in performing such operations in furtherance of the same, as were effected by the aid of mechanical power.

The results of these observations, together with a statement of the estimated horse power expended in each operation, is exhibited in the subjoined table, the arguments of which comprise the following assumptions, viz: that the number of muskets required to be manufactured annually is 12,000; that the number of working days contained in the year is 300, and that the number of hours constituting a working day is 10; consequently, that the number of muskets daily manufactured is 40, or four muskets in each hour.

Table 2.

Operations performed by the aid of mechanical power at the Harper's Ferry armory.	Time required for the operation.	Power expended in proportional parts of a day's work.	Power expended on 40 muskets, or per day.
	Min. Sec.	Horses.	Horses.
Forging scalps or barrel plates, per piece	1 04	.0225	.90
Loss and waste 33⅓ per cent.	–	–	.30
Bending scalps, per piece	1 05	.0180	.72
Loss and waste 33⅓ per cent.	–	–	.24
Welding and drawing gun barrels, per piece	4 40	.2040	8.16
Loss and waste 33⅓ per cent.	–	–	2.72
Boring gun barrels, per piece	75 30	.1250	5.00
Loss and waste 33⅓ per cent.	–	–	1.66
Drawing and swedging ramrods, per pieee	1 35	.0050	.20
Loss and waste not exceeding 10 per cent.	–	–	.02
Tapering bayonets, per piece	1 54	.0073	.29
Drawing do. do.	0 33	.0023	.09
Fluting do. do.	0 28	.0017	.07
Loss and waste on last 3 items not exceeding 10 per cent.	–	–	.04
Welding bayonet sockets, per piece	0 15	.0016	.06
Power expended on account of 40 muskets	–	–	20.47

The period of each operation, as recorded in the table, was the average time occupied in performing the same operation on several pieces, and of

course gives in each case a very near approximation to the truth. Similar observations might have been made in reference to a few other operations of a less uniform character on other parts of the musket, but the machinery usually employed therein was either idle or out of repair, so that no additional observations could be made. In the absence of other experimental results on other items of work, we shall content ourselves with an exhibition of the gross amounts of power expended thereon, making such deductions only as are obviously called for, on account of intermissions, occasioned by changing the pieces operated upon, and by changing from one operation to another. The propriety of such an exhibit will appear the more obvious, when it is understood that one of the leading objects we have in view is a fair and satisfactory comparison between the expenditure of a power generated by water and that of a power generated by steam, the former of which is not susceptible of a regulator, by means of which it is made to correspond with the demand for its action, while the latter is easily regulated by an appendage called the governor, in such a manner that no more steam is admitted into the machinery than is required for the performance of the work actually in progress.

The following table is intended to show the expenditures of power on several water wheels not contemplated in the preceding table, with such deductions, for casual delays, intermissions, and relaxations, as are obviously incident to operations unavoidably changeable, multifarious, and complicated.

Table 3.

Wheels referred to in table 1. No.	Reasons for delays, intermissions, and relaxations, also for the deductions made therefor.	Power of wheels when in full action. Horses.	Power expended in ordinary action. Horses.
1	*Barrel turning, &c.*—Steady and pretty uniform work; the other work changeable; full action about half of the time; for the residue, moderate action; few intermissions—deduct one-fifth - - - -	9.70	7.76
2	*Turning lathes, &c.*—Frequent changes and relaxations; work unsteady; full action one-third of the time—deduct one fourth - - -	13.60	10.20
3	*Turning grindstones.*—Work laborious and steady; occasionally intermitted on account of its intensity—deduct one-fifth - - -	14.90	11.92
4	*Bellows blowing.*—Blast pretty constant, but occasionally relaxed—deduct one-sixth - - - - - - - -	6.90	5.75
6	*Driving tilt-hammer.*—Labor exceedingly intense; frequent respites required; frequent changes of work—deduct one-fourth - - -	7.73	5.80
7	*Stocking machinery.*—Great diversity of operations; frequent changes and intermissions; pretty constantly in action, but seldom intensely—deduct one-fourth - - - - - - - -	13.64	10.23
16	*Drilling and milling.*—Operations exceedingly variegated; frequent relaxations and intermissions—deduct one-fourth - - - -	2.15	1.62
	Aggregate power expended - - - -	-	53.28

The deductions made in the table being matters of judgment rather than of computation, special care has been taken to avoid making them too great. It is believed that in every instance they are very considerably less than those warranted by the nature of the case.

Hence the aggregate expenditure of mechanical power required for the manufacture of 12,000 muskets annually will be as follows, viz:

	Horses.
Amount expended agreeably to table 2 - - -	20.47
Do. do. table 3 - - -	53.28
Aggregate expenditure required for the armory - - -	73.75

The foregoing estimate covers not only the expenditure of power required for the fabrication of 12,000 muskets annually, but that also required for the manufacture and repair of tools and other apparatus employed in the fabrication of the same.

Cost of works required for the production and application of a water power at the armory.

Whatever may be the amount of power expended, the preparations for its employment must undoubtedly be made on a scale commensurate with that adopted by the commissioners of 1823, as exhibited in their report before cited, and to which we beg leave to refer for a vast variety of information on this subject, therein exhibited in numerous minute, elaborate, and copious details, which need not be again repeated. (See House document No. 120, 25th Congress, 2d session.)

From the report just cited we derive the following summary estimate, viz:

Average cost of works for the production and employment of water power sufficient for the manufacture of 12,000 muskets annually, at each of nine sites, examined by the commissioners of 1823, exclusive of any allowance for the purchase of a site for the buildings of an armory, water privileges, repairs, attendance, &c. - - - - -	$119,944
To which should be added the principal, corresponding to a rent of $8 50 per annum for each horse power, chargeable on account of water privilege, (which is less than half the lowest charge made for such privilege in connexion with the canals of Ohio,) and we shall have for the amount of annual rent $626 87, which gives for its corresponding principal -	10,447
Average cost of water works, as above, inclusive of the cost of water privileges - - - - - -	130,391

If, instead of the *nine sites* above alluded to, we should take those only which are situated at points accessible to steamboat navigation, we shall have only *four sites*, the average cost of erecting water works at which, exclusive of any allowance for water privileges, would be $154,141 instead of $119,944, which is the average cost for each of the nine sites. For the sake of keeping within the bounds of probability in the estimation of the cost of such works, we shall nevertheless adopt the smaller average cost.

Although the amount in the first of the preceding items is undoubtedly far less than the actual cost of similar preparations, actually made in connexion with the armory at Harper's Ferry, and that in the second item less than the ordinary cost of water privileges of equal magnitude in favorable situations, we shall nevertheless adopt them for the purpose of testing the relative cost of water power and steam power, the latter of which is next in order for consideration.

Cost of works required for the production and application of steam power at the armory.

Under this head we shall also avail ourselves of the data furnished in the report above cited, believing them to be as accurate and appropriate as any we are able to give in relation to the subject, as viewed by the commissioners of 1823.

Cost of four steam engines, including fixtures of all kinds pertaining to the same, and sufficiently powerful for the manufacture of 12,000 muskets annually, exclusive of any allowances for the purchase of sites, fuel, attendance, &c., per estimate of the commissioners of 1823, $15,941.

It now becomes necessary to show the quantity and cost of the coal required in the generation of a steam power equivalent to that generated by water, agreeably to the foregoing exhibits, which we shall attempt to do as follows:

In the first place, we shall define the purport or value of the term "horse power," as used in all cases under consideration, to denote a certain quantum of mechanical power.

According to the best authorities on this subject, the value or measure of a horse power is a force sufficient to raise 33,000 pounds one foot high in one minute. Hence we derive the following series of statements, viz:

A horse power is equal to 33,000 pounds raised one foot per minute.

A horse power is equal to 1,980,000 pounds raised one foot per hour.

A horse power is equal to 19,800,000 pounds raised one foot per day of ten hours.

A horse power is equal to 5,940,000,000 pounds raised one foot per year of 300 days.

Recent authorities of unquestionable authenticity have shown, from actual experiments often repeated, that a steam power capable of raising 1,000,000 pounds to the height of one foot has actually been generated by the consumption of *one pound* of coal; and that a bushel of coal, weighing 84 pounds, applied to the production of steam, has been proved sufficient to raise 84,000,000 pounds one foot high. Accordingly, if we divide the annual power of a horse, as given in the last of the above statements, by the number of pounds last mentioned, we shall have the number of bushels required annually for the maintenance of a horse power: thus—

$$\frac{5,940,000,000}{84,000,000} = 70.72 \text{ bushels.}$$

Hence, 70¾ bushels of coal are sufficient for the maintenance of a horse power for one year.

But, lest the result just exhibited should be deemed too small when viewed in its relations to ordinary steam engines and the work done by them, which is no doubt true, we shall exhibit results of a more general

bearing and more common occurrence, by which to regulate our computations and deductions.

Mr. Tredgold states that the effect produeed in a high pressure steam engine, with steam acting with a force of 60 pounds per square inch, by the consumption of 84 pounds or one bushel of coal, is equivalent to that of raising 26,200,000 pounds one foot high: accordingly—

$$\frac{5,940,000,000}{26,200,000} = 226.72 \text{ bushels.}$$

Hence, 226¾ bushels of coal are sufficient for the maintenance of a horse power for one year. If to this quantity we add a little over 10 per cent. for loss and waste in raising steam, extinguishing fires, &c., which is believed to be amply sufficient for these purposes, we shall have for the annual consumption of coal, in the maintenance of a horse power, 250 bushels, which, at six cents per bushel, will give for the annual cost of fuel for the production of a horse power $15 only; or the quantity of coal required for the production of a power equivalent to that of 73¾ horses (which we have shown to be the power required for the armory) will be 18,437½ bushels, which, at six cents per bushel, will cost $1,106 25.

With reference to the arrangement of machine shops adapted to the employment of steam power, we take this opportunity to suggest, that four large buildings, two on one side and two on the opposite side of a square or parallelogram, with a street passing longitudinally between them, be erected for this purpose—thus constituting a brace of shops on each side of the street. The shops of each brace should be located in such a manner as to have a space of about 20 feet between them, for the reception of a steam furnace and set of boilers for each brace. Each set of boilers may thus be made to supply two steam engines, viz: one engine for each shop of its appropriate brace. By this arrangement, a very considerable expense in the construction of furnaces and boilers, in providing room for their accommodation, in the consumption of fuel, and in the employment of firemen, may readily be saved.

We would also add, in reference to the employment of steam engineers, for the management of the engines, that it may readily be dispensed with, and that this duty may be performed by some one of the mechanics employed in the shop in which the engines are respectively situated, without materially interrupting his attention to other work. At any rate, the attention paid to the steam engines will not be likely to occupy more time or interfere more with other operations than the raising and shutting of water gates, and the adjustments of the water currents issuing upon the wheels.

Comparative prime cost of water power and steam power.

Prime cost of works for the production and employment of water power, inclusive of that of water privileges, as before estimated, but exclusive of any allowance for the purchase of a site for the buildings of an armory, &c. - - -	$130,391
Prime cost of four steam engines of 27 to 45 horse power each, exclusive of any allowance for an armory site, fuel, attendance, repairs, &c. - - - - - -	15,941
Difference of prime cost in favor of steam power -	114,450

Comparative annual cost of water and steam power.

Annual interest on average prime cost of works required for the production and employment of water power, including the cost of water privilege, viz: six per cent. on $130,391		$7,823 46
Annual cost of repairs and renewals of water wheels and other wooden fixtures, as estimated by the commissioners of 1823*		700 00
Annual expense on account of water power		8,523 46
Annual interest on prime cost of steam engines, boilers, &c., as estimated by the commissioners of 1823, viz: six per cent. on $15,941	$956 46	
Repairs and renewals estimated at 12½ per cent. on prime cost, viz: 12½ per cent. on $15,941	1,992 64	
Oil, tallow, packing, and occasional attendance on engines—300 days, at $1 50 per day	450 00	
Two firemen at $225 each per year, inclusive of board	450 00	
18,437½ bushels of coal for generating steam, at six cents per bushel, as before stated	1,106 25	
Annual expense on account of steam power		4,955 35
Difference in annual cost in favor of steam power		3,568 11

Hence it is manifest that steam power is decidedly preferable to water power, not only on the score of prime cost, but on that also of the annual expense required for its maintenance. Other considerations of very considerable importance may also be urged in favor of the adoption of steam power at the contemplated armory, among which are its susceptibility of being kept under complete control, and of having its efficiency varied at pleasure from 40 to 100 pounds to the square inch with entire safety, simply by increasing the consumption of fuel; its adaptation to the most convenient arrangement of the machine shops and other buildings; its security against atmospheric changes of all kinds, and the constancy with which it can be made to operate; to which may be added, also, the tendency of the heat and smoke accompanying its production to counteract noxious effluvia, and render the atmosphere in its neighborhood more healthy—neither of which can be urged in favor of the adoption of a water power, especially at any point on the Western waters accessible to steamboat navigation, where in every instance, without a single exception, the works for the production and use of a water power must unavoidably be attended by the annoyances and interruptions occasioned by back water during every considerable freshet.

* Since the date at which this estimate was prepared, we have been favored with a statement from the mill machinist of the armory at Harper's Ferry, which shows that the cost of renewals and repairs at that establishment is much greater than that estimated by the commissioners as above, and is as follows, viz:

For renewals of water wheels, gates, forebays, and other wood work connected with the same, per year	$1,440 17
Annual cost of labor for repairing the same	328 69
Annual cost of materials required for repairs	171 31
Annual cost of renewals and repairs	1,940 17

SELECTION OF THE SITE FOR THE ARMORY.

In view of what has been advanced under the foregoing heads, we feel prepared to offer our decision in reference to this important question, which we shall give as follows:

An equation, or rather a concentration of the points of centrality which have been duly considered and determined among the premises exhibited in this paper, may be drawn therefrom in the following manner: The point accessible to steamboat navigation, and nearest to the geographical centre, is situated on Tennessee river, thirty miles above its confluence with the Ohio, or seventy-eight miles above the mouth of the latter. The hydrographical or commercial centre, not only from the representations made in this paper, but from a glance at the hydrography of the Western country, is obviously at the mouth of the Ohio river. Hence, if we take one-half of the navigable distance between these two points, (viz: thirty-nine miles,) we shall have for the equated point, or point of concentration between the geographical and hydrographical centres, a position on the Ohio, thirty-nine miles above its mouth, or one mile above Fort Massac, which is one of the positions examined by the board as a site for the contemplated armory, and is regarded as more favorable on all accounts for such an establishment than any other that has been examined by the board on the Western waters. Accordingly, we do not hesitate to designate and select this position as the most suitable site for the Western armory.

A perusal of our descriptive memoirs in reference to sites at Massac, Caledonia, Cario, Paducah, and Smithland, to which we beg leave to refer for information with respect to their condition and relative advantages, will show satisfactorily that the site at Fort Massac, in point of local situation, convenience, and healthfulness, is preferable not only to the other sites just mentioned, but to any other positions in the neighborhood of either.

In order to show the relative distances between this and other sites on the Ohio and Mississippi, and sundry remote positions on the frontiers of the Western department, we subjoin the following tabular synopsis:

Points on the frontiers of the Western department.	Sites on the Ohio river.				Sites on Mississippi river.		
	Fort Massac.	Louisville.	Cincinnati.	Wheeling.	Rock island.	St. Louis.	Memphis.
	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.
Pittsburg, Pennsylvania	528	332	255	45	553	568	662
Savannah, Georgia	552	504	525	553	845	662	554
Appalachicola bay, Florida	550	595	650	750	875	650	460
Mobile, Alabama	446	550	625	775	755	530	320
New Orleans, Louisiana	500	636	723	880	805	570	350
Fort Towson, Red river	428	612	700	900	595	406	295
Fort Gibson, Arkansas river	375	562	636	848	476	328	300
Council Bluffs, Missouri	500	580	621	805	275	378	550
Fort Snelling, upper Mississippi river	600	618	608	735	275	500	720
Fort Winnebago, Wisconsin river	455	425	395	510	165	387	600
Chicago, on Lake Michigan	336	270	250	398	147	286	490
Maumee bay, on Lake Erie	426	250	200	185	365	445	580
Cleveland, on Lake Erie	482	212	227	116	466	514	645
Maximum distances	600	636	723	900	875	662	720
Minimum distances	336	212	200	45	147	286	295
Differences	264	424	523	855	728	376	425

The distances exhibited in the several columns of the foregoing table are those measured on right lines extending from the several sites indicated at its head, to the several frontier positions indicated in the left margin of the table. By an examination of these tabular distances, it will appear that the distances in the column headed "Fort Massac" are more uniform in their relative extents, and less eccentric in their relations one to another, than those of any other column of the table, which is another proof of the centrality of the site selected.

We shall also add another similar synopsis, showing the distances by river, canal, and railroad conveyances, on the most secure and favorable routes, between the several sites designated at the head of the preceding table, and most of the frontier positions exhibited in its margin, which are as follows :

Positions on the frontiers of the Western department.	Sites on the Ohio river.				Sites on Mississippi river.		
	Fort Massac.	Louisville.	Cincinnati.	Wheeling.	Rock island.	St. Louis.	Memphis.
	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.
Pittsburg, Pennsylvania	958	609	470	90	1,546	1,196	
Savannah, Georgia	956	1,295	1,434	1,817	1,544	1,194	
Mobile, Alabama	797	1,136	1,275	1,654	1,385	1,035	
New Orleans, Louisiana	1,076	1,425	1,564	1,943	1,588	1,238	808
Fort Towson, Red river	1,888	2,237	2.376	2,755	2,190	1,840	1,620
Fort Gibson, Arkansas river	1,084	1,433	1,572	1,951	1,596	1,246	816
Council Bluffs, Missouri river	975	1,324	1,463	1,824	1,047	737	1,167
Fort Snelling, Mississippi river	978	1,327	1,466	1,845	390	740	1,170
Chicago, Lake Michigan	594	943	1,082	1,461	–	356	824
Maumee bay, on Lake Erie	675	389	288	629	1,263	913	943
Cleveland, Lake Erie	914	565	426	202	1,627	1,152	1,182

SUMMARY ESTIMATE.

We here subjoin a summary estimate exhibiting the probable cost of establishing an armory at Fort Massac. With the exception of such details as relate to the cost of steam engines, the items are derived altogether from the estimate of the commissioners of 1823, which are predicated on data more variegated, satisfactory, and authentic, than we are able to furnish in relation to the same items.

Presuming, however, that the several items contained in the estimate may now be procured at a cost considerably less than at the time when that estimate was made, we shall omit, in every instance, the allowance of 10 per cent., as made by the commissioners on account of contingencies. Our estimate is briefly as follows :

Four steam engines, of 18 to 20 horse power each, with two sets of boilers and furnaces, inclusive of fly-wheels, engine frames, foundations, &c., at $2,500 for each engine and its fixtures	$10,000 00
Add, on account of superintendence and contingencies, 10 per cent. on the above	1,000 00
Sixty-one buildings, including storehouses, offices, quarters for officers and mechanics, and workshops adapted to the reception of machinery—average cost, as estimated by the commissioners of 1823, for eight different sites	156,280 75
Tools, patterns, lathes, and other machinery of various kinds required in the fabrication of arms, as estimated by the commissioners of 1823	14,522 00
Miscellaneous articles, including wagon, horses, harness, wheelbarrows, and a great variety of utensils and implements required in an armory, as estimated by said commissioners	1,549 00

Purchase of 1,000 acres of land, including old Fort Massac, as a site for the armory, the whole at a price not exceeding $10 per acre - - - - - -	$10,000 00
Amounting to - - - - - -	193,351 75

Hence the estimated cost of establishing an armory at the site of Fort Massac is one hundred and ninety-three thousand three hundred and fifty-one dollars and seventy-five cents, which is believed to be sufficient for all the purposes therein contemplated.

The foregoing estimate is predicated on the supposition that the contemplated armory is to be established on a scale adapted to the fabrication of 12,000 stands of arms annually. A scale adapted to the production of 18,000 muskets and rifles annually would probably be better suited to the exigencies of the case. Such an enlargement would require a corresponding enhancement of the estimate in all respects, except in so far as relates to the cost of the naked site, which would give for the increment to be added to the amount estimated as above the sum of $91,675 87, or for the gross amount required for an establishment adequate to the manufacture of 18,000 stands of arms, including muskets and rifles, or perhaps muskets, rifles, and horsemen's pistols, $285,027 62.

In conclusion, we take leave to suggest the propriety of annexing to the contemplated armory a foundry and machine shops suitable for the casting and preparing ordnance of all kinds, required both for the military and naval service of the United States. Supplies of provisions and materials of all kinds required for such a purpose can probably be obtained at Massac with more certainty, in greater abundance, and at a cheaper rate, than at any other point in the United States. The fabrication of ordnance requires the utmost care, science, and skill, in the preparation, selection and combination of the different metals made use of for this purpose, as also in determining the forms, dimensions, and proportions, best adapted to the different kinds of ordnance required in the service. In order to arrive at the best practical results in these several respects, numerous experiments of a costly nature, and too onerous for individual enterprise to achieve, are yet to be made. These are deemed of sufficient importance to deserve public attention, and to be carried into effect at the expense and under the special authority and direction of the General Government.

All of which is respectfully submitted.

W. K. ARMISTEAD,
Bt. Brig. Gen. U. S. Army, President of the Board.
S. H. LONG,
Brevet Lieut. Col. Topographical Engineers.
WILLIAM L. HENLEY,
Secretary.

WASHINGTON CITY, *February* 8, 1843.

P. S. As a majority of the board, the undersinged take occasion to add that, in a spirit of compromise, they assented to numerous alterations made and insisted on by the Surgeon General, in preparing the first copy of the memoirs relating to the several sites, numbered from 1 to 23, inclusive, in the foregoing report. On being apprized by the Surgeon General that he should not concur with the majority of the board, unless he were permitted

to make such alterations and amendments of the original minutes throughout as he deemed proper, the undersigned took occasion to reinstate several of the clauses stricken out by that gentleman in the memoirs just alluded to, and to correct several errors which their subsequent examinations enabled them to detect in their first draught of the memoirs in question. But for the inability of the secretary of the board to prepare in due time entire new copies from the original minutes, with the corrections that were deemed appropriate and necessary, the undersigned would have prepared such a transcript to that now submitted, which still retains very many of the alterations introduced by the Surgeon General.

Respectfully submitted.

W. K. ARMISTEAD,
Brig. Gen. U. S. Army, President of the Board.
S. H. LONG,
Brevet Lieutenant Colonel.

WILLIAM L. HENLEY,
Secretary.

To the Hon. JOHN C. SPENCER,
Secretary of War.

ABSTRACT OF THE PROCEEDINGS

OF THE

Board of officers appointed to "select a suitable site for the establishment of a national armory on the Western waters," comprising sundry descriptive memoirs in relation to the several sites examined in fulfilment of the duties assigned them.

SITE AT THE DES MOINES RAPIDS.

From a report and drawings in reference to a survey executed under the direction of Lieutenant R. E. Lee, of the corps of engineers, in 1837, and other authentic sources, and especailly from the report of a survey made under their immediate orders, the board have derived sundry items of information touching the water power and other advantages presented at the Des Moines and Rock Island rapids; and among the results relating to the former we have the following, viz:

Length of the Des Moines rapids, eleven and a half miles.

Entire fall in this distance, twenty-five and one-fourth feet.

The site or position deemed most suitable for the attainment and display of a water power is at a point six miles below the head of the rapids.

The fall to the point just designated is eight and one-fourth feet.

The range from extreme low to extreme high water, at the head of the rapids, is said to be five and a half feet.

The range, as above, at the foot of the rapids, twenty feet.

The range, as above, at a point six miles below head of rapids, five and a half feet.

The river at the head of the rapids spreads to the width of about four-fifths of a mile, and embraces a small island, immediately at the commencement of the rapids, about three hundred yards wide, between which and the Iowa shore is the main navigable channel of the river, about one-fourth of a mile wide; and between the same and the Illinois shore is a broad shoal slough, one-half a mile wide. At the foot of the island commences a broad bar, composed of rock, gravel, and sand, which extends obliquely downwards, approaching the Illinois shore, through a distance of about two miles, to the head of a series of three small islands or rocky bars lying parallel to the Illinois shore, and at the distance of about three hundred yards from the shore. The low-water depth on the broad bar first mentioned varies from two to four feet, and occasionally even to six feet. The depth in the channel between the small islands and the Illinois shore varies from four to eight feet. This depth continues downward on the Illinois side, and near the shore, for a distance of two and one-fourth miles, through which distance a bench or beam, fifty to four hundred feet wide, and three to fourteen feet above low water, occurs at the base of the hills along the margin of the river. A bar again presents itself, extending downward along the shore for several miles, in rear of which the bench above mentioned continues for a distance of about a mile, and in its widest part embraces a

width of six hundred feet, affording the most eligible and convenient locality for the display of the water power presented on this part of the river. At the lower extremity of this locality the bench is precluded by the river hills, which here approach with precipitous fronts quite to the margin of the river.

The method deemed most appropriate for creating the water power is as follows:

Let a dam or jettee of rock work be extended from the lower end of the islands first mentioned to the head of the uppermost of the small islands, near the Illinois shore, the top of the dam being raised throughout to the level of low-water surface at the head of the rapids. From this point the dam should be continued downward on the small islands, and thence across the channels between them to the foot of the lowermost island, the summit of this part of the dam rising to the level of the highest freshet at the head of the rapids, or five and a half feet above the crest of the dam first mentioned. From the foot of the lowermost of the small islands a dam should be run obliquely downward from the island to the Illinois shore, the height and level of which should be equal to those of the dam upon the islands.

From the dam last described, a canal or race should be formed, on the bench between the margin of the Mississippi and the river hills, leading downward parallel to the shore, the canal serving also as a forebay, from which the water power may be displayed at any point through a distance of about three miles.

The method above proposed will no doubt ensure an efficient head and fall of at least eight feet during all stages of the water, which may be rendered operative under all circumstances by the use of percussion or reaction wheels.

The dams and race above contemplated embrace an aggregate length of about six and a half miles. The cost of their construction may be assumed at an average of $12,000 per mile, making the aggregate cost of providing for a water power at least $78,000.

The ascent from the site or bench to the level of the table lands which occur on this part of the river may be effected at a gentle inclination, by pursuing either or both of two ravines, by which the river hills are intersected in the immediate vicinity of the site. The passes alluded to are those formed by Middleton's run and Calkin's run, the former near the upper and the latter near the lower end of the site.

A tract of any desirable extent, covering the localities and water privileges above contemplated, may no doubt be purchased at an expense not exceeding $10 per acre.

The uplands in this vicinity are generally covered with a scattering growth of post, white, and red oak, while the bottom lands and valleys afford a plentiful supply of white oak, black walnut, ash, cotton wood, elm, sugar tree, maple, wild cherry, hickory, &c. The soil of the uplands as well as that of the bottoms is exceedingly fertile, producing corn, wheat, rye, oats, and other agricultural products, in great abundance and perfection.

Good building stone, both of sandstone and limestone, abounds in the vicinity of the rapids. Abundant supplies of timber may be obtained from the upper Mississippi and Des Moines rivers, at innumerable points above their confluence. Stone coal abounds on both sides of the Mississippi, several localities of which have been discovered also on the Des Moines river.

Distance from St. Louis to Des Moines rapids, 200 miles. At the head of the rapids, on the Illinois side, is situated Nauvoo, the city of the Mormons; and immediately opposite, on the Iowa shore, is the town of Montrose, late the site of Fort Des Moines.

At the foot of the rapids, on the Iowa side, is the town of Keokuck; and four miles below, on the Illinois shore, stands the flourishing town of Warsaw, near the late site of Fort Edwards, opposite the mouth of the Des Moines river.

For additional information in relation to the site at the Des Moines rapids, see Appendix.

SITE ON ROCK ISLAND.

This beautiful and interesting island derives its name from the circumstance of its resting upon a bed of rocks, consisting of limestone, in horizontal strata, well adapted to the purposes of building.

It stands in the Mississippi, at the foot of Rock Island rapids. Its length is about two and seven-eighths miles, and its greatest breadth four-fifths of a mile. It contains about 800 acres of excellent land, still the property of the United States. The surface of the island is generally waving, and is pervaded by a broad valley, passing centrally and longitudinally two-thirds the length of the island. With the exception of a few acres cleared at the head of the island, (the site formerly occupied by Fort Armstrong, now used, in part, by the United States, as a depot of arms for the Western country, and a large garden, with other improvements, occupied by George Davenport, Esq.,) the island is covered with a dense timber growth.

The island is bounded, for the most part, by precipitous cliffs, or abrupt and rocky hill slopes, its surface rising ten to twenty feet above the reach of the highest freshets.

The width of the channel on the south side of the island varies from 150 to 300 yards; while that on the north side, which is the main channel of the river, has a width varying from 420 to 700 yards.

A dam 600 feet long has been erected across the south channel, 300 yards below the head of the island, which affords a low-water head and fall of about four and a half feet, the surface of the water of the dam being nearly seven feet higher than the low-water surface at the foot of the rapids.

In connexion with this dam, a saw mill has recently been constructed on the south side of the river, in which a very efficient and forcible water power has been produced and rendered operative, on the principle of the percussion wheel.

With the existing arrangements at this mill site, however, any machinery must unavoidably be liable to interruptions by back water, and rendered completely inoperative whenever the range at the foot of the rapids exceeds seven feet above low water.

It is, moreover, equally obvious that the head and fall of water at this place is not susceptible of any enlargement, or other modification, of a character to prevent interruptions during stages of water more elevated than that above designated, without a resort to other means than those immediately connected with the south channel.

It has been deemed important, if not essential, that the power proper for

the armory, whether of water or steam, should be constant, and, if possible, entirely exempt from interruptions.

Such a power may be obtained at the site now under consideration, in the following manner:

It has already been observed that the entire head and fall at the island, or the aggregate descent from the surface water of the dam to the low-water surface at the foot of the rapids, is seven feet, nearly. To this fall it is proposed to add the descent from the head of Campbell's island to the head of Rock island, which is six and a half feet more; making the aggregate fall from the head of Campbell's island to the foot of Rock island thirteen and a half feet.

The method of uniting these two falls, and bringing them into conjoint operation on Rock island, consists in the erection of a river wall or dam, extending upward from the head of Rock island, parallel, or nearly so, to the Illinois shore, till it reaches the foot of Campbell's island—the distance between the two islands, and consequently the extent of the wall, being three miles and three-quarters.

The height of the wall should be such that its summit may be elevated at least two feet higher than the low-water surface at the head of Campbell's island, in order to secure a head and fall at least three feet greater than the extreme range at the foot of the rapids, which is supposed to be twelve feet above extreme low water at that point.

In addition to the wall, a dam will also be required across the south channel at Rock island, the appropriate locality for which is at a point about midway of the island, where the rapids in that channel have their lowermost termination. The length of the dam will be about 300 feet, and its height above extreme low water 15 or 16 feet.

The water power thus created may be conveyed from a point a little above the dam, through a deep-cut race leading across a ridge on the southerly side of the island, 25 to 30 feet high, and 150 yards wide, and terminating in another race or canal, formed centrally and lengthwise of the island; from which last the power may be conducted and displayed through races leading to either or both sides of the island, near its lower extremity.

The following items, taken from the minutes of the survey executed by Mr. Ogilvie, for the use of the board, will explain more clearly the extent and declivity of that part of Rock Island rapids of which we have been treating:

Distance from the head of Campbell's island to the foot of Rock island	8¼ miles.
Aggregate fall in the above distance	12.96 feet.
Extreme range from lowest to highest water at head of Campbell's island	5 feet.
Extreme range from lowest to highest water at the foot of Rock island	12 feet.
Length of Campbell's island	1½ mile.
Fall from head to foot of Campbell's island	2½ feet.
Distance from foot of Campbell's island to head of Rock island	3¾ miles.
Fall in this distance	3½ feet.
Length of Rock island	2⅞ miles.
Fall from head to foot of Rock island	6.96 feet.

The cost of providing for a water power in the manner above contem-

plated, and of remunerating the proprietors of the present dam and mill for the damage that will be done to their improvements, may be stated as follows:

River wall, 3¾ miles or 20,000 feet long, 8 to 15 feet high, at $10 per foot	$200,000
Dam, 300 feet long and 16 feet high, at $20 per foot	6,000
Canals, races, forebays, &c., on Rock island, 3,000 lineal yards, at $12 per yard	36,000
Damages to proprietors of dam and mill, as valued by themselves, covering the purchase of their entire site and its privileges	40,000
Amounting to	$282,000

Building materials of all kinds are to be had in abundance upon Rock island and in its vicinity. Sawed lumber, consisting of white and black oak, black walnut, yellow poplar, ash, and cherry tree, is prepared in this neighhood, and afforded at prices varying from twelve to twenty dollars per thousand, board measure. Pine lumber is procured from the Wisconsin, Black, and St. Croix rivers, and can be afforded at about the same rates.

The woodlands of this part of the country occupy about one-sixth of the entire surface, the remaining five-sixths being prairie. The growth of the woodlands is generally scattering, and consists of white, red, and bur oak, black and white walnut, yellow poplar, wild cherry, sugar tree, maple, linden, red and white hickory, yellow birch, dog wood, &c.

The soil is generally rich, and in places where it has been cultivated gives evidence of exceeding fruitfulness. Corn, wheat, rye, oats, flax, hemp, tobacco, apples, pears, and other fruits, potatoes, turnips, radishes, and other culinary roots and vegetables, are produced in great abundance and perfection.

Bituminous or stone coal is found in abundance in this neighborhood. It generally occurs in the river hills, at different elevations, from five to thirty or forty feet above their bases, and in veins from two to four and a half or five feet thick.

Lead is obtained in abundance from the mines of the upper Mississippi and Wisconsin rivers, and iron ore is said to abound in many parts of the country.

Articles of subsistence of all kinds, for man and beast, are abundant; and these are remarbably cheap, especially those produced in the nighborhood.

The site is remarkably healthy, as evinced by the reports now on file in the office of the United States Surgeon General, in relation to the health of the troops stationed at the various military posts of the United States, and covering a period of more than twenty years, during which the number upon the sick list at Fort Armstrong was proportionally less than at any other post in the Western country.

The navigation of the upper Mississippi is liable to annual obstructions by ice, during a period of about three months, beginning on the first of December and ending on the first of March. On the breaking up of the ice, especially when it is thick and strong, jams of this solid material are often formed at narrow passes of the river, and especially at the heads of islands, by which the river is divided into two or more narrow channels. On such occasions, those parts of the river situated above the jams are

liable to sudden and excessive floods, which inundate the bottoms to a great depth and extent.

In a dry season the river is liable to obstructions from sand bars, so that a boat drawing more than two or two and a half feet cannot pass the shoalest places, even in the deepest channel, without impinging against the bars. Extreme low water seldom continues more than a few weeks, and sometimes only a few days at a time.

At a medium stage of water, the river is navigable for boats of the largest classes, from the mouth of the Missouri to the foot of Des Moines rapids, from the head of these rapids to Rock island, and from the head of Rock Island rapids to Fort Snelling, at the mouth of St. Peter's river.

For additional information in relation to the site at Rock island, see Appendix.

Cost of building materials, provisions, &c., at the Des Moines rapids, Rock Island rapids, and lower rapids of Rock river.

Dry rubble wall, per perch	$1 75.
Mortar walls, per perch	$2 25.
Dressed stone work, per perch	$3 to $3 50.
Bricks, per thousand	$4.
Brick masonry, complete, per thousand	$8.
Lime, per bushel	10 to 12½ cts.
Hard-wood lumber, per thousand	$8 to $10.
Pine-wood lumber, per thousand	$10 to $12 50.
Stone coal, per bushel	8 to 10 cts.
Wrought iron, per pound	6 to 8 cts.
Corn, per bushel	15 to 18 cts.
Wheat, per bushel	50 to 62½ cts.
Beans, per bushel	37½ to 50 cts.
Potatoes, per bushel	20 cts.
Pork, per pound	2½ cts.
Beef, per pound	3 cts.
Lard, per pound	6¼ cts.
Butter, per pound	10 to 12 cts.
Tallow, per pound	8 to 10 cts.
Hemp, per pound	5 to 6 cts.
Wages of common laborer, per month, and found	$10 to $12.
Wages of carpenter, per day, including board	$1 50.
Wages of masons, per day, including board	$2.

SITE AT LOWER RAPIDS OF ROCK RIVER.

The site to which the attention of the board was directed in this vicinity is on the north side of Rock river, three miles above its mouth or junction with the Mississippi river. The claims of this position rest upon the water power supposed to be available at this point, the magnitude and efficiency of which may be inferred from the following statements derived from the minutes of a survey made by Mr. Ogilvie for the use of the board.

Length of rapids from head of Carr's island to foot of Vandruff's island, 1.65 miles.

Fall from head to foot of rapids, 10.2 feet.

Extreme range from highest to lowest water surface at the foot of the rapids, (the channel below being gorged with ice,) 15 feet.

Ordinary range, as above, (the channel being gorged with ice,) 11 feet.

Extreme range at foot of rapids, (the river below being clear of ice,) 9 feet.

Ordinary range from high to low water at the head of the rapids, 3.26 feet.

Corresponding ordinary range at the foot of the rapids, 6.37 feet.

Distance from foot of rapids to mouth of Rock river, 3 miles.

From the foregoing statements, it is obvious that the entire fall at this site will be cancelled, and the water power neutralized, whenever the range at the foot of the rapids amounts to 15 feet, or even to 13½ feet; consequently, on such occasions, all operations depending upon water power must necessarily cease.

With occasional interruptions of the character above intimated, which would be likely to continue but for a short time, the water power at this place may be regarded as abundant and efficient in a very high degree. The ordinary effective fall in high-water stages may be kept at 6 to 7 feet by the following arrangement:

The channel separating Vandruff's island from the north shore of the river varies in width from 400 to 600 feet, has a rocky bed, and a depth of 2½ to 3½ feet of water, with a rapid current during low water. This channel may be entirely stopped by a dam erected at a point about midway of the island, and uniting the island to the north shore. The waste or surplus water, instead of being precipitated over the dam, may be carried off by the channel on the other side of the island, which is broad and capacious, having a width varying from 300 to 500 yards.

In order more effectually to secure the high-water range at the head of the rapids, it will be advisable also to construct a dam across a narrow channel situated between Vandruff's and Carr's islands, and communicating between the north and south channels of the river.

By this means, the entire descent from the head to the foot of the rapids, together with the high-water range at the head, may be rendered operative as a fall at a point on the north shore at some convenient distance below the dam first mentioned, and within the limits of the site now under consideration.

The quantity of water which the river affords in its lowest stage (as ascertained by admeasurement) is said to be 168,000 cubic feet per minute. With this quantity of water, and a fall of 10 feet, which may be readily secured for at least 11 months in the year, the effective power would be equivalent to that of more than 2,000 horses, or sufficient to drive more than 200 run of stones.

The works required for the creation and display of such a water power could be constructed at a comparatively trifling expense. The cost of the two dams need not exceed $12,000, while that of a race for conveying the water from the pool above the dam to a position about one-third of a mile below, most convenient for the display of the power, together with the expense of constructing forebays, &c., may be estimated at an equal sum—making the whole amount required for these purposes only $24,000.

The country in the vicinity of this site may be described thus:

On the north side of the rapids a high ridge of land or bluff comes in upon the river, sinking near the foot of the fall into an inclined plane from 200 to 500 yards wide, extending to the water. Immediately to the south

is Vandruff's island, and some smaller isles, all subject to be partially and sometimes altogether overflowed.

A little further to the south and to the east lies a great extent of bottom land, indented with ponds and intersected with sluices, the whole subject to occasional overflow, with the ponds holding water throughout the year; and to the west, or below the fall, are low grounds, sluices, &c., extending to the Mississippi. The inclined plane on the north side of the river is the only position on which buildings could be displayed to any advantage. This tract of land, lately occupied by the Fox Indians, and their celebrated chief, Black Hawk, and whereon stood their principal town, is now the site of Rock Island city, the ground of which having been divided into lots, and sold to companies and to individuals, it was of course impracticable for the board to ascertain the terms on which a locality for an armory could be obtained.

From the low grounds, sluices, &c., contiguous to this position, the atmosphere cannot but be more humid than is desirable around a manufactory of arms; and the wide range of bottom land, &c., lying to the windward during the summer season would necessarily render the location very unhealthy.

A canal, with a dam, and lock of 6½ feet lift, has been projected at this place, for the purpose of aiding boats in their passage over the rapids. The site of the dam is at a point about 200 yards above that designated in a former part of this article, and that of the canal is on the north side of Vandruff's island, extending downward about 450 yards below the dam. The excavation of the canal and the construction of the guard lock has already been commenced, at the expense of the State of Illinois.

The agricultural, mineral, and other products, and the facilities for procuring them, at this site, are very similar to those enjoyed at Rock island and its vicinity.

For further particulars, see document No. 3, in the Appendix.

SITE AT THE UPPER RAPIDS OF ROCK RIVER.

Distance from the mouth of the river to upper rapids, by water, 75 miles.
Aggregate fall in this distance, 60 feet.
Length of rapids, 1¼ mile.
Aggregate fall of water, 8¼ feet.
Width of river at rapids, 265 to 530 yards.
Extreme range, except when obstructed by jambs of ice, 5 feet.
Measured width midway of rapids, 1,300 feet.

The quantity of water passing these rapids cannot be less than 150,000 cubic feet per minute, that at the lower rapids being 168,000 cubic feet, as before stated. This inference may be safely drawn from the fact that a large quantity of the water must be taken off by evaporation on a distance of 72 miles of broad surface water presented by the river between the upper and lower rapids, and from the fact that only three inconsiderable streams, viz: the Elkhorn, the Little Rock, and the Green river, respectively, of about equal sizes, enter the river between the points designated.

A canal, with a lock and dam, has been constructed at this place, at the expense of the State of Illinois.

Materials for the construction of locks and other masonry are found in his vicinity.

No coal, iron, or lead ore, has yet been found within a considerable distance of this point.

The water power at these rapids belongs to the State.

The lands on both sides of the river, with the exception of a few tracts, belong to the United States. A town called "Rapids City" has been commenced on the south side of the river, and another called "Sterlingville" directly opposite, on the north side.

Tracts of valuable timber are occasionally to be met with in the valleys of the streams, while the uplands are generally prairies.

The distance by land from Rock island to the upper rapids of Rock river is about 56 miles.

This position presents some advantages on the score of health, fertility of soil, evenness of surface, &c.; yet, as the site is 70 miles up a river requiring expensive improvements to render it permanently navigable, and, withal, possesses but a doubtful water power in very high freshets, or during engorgements of the stream by ice below, the board deem it unnecessary to go into an estimate of the expense likely to be incurred in the establishment of an armory at this place.

For further particulars, see Appendix, document No. 3.

SITE AT PERU, ON THE ILLINOIS RIVER.

The water power contemplated in this vicinity is that afforded by the Illinois and Michigan canal, which has its southern termination at La Salle, immediately above Peru.

The entire length of this canal, from Peru to Chicago, is ninety-six miles. Its summit level, which extends from Chicago to Lockport, —— miles, is supplied with water from Lake Michigan.

The lockage water from the summit level, and the water employed from the same level in operating machinery at Lockport, together with the low-water tribute afforded by the Des Plains river, are relied on for the supply of the canal between Lockport and Marseilles, at which commences a lower reach or level, supplied mainly by Fox river. From this level the canal passes downward by four locks and three successive levels, all depending for their supply of water mainly upon the lockage water derived from the Fox river level. At Ottowa, in the vicinity of the level last mentioned, it is the purpose of the State to withdraw from the canal (viz: from the Fox river level) all the water that can be spared, for the purpose of operating machinery at this point; consequently, there will remain but very little water for the supply of the lower levels, except what may be drawn from the Fox river level as lockage water, all of which will be required for the supply of the locks below. Hence we may infer that any dependence upon a water power for any considerable mechanical operations, to be derived from the canal at Peru, is altogether fallacious.

Moreover, the range from extreme low to extreme high water, at Peru, is variously estimated; some say that it is twenty, others twenty-four, and others again twenty-six feet. We were credibly informed, by one of the canal engineers who had paid particular attention to the subject, that its ordinary range might be stated at twenty feet; and that an extreme range, especially when the river below happened to be gorged with ice, which is not unfrequently the case, is twenty-four to twenty-six feet. In either of these events, the water power at the levels above the first and second locks,

both of which are situated near the southerly terminus of the canal, will be nearly or quite neutralized during the continuance of extreme high water.

The board, being satisfied that a water power adapted to the purposes of an armory could not be derived from the canal, directed their inquiries to a natural waterfall a few miles above Peru, called the Vermilion rapids, and obtained the following information concerning the same:

Mr. Woodworth, late an engineer in the service of the State, kindly furnished the following results from surveys executed under his special direction:

Length of Vermilion rapids, 5 miles.

Aggregate fall in this distance, $7\frac{2}{3}$ feet.

Extreme range at foot of rapids, 20 feet.

Extreme range at head of rapids, 13 feet.

Hence the water power at Vermilion rapids, during extreme high water, will be entirely neutralized.

Again: agreeably to intelligence received from the same gentleman, the aggregate fall from Ottowa to Peru (the distance by land being sixteen and by water between eighteen and twenty miles) is only nineteen feet. Of course, the efficient water power of the river, throughout that entire distance, will be completely neutralized during extreme high water.

In reference to the canal above mentioned, it may be further observed, that its transverse dimensions are as follows, viz:

Width at surface water, 60 feet.

Width at bottom, 40 feet.

Depth of water, 6 feet.

Estimated cost of entire canal, ninety-six miles, about eight millions of dollars; already expended, between three and four millions; required to complete the canal, between four and five millions.

Having been thus fully convinced that the requisite uninterrupted water power could not be obtained, either at Peru or any other point between that place and Ottowa, the board proceeded to Ottowa for the purpose of examining a site at which a water power derived from Fox river might be available.

See Appendix, documents Nos. 4 and 5.

SITE AT OTTOWA, ON THE ILLINOIS RIVER.

The water power at this place must be derived almost exclusively from Fox river, which enters the Illinois immediately above the town of Ottowa.

The Fox river level, which has an extent of about ten miles, reaches from a point about three miles below Ottowa to Marseilles which is about seven miles above, by the line of the canal.

This level must also be supplied by water from Fox river, which is to be conveyed through a feeder about five miles long, commencing at the head of the lower rapids of Fox river, and terminating in the ten-mile reach before mentioned, opposite the town of Ottowa.

The transverse section of feeder is as follows:

Width of water surface, 22 feet.

Width of bottom, 10 feet.

Depth of water in feeder, 4 feet.

Minimum quantity of water discharged from Fox river, said to have been determined by admeasurement, thirty-seven thousand three hundred cubic

feet per minute. Of this quantity, one-fourth is owned by Messrs. Green & Stadden, who have mills now in operation near the head of the feeder; another equal quantity (viz: one-fourth) is in the right of the State, and is to be applied not only for the supply of the Fox river level, but for operating machinery on a large scale at the town of Ottowa; the remaining two-fourths of the water of Fox river belong to a company in New York, who are possessed of the land on the east side of Fox river, adjacent to the rapids.

Messrs. Green & Stadden offer their privilege, together with all their improvements in mills, &c., and 160 acres of land, including the dam, feeder, &c., for $150,000.

The quantity of water required in the Fox river level, on account of leakage, absorption, and evaporation, will amount to at least 1,000 cubic feet per minute.

The quantity owned by the State, being one-fourth of the river, will amount, in the dryest season, to 9,325 cubic feet per minute.

The aggregate descent from the surface of the Fox river level to the low-water surface of the Illinois, at Ottowa, is 37 feet.

Range from extreme high to extreme low water, at Ottowa, 13 feet.

Aggregate descent in extreme high water from surface of canal to surface of river, 24 feet.

The quantity of water (with this fall of 24 feet) required to furnish a power equivalent to that of 175 horses, is 5,866⅔ cubic feet per minute.

Hence a power equivalent to that of 175 horses being required for the purposes of an armory, and this power being furnished by water from the Fox river feeder, there will remain for operating machinery at Ottowa 3,458⅓ cubic feet per minute.

By extinguishing the claim of the New York company, or even that of Messrs. Green & Stadden, to their portion of the water privileges, that of the former being attainable at a fair price, the amount of water power at this site will be amply sufficient for all the purposes under consideration.

The site here contemplated commences about a mile below the town of Ottowa, and extends downward a mile or more on the Illinois river, embracing the entire area situated between the Illinois and Michigan canal and the Illinois river. The extent of the area and other particulars respecting the site are expected in a communication and drawings from E. B. Talcott, Esq., civil engineer in the State service of Illinois, agreeably to overtures kindly made by that gentleman to the board.

The site occupies a portion of a beautiful plain, of a slightly waving aspect, extending from the mouth of Fox river downward several miles. It is elevated considerably above the reach of the highest freshets, is considered comparatively healthy, and possesses a productive soil.

Beneath its surface, at various inconsiderable depths, are beds of limestone in horizontal strata, accompanied in many places by bituminous coal and carboniferous slate, resting upon the limestone.

See Appendix, document No. 3, before cited.

SITE AT MARSEILLES, ON THE ILLINOIS RIVER.

This locality is situated at or near the foot of the Grand rapids of Illinois river, about seven miles above the mouth of Fox river.

Length of Grand rapids, about 900 yards.

Natural fall of rapids, in low water, 10 feet.

Dam at head of rapids, (head of water,) 5.6 feet.

The dam, together with a large flour mill, three stories high, with six run of stones, also a saw mill connected with the same, are the property of an association of gentlemen called the Marseilles Manufacturing Company.

The agent of the company offers to sell their water privilege, which embraces the entire water power of the Illinois at these rapids, for the sum of $125,000, together with such additional compensation as may be awarded by suitable referees for the mills now erected thereat, which are to be valued at a rate not exceeding their actual worth or cost, independently of the water power; or he is willing to sell a portion of the water power and privilege, reserving for the company only a sufficiency of the water to operate the mills now erected, for the sum of $100,000.

He moreover offers 130 acres of land, within three-quarters of a mile below the mill, and situated between the canal and the river, for $25 per acre. It is believed that other tracts, sufficient to cover the entire area required for an armory, may be obtained on fair terms in the vicinity of the tracts before mentioned.

The low-water supply of the Illinois at these rapids is probably about double that afforded by Fox river. The charter of the Marseilles Manufacturing Company secures to them the privilege of erecting a dam seven feet high at the head of the rapids, instead of five feet and a half, its present height. Hence, the aggregate head and fall in low water will amount to seventeen feet.

A dam of the height just mentioned will back the water of the river nearly or quite to the mouth of the Kankakee, a distance of fifteen or twenty miles.

Extreme range at foot of rapids, about 13 feet.

Hence the pitch at the dam in extreme high water will be 4 feet.

Elevation of Fox river level (which commences at Marseilles) above the low-water surface of the Illinois, at the foot of the Grand rapids, 19.58 feet.

Elevation of Fox river level above the crest of a dam seven feet high, at the head of the Grand rapids, 2.58 feet.

Aggregate natural fall of Illinois river, from head of Grand rapids to Ottowa, 27.42 feet.

The site most appropriate for an armory at this place is a portion of an undulatory plain, situated below the village of Marseilles, and between the canal and the Illinois river. An area of about 320 acres may probably be obtained at a rate not exceeding that before mentioned, viz: $25 per acre.

This area may be enlarged at pleasure by procuring an equal or greater number of acres of land on the south side of the river, directly opposite to the former, at a price per acre considerably less than that before mentioned.

These two portions of ground, as above contemplated, may readily be connected by a bridge across the river, at or near the foot of the rapids, about 400 yards long.

The water may be conveyed from the dam, at the head of the rapids, in a race leading downward on the north side of the river, about three-

fourths of a mile, supplying a range of factories or workshops situated at and below the foot of the rapids, and between the race and the margin of the river.

The site on the north side of the river is underlaid with calcareous sandstone, in horizontal strata, which is every where found a few feet below the surface of the ground.

The ground on both sides of the river is elevated considerably above the reach of the highest freshets. On the south bank, in particular, a beautiful plain presents itself, upon which all the necessary buildings could be displayed to great advantage, and with every prospect of health.

Limestone of an excellent quality, and in abundance, is to be found in numerous localities in this section of the country.

The masonry of the Illinois and Michigan canal has been constructed of stone of this sort, and exhibits an appearance highly recommendatory, not only of the material, but also of the workmanship. The limestone contains a considerable portion of silex, but slakes well after calcination, and, with nearly equal proportions of sand and hydrate of lime, forms a good mortar.

Hydraulic lime has been found in abundance. The sandstone of this part of the country is generally friable and unfit for masonry. Sandstone of a reddish complexion (ferruginous sandstone) has been found on the south side of the river, opposite Peru, which is said to be well adapted to the purposes of building. Brick clay of a good quality is abundant.

The bottom lands of the valley of the Illinois river, and of the Vermilion, Fox, and other streams in this vicinity, are generally underlaid with sandstone, in horizontal strata, at depths varying from one to twelve feet below the surface.

The uplands contain beds of compact clay, and occasionally stone, at a depth of a few feet below the surface. Fire clay of a good quality is said to be abundant. Bur, red, white, and post oak, white ash, black walnut, sugar tree, maple, black locust, white walnut, and hickory, are the principal growth of the country. Of these, several varieties of the oak, the sugar tree, maple, black and white walnut, are sawed into lumber, and sold at the rate of about $20 per thousand, board measure.

The pine timber used in this country is brought from a great distance, and costs about $30 per thousand.

Stone coal of a good quality has been discovered in various localities in almost every part of the country drained by the Illinois, from the mouth of Kankakee downward to the Mississippi river. It is found in beds or veins, varying in thickness from one to five, and occasionally to eight feet.

The strata that have been laid open are generally situated above the water table of the principal streams in the vicinity. Their depth below the upland surface varies from fifty to one hundred and fifty feet.

These veins are generally surmounted by bituminous shale and carboniferous limestone. In several instances, however, within the valleys of the streams, they have been found near the surface of the ground, covered by a stratum of soil only.

The coal generally contains more or less sulphur, which prevails in many instances to an injurious extent.

From a cursory view of the country between Rock island and Peru, it appears that the proportion of prairie to woodland is about seven to

one, not more than one eighth of the entire surface being covered with a growth of timber.

The soil appears remarkably rich, and, in situations where it has been cultivated, gives evidence of exceeding fertility.

The navigation of the Illinois river is generally suspended by ice for a period of three months in the year, viz: from the first of December to the first of March. During a dry season it has a low-water depth of about two feet on the bars, and of course is then navigable only for boats of the lightest draught.

As this river, however, is a sluggish stream from Peru to its mouth, (its bed having only the minimum declivity requisite to the production of a current,) the obstacles last mentioned will no doubt in some degree be remedied, upon the completion of the canal, by the introduction of a copious supply of water from Lake Michigan.

The bed of the Illinois river, from Peru to its mouth on the Mississippi, is remarkably straight; and, in its broad and deep valley, evidences are every where presented, authorizing the conclusion that Lake Michigan and other lakes above the falls of Niagara once discharged their waters in this direction towards the Gulf of Mexico.

Cost of building and building materials, agricultural products, &c., in this part of the country.

Dressed stone, per perch	$6 to $10.
Rubble work, per perch	$2 to $3.
Lime, per bushel	12½ cts.
Bricks, per thousand	$4.
Brick masonry, complete, per thousand	$12.
Wages of bricklayers, per day	$2.
Wages of stonecutters, per day	$2 25.
Wages of attendants on masons, per month	$12 to $15.
Wages of brick makers, per month	$40.
Sawed timber, per thousand, (board measure)	$20.
Sawed pine timber, per thousand	$30.
Common shingles, per thousand	$4.
Wages of common farm hands, per month	$10.
Wages of mechanics, per month	$26.
Board of workmen in general, per week	$1 50.
Price of oxen, per yoke	$40.
Price of a good work horse	*$40 to $60.*
Wrought iron, per pound	4 to 6 cents.
Castings, per pound	5 to 7 cents.
Corn, per bushel	20 cents.
Wheat, per bushel	*50 cents.*
Oats, per bushel	*16 cents.*
Beans, per bushel	75 cents.
Onions, per bushel	60 cents.
Turnips, per bushel	12½ cents.
Hay, per ton	$2 to $3.
Pork, per pound	2 cents.
Beef, per pound	3 cents.

Mutton, per pound	5 cents.
Butter, per pound	12½ cents.
Lard, per pound	6 cents.
Chickens, per dozen	$1.
Eggs, per dozen	8 cents.
Transportation from St. Louis to Peru, per 100 pounds	12½ to 50 cts.
Transportation from New Orleans to Peru, per 100 pounds	62½ cts. to $1
Land transportation from Chicago to Peru, per 100 pounds	$1 50 cents.
Probable cost of transportation from Chicago to Peru, by canal, when completed, per 100 pounds	25 cents.

See Appendix.

SITES NEAR ALTON, ILLINOIS.

The localities examined by the board were the following:

1st. A position on the river bluffs, about two miles above Lower Alton. The ground is elevated about 150 feet above the Mississippi river, and is accessible by the favorable passes leading from the margin of the river up to the table lands at the summit of the hills. Of these passes, one leads from Smeltzer's ferry, one mile and a half above Alton, upward, in a ravine rising at the rate of about three degrees, to the surface of the uplands, which it reaches in a distance of half a mile; another from the mouth of Mason's run, two miles above Alton, to the same surface, and by a similar distance and acclivity; and a third from the mouth of Freestone run, three miles above Alton, by a longer, more circuitous, and less abrupt route, to the same surface of ground. The shore of the Mississippi at these several passes is rocky bound, and presents convenient and easy landings at all stages of the water. This site occupies a portion of the space between the two runs last mentioned. The ground is somewhat rolling, but contains an area of some forty or fifty acres, unbroken by hills or ravines, and tolerably well adapted to the proper arrangement of the necessary buildings of an armory. On all sides, (exteriorly of the area designated, however,) the surface is more uneven, and in places broken by deep ravines, with abrupt sides.

2d. A position accessible by a more gentle and extended acclivity may be had at or near the most southerly source of Smeltzer's creek, something more than a mile from Smeltzer's ferry landing, above Alton. This site presents a more level and extensive area, and is more commodious in all respects for an armory, except that its distance from the river is greater than that of the site before described. It lies on the track of the contemplated railroad leading from Alton to Springfield, the seat of Government of the State of Illinois, which road has already been partially constructed. A vein of good coal has been opened within a mile of the place, and indications of its existence in the immediate vicinity are abundant. Three hundred and twenty acres of land, constituting a portion of this site, can be obtained at the rate of ten dollars per acre; and there is no doubt that the quantity can be enlarged to any desirable extent, by additional purchases at the same price.

The considerations that entitle the last to a preference over the first site designated are the more favorable aspect of the ground around, and a more

gradual ascent from the river to the summit of the hill; in all other respects they may be regarded as possessing equal claims.

Both positions are probably as healthy as any others within the State of Illinois, and command unlimited resources, with respect to supplies of all kinds.

The supplies of bituminous coal, in almost every part of Illinois, are inexhaustible. The veins of coal that have been opened in the neighborhood of Alton vary in thickness from three to six feet, and the localities of it in the vicinity of that place are numerous.

Timber suitable to the purpose of building is comparatively scarce, owing to the predominance of prairies over woodlands in this section of the country. Supplies, however, may be obtained with much convenience, by water conveyance, from the extensive timber regions of the upper Mississippi and Illinois rivers.

Building stone of a good quality, consisting of limestone and sandstone, are found in great abundance, especially in the bluffs of the rivers and creeks. The soil is well adapted to the formation of bricks, and lime of a good quality can be furnished at a moderate expense.

Articles of subsistence, forage, &c., can be procured in the greatest abundance, and at the lowest market prices.

The proprietors of the site first designated have offered two hundred acres of the ground as a donation to the United States, on the condition that the armory be established thereon; and they also propose to sell four hundred acres more of the same tract, at the rate of ten dollars per acre.

For further information in relation to this place, see Appendix, documents Nos. 6, 7, and 108.

SITE IN THE VICINITY OF BELLVILLE, ILLINOIS.

Bellville is situated on a small stream, tributary to Kaskaskia or Ocoa river, called Richland creek, by the branches of which the neighboring country is much divided and broken.

Its distance from St. Louis, in a direction nearly east-southeast, is, by the road usually travelled, about fifteen miles, and from the nearest point on the Mississippi, by a direct line, between nine and ten miles; and is distant from the Mississippi bluffs, by the road first mentioned seven and by that last mentioned six miles. Between the bluffs and the Mississippi river lies the rich, flat, fertile tract known as the American bottom, varying in width from three to five miles, which must be traversed by any route leading from the river to Bellville.

The country in the vicinity of and surrounding Bellville, like most other tracts in the State of Illinois, consists of a soil exceedingly rich, producing all the necessaries of life, both for man and beast, in the greatest abundance and perfection.

The immense coal fields of Illinois have here been perforated at several points, and veins of good coal, from three to seven feet thick, have been discovered. The diggings for coal have invariably been made within the ravines of the principal streams, and the mineral has generally been found on a level with the low-water table of the streams in their vicinity. Thus situated, the mines are subject to be flooded whenever the streams are much swoollen by freshets.

Iron ore is said to abound within a distance of 14 miles from Bellville, but its qualities appear never to have been tested.

The timber growth of the country, especially on the uplands, is scattering and defective. It consists principally of oak, hickory, walnut, and poplar. Sawed lumber of oak and walnut is offered at $17, of poplar at $20, and of pine at $20 to $30 per thousand, board measure.

Limestone and sandstone suitable for building purposes, also good brick clay, lime, &c., are sufficiently abundant; but the quarries of the former are imbedded, in most instances, a great depth below the surface of the ground.

The site recommended by the committee of the citizens of Bellville is at the distance of half a mile southwestward of the town. The ground is much broken by ravines; but a spot of a gently waving aspect, sufficiently large for the accommodation of the necessary buildings of an armory, may be had, on a rising ground at the point just designated, the whole of which is probably underlaid with coal, at the depth of 40 or 50 feet below the surface.

Several other sites of a more favorable appearance, and quite as eligible in other respects, are to be found in every direction from Bellville, within a distance of three or four miles from the town, and especially between Bellville and the Mississippi bluffs, six or seven miles westward of the town. In the immediate vicinity of the bluffs, and near the point at which the contemplated railroad from St. Louis to Bellville is to reach their summit, a very level site of the requisite extent is presented, at the distance of about seven miles and a half from St. Louis, or about three miles from the nearest point of the Mississippi river.

On a portion of the distance first mentioned, (viz: from a point on the Mississippi opposite to St. Louis to the foot of the bluffs, about six miles and a half,) a railroad has already been constructed for the purpose of conveying coal from the Illinois coal mines to St. Louis. This road, however, is at present out of repair, and unfit for use.

The coal mines just mentioned are in the Mississippi bluffs, on the east side of the American bottom; their locality in the bluffs being elevated some 20 or 30 feet above the surface of the bottom land at their bases. The coal vein is from four to six or seven feet thick, and has been opened at intervals through a distance of seven or eight miles. Its extent northward and southward is probably commensurate, at least, with that of the American bottom.

The mines on the branches of Wood river, near Alton, and those on Muddy river, near the Grand Tower, are, in all likelihood, portions of the same vein.

Coal can be afforded at either of the localities just mentioned at five or six cents per bushel.

The requisite quantity of land for the accommodation of an armory may no doubt be had at either of the sites above designated, at rates varying from ten to twenty dollars per acre.

For further particulars, see Appendix, documents Nos. 8, 9, and 108.

SITE NEAR ST. LOUIS, MISSOURI.

The site recommended by the mayor and committee of the city council, acting in behalf of the citizens of St. Louis, is a point of land on the west side

of the Mississippi, about seven miles below St. Louis, situated immediately above the mouth of the river Des Perres, and extending upward about one mile, to the village of Carondelet.

This site presents a very favorable aspect, the ground rising very gently from the shores both of the Mississippi and of the Des Perres river, which are respectively elevated thirty feet above low-water mark, to a summit midway between these two streams, elevated about forty feet above the lowest water of the river.

The range of the Mississippi from the lowest to the highest water is supposed to have been thirty-three feet, in the highest freshet of which we have any account. This freshet occurred in the year 1785, since which period the range has in no instance recollected exceeded thirty feet. Of course, a small portion of the site under consideration, near the margins of the two rivers, would be liable to inundations in the event of an excessive freshet like that of 1785.

The shores of the Mississippi and Des Perres at this point are rocky bound, that of the former presenting convenient landings for steamboats in all stages of the water, while the channel of the Des Perres, running over a portion of the rocky substratum by which the site is underlaid, is inaccessible to steamboats at all times.

The site is of a triangular form, and embraces a portion of the commons of Carondelet, which are held by the citizens of that town in their corporate capacity. The board were given to understand that a tract of at least five hundred acres of the ground most suitable for the purposes of an armory may be obtained at a fair price, and perhaps by way of gratuity, from the authorities of the town, in the event of the place being selected and used as a site for the armory.

It was also intimated that a communication might be expected from the authorities of the town, setting forth the boundaries and contents of the tract they would be willing to appropriate as a site for the armory, and the terms on which they would be disposed to transfer the lands to the United States.

The United States garrison, (Jefferson barracks,) with a tract of 1,705 acres of land attached thereto, is situated four miles below; and the United States arsenal, occupying about forty acres of ground, is located about an equal distance above the site under consideration.

Building stone of an excellent quality (limestone in horizontal strata, varying in thickness from a few inches to two or three feet) may be obtained in the greatest abundance at the margin of the river, at almost every point between the river Des Perres and the arsenal.

Timber, consisting of boards, planks, scantling, &c., and other building materials, may be obtained at this site on the following terms, viz :

Sawed lumber, consisting of oak, ash, maple, black walnut, poplar, yellow pine, &c., per thousand, board measure,	$12 00	to	$18 00
Do. of white pine, variously assorted, per thousand	15 00	to	30 00
Shingles, per thousand	3 00	to	5 00
Bricks, per thousand	4 00	to	5 00
Lime, per bushel	12½	to	15

A portion of the State of Missouri, bounded on the north by the Missouri river, on the south and southeast by the Mississippi, and on the southwest by a line running from the mouth of the Des Perres, northwardly, to the Charbonaire coal mines, on the Missouri, the whole embracing between

six and eight hundred square miles, is analagous in the general appearance and mineral products of the country to the uplands of Illinois, and may be regarded as a carboniferous region. The localities in this district at which coal has been discovered are numerous, especially in the hills bounding the valley of the Des Perres river. The veins of the coal vary in thickness from three to four feet, and are situated at the depth of thirty to forty or fifty feet below the surface of the uplands. This coal ignites freely, but after combustion leaves much cinder, owing most probably to the sulphur and iron it contains. The prices at which this coal is furnished at St. Louis and Carondelet vary, like those of the coal from Illinois, from eight to twelve and a half cents per bushel; the coal from Illinois, however, is invariably perferred.

The iron brought to the St. Louis market is obtained principally from the iron works on the Ohio, Cumberland, and Tennessee rivers. Supplies of wrought iron are obtained also in considerable quantities from Massie's works, at the head of Maramec river, and from Perry's works, near Potosi, in the State of Missouri. The ore from which the iron made at the former of these works is extracted is said to be of a character and consistency like those of the ore of the Iron mountain, both of which are esteemed of a good quality for the manufacture of malleable iron, but not well adapted to castings.

Lead in vast quantities is brought to St. Louis, from the lead mines on the upper Mississippi, Wisconsin, &c.

The agricultural products brought to the St. Louis market, especially those that constitute the daily supplies of the inhabitants, are mostly derived from the State of Illinois, the soil of that shore being still more prolific, and withal more generally cultivated, than the country on the Missouri side of the Mississippi, in the vicinity of St. Louis.

Products of this kind command somewhat higher prices here than at Alton, owing to the incomparably larger demand for them at the great market of St. Louis. In the wholesale way, however, provisions of all kinds bear prices at St. Louis but little in advance of those at Alton.

The shore of the Mississippi, adjacent to the proposed site, is, as was said before, remarkably favorable for landings at all stages of the river, from the mouth of the Des Perres to the upper extremity of the position at Carondelet. A tabular bar of solid rock (limestone, in horizontal strata) presents itself at an elevation suitable for landings in low water, while in advance of this bar the channel is deep and free from obstructions. From the exterior margin of this table, a sloped pavement, rising at a suitable inclination to the summit of the highest freshets, may be formed of the materials in the immediate vicinity, and serve for landings during the more elevated stages of the river.

The power contemplated to be used at this site is that of steam generated by the use of bituminous coal. Plentiful supplies of this article may be obtained from the coal mines that exist near the Des Perres river, and within a few miles of the site, from which coal is obtained by means of shafts sunk to the depth of between 20 and 40 feet. The trouble of obtaining it in this way, however, materially enhances its cost, and supplies of the article can be obtained on terms quite as favorable from the Illinois mines as from those in this vicinity.

But, with respect to the attainment of supplies of coal from Illinois, it should be observed that there are impediments of considerable moment in the way. The American bottom, which separates the coal mines of Illinois

from the Mississippi river, is at least four miles wide, and exceedingly difficult to cross with loaded teams in wet weather. An expensive road, of the length just mentioned, will be required, in order to obviate this difficulty. The Illinois shore, for a considerable distance both above and below the site, is rendered inaccessible to water craft of any considerable burden, by reason of islands and sand bars that abound on that side of the river. No favorable landings for steamboats, or even ferry boats, are presented on the Illinois side, for several miles both above and below the site. By reason of these difficulties, the cost of procuring Illinois coal at this place will probably be somewhat greater than that of procuring it at St. Louis.

This position was formerly reputed unhealthy. The flat lands in the valley of the river Des Perres were supposed to give occasion to bilious diseases. But, since these grounds have been partially cleared and improved, their neighborhood has become more healthy.

It may not be improper in this place to offer a few remarks in reference to the character and condition of the Mississippi, between the mouths of the Ohio and Missouri rivers, the navigation of which may be regarded as more difficult and dangerous at this time than that of any other portion of this noble stream.

It is about three years since the business of extracting and removing snags and other obstructions from this part of the river was suspended, for want of an appropriation of funds for that purpose by the General Government; in consequence, snags, planters, sunken logs, &c., have been constantly accumulating in the present main channel, till they have become in many places almost impassable during the lower stages of the river. In some places new channels appear to have been cut across sand bars that contained numerous imbedded logs and trees, which now remain at the sides and bottoms of the channels, opposing the most formidable obstructions to the passage of steamboats. In other instances the banks have been undermined, and the trees standing upon them precipitated into the river, where they become snags, planters, and sawyers, in the new channel that has been formed beneath the site they formerly occupied. So greatly have obstructions of this character been multiplied, that steamboats have been wrecked upon them in almost every part of the river between St. Louis and the Grand Chain, 155 miles below; and in one place, particularly, within the distance of two miles, three wrecks of this kind present themselves, the boats having been lost in the past year.

So great has been the actual loss of steamboats on this part of the river within the last two years, and so dangerous is the navigation to all future adventurers, that the munificence of the General Government seemed to be imperiously called for. Property vastly greater in value than the amount required to remedy the evil has already been sacrificed, and still greater losses must necessarily ensue, unless measures are taken to remove the obstructions in this portion of the river.

This part of the Mississippi seldom freezes over, but the vast quantities of floating ice conveyed upon its surface during the winter months renders the navigation difficult, dangerous, and sometimes impracticable. In very cold weather, the river has been frozen entirely across in several places, with ice strong enough to bear a loaded team.

A succession of cold weather, continued for many days, chills the water to such a degree that floating ice has been often conveyed downward to Memphis, sometimes to the mouth of Arkansas river, and occasionally to

Vicksburg; but the river has probably never been frozen over below the mouth of the Ohio.

From the mouth of the Ohio upward to that of the Missouri, and even of Illinois river, the Mississippi is navigable for boats drawing 4½ to 5 feet, in all stages of the water.

See Appendix, documents Nos. 10, 11, 12, 13, and 108.

MARAMEC RIVER, AND COUNTRY DRAINED BY IT.

The headwaters of this stream interlock with those of the Gasconade—the former opening into the Mississippi 20 miles below St. Louis, and the latter entering the Missouri 100 miles above its mouth. The Maramec has its origin in the hilly and elevated region called the Ozark mountains; its principal source being a copious fountain denominated the Big spring, in the vicinity of which are Massie's iron works, which are worked by means of a water power derived exclusively from the spring. From this source the river pursues a very serpentine course to its mouth, receiving in its progress numerous tributaries, of which the most considerable are the East fork, the Courtois, and Big rivers.

The distance by water from the Big spring to the mouth of the Maramec is 178 miles, while the distance on a direct line between these two points does not exceed 80 miles. The aggregate fall from the spring to the mouth of the river is 382 feet, the fall in the first half mile being 30 feet, and on the remaining distance varying from three feet to less than one-fourth of a foot per mile. The quantity of water afforded by the river at its lowest stage is ample at all times from the spring downward, being 5,600 cubic feet per minute immediately below the spring, 8,200 cubic feet below the mouth of the East fork, 57,200 cubic feet at the Virginia mines, and 112,000 cubic feet per minute below the mouth of Big river.

The Maramec is said to be navigable for keel boats drawing 2½ feet water to the Virginia lead mines, 120 miles from its mouth, in all stages of the water, and probably for steamers of the smallest classes for 5 or 6 months in the year.

The range from the lowest to the highest water varies from 15 feet, which is the extreme range near the head spring, to 30 or 35 feet, which is the elevation attained by the highest freshets, from the mouth of the Big river downward to the Mississippi.

The waterfall most considerable and most available for manufacturing operations, and at the same time nearest to the Mississippi, is at a place called Devil's island, 60 miles above the mouth of the river, where the fall in a distance of 4½ miles is 12 feet. This fall may probably be increased by the erection of a dam (to the destruction of the navigation of the river above this point, of course) 12 feet high, which will increase the head and fall of the water to 24 feet; the whole of which, however, will be neutralized during priods of very high freshets, the range on such occasions being from 30 to 35 feet.

From the head of the spring downward to the mouth of Big river the Maramec flows through a deep narrow valley, or ravine, varying from 100 to 300 yards, the country on both sides of the valley being elevated, hilly, and broken. Below the mouth of Big river the valley gradually widens till we arrive at the Mississippi, in the neighborhood of which it spreads to the width of 2 or 3 miles.

The woodland growth of the country on the Maramec comprises the most valuable varieties of the oak, black and white ash, all the varieties of hickory, sugar tree, white walnut, poplar, wild cherry, yellow birch, white and curly maple, white and red elm, &c. Yellow pine abounds on the branches of the river, and large supplies of this article are annually brought down the river, and conveyed thence to markets on the Mississippi.

The soil of the valley is generally rich and productive, while that of the uplands is often meager, and seldom deserves estimation higher than that of third-rate land. The products of agriculture consist of corn, wheat, oats, buckwheat, tobacco, hemp, flax, potatoes, apples, wild plums, crab apples, &c.

No stone coal has yet been discovered in this part of the country, nor is it likely ever to be found here; supplies of this article can be obtained only by transportation up the river. Iron ore of an excellent quality is said to abound in various parts of the country. Lead is found in abundance at the Virginia mines, and it no doubt exists at numerous other localities near the river. Ores of zinc are said to have been found at a point on the river about 100 miles from its mouth.

The board searched in vain for a site convenient for an armory near the confluence of the Maramec and Mississippi rivers. An extensive tract of bottom land occurs near this point, most of which is liable to be inundated during a very high freshet. The hills by which this tract is bounded are considerably remote from the river, and at the same time present no level area sufficiently extensive for the buildings of an armory. No sufficient water power can be produced at or near the mouth of the river, except at the expense of a dam 12 feet high and a canal 30 or 40 miles long, through which to bring the necessary supply of water from that distance up the river.

We shall conclude this article by introducing a variety of tabular statements relative to the distances, waterfall, minimum supply of water, ranges, &c., at different points on the Maramec river, computed from information kindly imparted to the board by W. K. Singleton, Esq., civil engineer.

Table of distances.

Localities.	Distance from mouth of river, in miles.	Aggregate distance from mouth of river, in miles.	Minimum supply, in cubic feet, per minute.	Fall, in feet, per mile.	Aggregate fall, in feet.	Extreme range, in feet.
Head spring -	0	0	5,600			
Mouth of East fork	0.5	0.5	8,200	60	30	15
Virginia mines -	64.5	65.	57,200	–	–	25
Devil's island -	52.	117.	–	2.8	327.5	30
Mouth of Big river -	4.5	121.5	–	2.6	12	30
Mouth of Maramec -	56.5	178.	112,000	0.22	12.5	30 to 35
Total - -	178.	–	–	–	382.	

GASCONADE RIVER.

This stream has its sources southwardly of those of the Maramec, in the same mountain region that gives rise to the latter river. It runs northwardly, and falls into the Missouri at a point 100 miles above its mouth, as was before remarked.

Agreeably to information obtained by the board from the officers of the General Land Office, at St. Louis, and other authentic sources, this stream is far less prolific in water power than the Maramec, while the points at which inconsiderable falls occur are far more remote and difficult of access by water conveyance than similar points on the Maramec river.

This river is said to be navigable for small steamboats, during high water, through a distance of 30 or 40 miles only. Rapids or waterfalls, affording the requisite water power for mills, &c., present themselves at the distance of 120 miles from its mouth, where lumber is prepared in considerable quantities, and rafted down to the markets on the lower part of the Missouri and at several points on the Mississippi.

The lumber consists principally of yellow pine, sawed into boards, scantling, &c.; and abundant supplies of this kind of timber are said to exist on the upper portions of this stream and its tributaries.

For further particulars respecting the water power, &c., of these two last rivers, see Appendix.

IRON MOUNTAIN AND PILOT KNOB.

The Iron mountain is an isolated knob, having an elevation of about 350 feet, and a circumference of three miles, as measured round its base. It presents three distinct summits, connected together by narrow ridges less elevated than the summits by 60 to 80 feet. Its entire surface is thickly covered by fragments of iron ore, varying in size from that of a hickory nut to masses containing many tons.

The ore is apparently very rich, and free from oxidation, of a dark green or blackish complexion, and when fractured presents a distinctly ferruginous structure, with a lustre similar to that of steel or iron recently fractured. On analysis, it is said to yield 75 to 80 per cent. of pure iron.

It is supposed to be well adapted to the manufacture of bar iron and steel, but not so suitable for castings.

The only tests to which it has been known to be subjected are sundry trials in common smith's forges, the results of which are, that it has been refined without much difficulty, and wrought into implements of various kinds, such as hatchets, knives, horse shoes, &c. The entire mountain is apparently composed of this mineral, which is every where presented on the surface, unconnected with other rocks, though in most places it is accompanied with a scanty soil, sufficient for the support of a scattering growth of trees, bushes, and weeds.

The Pilot knob is situated at the distance of five miles southeastwardly of the Iron mountain, is similarly isolated, but has an elevation and circumference considerably greater than that of its compeer. The Pilot knob also presents a vast abundance of iron ore, but of a quality inferior to that of the Iron mountain, the per centage of iron contained in it being generally limited to 40 or 50 to the hundred. Moreover, the rocks of the knob afford a far greater variety than those of the mountain. Among the former,

porphyritic sandstone, red granite, feldspar, &c., are found in connexion with the ore, while the rocks of the Iron mountain are almost exclusively iron ore of the kind denominated peroxide of iron.

These two remarkable eminences are surrounded on all sides by a wilderness of hills and ridges of mountain height, being 600 to 700 feet high, the whole constituting a portion of the mountain range called the Ozark mountains.

The most northerly sources of the St. Francis river have their origin in this vicinity; and Big river, a copious tributary of the Maramec, rises but a few miles to the northwest of the Iron mountain.

The principal difficulty in the way of realizing immediate benefits from working the ore of either of these mountains is their remoteness from a constant water power sufficient to maintain the requisite blasts for smelting.

No such power is to be had within a distance of more than 20 miles from either mountain, and the roads of the country are at present too rough, if not impracticable, for the convenient transportation of the ore to a site where the requisite power may be had. The streams above mentioned all fail in dry weather, so that no dependence can be placed in their ability to afford the power required. At the distance of something more than 20 miles northeastward from the Iron mountain, and in the vicinity of Potosi, it is supposed that such a power may be obtained at a site on Big river, which is nearer than any other position suitable for this purpose.

The woodlands, which embrace all the varieties of timber and trees common to the country of Maramec river, afford the greatest abundance of materials suitable to the production of charcoal.

The soil of the country is generally poor, the best of it yielding only moderate crops of corn, wheat, oats, potatoes, &c.

The mineral products hitherto developed consist almost exclusively of iron ore and marble—a fine quarry of the latter having been found in a ridge about three miles to the southward of the Iron mountain.

Indications of lead, zinc, and copper, are occasionally presented. As a means of facilitating the conveyance of ore from the Iron mountain to a place where it may be worked to advantage, the construction of a good road leading from the mountain to some point on the Mississippi has been contemplated.

For this purpose, two routes, of nearly equal distances, have been proposed, viz: one leading from the mountain by the most direct and favorable ground to St. Genevieve, and the other leading towards St. Mary's landing, 13 miles below St. Genevieve—the distance on either route being about 45 miles.

The relative merits of the two routes can be determined only by an instrumental survey of the contiguous country.

On both routes extensive tracts of level ground are presented, the soil of which is for the most part poor, and, in places, quite sandy and steril. Several deep ravines must be passed, which may readily be surmounted by high bridges. In view of the general features of the country, no reasonable doubt can exist as to the practicability of constructing a road, adapted to the easy conveyance of heavy burdens, on either route, at an expense comparatively moderate.

The board have been credibly informed that castings made of iron extracted from the Iron mountain ore are more dense and heavy in the proportion of 38 to 37 than any other castings; that castings, bar iron, and

steel, manufactured from the same, are far less liable to oxidation than those from any other ores; and that bar iron made from the mountain ore is equally as malleable, ductile, and tenacious, as the best of the iron used at the Eastern armories. These positions, if they have been by a proper and thorough course of experiments established, show conclusively that the Iron mountain ore is better adapted to the manufacture of cannon balls, small arms, and ordnance, than any other heretofore used for that purpose.

The exhaustless resources in iron which the Iron mountain manifestly presents would seem to indicate the propriety of adopting measures, under the sanction and the patronage of the General Government, having in view the full development of the qualities of the ore, with the eventual object of having it employed in the fabrication of small arms and of cannon for the navy and army of the United States.

For further particulars respecting the Iron mountain and Pilot knob, see Appendix, documents Nos. 15 and 16.

SITE AT ST. GENEVIEVE, MISSOURI.

The locality deemed most favorable for a site for the armory in the vicinity of St. Genevieve is a position on the tabular tract of upland immediately in rear of the river bluffs, which are here separated from the Mississippi by an extensive tract of level bottom land, varying from half a mile to two miles in width. It is distant from the town half a mile; from St. Genevieve landing, one mile and a half; and from the nearest point on the margin of the Mississippi, about three-quarters of a mile. Its elevation above the bottom land is 50 to 75 feet, or from 75 to 125 feet above the surface of the river.

The ground is slightly waving, or rather rounded, in such a manner that the more elevated parts of the site rise by gentle slopes to the height of 20 or 25 feet above its more level and depressed portions. The land embraced by the site may be regarded as second rate, and is the property of several individuals. It may be purchased, at a rate not exceeding $15 or $20 per acre, in sufficient quantity for the purposes of an armory.

In the vicinity of the site is a remarkable spring, affording a constant supply of water, sufficient, with a fall of 20 feet, to drive three run of mill stones, or to furnish a power equivalent to that of 20 horses.

The fall at command, with a suitable dam and race, is said to be 26 feet. The land, including this water privilege, may probably be obtained at the same rate as that before mentioned.

The entire tract here contemplated embraces 800 or 1,000 acres, and covers an extensive area of uplands, together with the river bluffs, on the last of which the engine-houses and machine shops may be erected, while the other buildings of the armory, gardens, &c., may be located upon the high grounds in rear of the bluffs.

Building stone of a good quality, consisting of limestone in horizontal strata, may be had in abundance within or near the site. Oolite or roe stone of a beautiful character, and easily wrought, may be obtained in abundance within a mile and a half of the site. Good brick clay abounds in the neighborhood, and lime can be furnished at a very moderate expense.

The remoteness of the position from a convenient and permanent natural landing may be regarded as an objection to this locality. This defect,

however, may be remedied by a road about three-quarters of a mile long, leading directly from the site to a point near the present mouth of Gabourie creek, where the bottom land near the shore of the river is underlaid with an extensive bed of limestone, rising a little above the extreme low-water surface of the river. Upon this bed, as a permanent foundation, a wharf of stone work may be reared to any convenient height, and serve as a landing for all stages of the water.

The cost of the road, (which should be raised to the elevation of the highest freshets, and covered with a substantial macadam pavement,) together with that of the wharf, including the excavations required for its foundations, will probably amount to $30,000.

The power contemplated to be used in the armory at this place is that of steam, for the production of which stone coal must be obtained from Illinois.

The nearest locality at which this mineral has been discovered is distant fourteen miles from St. Genevieve, in the river hills back of the American bottom, where it is said to be found in veins from four to six or seven feet in thickness. Its present price, delivered at St. Genevieve, is ten to fifteen cents per bushel; it may no doubt be furnished in large quantities, per contract, at eight or nine cents per bushel.

All the varieties of lumber that are furnished at the St. Louis market may be obtained here with equal facility and at about the same expense. Provisions of all kinds may also be purchased at St. Genevieve on the most favorable terms.

The distance from St. Genevieve to Cairo, at the mouth of the Ohio, is 135 miles.

The Mississippi, at St. Genevieve, has occasionally been frozen entirely across; but the chief obstruction presented here by ice consists in the vast bodies of floating ice which come down from the upper Mississippi and Missouri rivers.

The site at St. Genevieve is said to be healthy, but its proximity to the extensive flats which intervene between it and the Mississippi river, and also to the broad American bottom on the opposite side of the river, seem to indicate that malarial disease must prevail to some extent during the sickly season of the year.

For further information respecting St. Genevieve, see Appendix, documents Nos. 14, 15, 16, and 108.

SITE NEAR ST. MARY'S AND PRATT'S LANDINGS.

This locality is on the bank of the Mississippi, immediately above the mouth of St. Loras creek, and at the distance by land of thirteen, or by water sixteen, miles below St. Genevieve.

The site contemplated at this place may be thus defined: It has an extent on the Mississippi, from the mouth of St. Loras creek upward, of half a mile; it then extends backward from the river, in the form of a rectangular parallelogram, a mile or more, embracing a tract of rolling land of considerable extent, through which the creek above mentioned has its course. A portion of the parallelogram contiguous to the river, and extending about one hundred and fifty yards backward from it, is cleared and under improvement; the residue is woodland, supporting a fine growth of oak, hickory, ash, sugar tree, maple, walnut, poplar, &c. On reaching the woodland, the site may be enlarged at pleasure, by additions to the sides

of the parallelogram, till its contents amount to eight hundred or one thousand acres.

The board made particular inquiry as to the price at which the site might be purchased, but could get no definite answer. The probability is, that it may be obtained at the same rate per acre as that at St. Genevieve, viz: fifteen to twenty dollars per acre.

The engine-houses, machine shops, &c., might be located on the cleared ground near the river, which is elevated above the reach of the highest freshets, while the dwellings and other buildings of an armory might be arranged on the woodland tract in the rear, which is elevated sixty to eighty feet above the surface of the ground in front.

St. Loras creek is an inconsiderable stream, affording a constant supply of water, sufficient probably to drive one run of stones, provided a fall of ten or twelve feet could be obtained. Its efficiency in this way, however, is neutralized by back water from the Mississippi during the freshets of that river.

A dam and mill were erected on this stream, at the distance of one hundred and fifty yards from its mouth, where it has a rocky bed and a fall of five or six feet; but both of these structures have been undermined and swept away by freshets.

The stream can be considered of but little use to an armory, except on account of its ability to yield an abundant supply of water for the necessary steam engines, and for other purposes of irrigation.

The power contemplated to be used at this point is that of steam, generated by the use of stone coal as a fuel. The facilities for obtaining stone coal here are similar to those presented at St. Genevieve, the localities from which it must be obtained being the same.

Building materials of all kinds are abundant and convenient, and may be had on terms no less favorable than at any other points on the Mississippi already noticed. The same is true, also, with respect to provisions of all kinds—abundant supplies of which may be had on favorable terms.

The landings in this vicinity are deemed more convenient and favorable than at St. Genevieve, while their contiguity to the ground to be occupied gives this a decided advantage over the other position.

This locality is probably quite as healthy as any other position on the Mississippi, from St. Louis downward. There are no flat or marshy grounds in its vicinity nearer than the American bottom on the east side of the Mississippi.

Prices of articles of subsistence, materials, &c., delivered at St. Louis, St. Genevieve, St. Mary's, &c.

Bituminous or stone coal, per bushel	8 to 12 cts.
Pig iron, per ton of 2,208 pounds, average	$28.
Blooms, per ton, gross	$55 to $60.
Common bar iron, per ton, nett	$100.
Assorted bar iron, per ton, nett	$120.
Boiler iron, per ton, nett	$160.
Sheet iron, for chimneys, stove pipes, &c., per pound	9 cts.
Cut spikes, per pound	7 cts.
Cut nails 8d., 10d., and 12d., per pound	7 cts.
Cut nails, 4d. and 6d., per pound	8 cts.
Castings, per pound	3 to 5 cts.

Charcoal, per bushel	3 to 5 cts.
Lead, per pound	4 cts.
Hard-wood lumber, consisting of oak, ash, black walnut, maple, wild cherry, &c., also poplar, cotton wood, &c., sawed into boards, plank, scantling, &c., per thousand, board measure	$12 50 to $15.
Yellow and white pine, sawed as above, per thousand, board measure	$18 to $30.
Shingles, per thousand	$3 to $5.
Corn, per bushel	20 to 25 cts.
Wheat, per bushel	56 to 85 cts.
Oats, per bushel	20 to 25 cts.
Beans, per bushel	75 cts.
Rye, per bushel	37½ to 50 cts.
Potatoes, per bushel	20 to 25 cts.
Pork, per pound	2 to 3 cts.
Beef, per pound	3 to 4 cts.
Butter, per pound	12½ cts.
Lard, per pound	6¼ cts.
Chickens, per dozen	$1.
Eggs, per dozen	10 to 12½ cts.
Hay, per ton	$7 to $10.

See Appendix, documents Nos. 10, 14, 15, 16, and 108.

SITE NEAR CAPE GIRARDEAU.

The position deemed most suitable for an armory in the neighborhood of Cape Girardeau is a point upon the river hills, about a mile below the town. Its surface is divided by a broad ravine, running parallel to the river hills, and descending into the valley of a small stream at the upper end of the site, thus affording a gentle declivity for a road leading from the summit of the highlands to the valley of the river, and thence to a position on the shore of the river suitable for a landing. At and near the head of the ravine the surface becomes more even, and of sufficient extent for the accommodation of the buildings of an armory.

The distance from the landing to the ground to be occupied by the buildings will be half a mile, and a road of that extent, more than half of which must be elevated upon an embankment rising above the reach of the highest freshets, will be required in order to afford an easy passage between the landing and the site. Such a road will cost about $5,000, and a wharf at the landing, adapted to the loading and unloading of boats in all stages of the water, will probably cost an equal sum.

The site is elevated about 100 feet above a low and marshy strip of bottom land, four or five hundred yards wide, situated between the hills and the river. The hill sides present a ramp of gentle and nearly uniform acclivity, rising at an angle of 20 to 30 degrees.

The landing above proposed is said to be accessible to boats of the deepest draught, in all stages of the water. The shore is rocky bound at this place, being but a short distance below a cape of high land based upon rock, and situated a little below the town of Cape Girardeau.

The ground is partially cleared and under improvement. Its soil is quite rich and productive. The board were informed, by one of its pro-

prietors, that a tract of 500 to 800 acres of ground, including the site, may be purchased at the rate of $25 per acre.

The power relied on at this locality is that of steam generated by the use of stone coal, there being no stream in this vicinity affording the requisite water power. Fuel of this sort, and of a very superior quality, may be obtained from the coal mines on Big Muddy river, by water transportation downward through a distance of about 65 miles. Its cost, delivered at Cape Girardeau, in a wholesale way, or by contract for large supplies, will be about eight cents per bushel.

Big Muddy river is said to be navigable for keel boats about five months in each year, from its mouth to the coal mines, a distance of 40 miles. The coal veins opened on this stream are said to vary in thickness from four to eight feet, and there is no doubt that inexhaustible supplies exist in this vicinity. The coal appears to be quite free from pyrites and other impurities, ignites freely, burns with a bright flame, leaves no other residuum but a light impalpable ashes, and is believed to be equal to the best bituminous coal found in the United States.

Between three and six miles below Cape Girardeau is a tract of bottom land called "the swamp," about three miles wide, and extending westwardly and southwestwardly till it meets and becomes incorporated with the great swamp through which the St. Francis river has its devious course and intricate windings. A little below "the swamp" the highlands approach the Mississippi on both sides of the river, and four or five miles below the same swamp the remarkable rocky bar called the Grand Chain stretches entirely across the bed of the river. These circumstances indicate with some degree of probability, if not certainty, that the Mississippi once had its course through this region of morasses, from Cape Girardeau, by way of the valley of St. Francis river, to its present bed at the mouth of that river, having pursued its course through a channel many miles to the westward of its present channel, for a distance of more than 300 miles.

Easy access by land from the Mississippi to the country westward of the St. Francis river, throughout this entire range, is rendered impracticable, without the construction of expensive roads and bridges, leading across the extensive morass above mentioned. This consideration may be regarded as an objection to the establishment of an armory on the western bank of the Mississippi, at any point from Cape Girardeau downward to the mouth of the St. Francis.

Building materials, provisions of all kinds, and raw materials for manufacturing purposes, may be supplied at Cape Girardeau at the ordinary rates of other markets on the Mississippi.

The distance between Cape Girardeau and St. Louis is estimated at 120 miles, and between the Cape and Cairo 80 miles.

For further particulars, see document No. 19, in the Appendix.

SITE AT CAIRO.

Cairo, situated on the point of land immediately above the confluence of the Ohio with the Mississippi river, is the common centre of an extensive range of inland navigation, embracing an aggregate distance of more than 10,000 miles; and, from its geographical position, would seem to be the proper place of depot for the trade and commerce of the vast region drained by the Mississippi.

Unfortunately for this locality, however, it is made up of an extensive bed of alluvious deposites, and is liable to encroachments upon its borders

by the irresistible currents of the Mississippi and Ohio rivers, which during the prevalence of high water undermine and abrade their banks wherever they are unprotected by a rocky substratum. Moreover, the site is so low that almost the whole of its surface, is liable to inundations, to greater or less depths, whenever an excessive freshet occurs.

An efficient association of enterprising gentlemen, denominated the "Cairo City and Canal Company," have undertaken to reclaim and improve this site by the formation of heavy embankments or levees, to prevent overflows, and by the erection of warehouses, stores, dwellings, mills, a foundry, furnaces, machine shops, and a floating dry dock, for the accommodation of mercantile and other business operations, and of the persons employed in the same.

A levee three and half miles long, twenty feet wide on its summit, and rising, as is supposed by its projectors, at least eighteen inches above the highest freshets ever known, has been partially constructed, and nearly completed on the westerly or Mississippi border of the position. The distance of its southerly extremity from the Mississippi, at the confluence of this river with the Ohio, is about three hundred yards. From this point, which is on the immediate bank of the Ohio, the levee passes upwards at distances of fifty to three hundred yards from the margin of the river, and is to terminate at an elevated ridge of the bottom, supposed to be above the reach of the highest freshets.

The levee on the Ohio or easterly side of the site has the same width of summit, passes upward near the margin of the Ohio about two miles, and is to terminate at a rising ground of about the same elevation as that of the ridge at the head of the Mississippi embankment. The height of both of these embankments above their bases varies from three to sixteen feet. That on the Ohio, for about half its length, remains unfinished, while that on the Mississippi side is nearly complete.

The town site proper, as surveyed and laid off by the company, is said to contain 3,884 acres; in addition to which, the company are possessed of 5,848 acres more, amounting, in the aggregate, to 9,732 acres of land; the whole of which is bottom land, possessed of a soil exceedingly rich, and covered with a dense and heavy growth of cotton wood, sycamore, and occasional thickets of cypress.

The amount actually expended in the purchase of land, and in making improvements thereon, could not be definitely ascertained. The estimated amount required to complete the improvements contemplated by the company, and to cancel their liabilities, is said to be about one million of dollars.

However confident the company may be in the successful issue of their enterprise, doubts may be entertained as to the sufficiency of their works to withstand the impetuous floods that sometimes occur in these mighty rivers. It is true that the levees, in their present new and unfinished state, have effectually resisted the percolations, washings, and abrasions of our annual freshet in each river, in which the water rose to an elevation several feet higher than the surface of the ground in their rear; but their ability to withstand such freshets as occurred in the years 1785, 1828, and 1832, when the high-water surface attained an elevation eight or ten feet higher than that of ordinary high freshets, remains to be tested.

The bottom lands owned by the company constitute but a small proportion of the flat lands in this vicinity.

These flats extend upward on the Ohio river about twelve miles, and on the Mississippi at least an equal distance, embracing an area of about forty thousand acres. This extensive tract is altogether alluvial, and, with the exception of here and there an isolated ridge or swell, rising a little above the reach of the highest freshets, is subject to overflows. It is in places swampy, and is covered with a dense growth of trees, bushes, vines, and weeds, which are successively springing and decaying upon the surface.

An extensive body of bottom land, called the "Tywassatic bottom," also lies on the westerly side of the Mississippi, directly opposite to Cairo; and a similar tract of great extent, covered with a dense growth of cotton wood, willows, &c., presents itself on the Kentucky side of the Ohio, and immediately on the bank of the river. Surrounded by these fruitful sources of damps and of miasmata, the inhabitants of Cairo cannot fail to be injuriously affected by them; and the place cannot, under existing circumstances, be otherwise than unhealthy. But when the country shall have been cleared, the swamps and bottom lands drained and cultivated, and the atmosphere around made dry or rarefied by the fires and smoke of the workshops and of the dwellings of a numerous population, Cairo may then boast of as much health as her sister towns on the Western waters.

No particular locality could be designated as a site for the armory, either within the limits of the city or upon the adjacent grounds owned by the company; but no doubts are entertained that any portion of the whole tract that may be deemed most suitable for this purpose, exclusive of that occupied by the buildings and other improvements, may readily be obtained on liberal terms.

The Mississippi is navigable from the Gulf of Mexico to this place, for steamboats of the heaviest burden, during all stages of the water. Its navigation below this point is sometimes rendered difficult by floating ice, with which the river is occasionally gorged at narrow passes below; and its entire surface for a greater or less distance may be closed, for a short time, in a manner to prevent entirely the passage of steamboats. Above this point the Mississippi is occasionally frozen entirely across, and remains closed for several days in very cold weather.

The temperature of the Ohio being considerably raised by large supplies of warmer water from the south, received though the channels of the copious Tennessee and Cumberland rivers, that river is seldom or never known to be closed by ice between its mouth and that of the Tennessee; while the water of the Ohio, thus partially warmed, contributes to dissolve the ice brought down by the Mississippi, and to prevent the latter from being frozen over below the confluence of these two rivers.

The only power available at this place for the uses of an armory is that of steam, the means of producing which may be derived from any or all of the coal fields of the great West, most if not all of which lie upon the waters of the Mississippi and Ohio above this point.

Coal from Pittsburg and Wheeling may be had at twelve and a half cents per bushel; from the mines on Big Muddy river, in Illinois, Tradewater river, and Hawesville, in Kentucky, and various other localities in these two States, it may be had for eight to ten cents per bushel.

Hard-wood lumber of all kinds, sawed into boards, planks, scantling, &c., may be obtained at the rate of $12 50 per thousand, board measure.

Yellow pine, poplar, cypress, cedar, cotton wood, &c., sawed as above, may be obtained at $12 to $15 per thousand, board measure.

White pine, from Olean, sawed as above, at $15 to $20 per thousand.

Price of cypress shingles, delivered at Cairo, $2 50 to $3 per thousand.

Roofing slate, furnished and laid, per square of one hundred square feet, $12.

Building stone, per perch, delivered, $1 50 to $2 50.

Lime, per barrel, 62½ cents.

Bricks, per thousand, $5.

Wages of stone masons, per day, including board, $1 50 to $1 75.

Wages of stonecutters, per day, including board, $1 75 to $2.

Wages of brick masons, per day, including board, $1 75.

Wages of attendants on masons, per day, including board, 87½ cents.

Wages of carpenters, per day, including board, $1 50.

Wages of common laborers, per month, exclusive of board, $10.

Price of pig iron, per ton, gross, delivered at Cairo, $22 to $25.

Price of common bar iron, per ton, nett, $70 to $100.

Price of assorted bar iron, per ton, nett, $120.

Price of boiler iron, chimney iron, &c., per ton, nett, $120.

Price of cut spikes, nails, &c., per pound, 4½ to 6 cents.

Price of castings, per pound, 3 to 5 cents.

Price of common castings, made at Cario, per pound, 3 cents.

The pig metal most valued at this place is that made at the Shawneetown furnace. The most approved boiler iron is that manufactured at the Cumberland iron works. The iron made on the Tennessee river is said to be of a texture and consistency equal to that of the Cumberland, but not so well refined, and in all respects less highly wrought.

Provisions of all kinds may be obtained at Cairo on terms quite as favorable as at any other points above, either on the Mississippi or Ohio rivers.

For additional information in relation to this place, see documents Nos. 20, 21, 22, and 108, in the Appendix.

Distances from Cairo to remarkable points on the Western waters accessible to steamboats.

POINTS ON THE MISSISSIPPI RIVER.

	Miles.
Mouth of Mississippi river	1,150
New Orleans, Louisiana	1,038
Mouth of Red river, Louisiana	806
Vicksburg, Mississippi	623
Mouth of Yazoo river, Mississippi	610
Mouth of Arkansas river	406
Mouth of White river, Arkansas	384
Mouth of St. Francis river, Arkansas	302
Memphis, Tennessee	230
Fulton, Tennessee	165
Cape Girardeau, Missouri	80
Mouth of Big Muddy river, Illinois	106
Grand Tower, in Mississippi river	111
St. Mary's and Pratt's landings, Missouri	150
St. Genevieve, Missouri	165

	Miles.
St. Louis, Missouri	
Alton, Illinois	200
Quincy, Illinois	225
Des Moines rapids, Illinois	360
Rock island, in Mississippi river	404
Galena, Illinois	550
Prairie-du-Chien, Wisconsin	606
Fort Snelling, mouth of St. Peter's river, Wisconsin	692
	940

POINTS ON THE OHIO RIVER.

Caledonia, Illinois	15
Fort Massac, Illinois	38
Paducah, Kentucky, mouth of Tennessee river	48
Smithland, Kentucky, mouth of Cumberland river	60
Caseyville, Kentucky	107
Shawneetown, Illinois	119
Mouth of Wabash river	132
Mouth of Green river, Kentucky	196
Hawesville, Kentucky	260
Louisville, Kentucky	387
Madison, Indiana, near the mouth of Kentucky river	483
Mouth of Big Miami river, Ohio	510
Cincinnati, Ohio; Newport, Kentucky	526
Maysville, Kentucky	589
Portsmouth, mouth of Scioto river, Ohio	643
Gallipolis, mouth of Kenawha river	730
Marietta, Ohio, mouth of Muskingum river	815
Wheeling, Virginia	905
Beaver, Pennsylvania, mouth of Big Beaver	969
Pittsburg, head of Ohio river	996

POINTS ON THE MISSOURI RIVER.

Mouth of Gasconade river	317
Mouth of Osage river	348
Jefferson City, capital of Missouri	357
Franklin, Boonsville, Missouri	406
Mouth of Grand river, Missouri	459
Fort Osage, Missouri	545
Fort Leavenworth, Missouri	601
Mouth of Big Platte river	892
Council bluffs	937
Grand Detour	1,343
Mandan Village, Fort Mandan	1,761
Mouth of Yellowstone river, (probably)	2,220

POINTS ON THE ARKANSAS RIVER.

Post of Arkansas, Arkansas	446
Pine bluffs, Arkansas	542
Little Rock, capital of Arkansas	692
Fort Smith, mouth of Poteau river	921
Fort Gibson, near mouth of Grand river	1,046

POINTS ON RED RIVER.

	Miles.
Mouth of Black river, (Washita)	845
Alexandria, Louisiana	956
Head of bayou Bon Dieu, near Natchitoches	1,056
Foot of Red River raft, mouth of Loggy bayou	1,140
Shreveport, Louisiana	1,240
Head of raft near Phelps's landing	1,290
Fort Towson, mouth of Kiamichi river	1,640
Head of navigation, (probably)	1,850

POINTS ON THE BLACK AND WASHITA RIVERS.

Harrisonburg, Louisiana	920
Monroe, Louisiana	1,018
Ecore Fabre, on Bean's bluff, Arkansas	1,118

POINTS ON THE ILLINOIS RIVER.

Beardstown, Illinois	300
Peoria, at the foot of Lake Peoria	380
Peru, at the head of steamboat navigation	460

POINTS ON ROCK RIVER.

Upper rapids, Rapids City, Sterlingville	622
Dixon, Illinois	635
Mouth of Peckatonica, head of navigation	795

POINTS ON THE WISCONSIN RIVER, WISCONSIN TERRITORY.

Fort Winnebago, Wisconsin portage	844

POINT ON DES MOINES RIVER, IOWA TERRITORY.

Supposed head of navigation	500

POINT ON IOWA RIVER, IOWA TERRITORY.

Iowa City, capital of Iowa Territory	518

POINT ON OSAGE RIVER, MISSOURI.

Warsaw, head of navigation	548

POINTS ON WHITE RIVER.

Mouth of Big Black river, Arkansas	614
Batesville, Arkansas	647

POINTS ON ATCHAFALAYA AND TECHE RIVERS, LOUISIANA.

Franklin, Attakapas, Louisiana	989
St. Martinsville, Attakapas	1,058

POINT ON BAYOU BŒUF, VIA COURTABLEAU AND ATCHAFALAYA.

	Miles.
Washington, Louisiana - - - - -	1,004

POINTS ON THE YAZOO RIVER, MISSISSIPPI.

Mouth of the Yalobusha river - - - -	830
Pittsburg, Mississippi - - - - -	896

POINTS ON THE TENNESSEE RIVER.

Brownsport, Tennessee - - - - - -	204
Savannah, Tennessee - - - - - - -	260
Waterloo, foot of Colbert's shoals, Alabama - - -	295
Florence, Tuscumbia, foot of Muscle shoals - - -	325
Decatur, via Tuscumbia and Decatur railroad - -	370
Gunter's landing, Alabama - - - - -	430
Suck of Tennessee, base of Waldron's and Racoon mountains	560
Chattanooga, Ross landing, Tennessee - - -	573
Knoxville, Tennessee, on Holston river, head of steamboat navigation - - - - - - - -	760

POINTS ON THE CUMBERLAND RIVER.

Eddyville, Kentucky - - - - - -	105
Cumberland iron works, seven miles above Dover, Tennessee	165
Mouth of Harpeth river, Tennessee - - - -	220
Nashville, Tennessee - - - - - - -	260
Carthage, mouth of Caney fork - - - - -	340
Burkesville, Kentucky, head of steamboat navigation -	430

POINTS ON THE WABASH RIVER.

Mount Carmel, Illinois - - - - - -	227
Vincennes, Indiana - - - - - - -	259
Terre Haute, Indiana - - - - - - -	343
Lafayette, Indiana - - - - - - -	467

POINTS ON GREEN AND BIG BARREN RIVERS, KENTUCKY.

Rumsey, Kentucky - - - - - - -	256
Bowling Green, on Big Barren, Kentucky - - - -	371

POINT ON KENTUCKY RIVER.

Frankfort, capital of Kentucky - - - - -	549

The foregoing list has been compiled from the most approved authorities, and agreeably to information obtained from the most experienced navigators of the Western waters. The aggregate extent of the navigation contemplated in the list, and through which steamboats have been

known to pass, is 10,668 miles. The navigable distances on other streams of the West, not enumerated in this list, for want of well-authenticated information in reference to the subject, would no doubt increase the aggregate extent of navigation on the Western waters to between eleven and twelve thousand miles.

Among the navigable streams not noticed in the list, are the Allegany, the Monongahela, the Kenawha, the Big Sandy, the Muskingum, the Scioto, and the Miami, all tributary to the Ohio; the St. Peter's, the St. Croix, the Chippewa, the Black river, and others, tributary to the upper Mississippi; the Yellowstone, and numerous other tributaries of the Missouri; the Maramec, the Kaskaskias, the Big Muddy, the Big Hatchie, and numerous other streams of minor importance, connected with the Lower Mississippi, all of which are navigable for steamboats to greater or less distances, during a portion of each year.

The following summary will exhibit the approximate extent of steamboat navigation on each of the rivers enumerated in the list:

	Miles.
The Mississippi, from its mouth to head of navigation	2,090
Missouri to Yellowstone river, (probably)	2,000
Ohio to Pittsburg	996
Arkansas to mouth of Grand river	640
Red river to False Washita, (probably)	1,000
Washita river to Ecore Fabre	382
Atchafalaya and Teche rivers	145
Courtableau and Bœuf bayous	91
Yazoo river	319
White river	263
Illinois river to Peru	220
Rock river to mouth of Peckatonica	248
Wisconsin river to Wisconsin portage	156
Des Moines river to head of navigation	190
Iowa river to Iowa City	60
Osage river to Warsaw	200
Tennessee and Holston rivers to Knoxville	712
Cumberland river to Burkesville	370
Wabash river to Lafayette	335
Green and Big Barren rivers to Bowling Green	275
Kentucky river to Frankfort	66
Grand total	10,668

From the statements exhibited in the foregoing list are derived the following deductions, viz:

	Miles.
The aggregate extent of steamboat navigation on the Mississippi river and its tributaries and bayous with which it is connected, *below* Cairo, at the mouth of the Ohio river, is	3,990
The aggregate extent of steamboat navigation on the Mississippi and its tributaries *above* the mouth of the Ohio is	3,924
The aggregate extent of steamboat navigation on the Ohio river and its tributaries, above its mouth, is	2,754
Grand total, as before	10,668

Agreeably to the best information we could obtain in reference to the draught of boats adapted to the navigation of several of these rivers, or the depth of water on the shoalest bars in extreme low water, the following statements are believed to be approximately correct:

The Mississippi, from its mouth to Memphis, affords a minimum depth of only 6 feet; thence to Cairo, or the mouth of the Ohio, a very little more than 5 feet; thence to Alton, or the mouth of the Missouri, about 4 feet; and thence to the mouth of St. Peter's, (the Des Moines and Rock Island rapids excepted,) of 2 feet only, probably less in a very low stage of the river.

The Missouri is said to afford a low-water depth in the main channel of 3 feet, from its mouth to that of Grand river; thence to Council bluffs, 2½ feet; and thence upwards, of 1½ to 2 feet.

The Ohio has a low-water depth of 3 feet, from its mouth to Paducah; thence to Louisville, of 16 or 18 inches; thence to Cincinnati, of 2 to 2½ feet; and thence to Wheeling, of 10 to 15 inches.

The Arkansas river, from its mouth to the port of Arkansas, 2½ to 3 feet; thence to Little Rock, 2 feet; and thence to Fort Gibson, 12 to 15 inches, in extreme low water.

Red river, from its mouth to Alexandria, 3 feet; from head of rapids at Alexandria to head of raft, 4 feet; and thence to Fort Towson, 12 to 15 inches, in extreme low water.

Illinois river, from its mouth to Peru, 15 to 20 inches.

Rock river, from its mouth to Dixon, 12 to 15 inches.

Wisconsin river, from its mouth to Fort Winnebago, 10 to 12 inches.

Tennessee river, from its mouth to Waterloo, 18 to 20 inches; thence to Florence, 12 to 15 inches; and from the head of Muscle shoals to the Suck, 15 to 18 inches, in extreme low water.

Cumberland river, from its mouth to Horse ford, 3 feet; and thence to Nashville, 10 to 12 inches only, in extreme low water.

Wabash river, from its mouth to Mount Carmel, 12 to 15 inches; and thence to Layfayette, 6 to 8 inches only.

Green river, from its mouth to the mouth of Big Beaver, by slack-water navigation, 3 feet.

SITE AT CALEDONIA.

On ascending the Ohio, the first upland rising above the reach of the highest freshet (with the exception of two or three mounds) that presents itself on the bank of the river is the tract of land on the Illinois shore, 12 miles above Cairo, formerly laid out as a town site, and called "America."

The surface of the ground rises gradually from the margin of the river in front, and on the lower or west side, from the extensive alluvial bottom described under the preceding head as constituting the tongue of land running between the Ohio and Mississippi rivers.

This town site is now shut out from low-water navigation by a spacious sand bar, extending from a point three-quarters of a mile below to a point 2½ miles above the position—the width of the bar being several hundred yards, and its length three miles and more in extent. But for this obstruction to the landing at this point on the river, America would become the emporium of trade and commerce of the neighboring country, inasmuch as it occupies the high grounds nearest the confluence of the Ohio and Missis-

sippi, and is entirely exempt from the overflows and abrasions of these rivers.

Three miles above America, or 15 miles above the mouth of the Ohio, and on the same shore, is the town of Caledonia, situated on a bluff bank of the river, from 40 to 70 feet above the ordinary surface of the water, or from 20 to 50 feet above the highest freshets.

This town contains as yet only five or six houses, several stores, and a post office. The river banks here are exposed to the undermining influence of the Ohio, the current of which, in high water, sets strongly against them. The injurious effects of this abrasion have been recently exemplified in a striking manner by an avalanche or slide of the earth, in which a tract of between two and three acres was precipitated and partially thrown into the river.

This occurrence was owing to the absence of a rocky substratum for the support and protection of the bank—no beds of rock having been discovered in the banks of the Ohio, from its mouth to point half a mile above this place. From Caledonia to the Grand Chain, two and a half miles above, the main channel of the Ohio is near the Illinois side. Throughout this distance, a sufficient depth of water is presented for the landing of steamboats in all stages of the river. Above Caledonia, however, the river hills rise to the height of from 100 to 150 feet, and the surface of the country presents a very uneven and broken appearance, the ground being much divided by deep ravines, &c.

The position deemed most favorable for an armory in this vicinity is at the lower end of the town site, covering a portion of the same, where an area of about one hundred acres, of an irregular shape, and of a slightly undulating surface, is presented. About eighty acres of this tract, adjacent to the river, is cleared and under improvement; in connexion with which, is a spacious tract, heavily timbered with ash, oak, poplar, hickory, walnut, &c. Of this tract, together with the cleared land above mentioned, 500 to 800 acres may probably be obtained at a rate not exceeding $25 per acre.

The site is divided by a small ravine, through which the water is backed from the river in high freshets, and passes into a small creek or run called Marshall's bayou, the last entering the river about two miles below Caledonia, at the upper end of the town of America. Any upland site lower down the river is rendered inaccessible to boats of burden, by reason of the extensive sand bar before mentioned.

The landing at the upper end of this site is sufficiently deep and bold in all stages of the river, and the communication between it and the ground to be occupied may be rendered easy and convenient by the construction of a road two or three hundred yards long.

The power contemplated at this site is that of steam; for the generation of which, stone coal of course can be obtained at the several localities mentioned in treating of Cairo, and at the same expense.

Building stone, lumber, and provisions of all kinds, may be obtained at this place on terms quite as favorable as at Cairo.

With respect to the healthfulness of this position, it may be observed that here, as at most new places on the banks of the lower Ohio, malarial disease must prevail to a considerable extent until the country is cleared and the land cultivated.

In consequence of the absence of the proprietors of the land, the board

failed to ascertain the exact price at which a site may be purchased at Caledonia.

SITE NEAR SMITHLAND.

Smithland is situated on the Kentucky side of the Ohio, at or immediately below the mouth of Cumberland river, sixty miles above Cairo, forty-five above Caledonia, and fourteen miles above Paducah, at the mouth of Tennessee river. The site proposed for the armory in this neighborhood is that point of land situated between the Ohio and Cumberland rivers, immediately above their junction, extending upward on the former about one mile, and on the latter three-fourths of a mile.

A tract of 1,200 acres of land, embracing the site, is owned by Messrs. Dallam & Watts, of Salem, Livingston county, Kentucky, who will sell to the United States 800 acres of the same, with all their improvements thereon, at $30 per acre, in the event of the place being selected for the armory, reserving to themselves the right of establishing and maintaining a ferry across the Cumberland river, together with a suitable ferry landing on the northeasterly side of said river, about three-fourths of a mile above its mouth, and on the lower side of a deep ravine or slough uniting with the river at that place.

Out of the tract offered for sale as above must be excepted five town lots, of one-third of an acre each, owned by individuals as proprietors of a town formerly located on the tract, who it is supposed will be willing to dispose of their lots at a fair rate. These proprietors being absent, no definite price can be affixed to these lots.

About one-half of the site has a plane or gently rolling surface, elevated a few feet above the reach of the highest freshets ever known. A very large proportion of the residue is low and flat, being made up of bottom lands bordering upon the Ohio river, and subject to inundation during the ordinary high freshets in this part of the river. A portion of the tract extends to the river hills, and embraces the highland point situated between the valleys of the Ohio and Cumberland rivers. Between this tract and the Ohio bottom is a swampy flat, liable to overflows even in a moderate freshet.

About 80 acres of the site above designated, including the town lots before mentioned, are cleared and under improvements. The residue supports a heavy growth of timber, consisting of white, red, post, Spanish, and bur oak, ash, black walnut, hickory, elm, sweet gum, &c.

Building stone (limestone and sandstone) abounds in this neighborhood, but is characterized by no peculiar excellence. Brick clay of a good quality is abundant. Firestone (a coarse sandstone) has been discovered on the westerly side of the Cumberland, one mile and a half from its mouth, and on trial has been found well adapted to the construction of hearth stones for furnaces.

Bituminous coal, believed to be of a superior quality, is found in great abundance on Tradewater river, which enters the Ohio from Kentucky, 45 miles above Smithland. This stream is said to be navigable for keel boats through a distance of 6 miles from its mouth. The coal beds are presented within 1½ mile of the Ohio, and extend upward indefinitely. The coal veins are said to vary in thickness from 3 to 4 feet.

Stone coal is also found on Saline creek, near its mouth, 10 miles above

the mouth of Tradewater and 55 miles above Smithland. There are numerous other localities, both in Illinois and Kentucky, from which coal may be obtained for use on this part of the river. The prices at which this article may be delivered at the site under consideration vary from 6 to 8 cents per bushel. Coal from Pittsburg has been occasionally furnished at the rate of 12½ cents per bushel.

There being no means of obtaining any considerable water power in this neighborhood, steam power, generated by stone coal, must be relied on for driving the machinery of an armory at this site.

Iron ore, apparently of good quality, abounds within the distance of a few miles from the site, on both sides of the Cumberland river. The entire region situated between the Cumberland and Tennessee rivers, and extending upward on the former to Harpeth river and on the latter to the Muscle shoals, may be regarded as one continued iron field. Numerous iron works have already been constructed in various parts of this region of country, and the supplies of iron, in the forms of pig metal, blooms, bar iron of all sorts, boiler iron, sheet iron, cut nails, &c., produced thereat, are widely spread throughout the entire valley of the Mississippi, and constitute probably about one-third of the entire quantity consumed in the Western country.

The most considerable iron works hitherto put into operation in this part of the country are those of Messrs. Wood, Stacker, & Co., called the "Cumberland iron works," situated on the westerly side of the Cumberland. The wrought iron manufactured at these works is no doubt of an excellent quality. Specimens of it have been subjected to trials of the most severe and conclusive character, made with the utmost care and precision, by a scientific committee of the Franklin Institute at Philadelphia; and, according to these experiments, the quality of the iron made at these works has been found to be, so far as relates to its ductility, malleability, and tenacity, superior to that of any other made in the United States, and equal to the best of iron imported from abroad. The quantity of iron manufactured annually at these works is as follows, viz:

	Tons.
Of pig iron and castings - - - - - -	3,500
Of wrought iron in bars, round iron, boiler iron, sheet iron, spikes, nails, &c., maximum quantity - - - - - -	2,500
Minimum quantity - - - - - -	1,800
Average quantity - - - - - - -	2,150

The coal used in the furnaces connected with the rolling mill is obtained from the spurs of the Cumberland mountain, at a cost of 20 cents per bushel, and is said to be better adapted to these uses than that obtained from any other locality, by reason of its producing a more speedy and more intense heat.

Cumberland island, in the Ohio, is situated immediately opposite to this site. The noted bar at the head of this island, which was formerly an impediment to the low-water navigation of this river, may now be passed on the Kentucky side of the island—a wing dam of stone having been constructed a few years since, which, by interrupting the passage of the water on the right side, in a very low stage, throws the current into the left channel of the river.

Between the mouth of the Cumberland and that of Tennessee river, 14 miles below, however, there are two or three broad sand bars, upon which

the depth of water, in a very low stage, is said to be not more than from 16 to 18 inches in the deepest channel—the Ohio being there fordable entirely across. The extreme range on this part of the river is said to be 45 feet, perhaps a little more. Lumber, building materials, and provisions of all kinds, may be procured at this place on terms as favorable as at Cairo or any other point on the Western waters.

The proprietors of the land promised to furnish the board with a plat of the ground, defining the boundaries of the whole tract, and designating the limits of the pieces to be reserved, but the map has not been received. Until the figure and extent of the ground, and the relative proportion of high and low ground proposed to be sold to the United States, are ascertained, the immediate locality of the buildings cannot be determined; nor can a definite opinion, touching the probable healthfulness of the site, be expressed.

For further particulars, see documents 23, 24, 25, and 108, in the Appendix.

SITE AT THE NARROWS OF HARPETH RIVER, TENNESSEE.

This locality was examined by the commissioners appointed to select a site for a Western armory in 1823, and subsequently by Captain J. L. Smith, appointed for the same service in 1827. The reports of these officers, in reference to a site at this place, appear to be sufficiently comprehensive and accurate in their details, according in all respects with the information obtained by the present board.

For a description of this interesting locality, reference is respectfully had to the very able reports of the officers above mentioned, from which many of the following particulars have been extracted:

The "Narrows" are situated on Harpeth river, twenty-two and a half miles above its mouth. This name is applied to the neck of a detour or bend of the river, between five and six miles in circuit, and containing about 1,000 acres. At and near the gorge or neck of the bend is an elevated ridge, bounded by high cliffs of limestone, and rising from fifty to more than two hundred feet above the reach of the highest freshets. The width across the gorge for a distance of about three hundred yards is only about one hundred and eighty feet; the neck through this distance being bounded on both sides by rocky precipices, facing the river valley.

Through this neck two tunnels, each sixteen feet wide and seven feet between the floor and roof, have been perforated, for the purpose of creating a water power at this place. The descent of the river, or its perpendicular fall, in extreme low water, from the heads to the outlets of the tunnels, is sixteen feet, which is the natural fall of the river in its passage round the bend.

At the time when the officers alluded to visited this locality, one of the tunnels only (viz: that furthest from the bend) had been opened. This tunnel was completed in 1818, at a cost of $8,000. The other, or new tunnel, which heads at the distance of one hundred yards further down the bend, was completed in 1835, at a cost of $6,000.

The range of the river, from the lowest to the highest surface water, both at the heads and at the outlets of the tunnels, is said to be only about twenty feet; but, agreeably to the reports above referred to, may with greater safety be stated at twenty-five feet, especially at a point immediately below the Narrows.

The method of creating a water power at this place, adequate to the uses of an armory, as proposed by the commissioners of 1823, is as follows:

A canal or race, to receive the water from the first tunnel, was proposed, to extend downward along the margin of the river two thousand one hundred and thirty-six feet, by means of excavations in the river banks, and the erection of river walls through that distance, rising thirty-one feet above the level of low-water surface. The point at which the power was to be displayed is on the lower portion of that distance, where a cove-like recess is presented, between the river hills and the margin of the river, sufficiently spacious for the accommodation of the buildings of an armory, and above the reach of the highest freshets—the recess above mentioned being the site then contemplated for the armory. The cost of the canal, river walls, forebays, tail races, and other works necessary to the creation and maintenance of the desired water power, was estimated at $142,606.

A different method was suggested by the same commissioners, and afterwards recommended by the commissioner of 1827, which is as follows: A tunnel eight hundred and sixty feet long, heading a considerable distance above the tunnel of 1818, discharging its water at the site above mentioned, and affording a water power of the same character as was before proposed to be opened. The cost of the new tunnel, forebays, walls, &c., requisite to the creation of a water power on this plan, was estimated at about $68,295—somewhat less than half the amount required for the creation of a water power on the plan first mentioned.

Of the two projects above proposed, the latter is undoubtedly entitled to the preference, on many accounts. It is believed that this method, however, is susceptible of improvement in the following manner:

In connexion with the proposed tunnel, and at a suitable distance below its head, a dam ten feet high, reaching entirely across the channel of the river and the narrow strips of alluvion on its two margins, should be erected and firmly united to the rocks at the bottom and sides of the channel. From the pool thus formed above the dam, the requisite supply of water may be drained through the proposed tunnel, at a greater elevation, and with an extent of tunnel somewhat less than it could be without a dam, while at the same time the water may be discharged at an equally increased elevation above the surface of the river below the Narrows. By this means the machine shops through which the power is displayed may readily be elevated above the reach of the highest freshets that occur at the foot of the Narrows, and the low-water head and fall increased from sixteen to twenty-six feet.

The cost of the dam, which will rise on an average about 11 feet above the bed of the river, and have an extent of about 120 yards, may be estimated at $2,500.

In order to protect the works below the tunnel against the influence of freshets at its head, it will be necessary to construct at its outlet a flood bay of substantial mason work, at least 12 feet square in the clear, and rising to the level of the highest freshet at the head of the tunnel. This bay should be furnished with suitable gates, through which the water may be admitted into the head race, and forebays connected with the machine shops, the walls of which (viz: of the head race and forebays) should also rise at least five feet above the low-water surface at the head of the tunnel, for the purpose of securing a head of five or six feet, in extreme

high water, which is supposed to attain an elevation of 25 feet above the lowest stage, immediately below the Narrows.

This head may be rendered operative by means of reaction wheels, which can ply to advantage with the head or fall corresponding to this or any other stage of the water. Such a flood or guard bay, with its gates, &c., its height being 30 feet from the bottom of the tunnel, would probably cost about $2,000.

Accordingly, the cost of creating a water power at this site, as reported by the commission of 1827, including tunnel, &c., being	$68,295
The cost of a dam, as above proposed - - - -	2,500
The cost of a flood or guard bay - - - -	2,000
The present estimated cost of creating a water power is -	72,795

Agreeably to the plan proposed by the commission of 1827, in the event of a freshet rising higher than 16 or 17 feet above low water at the site, the water power would be neutralized during the continuance of the freshet above that height.

But, agreeably to the improved plan above contemplated, the head and fall being 10 feet greater than by the plan just alluded to, and an additional head of five or six feet being also provided for, by means of a flood bay, &c., a water power sufficient for driving the machinery of an armory would be maintained during all stages of the water.

At and near the outlet of the proposed tunnel is situated the cove-like recess before mentioned, embracing an area of rolling land sufficiently large for the accommodation of the buildings of an armory, and elevated from 15 to 20 feet above the reach of the highest freshets. In case of a demand for a greater extent of ground, an additional area of about 250 acres on the opposite side of the river, somewhat more elevated, and equally as favorable in other respects for the location of the dwelling-houses, may be obtained, and united to the contemplated site of the machine shops, by means of a bridge 100 yards long across the river.

At the time this site was visited by the former commissioners, there existed a reservation, made by the Legislature of Tennessee, of a tract of land embracing the site and all the country within five miles of the same, for the use of the General Government, in the event of the Western armory being located at the Narrows. This reservation, however, has been cancelled since that time, and the tract embracing the Narrows has become the property of individuals.

Willam Montgomery Bell, Esq., is the proprietor of about 10,000 acres in this vicinity, which include nearly the whole of the bend, and a large tract of land both above and below the bend, together with the Narrows, and the improvements thereat. This gentleman offers to sell to the United States 1,000 acres, embracing the site, together with the privilege of creating and using the requisite water power, at the rate of $10 per acre, reserving the improvements already made by him for the creation and employment of a water power.

With regard to the quantity of water afforded by the Harpeth river at this place, in extreme low water, nothing definite has hithereto been determined. The water was probably too high to admit of the solution of this problem when the site was examined by the former commissioners; and at the time when the present board visited it, the river was eight or ten feet above its low-water surface. No doubts are entertained, however, as to

the sufficiency of the water for the creation of the requisite water power in the dryest season, especially if the improved arrangement herein suggested should be adopted.

Harpeth river is said to be navigable for keel boats drawing two or three feet water, from the Narrows to its mouth, (22½ miles.) during a period of two to four months in each year. It may no doubt be rendered navigable for steamboats of an equal draught, during the same periods, by clearing its channel of logs and its banks of impending trees. The low-water descent in this distance may be assumed to be two feet per mile; consequently, the aggregate descent from the Narrows to the Cumberland river will be 43 feet.

The extreme range of the Cumberland at the mouth of the Harpeth being assumed at 50 feet, which is probably less than the height attained by the highest freshet, it follows that a 50-feet rise of the former during a low stage of the latter will occasion at least seven feet depth of back water at a point immediately below the Narrows; while the water of the Harpeth, at a point immediately above the Narrows, would remain unaffected by such a rise. At the point last mentioned, the low-water surface would be elevated 59 feet above that at the mouth of the river; consequently, a 50-feet rise of the Cumberland would have but very little, if any, influence in checking or backing the water at this point.

The improvements at and near the Narrows consist of the two tunnels above mentioned, a forge at which there are manufactured 1,000 tons of hammered iron annually, a saw mill, a grist mill, several dwelling-houses, plantations, &c. Several furnaces and a few other forges are in operation within a few miles of the site. The country, for many miles around, abounds in iron ore of a superior quality. "A ton of iron from the works of Colonel Napier, in this vicinity, was sent to Sprihgfield, and on trial found to be equal in quality to any that is found in commerce."

The surrounding country presents an aspect exceedingly broken and diversified, by ridges, ravines, valleys, hills, &c. The hills are generally very abrupt, and in places precipitous, rising from 100 to 300 feet above their bases. The ridges and intervening valleys are remarkably serpentine in their courses, and oppose serious obstacles in the way of direct roads leading from one point to another. The soil upon the high grounds is generally meager, and in places quite unfit for cultivation, but for the most part well timbered. The valleys, especially those of the principal streams, generally possess a rich soil, and sustain a heavy woodland growth.

The timber growth consists principally of red, black, chestnut, white Spanish, pin, and bur oak, hickory, ash, maple, sugar tree, red and white beech, black and white walnut, chestnut, poplar, hackberry, red birch, wild cherry, sycamore, black and sweet gum, red elm, linden, cedar, yellow pine, dog wood, iron wood, &c.

The agricultural products consist of corn, wheat, rye, oats, Irish and sweet potatoes, turnips, beans, peas, apples, peaches, pears, quinces, plums, cherries, gooseberries, currants, raspberries, strawberries, millet, clover, timothy, herdsgrass, Egyptian grass, hemp, flax, &c.

Building stone of a good quality, and other building materials, are abundant and convenient. Hydraulic lime may no doubt be found in the neighborhood.

The distance from the Narrows to Nashville is 22 miles; and from the same place to the nearest point on the Cumberland river, which is at the

mouth of Sam's creek, the distance is said to be only eight miles, by a route well adapted to the construction of a good road, with grades of easy ascent.

No localities of stone coal have as yet been discovered in this part of the country, nor are there any geological indications to be met with, from which its existence in this quarter can reasonably be inferred. Supplies of this article must be obtained either from the coal mines at and near the sources of the Cumberland, or from those on the Ohio and its tributaries, at a cost of not less than 20 cents per bushel.

In view of the abundant supplies of timber that may be obtained from the woodlands on Harpeth river, and of the frequency of mill sites afforded by this stream, no doubt can be entertained that any amount of lumber can be furnished in this vicinity on the most moderate terms.

With regard to the healthfulness of this position, appearances seem to justify the conclusion that but few points in the Western country are, on this score, entitled to higher consideration.

SITE NEAR NASHVILLE.

The choice of a site in the vicinity of Nashville, at the instance of a committee appointed by the citizens of that city to confer with the board on the subject, was made contingent on the construction of a dam proposed to be built across the Cumberland river, about two and a half miles below the city, for the purpose of creating a water power for manufacturing operations. In accordance with this understanding, positions were examined on both sides of the river, at and near the extremities of the proposed dam. On the left shore, at this place, is presented an extensive alluvial plain, extending upward from a bluff bank three-quarters of a mile above the city, to the mouth of Brown's creek. This site was deemed objectionable on account of its proximity to the city, the great amount of expense that must be incurred in the purchase of the requisite quantity of land, and more especially its liability in many places to overflows during the prevalence of the higher freshets in the river.

A position on the right shore, directly opposite that just considered, was deemed more favorable on every account. With the exception of a narrow strip of low ground, near the margin of the river, the surface is more elevated on this side, being the termination of a low ridge which rises very gradually from the river shore, passes obliquely downward, receding from the river in that direction, and uniting with the slopes of the river hills opposite to and for a considerable distance below the site intended for the dam. Upon this ridge, which becomes broader and more elevated as it recedes from the river, is the site most suitable for the buildings of an armory, while the machine shops connected with the same must be erected near the margin of the river, and directly below the end of the contemplated dam.

A number of gentlemen in Nashville have recently applied to the State Legislature for a charter authorizing them to construct a dam across the river at the place above designated, of a height or elevation above low water not exceeding 25 feet. The charter has not yet been granted, but is expected to be obtained at some future period.

The highest freshet ever known at Nashville is said to have attained an elevation of 52 feet above extreme low water. During such a freshet it is

obvious that the water power at the dam must be effectually neutralized, in so far as relates to its agency upon machinery adapted to the action of a head and fall of only 25 feet. The same will of course be true also of all freshets rising above the crest of the dam. Hence an uninterrupted water power cannot be obtained at this site. The periods, however, during which freshets of 20 or 25 feet rise prevail seldom continue longer than 10 to 15 days, and the occurrence of such freshets is seldom oftener than once or twice in a year. Other freshets of less elevation will of course diminish the efficient head and fall in degrees proportionate to their respective elevations. Accordingly, in order to render the water power available, to the full extent of the head and fall, during the prevalence of the minor freshets of the river, a resort must be had to the use of reaction wheels.

With regard to the magnitude and sufficiency of the water power, except when interrupted by freshets, there can be no doubt of its adequacy, not only to the purposes of an armory, but to those also of the contemplated mechanical operations for which the dam is intended.

The position of the machine shops, as above proposed, must unavoidably be subjected to the inconvenience of being flooded whenever a rise of more than 30 or 40 feet occurs in the river. Any other position, exempt from this inconvenience, that could be selected for the work shops, would require expenditures to an incalculable amount, in the construction of races, forebays, guard walls, &c.

The proprietor of a large tract of land, including most of the site under consideration, has proposed to sell to the United States 700 acres for 100,000 dollars, on condition of the establishment of the armory at this place. Any additional grounds that may be required for this purpose may no doubt be obtained at a similar rate. About 400 acres of the tract first mentioned is cleared and under improvement, and, being bottom land, much of it is subject to inundations; the residue (viz: 300 acres) is mostly upland, and sustains a valuable growth of timber.

Nashville is situated on the southerly or left bank of Cumberland river, about 200 miles above its mouth. Throughout this distance the river is navigable for steamboats of the largest class during ordinary high freshets, which usually prevail during an aggregate period of four to six months in each year, and for steamboats of light draught during eight or nine months in each year. In 1839 no steamboats could navigate this river between Nashville and its mouth from the last of June to an advanced date in the following October, while in 1841 its navigation continued uninterrupted during almost the whole year. In extreme low water, numerous shoals occur on this part of the river, at which the depth in the deepest channel does not exceed 12 to 15 inches. From Nashville upward, the Cumberland is navigable for steamboats, in ordinary high water, to Burkesville, Kentucky, 600 miles above its mouth, or 400 miles above Nashville.

The bars of the Cumberland river, that give occasion to its numerous shoals, are generally composed of rock, affording substantial foundations for dams, &c. The bar at the site contemplated for the dam above Nashville is of this character. The descent of the water in its passage across this bar amounts probably to two or three feet.

Most of the stone coal used at Nashville is procured from the spurs of Cumberland mountain, near the head of navigation on Cumberland river, at a cost of about twenty cents per bushel. Supplies of this article to a considerable amount may also be brought from the coal mines of Pittsburg,

Wheeling, and other points on the Ohio river, at a cost of twenty or twenty-five cents per bushel.

An extensive rolling mill is now in operation at this place, at which large quantities of bar, boiler, sheet, and nail iron are manufactured of blooms obtained from forges in this part of the country. The iron thus wrought is offered in market at prices varying from five to eight cents per pound.

Building materials of all kinds are to be had in abundance at Nashville, but at prices, so far as relates to sawed lumber in particular, somewhat in advance of those at which the same description of materials may be had on the Ohio river and at Cairo.

Provisions of all kinds also are abundant and cheap, with the exception of beef, pork, lard, &c., which command higher prices here than on the Ohio and Mississippi rivers.

There are no less than five macadam turnpikes radiating from this point, viz: one northeastwardly, to Gallatin; another eastwardly, to Lebanon; a third southeastwardly, to Murfreesborough; a fourth southwestwardly, to Franklin; and the fifth westwardly, toward Memphis.

For further information in reference to the site near Nashville, see Appendix, documents Nos. 26, 27, 28, and 108.

SITE AT THE FALLS OF THE CANEY FORK OF CUMBERLAND RIVER.

The Caney fork enters the Cumberland at a point near the town of Carthage, one hundred and fifty miles above Nashville. It is said to be navigable for keel boats of one hundred to one hundred and forty tons burden during seven or eight months in the year, affording a low-water depth equal to that of the Cumberland between Nashville and its mouth. It is supposed that it may be rendered navigable for small steamboats of a similar draught, during the same periods, by the removal of trees, &c., overhanging the channel. In extreme low water, its greatest depth in the shoalest parts of its main channel is only one foot. From the head of navigation to the foot of the main falls, the distance, following the course of the stream, is about five miles. In this distance, the aggregate descent is estimated at between twenty and thirty feet, which will of course ever prevent the passage of boats of burden further up the river.

The country in the vicinity of the river, especially near the falls, is very elevated, rising from one hundred and fifty to two hundred and fifty feet above the surface of the water, and in many places is much divided and diversified by ravines, valleys, sinks, &c.

No site of easy access from the shores of the river, of an aspect sufficiently even and uniform, and in extent sufficient for the accommodation of the buildings of an armory, is to be found in this neighborhood. Any position that might be selected for this purpose must unavoidably be elevated at least one hundred feet above any appropriate site that can be found for the accommodation of machine shops or the display of the water power.

The site deemed most practicable for the purposes under consideration, although very objectionable on account of its elevation and the unevenness of its surface, is a peninsula situated between the Caney fork and Collins river, (which have their confluence immediately above this point,) containing five hundred acres of ground, partially cleared and under improvement, which the proprietor will sell for a sum not exceeding $3,000, together with the water privileges connected with the same. The position that must be occupied

by the machine shops is the declivity of the river hill, on the left side of Caney fork, contiguous to the neck of the peninsula, which rises from a precipitous basement of solid rock twenty to thirty feet high, by a slope of twenty to thirty degrees, to the summit of the neck, about two hundred and fifty feet above the surface of the stream last mentioned, but not more than one hundred and fifty above that of Collins river. From this position a road may be formed upon the hill side, rising at an angle of four degrees, and reaching the summit of the site in a distance of about six hundred yards.

The main consideration that gives this locality claims to attention is the extensive and magnificent water power which may here be created by the use of these two streams. In the distance of less than two hundred yards, adjacent to the proposed site of the machine shops, the river embraces two cascades of more than twenty feet each, and has an aggregate fall, in low water, of more than fifty feet. Owing to the narrowness of the channel, or rather chasm, below, which appears too limited to afford a free passage for the water in a high freshet, the current becomes checked at the foot of these falls, and back water accumulates to the depth of twenty feet; thereby neutralizing a portion of the fall, but leaving still an efficient descent of about thirty feet.

In order to command the power afforded by the falls, and for the purpose of supporting the machine shops through which this power is to be displayed, extensive walls of great height and strength will be required. The walls may rest upon the bed of the river and a tabular bar of about the same level, both of which are composed of solid rock, and must rise to the height of between thirty and forty feet above their foundation.

The requisite power for the purposes in view may be more readily and more economically obtained, however, in the following manner:

The distance through the neck or isthmus of the peninsula above mentioned, beginning at the surface of low water in Collins river, and passing horizontally through the neck to the valley of Caney fork, is only about one hundred and twenty yards. On this line a tunnel of suitable transverse dimensions may be opened, through which to convey the waters of Collins river to a position near that proposed for the machine shops, which by this arrangement may have a more elevated location and be made more commodious in all respects. In this position the foundations of the shops may be laid at or above the tops of the river cliffs, which rise perpendicularly about thirty feet above the bed of the river; thus obviating the necessity of heavy and expensive walls for the support of these structures.

The fall afforded by this arrangement will amount to about eighty feet, clear of back water, in the highest stage of the river; and, by the erection of a dam, ten feet high, across Collins river, below the head of the tunnel, may be increased to ninety feet. There is, however, a difficulty in the way of carrying this plan into effect, which is deserving of particular notice. The head of the proposed tunnel is near the extremity of a bend or detour of Collins river, near the gorge of which there is said to be a subterraneous channel, through which a part of the water of the river is conveyed from its bed at a point above the site of the contemplated dam, and restored to the main river again at a point below the same.

This being the case, it will be proper to prevent such a waste of the water by stopping up the subterraneous channel at its head.

The quantity of water afforded by the Caney fork above the mouth of Collins river, in a very low stage, is said to be at least 15,000 cubic feet per minute. That afforded by Collins river, in a similar stage, is supposed

to be fully equal to that of Caney fork, making the aggregate quantity of both combined at least 30,000 cubic feet per minute, in the dryest season.

The building stone in this vicinity consists principally of limestone in horizontal strata. That found in the bed of the river and at the bases of the hills abounds in flinty concretions, which render it difficult to dress. Stone of the same character, but of a superior quality, is found in more elevated situations, and is far better adapted to the purposes of building.

The timber growth embraces all the varieties common to the country on Harpeth river, and lumber of all kinds may be furnished on terms quite as favorable.

The soil is generally indifferent, and a few spots only deserve a higher estimation than that of second rate. Its products, however, are of sufficient variety and abundance to supply the exigencies of a far more numerous population than that which at presents inhabits this part of the country.

Bituminous coal abounds in the Cumberland mountain and its spurs, and has been found within a distance of eight or ten miles from this place. Its cost, delivered in this neighborhood, owing to the unevenness of the country and the present unimproved state of the roads over which it has to be conveyed, is twenty cents per bushel; it could no doubt be afforded at fifteen cents or less per bushel.

Iron ore of a good quality is said to abound in many places. A furnace for smelting this mineral, and a forge at which bar iron is manufactured from the pig, are in operation within a few miles of the site.

This locality was examined by the armory commissioners of 1823, who duly appreciated the importance of its water privileges, but regarded it as objectionable on account of the inequalities of surface on the grounds around, the abruptness and height of the river hills, and its remoteness from uninterrupted navigation.

In recommendation of this position, see documents 29, 30, 31, 32, 33, 34, and 35, in the Appendix.

SITE AT STONE FORT, TENNESSEE.

The remarkable antiquity denominated "the stone fort" contains an area of 37½ acres, and occupies an elevated portion of a peninsula situated between two considerable tributaries of Duck river, called the Barren and Bark Camp forks. This area presents a rolling aspect, and is surrounded almost entirely by parapets of earth and stones, taken from the surface and rudely thrown together, in a manner to form embankments, rising at present from three to eight or ten feet above their bases. On the banks or bluffs of the Barren fork the parapet is intermitted for a few yards, and on the Bark Camp fork a similar interruption occurs on a distance of about 300 yards. The probable reason for these intermissions was, that, as the bluffs here presented high perpendicular precipices, no defences were required. At the gorge of the peninsula, where the distance across the neck from one fork to the other does not exceed one hundred and fifty yards, are the gateways or sally parts of the fort, more strongly fortified by parapets and mounds of greater heights than any other part of the work. At this point the elevation of the enclosed area above the surface of the two streams does not probably exceed thirty-five or forty feet, while at the lower and broader part, which has a width of about 400 yards, its elevation is about 120 feet—the difference in these respective elevations being occa-

sioned principally by the great descent of the two streams, in their passage from the upper to the lower extremity of the fort.

The site contemplated for the armory embraces the entire peninsula, together with a contiguous tract extending upward between the forks to the Nashville road, and another tract on the northerly side of the Barren fork, opposite to those above mentioned, the whole embracing 1,000 acres. The ground here specified, together with the water-privileges connected with the same, may probably be purchased of its proprietor, Colonel Hynds, of Nashville, on reasonable terms. The position deemed most suitable for the buildings of an armory, exclusive of machine shops, is the area included within the walls of the fort.

The aggregate fall of water at this place, which consists of a series of cascades and intervening rapids in both of the streams, amounts to between forty and fifty feet, clear of back water, in a distance of about half a mile. The quantity of the water supplied by either of the forks in the dryest seasons appears never to have been ascertained; but with the fall above mentioned it is believed to be amply sufficient for all the purposes of an armory, so far as relates to a motive power. The quantity afforded by the Barren fork is supposed to be nearly double that furnished by the Bark Camp fork.

The method deemed most appropriate for the creation of a water power, embracing the forces of both streams, is as follows:

A dam fifteen feet high may be constructed across the Bark Camp fork, a little above its uppermost cascade, and near the site of a dam of six feet height, already built to supply a water power for a mill now in operation a little below. From the pool thus formed, a canal or race must be opened across the neck of the peninsula, through which the water of the Bark Camp fork may be conveyed into the channel of the Barren fork. Another dam of an elevation somewhat less may be reared across the stream last mentioned, a little above its uppermost cascade—thus forming a pool to be supplied by both forks, and affording a head and fall of about sixty feet. From the pool last mentioned a race may lead downward, on the northerly or right side of the Barren fork, one hundred and fifty or two hundred yards, to a position suitable for the erection of machine shops and for the display of the water power.

The locality under consideration is embraced within the limits of the extensive region known by the name of the Barrens, the soil of which no where surpasses that of second-rate land, and in many places is quite unproductive. The best crops of corn and wheat seldom exceed thirty bushels per acre of the former, and eighteen of the latter. The country generally appears to be better adapted to grazing than to the purposes of agriculture.

The timber growth of the Barrens consists of post, white, black, Spanish, red, and pin oaks, yellow poplar, chestnut, hickory, maple, dog wood, &c.; while, in the valleys of the principal streams, black walnut, white and blue ash, wild cherry, sugar tree, red beach, linden, hackberry, honey and black locust, mulberry, &c., are found in greater or less abundance.

The rocks nearest to the surface of the ground are generally hard sandstone, of no particular value as a building material. Limestone, better adapted to this use, is found at various localities, but not generally diffused through this region. This rock abounds near the confluence of the Barren and Bark Camp forks.

Iron ore of a good quality is abundant in this part of the country. Stone coal may be obtained from the Cumberland mountain, at the distance of twelve or fourteen miles from the site, at an expense of from fifteen to twenty cents per bushel.

This locality is situated at the head of Duck river, (which is made up by the confluence of the two forks above mentioned,) about twenty miles by land above Shelbyville, and fifty-five miles above Columbia. This river is said to be navigable for keel boats during a small portion of the year, from its mouth to the place last mentioned; but its navigation is represented as difficult, owing to the rapidity of the current, and its numerous shoals and other obstructions. The nearest point accessible by steamboat navigation is on the Tennessee river, near Jasper, forty-eight miles southeastwardly from the site. In this direction, however, any line of communication must cross the Cumberland mountain, which rises eight or nine hundred feet above the table of the Barrens, and twelve to fourteen hundred feet above the valley of the Tennessee. In the opposite or northwestwardly direction, the nearest point to navigation is at Nashville, sixty-five miles distant. The distance from the site southwestwardly to Triana, on the Tennessee river, below Huntsville, is seventy-five miles.

The commissioners of 1823 visited this place; and although they believed the water power sufficient for an armory in all seasons, and regarded the surface of the country as favorable for the location of such an establishment, yet they deemed its remoteness from navigation, and the difficulties of obtaining the necessary supplies of materials, provisions, &c., to the full extent required, as highly objectionable.

See Appendix, documents Nos. 33 and 34, already cited.

SITE NEAR PADUCAH, KENTUCKY.

Paducah occupies a position on the south bank of the Ohio river, and on the margin of a vast plain, elevated from six to fifteen or twenty feet above the reach of the highest freshets, and extending backward from the river, in every direction, to an indefinite distance. Two or three miles from town the plain unites, and becomes identified with the Barrens of western Kentucky and Tennessee, and embraces by far the largest portion of the country situated between the Tennessee and Mississippi rivers.

The surface of the plain, for several miles above, below, and back of the town, is slightly waving, and is here and there traversed by ravines and watercourses of a moderate depth; the most considerable of which are the valleys of Clark's river, which enters the Tennessee four miles above Paducah; that of Island creek, entering the Ohio about one mile above; and that of Perkins's creek, entering the same about four and a half miles below the town.

Directly below the mouth proper of the Tennessee river is an island, a little more than one mile long and four or five hundred yards wide, the channel between which and the Kentucky or Paducah shore is 420 yards wide; and between the head of the island and the point of land immediately above the junction of the Ohio and Tennessee rivers the width of the slough or channel is 770 yards. Whenever a freshet occurs in the Tennessee during a low stage of the Ohio, the water of the former discharges itself partly above and partly below the island. But when a freshet prevails in the Ohio, the Tennessee being at a low stage, the dis-

charge of the latter is confined to the channel between the island and Paducah shore, through which probably a portion of the water of the Ohio passes, the current at the head of the island being reversed.

The distance from the town upward to the point between the Ohio and Tennessee is a little more than two miles. This point or narrow tongue of land, for a distance of about a mile upward on both rivers, where it attains a width of about 200 yards, is subject to inundation during the higher freshets; which is also true of the island below, that is somewhat more elevated.

A strip of bottom land situated between the margin of the river and the plain of the town, extending from a point on the shore midway of the town site, where it has a width of about fifty yards, downward four and a half miles to the mouth of Perkins's creek, where it has a width of five or six hundred yards, is also subject to inundation whenever the island is overflowed. With these exceptions, together with the valleys of Island and Perkins's creeks above mentioned, and a few small ravines at and near their outlets, the country in the neighborhood of Paducah, on the south side of the Ohio, is entirely exempt from overflows in the highest freshets.

The highest freshet in the Ohio river, of which we could get any account, occurred in 1828, at the extreme rise of which the surface attained an elevation of between forty-five and forty-six feet above extreme low-water mark. At the height of this freshet the water backed upward in the valleys of Island and Perkins's creeks, and through a ravine about a mile from the town, twenty-five to thirty yards wide, uniting these two valleys so as completely to insulate the town site and the adjacent grounds. The depth of the overflow, however, at the summit, between the two creeks, was only about six inches, and in other parts of the ravine did not exceed eighteen inches or two feet. Its duration at this height was for a short time only.

The distance from Paducah to the mouth of the Ohio is forty-five miles, through which the river is navigable for boats drawing three feet in the lowest stage of the river. The navigation on this part of the Ohio is never obstructed by ice, except when brought down in large quantities from above. The temperature of the water from the Tennessee, as before observed, is such as to prevent the Ohio from being frozen over below the junction of these two streams.

The Tennessee is also said to be navigable at all times for about forty miles from its mouth for any boats that can pass the mouth of the Ohio to this place, and for boats of two and a half feet draught to the Big bend, 240 miles from its mouth, even in the lowest stage known by the oldest navigators of this river. During a period of twenty-two years, two or three weeks only have occurred during which boats of the draught just mentioned could not ascend even to Waterloo, 250 miles above Paducah.

The soil of the plain and barrens, before mentioned, is generally rich, and well adapted to the culture of corn, rye, oats, hemp, flax, potatoes, turnips, apples, pears, peaches, &c.

The natural growth is somewhat scattering, but embraces a great variety of timber trees, consisting of post, red, and white oak, yellow poplar, black and sweet gum, shellbark hickory, &c. The valleys, besides several of the varieties above mentioned, afford, in addition to the same, a dense growth of bur oak, black walnut, catalpa, red elm, white ash, hackberry, cotton wood, sycamore, cypress, &c.

The cost of necessary provisions, lumber, &c., delivered at Paducah, is as follows, viz :

Corn, per barrel	20 to 25 cts.
Flour, per barrel	$4 to $6.
Beans, per bushel	37½ to 50 ts.
Oats, per bushel	20 cts.
Potatoes, per bushel	25 to 37 cts.
Turnips, per bushel	12½ to 25 cts.
Pork, per pound	2 to 2½ cts.
Beef, per pound	2 to 3 cts.
Lard, per pound	5 to 6 cts.
Tallow, per pound	8 cts.
Butter, per pound	10 to 12½ cts.
Chickens, per dozen	75 cts. to $1.
Eggs, per dozen	6 to 8 cts.
Bacon, per pound	5 to 6 cts.
Salt, per bushel, (or 50 pounds)	50 cts.
Hay, per ton	$10.

Groceries of all kinds are obtained at retail prices, but little in advance of those at New Orleans.

Sawed lumber, in boards, planks, scantling, of the following varieties, viz ; oak, elm, gum, cotton wood, beech, chestnut, poplar, black walnut, yellow pine, cypress, &c., per thousand, board measure	$10.
White ash, cherry, cedar, per thousand	$12 50.
White pine, from the Allegany river, per thousand, board measure	$12 to $30.
Cypress shingles, per thousand	$2 to $2 50.
Building stone, consisting of sandstone, per perch	$1.
Building stone, consisting of limestone, per perch	$1 50.
Bricks, per thousand, from the kiln	$4 50.
Bricks, per thousand, laid, including all expenses	$9.
Lime, per barrel, unslaked	50 to 75 cts.
Lime, per bushel, unslaked	17 to 25 cts.

Hydraulic lime may be procured at various points on and near the Ohio river above Paducah, at a cost probably not exceeding 25 cents per bushel.

Sandstone suitable for building purposes is found in abundance, in the bluffs of the Tennessee, about six miles above Paducah.

Limestone may be obtained from the river hills on the south side of the Ohio, at the distance of ten miles above Paducah, and at sundry other localities in that neighborhood.

Bituminous coal may be obtained from the numerous coal mines on the Ohio heretofore noticed, at a cost of 8 or 10 cents per bushel.

Iron ore resembling that found on the Cumberland, in all its characters, abounds on both sides of the Tennessee river, from near its mouth to the Muscle shoals, 300 miles above, and probably to a much greater extent.

Iron from this river can be furnished on terms quite as favorable as that from Cumberland river.

The position deemed most suitable for the armory in this vicinity is a portion of the extensive plain already described, situated immediately above the mouth of Island creek, and extending from this point upward about a mile to the mouth proper of Tennessee river. Bold and commodious

landings are presented along the whole of this shore, from Paducah upward to the mouth of the Tennessee, through a distance of two or three miles.

Throughout this distance the plain presents itself immediately at the margin of the river, where it rises six or eight feet above the reach of the highest freshet, and is bounded by bluff banks more than 50 feet above extreme low water.

A tract of land of 4,160 acres, with a mile or more front on the river, and embracing the site above proposed, is the property of G. Woolfolk, Esq., of Paducah, who offers to sell the whole as a site for the armory at $3 per acre, or 1,000 acres of the same nearest to the margin of the river at $10 per acre.

The best locality for the workshops, dwelling-houses, &c., seems to be on the bank of the river, in the centre of Woolfolk's tract, immediately opposite to the pass between the island and the point above the confluence of the Tennessee with the Ohio river, and one mile and a half distant from Paducah.

It is a bluff bank, with a deep landing in front, and the position opens beautifully, both upon the Ohio and Tennessee rivers.

The elevation of the ground, as was said before, is 7 or 8 feet above the highest freshets; and its surface, although remarkably level, is nevertheless susceptible of easy and effectual drainage in every direction.

Steam, generated by the use of bituminous coal or other fuel, is the only agent that can be employed at this locality for propelling the machinery of an armory.

From the topography of the country around, this position may be regarded as comparatively healthy. The grounds subject to overflow in its vicinity are an extensive bottom on the Illinois side, a similar tract of considerable extent occupying the tongue or point of land between the Ohio and Tennessee rivers, and the island at the mouth of the latter—these several tracts, during the sickly seasons of the year, situated to the leeward of the site; and, of course, the miasmata arising therefrom are not likely to interfere materially with the salubrity of the position.

For further information in reference to this site, see Appendix, documents 36 and 37.

[At this point in their examinations (28th February, 1842) the board adjourned to the 1st of May, but were prevented from meeting until the 1st of July.]

SITE AT MEMPHIS.

The board, having resumed its duties at Paducah on the 2d of July, proceeded, in compliance with the recommendation of the Legislature of Tennessee and a memorial of the citizens of the place, to the city of Memphis, and examined the country in that vicinity.

Memphis is situated on the left bank of the Mississippi, 808 miles from New Orleans, (or 920 miles from the Gulf of Mexico,) 576 miles above the mouth of Red river, 176 miles above the mouth of Arkansas river, 230 miles below the mouth of the Ohio, and 430 miles below St. Louis.

It occupies a commanding eminence, (heretofore called the fourth Chickasaw bluff,) elevated 75 or 80 feet above the river, and embraces the former site of Fort Pike, near the mouth of Wolf river, and that of Fort Pickering, at the lower extremity of the bluff and about two miles below the mouth of Wolf river. The aspect of the country between these two points is that of an unbroken plain, separated from the river by a precipitous

bank of earth, gravel, indurated clay, subject in places to the undermining influences of the river; but, on retiring a few hundred yards back from the river, the aspect gradually changes from plain to rolling, and, at a distance of a quarter to half or three-fourths of a mile, is much broken by ravines and gullies, some of which lead into a small bayou, which enters Wolf river 500 yards from its mouth, and others into a similar stream entering the Mississippi a little below Fort Pickering. The plain, however, is sufficient to accommodate the city of Memphis extended far beyond the limits of its present improvements, together with the two incipient towns, South Memphis and Fort Pickering; and, but for the distribution of its entire surface into town lots, streets, public squares, &c., would present the most favorable locality for the armory any where to be found in this neighborhood. The valley of Wolf river presents extensive flats and bottoms, more or less subject to overflows from the river during periods of high water. The soil of these is exuberant in a high degree, and supports a dense and heavy growth of timber, shrubbery, and vines, in its natural state, and, when cultivated, yields abundant crops of corn, cotton, &c. The same is also true of other valleys in the environs of Memphis, and especially of that of Nonconnah creek, which rises several miles to the eastward of the city, approaches within a few miles of town, then deflects southwardly, and enters the Mississippi about five miles below Memphis and opposite to President island.

Between this stream and the river, and from the point where it approaches nearest to Memphis, downward to its mouth, is also an extensive plain, considerably less elevated than that of Memphis, the surface of which is for the most part exceedingly flat, and occasionally presents pools of stagnant water. The margins of this plain, especially that bordering on the Mississippi, are here and there deeply indented by ravines and gullies, through which are presented easy passages from the bottoms or flats upward to the surface of the plain.

Between Wolf river and Nonconnah is a broad flat ridge or swell, of moderate elevation, probably 30 to 40 or 50 feet above the plain of Memphis, which slopes very gently from its summit downward on both sides to the streams above mentioned, which flow at its base. Across this ridge are one or more passes, through depressions so low that it is believed that, with the aid of a cut of moderate extent, 30 to 40 feet deep, the water of Wolf river may be conveyed from a point near Germantown, 52 miles from the mouth of that stream, following its meanderings in a canal or race leading across the ridge, and discharged into the Mississippi at almost any point between Fort Pickering and the mouth of Nonconnah. The elevation of low-water surface of Wolf river at Germantown, above low water of the Mississippi in this vicinity, is said to be about 80 feet, after deducting the declivity necessary for a proper current in the canal. The distance from Germantown to the Mississippi, by Wolf river, as before stated, is 52 miles; from the same point to the Mississippi, by a direct line, about 15 miles; and by any route practicable for a canal or race, probably 20 or 25 miles.

In reference to the quantity of water afforded by Wolf river at Germantown, no measurements have been made with sufficient accuracy to give results entitled to much confidence; it is believed, however, that 15,000 cubic feet per minute may be relied on as the approximate supply.

On the west side of the Mississippi, opposite to Memphis, is an exten-

sive tract of bottom land, subject to overflows in very high freshets, and covered with a dense and heavy growth of timber, shrubbery, &c. This tract is included within an extensive detour of the river, which gives it the character of a peninsula. It is united to the uplands on the west by a neck less than a mile in width, against which the current impinges on both sides with much force. The violence of this action has been much abated, however, for several years past, and no doubts are at present entertained with respect to the permanency of the neck.

Two and a half miles below Memphis commences a large island, six miles long and more than half a mile wide, called President's island, on the easterly side of which is a narrow channel, 200 to 300 yards wide—the shortest and most frequented by steamboats during the more elevated stages of the river. The channel on the westerly side is much wider, and affords a greater low-water depth.

The Mississippi river is navigable from its mouth to Memphis, in the lowest stages of the river, for boats drawing six feet of water. Boats of this draught have occasionally grounded in the deepest channel, in very low water. From Memphis to the mouth of the Ohio, boats drawing five feet can pass with equal facility; thence to St. Louis, stages of the river have occurred in which boats of four feet draught have found it difficult to pass several of the numerous shoals that occur in that part of the river.

From Memphis, downward, the Mississippi has never been known to freeze over, but floating ice has occasionally prevailed in greater or less abundance, at Memphis, and even as low down as Vicksburg, nearly four hundred miles below.

The National road, leading from the Mississippi river, westward, to Little Rock, in Arkansas, has its commencement on the west bank of the river, opposite to Memphis.

This road has been constructed only on a distance of about thirty-one miles from the point of beginning, to St. Francis river. It consists of an elevated causeway of earth, which is said to be well formed and consolidated, and easy for travel and transportation in dry weather, but muddy and difficult in wet. The distance from Memphis to Little Rock, by this route, is estimated at one hundred and fifty miles.

A railroad, leading eastward from Memphis to La Grange, fifty-two miles, has been commenced, and is now in operation for a distance of several miles. In the projection of this road, a connexion with the Tuscumbia and Decatur railroad, on the Tennessee river, in Alabama, was contemplated.

The shortest route from Memphis, eastward, to the Tennessee river, embraces a distance of one hundred and two miles, reaching this stream at Savannah, two hundred and twelve miles above its mouth, or sixty-two miles below Florence, Alabama.

Of the localities in the neighborhood of Memphis, two only are deemed worthy of particular notice, as sites for the contemplated armory: one situated on the southerly side of Wolf river, between a half and one and a half or two miles from its mouth, and the other on the margin of the plain below Fort Pickering, between two and a quarter and three miles below Memphis, and nearly opposite to the head of President's island; both of which, and especially the latter, are elevated considerably above the reach of the highest floods.

The site on Wolf river embraces a tract of low upland of a waving as-

pect, containing about seven hundred acres, covered with the ordinary woodland growth of this part of the country. The valleys of Wolf and Loosahatchie rivers, the latter of which enters the former in the vicinity of the site, are broad and flat, embracing large tracts of densely wooded bottom lands, subject to inundation at every considerable rise of the Mississippi. Its proximity to grounds of this character cannot fail to have an injurious effect with respect to the salubrity of the position.

Whenever the Mississippi is at a stage exceeding eight or ten feet above its lowest, Wolf river is navigable to this site, and even beyond it, for boats of almost any burden; but, during the continuance of low water, steamers of the smallest class cannot enter even its mouth, owing to the shoalness and narrowness of its channel, the sunken logs imbedded in the bottom and sides, and to the rapidity of its current, which has a descent of some three or four feet, in its passage from the site to the Mississippi, in extreme low water. Moreover, in the event of a freshet in Wolf river, during a very low stage of the Mississippi, which occurs more or less frequently every year, the water rushes with great violence past the site, sweeping along with it boats, rafts, and other floating substances in the way of its progress, and precipitates them into the Mississippi.

In the vicinity of this site, and at the distance of a mile and a half from Memphis, is an arsenal, established within a few years past by the United States. The buildings of the arsenal are of brick, and have been erected at considerable expense. Its site embraces eight acres of ground, of a low and flat aspect, which was purchased at the rate of $200 per acre.

The site, as above described, embraces an area of about seven hundred acres, situated between the arsenal and Wolf river, and adjacent to the latter, which has been offered at a rate not exceeding $40 per acre, for the purposes of the Western armory.

The position below Memphis occupies a portion of the extensive plain situated between the Mississippi and Nonconnah creek, and is regarded as more favorable on account of its accessibility, salubrity, its greater distance from the city, and on various other accounts, than that above considered. The tract embraced by the site here proposed has a front of about half a mile on the river, immediately opposite to the head of President's island, and extends back, in the form of a parallelogram, far enough to include six or eight hundred acres, which may be purchased at a rate not exceeding $30 per acre, in accordance with offers made by the proprietors of the land. This tract presents a plain or slightly rolling surface, is for the most part unimproved, possesses a rich soil, and sustains a heavy growth of timber of an excellent quality. It is elevated sixty or seventy feet above the Mississippi, from which it is separated by a mural bluff like that binding the plain of Memphis, at the base of which, and near the level of high water, is a strip or berm of bottom land thirty to fifty yards wide, intervening between the base of the bluff and the margin of the river.

The site is accessible from the river by two or more ravines, through which roads of easy ascent may be carried, from the water's edge, quite to the surface of the plain. The landings, especially at and near the upper corner of the site, are said to be very good, and easy of access in all stages of the river.

The mechanical power contemplated to be used at this site is that of water, derived from Wolf river, at Germantown, as before mentioned, and conveyed hither by means of a canal or race of suitable dimensions, the

appropriate locality of which cannot be assigned, for want of surveys showing the nature of the ground over which it must pass. The extent of such a work will not probably exceed twenty-five miles; its cost, including a dam at Germantown, a deep cut or tunnel through the Nonconnah ridge, together with several embankments and aqueducts across ravines, cannot be estimated at less than $200,000. The minimum quantity of water furnished by the river at Germantown being fifteen thousand cubic feet per minute, and two thousand five hundred feet of this quantity being required to compensate for the loss by evaporation, leakage, absorption, &c., on an extent of twenty-five miles, we shall have for efficent action in generating power twelve thousand five hundred cubic feet per minute. This quantity, acting with a head and fall of forty-five feet, which is considerably less than the difference between the level at Germantown and that of extreme high water at the site, will afford an effective power of more than six hundred horses, if applied to overshot wheels. This estimate of the quantity and power may seem exaggerated, yet, if the data that have been furnished are correct, the computation is considerably within the limits of the results that may be actually realized.

In reference to the power contemplated for the Wolf river site, it is the same as that above stated, except that the water may be taken from Wolf river at a point much lower down, conveyed through a channel or race of less extent, and employed with a head and fall considerably reduced. The expense of creating the necessary water power at this place will of course be somewhat less than that required in connexion with the site below; and the power produced at the former, though much less considerable than at the latter, will nevertheless be amply sufficient for the purposes of the armory. Both sites may be readily supplied with the requisite materials for building, at a comparatively moderate expense, except the stone and lime required for the purpose, which will have to be procured from remote points, and at very considerable expense.

Brick clay of a good quality is abundant and convenient; and the neighboring forests afford timber of an excellent quality in great abundance. The timber growth of the country comprehends the following varieties, viz: White, post, red and bur oak, white ash, poplar, black and white walnut, red and white hickory, black and sweet gum, mulberry, locust, maple, cypress in the swamps, cotton wood, sycamore, &c., in the bottoms.

Among the mineral products of this part of the country hitherto developed, coal has not as yet been discovered, except in veins a few inches thick only, which are said to have been found in numerous localities. Supplies of coal for an armory or any other manufacturing purposes must be obtained from abroad. The nearest localities at which this article has been found in any considerable abundance are at Tradewater river, Caseyville, Kentucky, one hundred and six miles up the Ohio, and on Muddy river, Illinois, three hundred and eighty miles above Memphis.

From the nature of the surrounding country, as already described, we cannot bring ourselves to believe otherwise than that Memphis occupies an unhealthy position. With climate and local causes both combining to produce indisposition, malarial disease must necessarily prevail to considerable extent in the summer and fall of each year. This locality is represented to be much less sickly than formerly, owing to the expansion of the town and the opening and cultivation of the grounds around. Judging from these favorable changes, that have been wrought by the partial improvements

already made, it may be reasonably anticipated that when the country shall be more extensively cleared and cultivated, more especially should the atmosphere of the place hereafter have the neutralizing influence of fires from furnaces, workshops, &c., Memphis will become comparatively healthy.

For further information touching the advantages possessed by Memphis for the establishment of a national armory, naval depot, &c., see documents Nos. 33, 34, 35, 38, and 108, of the Appendix.

SITE AT FULTON.

Fulton is situated on a high point of land, known as the upper or first Chickasaw bluff, on the east side of the Mississippi, four miles above the confluence of the Big Hatchie with that river, sixty-five miles above Memphis, one hundred and sixty-five miles below the mouth of the Ohio, one hundred miles westward from Brownsport on Tennessee river, and forty-five eastward from the uplands on the west side of St. Francis river. On the distance last mentioned, which embraces the entire width of the low-land valley of the Mississippi near this place, a route for a railroad has been surveyed, and found practicable under circumstances somewhat favorable. The ground for three-fourths of the distance is elevated above the highest freshets; on the residue, and especially across a low tract called the Bay, west of the St. Francis river, the surface is occasionally inundated to the depth of several feet. The St. Francis, which is usually divided into numerous bayous, here occupies but one channel, bounded by alluvial banks rising within a few feet of extreme high water, and is supposed to be navigable for small steamers from the bay to its mouth.

Big Hatchie river is navigable for steamboats about sixty miles during the more elevated stages of the water. It enters the Mississippi by two mouths, or rather in rear of an island, the head of which is four miles, and the foot eight miles below Fulton.

The width of the Mississippi at Fulton is about 1,100 yards. In its progress downward, it expands to more than double that width, and embosoms a large island, containing several hundred acres of land. In extreme cold weather, it has been known to be covered from shore to shore with drift ice, brought down from the waters above, and arrested in its progress by islands, &c., below this point. Such an occurrence, however, has not been witnessed in the lapse of several years.

The bluffs or highlands at Fulton present a very uneven aspect, being much divided by deep narrow ravines, especially near the river. A little below the town site, and a few hundred yards back from the river, the surface subsides to an elevation of only 20 or 30 feet above the reach of the highest freshets, and spreads into an extensive plain of remarkable fertility, and of a waving aspect, separated from the river by a chain of knobs, into which the river bluffs are here divided.

The plain just mentioned may with more propriety, perhaps, be regarded as an extensive basin, embracing four or five hundred acres of first-rate land, bounded northwardly and eastwardly by elevated grounds, connected with the highland point or ridge formed above the junction of the Mississippi and Hatchie rivers; on the westwardly side, by the chain of knobs before mentioned, and sloping southwardly by a gentle declivity, till it unites with the bottom or flat lands, near the mouth of the Hatchie.

From this basin there are two easy passages, leading to the margin of the Mississippi, viz: one through a broad ravine of gentle declivity, which passes to the river at a point immediately below the town site of Fulton, where the landing is favorable, except in a low stage of the river; the other, passing from the basin southwardly, and arriving at the shore of the Mississippi, at a point below the chain of knobs, or about a mile below Fulton. The landing is less favorable at this than at the point above.

The site deemed most favorable for the armory in this vicinity embraces the river shore and its chain of knobs, to the extent included between the two landings above mentioned, and extends back from the river in a manner to cover the entire basin already described. The area covered by it is supposed to contain between six and eight hundred acres, which may be purchased of the owner at a rate not exceeding $10 per acre. A small portion of this tract has been cleared and cultivated, while the residue remains unimproved, and sustains a heavy growth of white and bur oak; red, white, and blue oak; black and white walnut; maple, sugar tree, box, elder, sassafras, sweet gum, hickory, birch, white and red elm, pawpaw, &c. We take occasion to observe, that we saw and measured a sassafras tree remarkable for its size, being, at the surface of the ground, 18 feet, and 2½ feet above the surface 15 feet in circumference. Abundant supplies of excellent timber can be had at this site with great convenience.

A vein of coal is said to have been discovered in the bluffs of the Mississippi, about three miles above Fulton, situated at an elevation of ten or twelve feet above low water, and extending upward to Coal creek, where its elevation is considerably less. The vein is said to be about 4 feet thick, and crops out in several places along the valley of the creek just mentioned. The value of this coal remains to be tested, and, from its geological accompaniments, doubts may be fairly entertained with respect to its value as a fuel.

A hard ferruginous sandstone exists in considerable abundance a few miles eastward of Fulton, and has been found serviceable in preparing the foundations of buildings. The scarcity of building stone in this part of the country renders this an object of no small importance. This deficiency, however, is well supplied by the abundance of good brick clay, which is found in almost every locality in this quarter.

It has been supposed that a copious water power may be created at Fulton, by means of a canal for the conveyance of water from the Big Hatchie, some 20 miles above its mouth, to the Mississippi, at or near the town site. A work of this kind, however, must unavoidably be subjected to overflows to a very considerable depth, during the higher stages of the Mississippi, the extreme range of which, in this vicinity, cannot be less than 40 feet.

The attainment of an uninterrupted power at this site must be achieved by a resort to steam, generated by coal, which, in the event of the coal discovered in its vicinity being found suitable for this purpose, will no doubt prove not only more constant, but more economical than water power, attained in the manner above suggested. But, in case supplies of coal are to be derived from abroad, its cost will not be less than 10 or 12 cents per bushel, delivered at the site.

In regard to the healthfulness of the site, it cannot be regarded as less questionable than that of the sites near Memphis. The extensive flats situated between the Mississippi and St. Francis rivers, and those in the valley of the Big Hatchie, which are generally very low and broad, are of a char-

acter to generate miasmata in great profusion, and to infect the atmosphere with pestilential effluvia.

For further information respecting this locality, see Appendix, document No. 39.

SITE AT FORT MASSAC, ILLINOIS.

Massac, or Massacre, (so called from a slaughter by the Indians soon after the occupancy of this part of the country by the French,) is situated on a beautiful plain on the northern side of the Ohio river, 38 miles from its mouth; 10 miles below Paducah, at the mouth of the Tennessee river; 22 miles below Smithland, at the mouth of Cumberland river; 67 miles below the coal fields, in the neighborhood of Caseyville; 293 miles below Louisville; 870 miles below Wheeling; and 960 miles below Pittsburg. It includes the site formerly occupied by a fort of the same name, and commands an extensive view of the river, both above and below. The fort stood upon the highest part of the plain, elevated about 20 feet above the reach of the highest freshets. From this position, which is near the margin of the river, the surface of the plain declines very gradually, both above and below, and especially in the rear—its dip in these directions being so slight that it is hardly perceptible. With the exception of a few small valleys and several narrow ravines, that serve as drains and passways between the plain and the river, no part of the tract has an elevation less than 10 feet above the range of the highest freshet, or 50 feet above extreme low water.

The river in this vicinity has a width varying from five-eighths to three-quarters of a mile, and presents favorable landings along the Illinois shore, from Massac to the head of the Grand Chain, 10 miles below. Through this distance, and, indeed, for an equal extent below, the uplands approach so near the river that bottoms or flats of any considerable area are excluded. A little above the old fort is a cove-like recess, of small dimensions, at the mouth of a run, into which the water of the river in a high stage is backed. Three-fourths of a mile below the same point is another similar recess, of larger extent, at the mouth of another run. Through these depressions, and the runs leading to them, every desirable facility is afforded for draining the surface of the extensive plain on which Massac is situated. The entire width occupied by the river at this place, even when swelled by a freshet to its greatest magnitude, does not exceed a mile, there being no bottom land on the northerly side, and a strip three or four hundred yards wide only, on the southerly side, subject to overflows. The valley becomes wider both above and below Massac, and the bottom lands included within it become much more extensive. The valley is bounded on both sides by gently sloped hills, rather than bluffs, the summits of which are connected with extensive upland regions, of a rolling aspect and of moderate height, reaching far to the north and south, and uniting in the former direction with the Illinois prairies, and in the latter with the barrens of Kentucky and Tennessee.

The Grand Chain is a rocky bar, commencing at a point 10 miles below Massac, and extending downward eight miles to a point two miles above Caledonia, or seventeen miles above the mouth of the river. At the head and foot of this chain or bar, the extreme low-water depth in the deepest channel is only three feet, while at all intermediate points on the bar a much greater depth prevails. So low a stage seldom occurs, the ordinary low-water depth being usually not less than four feet. The rocks that occur at the chain are a coarse hard sandstone, fragments of which, in the shape of

boulders, pebbles, and gravel, are strewed in considerable profusion along the Illinois shore, from the head to the foot of the chain.

At Massac, the river shore presents a coarse conglomerate of sand, gravel, and pebbles, strongly cemented with iron, which here and there occurs in large masses, but for the most part is reduced to fragments which cover the surface of the beach, and form a handsome and firm escarpment, sloping from the surface of the plain to the margin of the water in the lowest stage, thus contributing to form an easy and commodious landing.

The plain of Massac extends northwardly and northwestwardly more than a mile and a half, and presents a surface remarkably uniform, here and there interrupted by ravines or runs of moderate depth, which serve as drains to convey off the water that falls upon its surface.

The land may be regarded as second-rate only, and is mostly unimproved, sustaining an open growth of white and red oak, post oak, poplar, elm, maple, white walnut, &c. When cleared and cultivated, it yields tolerable crops of corn, wheat, potatoes, and other esculent plants and vegetables.

The neighboring bottom lands of the Ohio, both above and below, are exceedingly prolific, and yield abundant crops of all the varieties of products reared in this part of the country.

A tract of 700 acres, including the site of Fort Massac, was formerly reserved by the United States for military purposes; but a few years since the Government was induced to relinquish the reservation, and authorize the sale of the land at public auction. It was bid off and purchased by the present proprietors, Messrs. J. Hynes, of Massac, J. M. Robertson and William Wilson, of Carmi, and A. Kirkpatrick and H. Eddy, of Shawneetown, at $7 per acre. A portion of the tract has been surveyed and laid off in town lots, and constitutes a considerable part of the town of Massac, which has a square form, extending half a mile along the river shore and an equal distance due north from its margin. The southeast angle of the town is situated at a point on the bank of the river, about one-fourth of a mile below the site of the old fort, from which its eastern boundary extends due north about half a mile.

The site deemed most suitable for the armory in this neighborhood is on the east side of the town, and in its immediate vicinity, and embraces the following parcels, viz:

1st. A tract, including the site of old Fort Massac, bounded on the west by the town of Massac, on the north by a line running due east half a mile from a line from the northeast corner of said town, on the east by a line running due south from the termination of the northern boundary just mentioned, and on the south by a line pursuing the margin of the river downward to the southeast angle of said town. This tract or parcel contains 147 acres.

2d. A tract situated on the north side of the tract just mentioned, and of the town site of Massac; its width from south to north being half a mile, and its length from east to west being such that the tract will contain 453 acres—the southerly boundary of this tract being coincident with the northern boundary of the town site, and also with that of the tract first described.

3d. A tract of uniform width, containing 13 acres, may be added to the parcel first described, in contact with the eastern boundary of the same.

4th. A tract of 27 acres may be added to the second tract described, in such manner as may be required for the purpose of giving the most convenient form to the several parcels when combined; it being understood that

no encroachments are to be made upon the town site for the purpose of making up the entire tract.

The aggregate of the several tracts above designated will amount to 640 acres, or one section of land, which, we are authorized by Colonel Haynes, who is agent for the proprietors above named, to state, may be purchased at a rate not exceeding $10 per acre for the several tracts above described; all of which may with propriety be comprehended in the site.

Other sites, deemed less eligible than that above pointed out, are to be met with in this vicinity; for example, a site having a front of half a mile on the river, and situated between the town of Massac and another incipient town, called Metropolis, of about the same area, one mile below Massac, may be regarded as worthy of some attention. It may be extended back from the river far enough to embrace an area sufficiently large for the accommodation of an armory. It has very favorable landings along its entire front, but presents a surface less elevated and more divided by ravines and gullies than the plain of Massac. The grounds in this direction being similar in all respects to those in rear of Fort Massac, the cost of this site will not probably exceed $8 per acre.

Immediately below the town of Metropolis is another site, having a front of a mile on the river, and an equal extent inland from the river, and including about 600 acres of ground, a little less elevated than either of the sites before considered. The landings are here quite as favorable as those above, the surface quite as level, and the soil somewhat richer than at either of the other sites. The entire tract under consideration is in an unimproved state, and covered with a woodland growth. It may be purchased as a site for the armory, at a rate not exceeding $10 per acre.

In comparison with the site at Fort Massac, the two localities last described may be regarded as less favorable, on account of their reduced elevation, their greater liability to the encroachments of high freshets upon their margins, their nearer proximity to tracts of bottom land, and their exposure to a more humid atmosphere.

The position of Massac, and the aspect and character of the surrounding country, seem to indicate as complete exemption from the causes of disease as those of any other position on the Ohio river, from Wheeling to its mouth.

Intermittent and bilious fevers have sometimes prevailed, which is also true of all other points on or near the river; but here, as well as at almost every other locality in the West, in proportion as the population increases and improvements of all kinds are multiplied, the condition of the country, with regard to its healthfulness, will be ameliorated.

The plain of Massac is generally dry, inclining to aridity, except when drenched with copious rains, the water of which may be readily conveyed from its entire surface, by drains of easy formation. No stagnant pools or marshy grounds are to be found upon it or in its neighborhood. The river passes it with a steady and gentle current, from shore to shore. Pure and wholesome water is supplied in sufficient abundance from springs along the shore, and may be obtained on the plain from wells sunk to the depth of 30 or 35 feet.

Inexhaustible supplies, both of stone and cannel coal, of a good quality, may be obtained from the coal fields near Caseyville, 55 miles above the site; and bituminous coal of equal value may be obtained from Muddy river, on the Mississippi, by water conveyance, through a distance of 190 miles. Appearances justify the conclusion, that the southern margin of the

great Illinois coal field passes northwardly on this point, at a distance not greater than 20 or 25 miles.

Sandstone, adapted to the purpose of building, may be obtained from the river hills on the Kentucky side, a few miles above Massac. Limestone abounds within a distance of 20 or 30 miles, and copious supplies of building stone, of a superior quality, may be derived from Tennessee river, at numerous points six miles and upward from its mouth. Brick clay, of a good quality, may be had in abundance at and near the site.

The iron fields of the Cumberland and Tennessee rivers lie at the distance of 20 to 30 miles to the southeast, from which abundant supplies of castings, pig metal, bar, boiler, hoop, sheet, nail iron, and nails, may readily be obtained.

The forests in the neighborhood of the site abound in timber of the following varieties, viz: post, red, bur, and white oak, hickory, yellow poplar, gum, white ash, maple, wild cherry, yellow birch, black walnut, elm, cypress, cotton wood, sycamore, &c.; and lumber of all kinds may be procured in abundance by water transportation from the Ohio, Tennessee, and Cumberland rivers.

Provisions of all kinds can be furnished at Massac in as great profusion and on as favorable terms as at any other point on the Western waters. The rates at which the principal articles of subsistence and various other commodities can be supplied are exhibited in the Appendix. (See document No. 108.)

Massac is accessible at all seasons of the year, and in all stages of the river, to steamboat navigation—the depth across the bars at the Grand Chain, in extreme low water, being at least three feet; which is the minimum depth, not only from the mouth of the Ohio to this place, but to Paducah, ten miles above; and thence up the Tennessee to the Chain, fourteen miles further, where abundant supplies of building stone may be obtained for purposes of construction.

For further information in reference to this site, see Appendix, documents Nos. 40, 41, 42, and 108.

SITES AT BROWNSPORT AND NEAR CARROLLVILLE, TENNESSEE.

Two positions on the Tennessee river having been designated by the Legislature of Tennessee as suitable sites for the armory, (viz: one at Brownsport, 156 miles above the mouth of the river, and the other at or near the point at which a projected road, called the central turnpike road of the State of Tennessee, leading southwestwardly from Nashville, is to have its termination,) the board visited these positions on the 17th of July, and made such inquiries and examinations in relation to the same as were deemed requisite and proper in the discharge of their duties.

The country on the Tennessee river, from near its mouth to Waterloo, 244 miles, exhibits the following features. The river valley has a general width of about half a mile, or 1,000 yards—seldom exceeding a mile in the widest part. It is generally bounded by abrupt hills or bluffs, in most places faced with mural precipices of limestone and sandstone, in strata nearly horizontal, which afford, in the greatest abundance, building stone of the best quality. The bottom lands included within the valley are generally low and flat, and subject to inundations to various depths during ordinary high freshets—even to 15 or 20 feet, in places, in extreme high water. The river hills and uplands rise to a height of 100 to 150 feet above

the valleys, and in the vicinity of the watercourses are much divided by ravines and gullies, and, when viewed from the river, present the appearance of a succession of knobs on both sides. On retiring inland from the river valley in both directions, we enter upon tracts of a more even and uniform aspect, constituting the extensive regions of tabular lands called the Barrens.

The Tennessee river is navigable at all times from its mouth to Waterloo, 244 miles, except at a pass about five miles long, called the Big Bend shoals, 224 miles from the mouth, where boats drawing more than 17 or 18 inches have been obstructed in their progress during extreme low water. In all stages two or three feet above the lowest, no river of the West affords a more easy or commodious navigation.

The valleys afford a dense and heavy growth of white, red, post, and bur oak; hickory, ash, maple, poplar, beech, black walnut, sugar tree, cotton wood, sycamore, gum, locust, iron wood, dog wood, &c. The growth upon the highlands and barrens is generally scattering, and of a scrubby character, consisting of hickory, post oak, blackjack, sumac, chinkapin, &c., interspersed in places with yellow or hard pine of a stately growth.

The country on both sides of the river, but more especially on the east, abounds with iron ore of an excellent quality, and furnaces for smelting it have been established at several points on both sides; at which pig metal is produced in considerable quantities, and can be afforded at $22 per ton.

The population of the country is very scattering. No villages of any considerable size have been formed near the river. The inhabitants who reside within or near the river valley are subject to frequent attacks of intermittent and bilious fevers, especially in the months of August and September, which constitute the most sickly season of the year.

The sites under consideration appear to possess no particular claims to attention paramount to those presented by numerous other positions on this part of the river. No water power of any considerable magnitude is to be found in the vicinity of either, nor indeed at any other point accessible to steamboat navigation, and secure from the excessive floods of the Tennessee, on the entire distance above mentioned.

The nearest coal veins from which supplies of this article can be obtained, for the generation of the requisite steam power, are those of Cumberland and Warrior mountains, situated above the Muscle shoals, nearly 200 miles from the sites; the coal from which, delivered at either site, will probably cost 18 or 20 cents per bushel. Supplies of this sort can probably be obtained also at the same rate from the coal fields on the Ohio river.

The site at Brownsport most suitable for the armory is near the summits of the river hills, where the surface is very uneven, and much divided by ravines and gullies. It is separated from the river by a strip of bottom land, 50 to 150 yards wide, subject to frequent inundations, and upon which the high freshet of last spring rose 18 or 20 feet above its surface.

The site at or near the termination of the proposed turnpike is about 2 miles above the town of Carrollville, and 20 above Brownsport. It occupies an upland tract of rolling ground elevated 20 to 30 feet above the reach of the highest freshet. It has a front of more than a mile along the immediate margin of the river, covers a large cultivated field, and extends inland far enough to afford the space required to accommodate the buildings of an armory. The shore is bold and abrupt, and the water in its

immediate vicinity sufficiently deep to admit the landing of boats in all stages. Ravines are here and there presented, leading from the margin of low water to the surface of the site, through which passways from the river may readily be conducted.

The country drained by the Tennessee is generally less fertile and far less extensive than the widespread valleys of the Ohio and its tributaries from the north. Of course the necessaries of life, and indeed all articles of subsistence, will be likely in all time to come to be somewhat more expensive and more difficult of attainment at all points on the Tennessee above its mouth than on the lower portions of the Ohio.

We shall conclude our remarks under this head in a brief description of that portion of the river situated between Waterloo and Florence, embracing a distance of 30 miles, which is navigable for steamboats only when the river has an elevation of two or three feet above its lowest stage.

From Waterloo upward, through a distance of ten miles, a series of shoals and rapids are presented, the lowermost of which is called the Bee tree, and the uppermost Colbert's shoals—the aggregate fall in that distance being eighteen and a half feet. This part of the river is generally wide, and embosoms two or three small islands—its bed for the most part being composed of rock, in ledges and boulders or loose fragments. Its navigation can be readily improved, and rendered safe and commodious in all stages of the river, by the erection of a dam 18½ feet high, at or near the foot of the shoals, accompanied by a lock with a lift equal to that of the height of the dam, which would serve to prolong the low-water navigation more than 20 miles. From Colbert's shoals upward to Florence, the deepest channel, in extreme low water, is said to afford a depth equal to that at the Big Bend shoals, 20 miles below Waterloo, of which we have before treated. The aggregate descent in the distance last mentioned (viz: from Colbert's shoals to Florence, 20 miles) is only about 5½ feet. The navigation at the Big Bend shoals, below Waterloo, may be improved by the construction of a lock and dam, with a lift of five or six feet, and above Colbert's shoals by the erection of similar works; or perhaps with greater propriety by the extension of the Muscle Shoals canal downward to the foot of Seven Mile island, through a distance of about 13 miles; thus connecting the basin or pool formed by the dam first proposed, with the canal above mentioned, at a point about 6¼ miles above Florence, where the canal at present has its lower termination. On the completion of the improvements here suggested, an uninterrupted navigation may be secured from the mouth of the Tennessee river to the foot of the Muscle shoals, through a distance of 274 miles.

See Appendix, documents Nos. 33, 34, and 45.

SITE ON CYPRESS CREEK, ALABAMA.

This locality, which is the same as that examined, surveyed, and reported on by Colonels McRea, Lee, and Talcott, in 1823, was visted by the present board on the 19th of July. It is situated on Cypress creek, about 3 miles from Florence, or 2½ miles from the mouth of the creek in a direct line, but by its meanderings, which are very serpentine, forming no less than three extensive detours, with narrow gorges; between this locality and the Tennessee river the distance is at least 5 miles. The highland points protruding into these bends slope downward to the margin of the creek

by declivities somewhat gentler, while the shores on the opposite side of the creek are abrupt and precipitous, presenting cliffs of stratified sandstone and limestone, 100 to 150 feet high. The range, from its lowest to its highest water surface, at its mouth, conforms to that of the Tennessee river, which is about 22 feet. At the proposed site, and for a distance of half a mile below, the creek is not affected by back water from the river. Its floods are occasioned exclusively by supplies of water derived from its own sources, which give to the highest freshets an elevation not exceeding 13 feet above extreme low water on this part of the creek.

The width of the creek is generally about 75 yards; its bed is rocky, and its banks firm and substantial, occasionally presenting rocks on their fronts. The width of the valley at the extreme head of back water from the Tennessee river is about 100 yards, but above it gradually increases to 200 or 300 yards; the hills on both sides rising by slopes of 10 to 20 degrees from the valley to the summits of the highlands, which rise 150 to 200 feet above the general water table. The condition of the creek and its valley, especially that portion of it under now consideration, is favorable for the erection of a dam of any desirable height, and positions may be selected favorable for the erection of machine shops on both sides of the creek, and conveniently situated with respect to the employment of the water power afforded by means of such a dam. At a point a little above the reach of back water from the Tennessee, a mill has already been erected, with a dam about 4 feet high, which has occasioned the formation of a pond or pool, extending half a mile above the dam. At the head of this pool a cotton factory has been established, which has a head and fall of water of about 10 feet.

The works above mentioned, together with a tract embracing 400 acres of land, on which they are situated, are the property of Mr. James Martin, who offers to sell the entire tract, with all the privileges and improvements upon it, except the mill first mentioned, and a small tract around it, for the sum of $15,000.

About half a mile above the factory is the position formerly occupied by Cloppin's mills, which have been demolished and swept away by the water since the time when the former commissioners above named visited this part of the country. A tract of 160 acres, including this position, is the property of one or more individuals in Philadelphia, and may probably be purchased for a sum not exceeding $600. Any additional tracts that may be required in this vicinity, for the purpose of enlarging the site, to the extent of 800 or 1,000 acres, may no doubt be obtained at a very moderate cost.

The site deemed the most favorable for the buildings of an armory is on the westerly side of the creek, extending upward, half a mile or more, from a point a little below the factory, (where there is a copious spring of fine water,) to the position formerly occupied by Cloppin's mills, and covering the site regarded as the most eligible for the same purpose by the former commissioners. It occupies the declivity of the hills binding the Creek valley, which here rise by slopes varying from three to six degrees, from the margin of the valley to the upland surface. The area adapted to the erection of workshops and other buildings has a length of about five-eighths of a mile along the creek, and a width of three to four hundred yards from the creek shore. With respect to its healthfulness, no position in this part of the country can present paramount claims to consideration.

The timber growth of the neighboring forests consists of white, red, and post oak, ash, hickory, maple, poplar, black walnut, red beach, black and honey locust, &c. Cypress may be obtained from the flats occasionally to be met with at no great distance, and yellow pine is abundant upon the hills in this part of the country.

The mills and other buildings on the site may be used to advantage in the preparation of lumber and other materials for the construction of the buildings of an armory. A road of easy gradients may readily be formed, leading from the site across the highlands to the Tennessee river, in a distance not exceeding 2¾ miles. Moreover, the creek may readily be rendered navigable half the year, to a point within half a mile of the site, for boats of 25 to 50 tons burden.

For more particular information relating to this site, we take leave to refer to the report of the commissioners of 1823, as exhibited in House Doc. No. 120, 2d session 25th Congress; also, to a manuscript report of Major J. L. Smith on the same subject, and to the Appendix herewith.

THE MUSCLE SHOALS OF TENNESSEE RIVER, ALABAMA.

The board visited this interesting and remarkable portion of Tennessee river on the 21st and 22d of July, for the purpose of examining some of its features, and the facilities presented for the production and employment of an immense amount of water power.

The Muscle shoals commence a little above Florence, and extend upward through a distance of about 36 miles to the head of a low flat island, called Slough island, opposite to Sherrod's island, a little below Lamb's ferry, and about two miles below Brown's ferry. The river, throughout their whole extent, is remarkably broad, varying in width from one to two miles, and embosoming numerous islands, some of which are very spacious, containing large tracts of woodland. Its bed is generally composed of rock, in stratifications nearly horizontal, and its shores are frequently rocky bound, rising only 6 to 10 or 12 feet above the low-water surface of the river. The low grounds within the river valley, especially on the north side, are generally narrow, not exceeding 150 or 200 yards in width, being limited by the river hills, which occasionally present themselves in the form of precipitous bluffs, rising abruptly from the water's edge. The flats intervening between the hills and the river, though apparently low, are nevertheless elevated beyond the reach of the highest freshets, which never attain an elevation greater than 5 or at most 6 feet above extreme low water on any part of the shoals, from their head downward to Shoal creek, 27 miles. The uplands, on both sides of the valley, rise 150 to 200 feet above the river, and present a surface agreeably diversified by plains and depressions rather than by hills and valleys, except at the brows of the river hills, where they are deeply furrowed by ravines and gullies.

The facilities for generating and applying an enormous amount of water power presented at the Muscle shoals are not surpassed, probably, by any to be met with at any other locality within the limits of the United States. The entire Tennessee, which is one of the most copious streams of the West, in its passage through the shoals, (the distance being 30 miles from the head of the shoals to the lower extremity of the canal, 6¼ miles above Florence,) has an aggregate descent or fall of 111¾ feet, which is equivalent to 3¾ feet per mile nearly; the range from low to high water, as before intimated, sel-

dom or never exceeding 5 or 6 feet. Thus, through the distance above mentioned, (30 miles,) an enormous water power may be had, almost entirely exempt from interruptions from back water, even in the highest stages of the river.

In addition to the water power attainable from the Tennessee river at these shoals, there are several tributaries of respectable size entering on the northerly side of the river, the water of which may readily be turned to account in increasing the amount of power in the vicinity of the shoals. Of these tributaries, the most considerable are Elk river, entering 7½ miles below the head of the shoals; Bluewater creek, entering 12 miles below; and Shoal creek, entering 8¾ miles still lower down, or at the distance of 9 miles above Florence—all of which are streams of respectable size, especially Elk river, which, though generally rapid, is said to be navigable for keel and flat boats to a considerable distance during the more elevated stages of the water. They are all rapid streams, with rocky beds and shores, and afford constant supplies of water, copious enough for hydraulic purposes on a large scale. Besides these, there are numerous creeks and runs of smaller magnitude entering from the north, among which are First and Second creeks, Four Mile and Six Mile creeks, and several runs of less note, most of which are sufficiently large and copious for ordinary mills, and afford convenient sites for their establishment.

The armory commissioners of 1823 examined a site on Shoal creek, about 2½ miles above its mouth, at a rapid called the Iron shoals, near the mouth of Brush run, and reported favorably of the water power, and of the facilities for employing the same, as presented at this point. They, however, regarded the position as objectionable, on account of the unhealthfulness generally ascribed to the country bordering on this part of Tennessee river.

A reservation of land, embracing a tract 7 miles square, situated at the forks of Shoal creek, 23 miles from Florence, and 15 or 16 miles from the mouth of the creek, and embracing extensive beds of excellent iron ore, was formerly made, and is probably still retained by the United States, the object of which was the attainment of abundant supplies of iron for military and other national purposes.

On the south side of the river, a railroad, called the Tuscumbia, Courtland, and Decatur railroad, 45 miles long, leading from a point 4 miles below Florence to Decatur, on the Tennessee river, 13 miles above the head of Muscle shoals, has been constructed, and is still in operation. It is at present, however, much out of repair, and doubts are entertained as to the ability of its proprietors to make the repairs and renewals necessary to restore it to its former usefulness, without assistance from abroad.

The Muscle Shoals canal, which has been constructed at an expense of about $600,000, resulting from the sale of lands bestowed by the United States for that purpose, commences on the north side of the river at Campbell's ferry, 6¼ miles above Florence, and near the foot of the shoals, and extends upward on the same side to a point a little below Lamb's ferry, or 15¼ miles below the head of the shoals, embracing a distance of 14¾ miles. The canal, in its present plight, is totally unfit for use, and cannot be rendered navigable without expensive repairs, amounting probably to a cost of at least $100,000. Owing to serious defects in its original projection and construction, especially to the want of waste wiers of sufficient frequency and extent, to void the surplus water brought into the canal by the drainage

from a large surface of country, consequent upon excessive rains, extensive breaches have been formed in the embankments on the river side of the canal, and particularly at the crossings of the principal streams, where the dams connected with the wiers have, in almost every instance, been undermined and swept away. Moreover, the work of demolition has been carried to such an extent that, at the present time, no part of the canal is in a condition to receive and retain its appropriate supply of water.

Various other defects appear to have been committed in the planning of the work. For example, the dimensions of the lock chambers are obviously too small, and the width of the canal, in many places, is so much contracted that boats adapted to its navigation find difficulty in passing one another; but with respect to the materials employed in its construction, and the manner in which the various parts have been executed, very few exceptions can be taken. The embankments, walls, and locks, except where they have been demolished in the manner before stated, appear firm and substantial.

The canal, as originally projected, was to extend from Florence to the head of the Muscle shoals—36¼ miles. To this might have been added with propriety an extension of 30 miles downward, either by a lateral canal or slack-water navigation, to Waterloo, at the foot of all the rapids on this part of the river. The portion remaining to be constructed, from the head of the shoals downward to the head of the present canal, embraces a distance of 15¼ miles. On the completion of the entire line of improvement here contemplated, an uninterupted navigation, in all stages of the water, and in all seasons of the year, from the Ohio river to the noted obstruction called the Suck, a little more than 500 miles from the mouth of the river, will have been opened; it being understood that the depth afforded at one point below, and at a few points above the Muscle shoals, does not exceed 18 inches in extreme low water.

The positions along the canal convenient for the production and employment of water power on a scale of any desirable extent are numerous; and, in their immediate vicinity, sites sufficiently spacious and commodious for the machine shops and other buildings of an armory, and other manufacturing establishments, are presented and may be obtained at a very moderate cost; but, in the establishment of an armory on the line of canal, the extra expense, not only of extending the canal in the manner before explained, but of repairing that portion of it which has already been constructed, would constitute heavy items in the cost.

The entire region traversed by the Tennessee, especially in the immediate neighborhood of the river, has long possessed and still sustains the reputation of being sickly—an imputation which seems to have been warranted by the experience of its inhabitants. Present appearances also seem to authorize the same conclusion, yet it is manifest that the causes of disease diminish or operate less injuriously in proportion as the population and improvements of the country are multiplied.

The district of country in which the Muscle shoals are situated has shared largely in the disrepute in which other portions of the Tennessee country has been implicated, on the score of unhealthiness. But, if rapid streams of pure water flowing through narrow valleys almost entirely destitute of marshy flats and stagnant pools; if an elevated upland country, diversified by hills, valleys, and ravines, from which the water is drained quickly into the principal streams; if copious springs of pure water, gushing out at the bases of the hills in almost every valley; if a region destitute of

any considerable flats, swamps, lagoons, and ponds, which is especially true of the country on the north side of the Muscle shoals—if all these characteristic features combined may be regarded as indications of a salubrious and healthy country, then no portion of the United States merits higher consideration, on account of its healthful appearance, than the country on this part of the river.

Almost the only cause of disease likely to arrest the attention of the casual observer is the abundance of river weeds, or moss, which springs from the bottom of the river, and adheres to the numerous rocks every where to be met with in the shoals. This vegetable production is yielded in great profusion during the early part of the summer, while the water is yet sufficiently deep to cover the rocks; but, on the subsidence of the river to its ordinary low stage, large fields of these weeds are left dry and exposed to atmospheric changes, which cause them to putrefy and emit noxious exhalations. The evil thus produced, however, begins to be annually diminished, in proportion as the cattle, hogs, &c., belonging to the inhabitants, are multiplied; for the animals just mentioned feed with avidity on the moss in its green or growing state, while covered with water, and thrive well upon its use as a means of sustenance. Thus the quantity annually left to decay and putrefy is already much reduced, and a corresponding amelioration in the condition of the country, with respect to the frequency and fatality of its diseases, is already observable, and has been evinced by the testimony of those most experienced and best informed in relation to the subject; and it may fairly be anticipated that this very interesting portion of the country will ere long become entitled to rank among the most healthy parts of the United States.

The resources of the country are ample and diversified. Almost every variety of lumber can be obtained on moderate terms. Iron ore of a good quality abounds in every direction. Limestone and sandstone, in horizontal stratifications, well adapted to the purposes of building, are abundant and convenient. Good brick clay is also abundant. Stone coal may be obtained from the Warrior and Cumberland mountains, within a hundred miles above the head of the Muscle shoals. Cotton, corn, wheat, oats, tobacco, hemp, flax, apples, pears, peaches, peas, beans, potatoes, and other culinary roots and vegetables, are reared in large quantities, and may be produced to any desirable extent. The ordinary prices at which some of the principal articles above enumerated may be obtained at Florence are exhibited in the Appendix.

SITE AT MOUNT CARMEL.

Mount Carmel is situated on the westerly side of the Wabash river, 70 miles overland, or 95 miles by water, from its mouth; 153 miles to the eastward of St. Louis; 120, westward, from Louisville, Kentucky; 150 miles from Indianapolis, Indiana; and 165 miles from Springfield, the seat of Government of Illinois.

It occupies an elevated position at the summit of the river hills, which are here separated from the river by a tract of valley land from four to five hundred yards wide, portions of which are subject to overflow during a very high stage of the river.

The noted waterfall called the Grand Rapids of the Wabash has its lowermost termination immediately opposite to the town, and a little above

the mouth of Patoka river, which enters the Wabash on the Indiana side, and about a mile below the mouth of White river, which also enters on the same side.

The entire length of the rapids, from their foot to their head, is six miles, and the entire fall of the water, in a low stage of the river, through that distance, is 10½ feet, as determined by actual survey.

The river, in this distance, makes a circuit of considerable extent above the mouth of White river, so that the distance in a right line from the foot to the head of the rapids is only about 3½ miles.

About half a mile above the head of the rapids is a small sluggish stream, called Cragfish creek, entering on the Illinois side, worthy of notice only on account of the course of its valley for half a mile above its mouth, and the connexion of the same with a deep ravine, by which the uplands are here divided to their base; the positions and directions of the creek valley and the ravine being remarkably favorable for the route of a canal or race, leading from the mouth of the Creek, across the gorge of the river bend above mentioned, in almost the nearest direction, and on very favorable ground, quite to the foot of the rapids.

In its approach towards this point, the route enters and pursues the valley of a small stream called Mill run, which enters the Wabash a little below the foot of the rapids—thus passing through a series of low valleys, elevated but a little above the reach of the highest overflows, from a point above the head of the rapids to the mouth of Mill run, immediately opposite to the site of Mount Carmel, near the town landing, and below all the rapids; the distance on the route being only three miles and a sixth.

The position regarded as the most suitable for the armory, in this vicinity, embraces a portion of the river valley between Mount Carmel and the river, covering a tract about half a mile wide at and above the mouth of Mill run, extending back to the river hills, and for a considerable distance upward, between the hills and the river.

This tract has a waving aspect, is generally underlaid with rock in horizontal stratifications, and is for the most part elevated above the reach of the highest freshets. Its proprietors have offered this and other tracts, embracing in all 640 acres, the whole of which has been designated and defined by them, as set forth in document No. 54 of the Appendix, to which we take leave to refer, as a donation to the United States on condition of the establishment of the Western armory thereon.

The site designated as above has been preferred on account of the facilities connected with it for the generation and employment of a water power sufficient for the purposes of the contemplated armory.

The means deemed most advisable for the production of the power are briefly as follows: A substantial dam, about 1,200 yards long and 18 feet high, should be erected at or near the head of the rapids, extending across the river and its valley, from base to base of the river hills on both sides. Such a dam would raise the river surface at the mouth of Cragfish creek so high that a canal or race of moderate depth would readily convey the water thence through the ravines and valleys before mentioned, to the proposed site, where it may be employed for driving the machinery of an armory, or for other mechanical purposes, and afterwards discharged into the river through the channel of Mill run.

The range at the foot of the rapids, from extreme low to extreme high water, is about 22 feet, while the corresponding range, at the head, is

only 14 feet. Accordingly, the crest of a dam raised 18 feet above low-water surface, at the latter locality, will be six and half feet above high-water surface at the former locality; and the head and fall, in the highest stage of the river, will be at least equal to the difference just stated, viz: six and a half feet.

By the employment of reaction wheels, this amount of waterfall may be rendered operative during the highest floods. On such occasions, the fall might be considerably increased, but for the danger to which the canal and the works upon it would be exposed, by admitting the flood waters from above to enter the canal, and pass downward in this direction. In order to obviate the hazard thus accruing, it will be necessary to construct a substantial guard bay, or bulkhead, with suitable gates, at the head of the canal, for the purpose of regulating the quantity of water admissible into the canal during the more elevated stages of the river.

In reference to the construction of a dam of the height above proposed, it should be observed, that such a work might prove injurious to persons residing upon the river above the Grand rapids, inasmuch as several mill seats and numerous plantations, at and near the margin of the river, and within its valley, would be liable to partial inundation, even by the pool formed above the dam. The mills alluded to are situated immediately at the low-water margin of the river, and are worked by means of natural falls that occur in the river during its lower stages. These, of course, would be rendered entirely useless in the event of the dam being erected, while many extensive tracts of excellent bottom land, partially under cultivation, would no doubt be injuriously affected from the same cause.

The Wabash is navigable for steamboats of moderate size and light draught during six to eight months in each year; its navigation being obstructed by shoals and ice during the residue of the time. Boats of the same description are said to have occasionally ascended to Lafayette, more than 200 miles above Mount Carmel.

The woodland growth of this part of the country, especially in the valleys and low plains, is dense and heavy, affording timber trees in abundance, of the following varieties, viz: White, red, Spanish, bur, and post oak, red and white shellbark hickory, white and blue ash, beech, black walnut, maple, mulberry, locust, cherry, gum, elm, dog wood, &c.

The building stone found in the neighborhood of Mount Carmel appears to be of an indifferent quality, being, for the most part, a coarse sandstone, liable to disintegration on exposure to the atmosphere. Limestone and sandstone of a better quality may be obtained at a distance of a few miles. The natural soil, in many places, appears well adapted to making brick.

Stone coal abounds in almost every direction around Mount Carmel, often occurring in beds or veins said to be four, five, or six feet thick. The locality nearest to this place at which it has been discovered is near the mouth of Coffee creek, about four miles below the town. Other localities at which it is found are presented along the valleys of Patoka and White river, at no great distance from the town. From the great abundance of this mineral in this part of the country, no doubt is entertained that it may be afforded at Mount Carmel at a price not exceeding six cents per bushel.

Provisions of all kinds, adapted to the comfortable subsistence of man and beast, are abundant and cheap in this part of the country. Its general appearance and the luxuriance of its vegetable productions give evi-

dence of its great fertility. Corn, wheat, rye, oats, barley, hemp, flax, hay, potatoes, beans, peas, and all other edible roots and vegetables, suited to the climate, may be reared in high perfection.

The healthfulness of any region abounding with frequent and extensive tracts of rich flat lands, especially if large portions of its surface are subject to occasional overflows, is fairly questionable. On these accounts, doubts are entertained as to the salubrity of the site at Mount Carmel, and of many parts of the surrounding country.

For further information respecting this locality, see Appendix, documents Nos. 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, and 108.

SITE AT EVANSVILLE, INDIANA.

Evansville is situated on the right bank of the Ohio river, a little above the mouth of Big Pigeon river, 194 miles above Cairo, at the mouth of the former, and about the same distance below Louisville, Kentucky. The town site covers a handsome plain, of a rolling aspect, elevated 10 to 20 feet above the reach of the highest freshets, or 55 to 65 feet above the low-water surface of the river—the extreme difference between low and high water at this place being 45 feet.

The site deemed most favorable for the armory in this vicinage is a tract of level land, somewhat less elevated than that occupied by the town, and situated immediately below the mouth of Big Pigeon river, which enters the Ohio from the north, and separates the proposed site from that of the town of Evansville. It has an extent or front on the bank of the Ohio of half a mile downward from the mouth of Big Pigeon, and stretches back from the river, widening in that direction, quite to the river hills. A portion, of this tract has been laid off into town lots, and constitutes the site of a town called Lamusee, which, together with additional grounds covering an aggregate area of 300 acres, the proprietors thereof, through their agent, John Mitchell, Esq., of Evansville, have offered, by way of a donation to the United States, on condition of its being occupied as a part of the site of the contemplated armory. In addition to these grounds, 800 acres more, adjacent to the same, which belongs in part to another association called the Winnebago Company, and in part to a gentleman in Philadelphia, by the name of Warner, may, no doubt, be purchased at a rate not exceeding $10 per acre. Small portions of these tracts, especially near the mouth of Big Pigeon, are subject to occasional overflows; but, for the most part, they are elevated five to twenty feet above the reach of the highest floods of the river.

The country at and around Evansville presents three varieties, viz: 1st, alluvial flats and bottom lands, extensive tracts of which are presented on the Kentucky side of the Ohio, from the mouth of Green river downward to a point six or seven miles below Evansville, and in the valley of Pigeon river, which is generally very wide, and embosoms extensive flats of a more marshy appearance—the surfaces, in both instances, being subject to inundations during ordinary high freshets; 2d, plains, or tracts of a waving aspect, situated within the valleys of the Ohio and Big Pigeon, and elevated five to twenty feet above the highest floods—such being the character of the grounds occupied by the town site, &c., above mentioned; and, 3d, the uplands, which rise 60 to 80 feet above the level of the plains, and at their junction with the valleys of the principal streams present an

aspect exceedingly broken and diversified by hills, knobs, valleys ravines, and gullies, but as we recede from the valleys the surface becomes less divided, and at length spreads into upland plains of great extent and of a remarkably uniform aspect. The soil of each variety is remarkably rich and productive, the uplands as well as the bottoms affording evidence of great fertility, from the crops of corn, wheat, oats, &c., reared upon them.

The Central canal of the State of Indiana, which has been commenced and is now in a state of considerable forwardness towards its completion, terminates on the Ohio river at the mouth of Big Pigeon, where a series of locks, with an aggregate lift of about 55 feet above extreme low water, is to be constructed. The line of the canal passes thence northwardly along the valley of Big Pigeon and that of one of its principal tributaries; and thence across Patoka river, to Newbury, or Point Commerce, near the junction of the east and west forks of White river; the distance on this part of its route being a little more than 93 miles. It passes thence to Terre Haute, on the Wabash, 42¾ miles, and thence by the Wabash and Erie canal, 320 miles, to the western extremity of Lake Erie, at the mouth of the Maumee river—the aggregate length of the line or route being about 455 miles.

The supply of water required for that portion of the canal situated between Evansville and Newbury is to be derived from Big Pigeon and its tributaries, and from White river; the former, in a dry season, affording nearly a sufficiency of water to compensate for the loss occasioned by leakage, absorption, evaporation, and lockage, on this part of the canal; while the supply of the latter, in the lowest stage, amounts to 7,600 cubic feet per minute. This quantity may of course be furnished at Evansville, where the nett fall from the canal, even in the highest stage of the river, is 10 feet, and in extreme low water 55 feet. The power afforded by this quantity employed on breast wheels, when the fall is at a minimum, would be equivalent to that of 96 horses, which would be sufficient to do most of the work required to be done by means of water power in an armory. In ordinary stages of the river, the power might be increased to any desirable extent.

The timber trees that may be obtained from the neighboring forests consist of white, black, post, bur, Spanish, pine, and yellow oak; red, white, and shellbark hickory; white and blue ash; hackberry; yellow and honey locust; black and white walnut; poplar, wild cherry, black and sweet gum, sugar tree, maple, dog wood, sycamore, cotton wood, linden, birch, cypress, mulberry, pecan, iron wood, catalpa, persimmon, sassafras, buckeye, box, elder, &c.

Limestone, well adapted to building purposes, abounds in the river hills, two miles from Evansville. Lime, roached or slaked, is afforded at 12½ cents per bushel. Good brick clay is also abundant, and bricks are furnished at the rate of $3 50 per thousand.

Inexhaustible supplies of good stone coal may be obtained from the hills binding the valleys of Big Pigeon and Green rivers, the latter of which enters the Ohio, from Kentucky, nine miles above Evansville, and may no doubt be afforded at this place at a rate not exceeding six cents per bushel. The extensive flats and low grounds by which Evansville is environed cannot fail to emit exhalations likely to have an injurious effect upon the salubrity of its atmosphere. The coal district of Indiana seems to be bounded on the east by a line commencing at Troy, 10 miles above Hawes-

ville, Kentucky, and running northwardly till it intersects the Wabash river. It is supposed to contain about 8,000 square miles.

For further information touching this locality, see Appendix, documents Nos. 56, 57, 58, 59, and 108.

SITE NEAR LOUISVILLE, KENTUCKY.

The armory commissioners of 1823 visited this neighborhood, and examined with great care three different positions near Louisville, in reference to which they submitted a variety of plans and estimates, embracing in detail all the objects upon which expenditures should be made, in order to produce at each position a water power sufficient for the purposes of an armory. The positions examined by them, and treated of in their report, were as follows, viz: A site on the Indiana side of the river, a little below Jeffersonville, and about midway of the falls of the Ohio, which occur in this vicinity; a site on the Kentucky side, between Shippingsport and Portland, a little below the foot of the falls; and a site on the side last mentioned, a little above Shippingsport, directly opposite to that first mentioned, at all of which the power provided for must unavoidably be subject to interruptions during the prevalence of high floods in the river. Their report contains much useful and important information in relation to the nature, extent, and manner of employing the water power that may be generated at this place, and we beg leave to refer to that document for numerous details, which need not be again repeated. (See House Doc. No. 120, 25th Congress, 2d session.)

The present board arrived at Louisville on the 5th of August, re-examined the several sites above mentioned and other localities in their neighborhood, and obtained the following information respecting the same. The city of Louisville is situated on the left bank of the river, immediately opposite the head of the falls, 387 miles above the mouth of the Ohio, 608 miles below Pittsburg, 518 miles below Wheeling, 140 miles below Cincinnati, 280 miles eastward from St. Louis, and 356 miles southwestward from Wheeling by the nearest travelled road.

It is built on the margin of an extensive upland plain, which spreads far inland from the river valley, and is here and there traversed by broad ravines or watercourses, which beautify and adorn its general aspect. The plain in the immediate vicinity of the city is elevated forty or fifty feet above the highest floods; but as we retire inland from the river it gradually subsides, and at the distance of about a mile unites with an extensive interval of low flat ground, situated between the plain and a hilly country in its rear, which was formerly humid and swampy, but has since been reclaimed by ditching and draining, and is now tillable and productive. In front, the majestic falls of the Ohio are displayed to the view in a broad chasm, about twelve hundred yards wide, in which the water rushes with violence over a rocky bed, and is precipitated downward twenty-two feet in a distance of two miles, during the ordinary low stages of the river. Across this chasm, through which the entire volume of the river, even when swollen to its greatest magnitude, is compelled to pass, a similar plain, of about the the same elevation, but less extensive, is presented to the view, on the Indiana side. On the margin of this plain, and a little above Louisville, is situated the town of Jeffersonville. Five miles below Jeffersonville, and on the same side of the river, is the town of New Albany, situated on a

plain much less extensive, and somewhat less elevated; in the rear of which, and in the immediate vicinity of the town site, the surface is much divided by valleys and gullies. Between this plain and the river is a strip of bottom land subject to overflows in ordinary high water. Two and a half miles below Louisville, on the Kentucky side, is the town of Shippingsport, situated at the lower extremity of an elevated tract of bottom land, portions of which, including that occupied by part of the town, are occasionally subject to inudations of considerable depth. Portland is situated on the same side, about a mile still further down, and occupies a position on the Louisville plain, which stretches many miles downward, retaining its general elevation above the highest floods of the river. The upland plateaus, of which we have just treated, are bounded on their inland margins by ranges of hills and highlands, rising one to two hundred feet above the plains, and uniting with regions more or less hilly and broken, stretching from the valley of the Ohio, southwardly, to the bases of the Alleganny mountains, and northwardly to the great Northern lakes.

The navigation of the river, from Louisville downward to the mouth of Tennessee river, three hundred and fifty-two miles, is liable to interruptions, by shoals in the summer and ice in the winter, during periods varying from one to three months in the year. Above Louisville, the shoal-water depth is more considerable between Louisville and Cincinnati; but above the latter the obstructions to navigation are even more numerous, and of longer duration, than they are below Louisville. The navigation for very light steamers, drawing no more than fifteen or sixteen inches, is seldom interrupted more than eight or nine weeks in the year.

Since the visit of the former armory commissioners, an important change has taken place in the commercial and other business relations of Louisville and its neighborhood, which have been brought about by the construction of the Louisville and Portland canal, and by that of a railroad between these two points; the former of which has been constructed at an expense of about one million of dollars, and the latter probably at an expense not exceeding thirty or forty thousand dollars.

The canal has its upper extremity at the foot of the Louisville landings, immediately at the commencement of the rocky bar at the head of the falls, and pursues a route nearly direct across an extensive lowland plain, situated in the immediate valley of the river, for a distance of about two miles, to a point at the mouth of a ravine immediately below Shippingsport, where it debouches into the river. The range of the river at the head of the canal, from the lowest to the highest water surface, is said to be 40.12 feet. The canal banks have an elevation somewhat less, and of course are subject to inundation whenever an extreme freshet prevails in the river. On one occasion since its construction, probably in the freshet of 1832, the highest known in recent times, the banks near Shippingsport are said to have been inundated to the depth of two feet. The extreme range of the river, at the lower end of the canal, is reported to be 64.44 feet, which gives for the fall or descent of the river between the head and foot of the canal, in its highest stage, 1.33 feet only per mile. The descent at the falls, in extreme low water, when the depth in the canal is said to be only four feet, has been computed at twenty-four feet, and in extreme high water at only 1.33 feet, as just before stated. The descent at intermediate stages of the river is variable, decreasing at every equal increment in the depth of the water at the head of the canal, and increasing at every equal

reduction of that depth. A series of statements in reference to corresponding rises of the water at the head and foot of the falls has been given in the report of the commissioners before cited, to which we beg leave to refer for more particular information on this subject; as also to documents No. 62 of the Appendix herewith.

The entire lockage of the canal is provided for by a series of locks near its lower extremity, which serve for the admission of boats into the canal, and for their discharge therefrom, during the middle and lower stages of the river. When ordinary high freshets prevail, steamboats can ascend and descend by the river without hazard or difficulty. In connexion with the canal, a little above its locks, a dry dock has been constructed of earth and stone work, into which boats of all classes that can enter the canal may be readily conducted and repaired, and afterwards withdrawn with the greatest facility.

The railroad commences in the main street of Louisville, and pursues a route along the surface of the plain, nearly parallel to the canal, and six to eight hundred yards southwardly from it, about three and a half miles, to the landing at Portland, which is about half a mile below the debouchure of the canal. Its course is generally pretty direct, but in approaching Portland, and about five hundred yards short of its termination at that place, it deflects to the right, forming a curve of about sixty degrees, from which it pursues a straight course to the landing.

The site deemed most favorable for the armory in the neighborhood of Louisville is the same that was proposed by the mayor and other civil functionaries of that city, and may be described as follows: It fronts on the Ohio river for a distance of about half a mile, extending from the foot of the canal to the railroad landing at Portland. From the point first mentioned, it extends upwards along the southerly side of the canal to a point directly opposite to the lot recently purchased for one of the United States marine hospitals on the Western waters, the point last mentioned being the same at which a continuation of the easterly line of said lot would strike the canal; the entire tract bounded northwardly by the canal, eastwardly by the continuation of the line just mentioned, southwardly and southwestwardly by the railroad, and northwestwardly by the Ohio river, and containing about 200 acres, being part of the site. The residue, to the amount of two to four hundred acres, and giving for the aggregate area of the site four to six hundred acres, is to be laid off in a regular form on the southerly side of the railroad between the easterly line of the hospital lot and the course of the railroad before designated.

The prices at which the tracts above described may be purchased could not be ascertained at the time of our visit. Information of this character is expected to be received in due time from his honor the mayor of the city of Louisville, who is also expected to communicate to the board the conditions on which the United States can obtain from the canal company such water privileges as may be required for the use of an armory.

A portion of the tract above described as lying between the canal and railroad, especially in the vicinity of the locks and dry dock, is subject to overflows in ordinary high water. These may be effectually shut out, however, by a levee or embankment extending across the ravine or valley below Shippingsport, from the canal embankment at the locks to the hill slopes by which the plain at Portland is bounded on the upper side. In order the more effectually to prevent overflows on this part of the site, as also to protect the canal against similar disasters in extreme high water, it

would be proper to raise the canal banks two or three feet higher than they are at present, and give to the levee a corresponding elevation, and thus render the site inaccessible to floods at all times. Instead of a single bank or levee, however, it may be advisable to form two parallel banks of equal altitude, embracing between them a branch canal or race, through which the water for the uses of the armory may be conveyed across the ravine, and conducted thence by a circuitous route leading along the slope or ramp that separates the plain from the valley, till it reaches the railroad landing, the race being prolonged for this purpose.

The machine shops and other buildings, at which the power is to be displayed, may be erected along the river side of the branch canal and race above contemplated, the aggregate length of which will be nearly three-fourths of a mile. It is believed that the facilities thus afforded for displaying the water power will prove more ample and commodious than those presented at other sites in this neighborhood. The power thus produced, however, must unavoidably be subject to considerable abatement during ordinary high freshets, and to almost entire annihilation in time of excessive floods.

At least one-half of the tract first mentioned (the 200-acre tract) is situated between the railroad and the slope or ramp by which the plain of Louisville and Portland is separated from the valley below Shippingsport and the flat or low plain traversed by the canal, and presents an area sufficiently spacious and convenient for the reception of the other buildings of an armory. The ground is here elevated thirty to forty feet above the valley, possesses a productive soil, and is mostly cleared and under cultivation.

With respect to the employment of a water power at the site above considered, or at any other point in this neighborhood, it may be observed that recourse must be had to the use of reaction wheels, either in whole or in part, in order that the power may be rendered operative during the changes in the elevation of the water surface occasioned by the rising and falling of the river. If horizontal reaction wheels are used, their power and speed must unavoidably vary in conformity to the changes above mentioned; and, in order to operate with them with a fall of fifteen or sixteen feet during the ordinary low water of the river, they must be furnished with shafts rising at least forty feet above the wheel. If overshot, pitch-back, or breast wheels are adopted, their efficiency will be equally as variable; and their operation must be entirely suspended whenever the river attains an elevation equal to that of their axes. Whatever may be the means employed to generate the power, they must be such as will admit of the communication of the same, when generated, to machinery placed above the reach of the highest freshets, which, in the present case, will be at an elevation of at least sixty-four feet above extreme low water.

The inconveniences just adverted to are among the difficulties that must be encountered in the application of water power, not only at this site, but at all other points on the Ohio river, and, indeed, on all other streams liable to excessive floods and frequent changes in their depths.

As before intimated, no explicit information has been obtained with respect to the charge that will be made by the canal company for the water that may be required for the use of the armory. On a former occasion, the demand made in their behalf for a water power sufficient for the manufacture of 12,000 muskets annually was $3,000 a year.

Materials of all kinds, adapted to constructions, are to be had on favorable terms at this place. Limestone and sandstone abound in the neighboring hills. The bed and northerly shore of the river at the falls contain inexhaustible supplies of excellent hydraulic limestone. The common earth on both sides of the river is suitable for brick making, and the common lime of the country contributes to form an excellent mastich.

The nearest locality from which coal can be obtained is on the Kentucky river, about 100 miles by land, and probably more than twice that distance by water, from Louisville. The supplies of this article furnished at this place are generally, if not invariably, brought down the Ohio from the mines at Pomeroy and other points above. It may be afforded at Louisville for 10 cents per bushel.

Provisions of all kinds are abundant and cheap. Among the products of the field, hemp and tobacco are prominent items.

For further information respecting this site, we take leave to refer to the Appendix, documents Nos. 60, 61, 62, and 108.

SITE NEAR CINCINNATI, OHIO.

Cincinnati stands on the right bank of the Ohio, 140 miles above Louisville, 527 miles above the mouth of the Ohio, 460 miles below Pittsburg, 370 miles by water, but only 249 miles by the stage road, from Wheeling, and 223 miles from Sandusky, the nearest point on Lake Erie. Its position is beautiful and commanding, rising from the river bank, by a succession of terraces, till it attains an altitude of more than 100 feet above the river. The lowermost of these terraces or benches, though elevated more than 50 feet above extreme low water, has been repeatedly inundated to considerable depths. Within the last 90 years at least four freshets have occurred, which attained elevations greater than that of the river bank in front of the town. The freshet of 1832 is said to be the highest ever known. The surface of this flood is reported to have been about 63 feet above the lowest water surface of the river at this place.

The river hills above and below Cincinnati, and especially in its rear, rise to the height of three to five hundred feet above the river. The summit of Key's hill, in the direction last intimated, which is regarded as the highest in this neighborhood, is said to be 511 feet above the Ohio river; its elevation being identical with that of Loramie's summit, which is the highest point on the Miami canal. The hills present very rugged and precipitous fronts, when viewed from the spacious basin or valley in which Cincinnati is situated, while, at the same time, they serve to beautify and embellish the surrounding scenery in a very high degree.

On retiring inland from the hill summits, the country is at first exceedingly hilly and broken, but, in the distance of a few miles, the ravines by which it is intersected become less frequent, and the surface begins to assume an aspect agreeably diversified by gently sloping hills and broad valleys. For many miles in the rear of Cincinnati the country, for the most part, is cleared and in a fine state of cultivation, and its inhabitants sufficiently numerous for an agricultural population.

Among the advantages enjoyed by Cincinnati are those already derived from the Miami canal, which connects the city with the rich and extensive valley of the Big Miami, and those about to be realized from the Whitewater canal, which leads downward, along the margin of the Ohio, to

North bend, and thence in a direction towards the fertile interior of Indiana. The former is already constructed to Piqua, 93½ miles, and is to be extended 152½ miles further, to Lake Erie, making the whole distance from Cincinnati to the lake, by the route of the canal, about 250 miles only. These, added to a countless variety of facilities and inducements here presented for business transactions of every description, with the entire region traversed by the Ohio and Mississippi rivers, cannot fail to secure to Cincinnati future pre-eminence, corresponding to the distinction she has already attained.

Accompanied by a committee appointed by the citizens of Cincinnati to confer with them in reference to the selection of a site for the armory in this neighborhood, the board commenced their examinations within the limits of the city, on the line of lockage connecting the Miami canal with the river. This line passes downward, from the canal basin back of the city, in a ravine, which divides a small portion of the upper part of the town from its main body. The descent along the line, from the surface water of the canal to extreme low-water surface of the river, is computed at about 111 feet; the descent to the surface of the highest flood, at 48 feet; and the descent to the surface water of the Whitewater canal, at Cincinnati, at 54 feet. The difference of levels just mentioned is to be overcome by a series of locks of about 11 feet lift to each lock, separated one from another by basins spacious enough to admit an ascending and descending boat to pass each other. The locks are not yet completed, and of course boats cannot yet ply between the river and the canal.

The declivity of the Miami canal, from the point at which it receives its last supply from the Miami river, is such as to produce in the canal a current of three-quarters of a mile per hour, or 66 feet per minute; hence, the transverse section of the water prism in the canal being 132 square feet, the quantity of water conveyed along the canal per minute will be 8,712 cubic feet. Of this quantity, it is supposed that 5,712 cubic feet will be expended in evaporation, leakage, lockage, &c., and that there will remain for hydraulic uses at Cincinnati 3,000 cubic feet per minute.

If from the quantity first stated (viz: 5,712 cubic feet) we deduct, for evaporation, leakage, and waste, 4,200 cubic feet, (the distance from Cincinnati to the head of the lowermost Miami feeder being 42 miles, and the usual allowance per minute on the scores just mentioned being 100 cubic feet per mile,) we shall have 1,512 cubic feet remaining for expenditure in lockage water.

With a nett fall of 54 feet above the summit of the highest flood, and 3,000 cubic feet per minute applicable to the production of a water power, the efficiency that may be obtained therefrom, by means of overshot, pitch-back, or breast wheels, will be equivalent to that of 204 horses. Should a greater power, or, rather, should a more copious supply of water than that above considered ever be required at this locality, it must be obtained by the enlargement of the transverse section of the canal, and a corresponding increase of its volume of water.

A portion of the water power afforded at this locality is already disposed of, but there still remains a sufficiency to answer the exigencies of an armory, so far as they relate to a supply of this nature; but the space in which it must be employed is limited in extent, so unfavorable in aspect, so much incommoded by the locks and intervening basins of the canal, and so much hemmed in by the mills, workshops, dwellings, and other build-

ings of the neighborhood in which it is situated, that it cannot be regarded as a favorable site for the armory.

The attention of the board was next invited by the committee to a site at North bend, on the northerly side of the Ohio, 15 miles below Cincinnati, which they accordingly visited, in company of those gentlemen, on the day following. In going thither, the route pursued led us downward in the immediate valley of the river, and along the side of the Whitewater canal. On the way, many handsome positions were presented to our view, but none of them appeared sufficiently spacious, secure from the encroachment of high floods, and convenient in other respects, to entitle them to much consideration as sites for the armory. Even the canal banks were less elevated by two to six feet than the summit of the flood of 1832.

At North bend, the canal descends from the valley of the Ohio, enters and passes through a hill by means of a tunnel 1,420 feet long, enters the valley of the Big Miami near the village of Cleves, and crosses the river last mentioned on an aqueduct about six miles above its mouth by the courses of the stream, and at the distance of about two and a half miles from the Ohio at North bend.

The commissioners of 1823 visited this neighborhood, and reported favorably of the locality situated within the river valley, at the point where the canal deflects from the river and approaches the tunnel. This locality embraces the domicil of the late General Harrison, President of the United States, whose remains have been entomed in a sort of natural terrace on the slope of the river hills, a little westward of the tunnel.

This position was deemed worthy of consideration as a site for the armory, on account of the practicability of obtaining a copious water power by means of a canal or race, leading from the mouth of Jordan's creek, on the Miami, downward in the valley of this river, to the village of Cleves, and thence through the hill by a tunnel to the site at North bend—the whole distance on the line of the race being nearly 18 miles. The circumstances in favor of this position, and the facilities of producing a water power thereat, are set forth in copious details in the report of the commissioners before cited, to which we beg leave again to refer. (See House Doc. No. 120, 25th Congress, 2d session.)

Since the examination of the commissioners just alluded to, the Whitewater canal and its tunnel have been constructed, and were to have been ready for operation in the month of October last. In consequence, the facilities for generating a water power at this site are now much more considerable than they were at the date of the former examination.

The water surface of the canal at North bend is 58 feet above extreme low water of the river. The freshet of 1832, which here attained an elevation of a little more than 60 feet above extreme low water, rose to the summits of the canal banks, or two feet higher than the water surface of the canal at this place. The ordinary high freshets of the river attain an elevation of 40 to 45 feet above the lowest water mark, or 13 to 18 feet below the surface of the canal. Accordingly the efficiency of the water power will be entirely neutralized during extreme high floods, but may be rendered operative to very considerable advantage during the ordinary high freshets of the river.

The machine shops and other buildings required for the employment of the water power must be elevated above the highest water surface, in order to guard the machinery against the destructive influences of an over-

flow, in the event of another flood similar to that 1832, which is to be anticipated at some future date. Aside from the trouble and expense of such an arrangement, the inconvenience resulting therefrom is a matter of no inconsiderable moment. The communication of the power, especially that produced by water, through a distance of 30 to 50 feet above the level at which it is generated, especially in so far as relates to the working of tilt-hammers, is an inconvenience of serious magnitude.

The site covers a beautiful plain, of an undulatory aspect, situated within the valley of the river, and for the most part elevated above the reach of the highest freshets. The freshet of 1832, however, the highest known within a period of nearly 100 years, overflowed the less elevated portions of the plain, which occur near the margin of the river, and in several broad valley-like depressions that serve for the draining of the back parts of the plain. An area secure from inundations, and sufficiently spacious for the buildings of an armory, is presented at a distance of 150 to 200 yards from the margin of the river. This area includes the late residence of the lamented Harrison, and is now the property of his heirs. The price at which this and other surrounding tracts, embracing an area of the requisite space for an armory, could not be ascertained at the time of our visit; nor could we ascertain the charge that would be made for the requisite water power derived from the canal. We were led to expect, however, that the desired information in reference to these topics would, if practicable, be obtained, and communicated to the board in due time by the committee.

The supply of water at North bend, for hydraulic purposes, may be increased to any desirable extent, by the introduction of the entire low-water volume of the Big Miami, which may be effected by means of a dam at Matson's mill, 3½ miles above the tunnel, raised eight feet above low water of the river at that place, and a feeder or race leading thence into the canal at some convenient point between the aqueduct and tunnel. By this arrangement, the surface level of the pool above the dam, and also that of the feeder, will be coincident with the water surface of the canal. The cost of the dam and feeder will not probably exceed $35,000.

In reference to this site, the former commissioners observe that it possesses peculiar advantages, among which are the extent and fertility of the adjacent country, and its proximity to Cincinnati, which will ensure to it a plentiful supply of provisions and the command of all necessary supplies of material and labor, and to which may be added the increased facilities of intercommunication, not only between the site and Cincinnati, but also between it and a rich and productive interior, now presented by the White-water canal.

Cincinnati and its neighborhood, including North bend and a broad scope of intermediate country on both sides of the river, may be regarded quite as healthy as any other district of country bordering on the river, from Wheeling downward to its mouth. Here we have many striking examples of increased salubrity and of healthfulness, in the condition of numerous localities, induced by a multiplied population and its multifarious improvements. Malarial epidemics, which formerly prevailed at Cincinnati to an extent quite alarming almost every year, have seldom occurred for many years past, and seem to have been almost entirely eradicated. A similar change appears to be in progress at Newport and Covington, on the southerly side of the river, opposite to Cincinnati. Appearances, forti-

fied by the concurrent testimony of numerous intelligent citizens, authorize the conclusion that a similar amelioration in the condition of almost every part of this neighborhood, with respect to its healthfulness, has taken place whenever the settlements have become frequent and considerable improvements have been made.

The country around Cincinnati is proverbial for its fertility and the great abundance of its products, which embrace all the varieties necessary to the comfortable subsistence and wellbeing of man and beast. In consequence, provisions of all kinds are to be had at prices exceedingly low.

Building materials of all kinds are also abundant and convenient. The neighboring hills afford excellent building stone. Brick clay, of a good quality, is the principal ingredient in the common soil. Carpenters, masons, and mechanics of all kinds, are numerous; and labor, in all its varieties, may be procured on reasonable terms.

The nearest locality from which stone coal can be readily obtained is at or near the place called the Hanging rock, about one hundred and fifty miles, by the Ohio river, above Cincinnati. The mines at this place, however, have not yet been opened on a scale sufficient to afford any considerable supplies of the article; and in consequence, the coal used here is mostly obtained from points further up the river. The charge for coal varies according to the distances whence it is procured, and this variation is also said to correspond to the intrinsic worth of the several varieties obtained. For example:

Coal from the	Youghiogeny river	is furnished for	7 to 9	cents per bushel.
Do	Pittsburg	do	5 to 8	do
Do	Wheeling	do	4 to 6	do
Do	Pomeroy's coal mines	do	4 to 5	do

The coal fields on Licking river, in Kentucky, are probably nearer to Cincinnat than any others to be met with in any direction; but no practicable route has yet been provided for the easy conveyance of coal from the mines in that quarter to this market. The improvements of Licking river, by locks and dams, for the purpose of establishing slack-water navigation to the coal fields, has been commenced, but as yet comparatively little has been done towards the accomplishment of the object.

For further information touching sites in the neighborhood of Cincinnati, see Appendix, documents Nos. 63, 64, 65, and 108.

SITE NEAR PORTSMOUTH, OHIO.

Portsmouth is situated on the point of land immediately above the Scioto river, and occupies a plain, rising gradually from the river bank to an elevation about equal to that of the freshet of 1832, which rose to the height of about sixty-two feet above extreme low water. Its distances by water from other important points are as follows, viz: from Cincinnati, 117 miles; from Louisville, 257 miles; from the mouth of the Ohio, 644 miles; from Wheeling, 262 miles; from Pittsburg, 352 miles; and from Cleveland, on Lake Erie, by the Ohio and Erie canal, 309 miles.

Several positions in the vicinity of Portsmouth have been recommended as sites for the contemplated armory, on account of the advantages supposed to be offered for the production of suitable water power, by the use of a portion of the water conveyed hither by the great canal just mentioned. A brief exposition of the circumstances and condition of the canal, with respect to its ability to furnish water at this place for hydraulic pur-

poses, will show the nature and character of the water power available at this place.

The canal communicates with the Ohio river by means of six locks, situated in the valley of the Scioto river, within a distance of one mile and a half from its mouth upward. Three of the locks, with an aggregate lift of twenty-nine and a half feet above extreme low water, have been located in the bottom lands that occur at and near the mouth of the river, at intervals of considerable distance from one to another. The remaining three, with an aggregate lift of twenty-five and a half feet, are situated on the slope of the river hills, on the west side of the Scioto, at a place called the "Three locks," from the juxtaposition of these locks with respect to each other, one mile and a half from the mouth of the Scioto, at Portsmouth. The amount of lockage of these six locks is fifty-five feet, which is of course the aggregate fall from the canal basin above them to low water-mark of the Ohio river at Portsmouth. The freshet of 1832, as before remarked, rose to the height of sixty-two feet above extreme low water. Accordingly, if we deduct fifty-five feet, the amount of lockage, from sixty-two feet, (the extreme range of the river,) we shall have a difference of seven feet, which is the height attained by the freshet of 1832 above the surface of the canal basin, which extends from the three locks upward seven and a half miles. A flood of so excessive a range, however, is of very rare occurrence; but, in order to secure the buildings of an armory from the ravages of such a deluge, they should be placed beyond its reach, for the very obvious reason that a another similar flood is as likely to occur as that was which has already taken place.

The ordinary high freshets attain an elevation of about forty feet above extreme low water at this place, which, deducted from fifty-five feet, leaves for the efficient head and fall at the "Three locks" fifteen feet in ordinary floods. The quantity of water that can be spared from the canal, under existing circumstances, and applied to hydraulic uses in the armory, is said to be only one thousand cubic feet per minute, which, with a constant fall of only fifteen feet, would afford an efficient power equivalent only to that of nineteen horses, and would fall far short of the power required for the armory. An addditional supply, to any desirable extent, may probably be obtained from the Scioto river, twenty-five miles above the "Three locks," by means of a feeder communicating between the canal and the river in that neighborhood; but in order that such a supply may be conveyed downward in the canal, (the basins of which, between the locks, are said to be on a dead level,) its prism must be much enlarged. The expenditures required for these additional improvements would probably amount to a very heavy cost.

It may be observed in this place, with respect to the farming out of water power derived from any and all of the canals belonging to the State of Ohio, that a reservation of thirty days in each year is made in behalf of the State, during which all operations carried on by the aid of such power are liable to be entirely suspended, for the purpose of allowing opportunities for making all necessary repairs and renewals in the canal and other works connected with it.

The sites to which the attention of the board was directed, in this neighborhood, were the following, viz: one on the slopes of the river hills, near the Three locks, another at Bradford's landing, on the north bank of the Ohio, about two miles and a half from the Three locks, or about three miles below Portsmouth, and a third on Lawson's run, two miles above Portsmouth.

The site at the Three locks is accessible from the Ohio river, by means of the canal, through a distance of nearly two miles. It occupies the hill slopes immediately above and below the canal, and presents a very uneven aspect. On the lower side of the canal basin at this place facilities are afforded for the display of a water power on a scale commensurate with any supply of water that can be furnished at this place. In front of the site is an extensive tract of rich bottom land, half a mile wide, and extending upward, in the valley of the Scioto, many miles from its mouth.

The position at Bradford's landing is on the immediate bank of the river, and has an elevation of fifty to sixty feet above extreme low water. It occupies a portion of the Ohio valley, which is here more than a mile wide. In rear of the site the bottom lands are somewhat less elevated than they are in the vicinity of the river, and present a very even and uniform aspect. The entire valley on this part of the river, from base to base of the river hills, is said to have been inundated by the freshet of 1832.

The practicability of conducting water through a race or canal, constructed for this purpose, from the Three locks to the landing, is not to be doubted; but in view of the liability, not only of the canal itself, but of the entire district traversed by it, to submersion under water to the depth of six or eight feet, in the event of another freshet like that of 1832, the propriety of such a work is rendered very questionable.

The site at Lawson's run occupies a portion of the river valley elevated above the highest flood, and separated from the river by a strip of bottom land, three or four hundred yards wide, subject to overflows during ordinary high freshets. Its surface is well adapted to the reception of the buildings of an armory; but its remoteness from the river, and the difficulty of approaching it therefrom in certain stages of the water, may be regarded as objections to the site.

The power contemplated to be used at this site is that of water derived from the Scioto river, by means of a canal or race, leading from a point on this river, about fifteen miles above its mouth, passing downward in its valley, and terminating at the ravine of Lawson's run, at an elevation of fifty-six feet above extreme low water of the Ohio. This work has been authorized by a resolution of the State Legislature, but as yet nothing has been done towards its accomplishment. Its cost, inclusive of a dam across the Scioto, at the head of the race, has been computed at $228,000. With the elevation just mentioned, it is manifest, that, in the event of another freshet like that of 1832, the entire line of the race, as here contemplated, will be overwhelmed, to the depth of five or six feet. The facilities for employing the water power at the ravine during the lower stages of the river are ample and commodious.

We were unable to learn the conditions, &c., on which either of the sites above considered could be purchased, but the committee appointed by the citizens of Portsmouth to confer with the board on subjects relating to the armory gave us encouragement to expect from them all the desired information touching matters of this nature.

Materials for building are quite as abundant, and may be had on terms quite as favorable, as at any other point on the Ohio river. Building stone of an excellent quality, and easy to be wrought, (a grayish sandstone, remarkably compact and firm,) abounds in the river hills, near the mouth of the Scioto. The canal locks in this vicinity have been constructed of this

kind of stone. Limestone is also abundant and convenient. The soil is rich, and generally productive, especially in the bottoms, large portions of which are sufficiently elevated to be exempt from overflows in ordinary high freshets.

The nearest coal locality is at and near a point called the Hanging rock, 27 miles above Portsmouth; but the sources from which supplies of this article are most obtained are at Pomeroy's mines, 80 miles further up the river.

The healthfulness of most positions in this neighborhood has hitherto been much impaired, probably by their proximity to the extensive flat lagoons and marshy grounds situated at and near the confluence of the Ohio and Scioto rivers, and especially in the valley of the latter for a considerable distance from its mouth. Extensive sand bars in the beds of both rivers, which lie uncovered and exposed to atmospheric changes during low-water stages, contribute also, in no small measure, to taint the air with their pestilential effluvia.

For additional information respecting the localities above considered, see Appendix, documents Nos. 66, 67, and 108.

SITES NEAR THE MOUTH OF BIG SANDY RIVER.

A position at or near the Hanging rock, on the Ohio side of the river, 27 miles above Portsmouth, has been recommended as a suitable site for the armory, by reason of extensive coal veins that have been discovered in this vicinity, which are said to vary in thickness from 2½ to 4½ feet, and to afford good coal. Above and below this cliff, which protrudes to the margin of the river in the form of a promontory, are narrow strips of elevated bottom lands, portions of which rise above the surface of ordinary high freshets, but are altogether subject to overflows in such a flood as that of 1832. No tract of sufficient elevation and sufficiently spacious for the accommodation of the buildings of an armory is here to be found within the valley of the river.

In treating of this locality, it should be observed that it is the first at which coal is to be met with on ascending the Ohio river, after leaving Hawesville, 400 miles below. Between these two points the geological formations, on both sides of the river, are regarded as inferior to those connected with the coal measures.

Three miles above Hanging rock, and on the same side of the river, the bottom spreads to a much greater width, and embraces a sort of intervale ridge about 200 yards long, parallel to the river and near its margin. This ridge, which spreads to a considerable width back from the river, is said to be a little above the reach of the highest flood, but is liable to be completely isolated and surrounded by water whenever much of a flood occurs. In addition to the inconveniences occasioned by overflows in its immediate vicinity, the position itself is too limited in its extent and area to be regarded as a suitable site for the armory. Big Sandy river, which separates Kentucky from Virginia, enters the Ohio about 7 miles above the position last mentioned, or 37 miles above Portsmouth. It is said to be navigable for steamboats of light burden to Louisa, about 30 miles from its mouth by land, and probably 40 to 50 miles by water. Its navigation, however, is very precarious, and seldom continues longer than a few days, and then only during the more elevated stages of the river. The channel in places

is very crooked, and in the lower stages its numerous sand bars and other impediments render it impassable for boats even of the lightest draught.

A position on Tug fork, one of the constituent branches of Big Sandy, 12 miles by land above Louisa, has been proposed as a suitable site for the armory, principally on account of a capacious water power supposed to be attainable at that point. But its remoteness from the Ohio river, added to the fact of its being inaccessible to steamboat navigation at all times, deterred the board from a personal examination of the locality in question. Such an examination was deemed the less requisite by reason of a visit paid at the site a few years since by one of the members of the board.

For further information respecting this site, see Appendix, document No. 69.

About 70 miles above the mouth of Big Sandy river is a place called Pomeroy's landing, in the neighborhood of which coal of an excellent quality, and in great abundance, has been obtained. Large supplies of this article are conveyed hence, downward, to most of the towns and villages on the Ohio river between this place and New Albany. It is delivered to steamboats at the landing for four cents per bushel.

We take this opportunity to remark, that between the town of Marietta and the city of Cincinnati, (distant from each other by water 290 miles,) and within 14 miles of the river, including both sides, there are said to be no less than 27 blast furnaces, for the smelting of iron ore, besides numerous forges, rolling mills, and other iron works.

See Appendix, document No. 68.

SITES NEAR PITTSBURG, PENNSYLVANIA.

Pittsburg and its environs at the head of the Ohio river are too well known to require any particular description on the present occasion. Its centrality with respect to a large portion of the United States may be inferred from the following distances, practicable in most instances for commercial conveyances, and in all for personal travel and intercourse:

Its distance from the mouth of the Ohio by water is 996 miles; from Louisville, 608 miles; from Cincinnati, 468 miles; from Portsmouth, or the southern termination of the Ohio and Erie canal, 352 miles; and from Wheeling, 90 miles. Its distance from Wheeling by land is 57 miles; from Erie, on Lake Erie, 129 miles; from Buffalo, 216 miles; from Oswego, on Lake Ontario, 315 miles; from Ogdensburg, on the St. Lawrence river, 454 miles; from Philadelphia 305 miles, or by railroad and canal 394 miles; from New York, 390 miles; from Boston, 600 miles; from Augusta, in Maine, 791 miles; and from Eastport, Maine, 955 miles; from Baltimore, Maryland, 274 miles; and from Washington city, 250 miles. Moreover, its distance in a right line from the eastern extremity of Maine is 710 miles, and from the western boundary of Missouri 780 miles. It occupies a position midway of a right line extending from Cape Hatteras to the northern extremity of the State of Michigan. Its distance from the armory at Springfield, Massachusetts, in a right line, is 404 miles; and from that at Harper's Ferry, Virginia, 148 miles; also, by the nearest travelled route from the former 529 miles, and from the latter about 200 miles. The distances exhibited in the foregoing statements, as travelled distances, are such as are presented on the most direct stage routes. The most feasible routes for the conveyance of freights would deviate materially from many of those above considered, and occasion a very considerable prolongation of the

distances. For example, the distance by railroad, canal, and steamboat routes, from Pittsburg to Springfield, is 680 miles.

The city of Pittsburg is, moreover, central to numerous channels, both natural and artificial, of inland navigation, which radiate in almost every direction from this point. The Pennsylvania canal pursues the valley of the Allegany river upward some twenty-five miles, when it deflects into that of the Kiskiminetas, and follows the latter to Johnstown. This line of communication is continued thence by railroad and canal to Philadelphia, through an aggregate distance of 396 miles, and has become the channel of a vast amount of trade between the two cities.

The natural channel of the Allegany is navigable during its more elevated stages to Franklin, at the mouth of French creek, from which, upward in the valley of the creek, and in a direction towards Lake Erie, an artificial navigation has been partially provided for.

The Monongahela is navigable during moderate freshets fifty-five miles, to Brownsville, where the national road from Cumberland crosses this stream in its progress westward, and presents a business connxeion with the Baltimore and Ohio railroad on a scale of considerable magnitude. A company has been formed and organized for the improvement of this river by means of a system of slack-water navigation, and has already completed and carried into successful operation two locks, each fifty feet wide by one hundred and ninety feet long, with a lift of about eight feet, together with dams in connexion with locks sufficiently high to ensure a depth of water corresponding to the lock lifts.

By means of this improvement, thus far advanced, the Monongahela is rendered navigable, even in the lowest stages of the water, to the mouth of the Youghiogeny river, from the hills of which coal, of a character said to be superior to that of any other coal hitherto discovered in this part of the country, is obtained in great abundance.

About twenty-eight miles below Pittsburg, the Big Beaver enters the Ohio from the north, and presents another line of water communication between Pittsburg and Lake Erie, by means of canals and slack-water navigation, the distance on this route being much less considerable than on any other hitherto discovered between the Ohio river and that lake.

The Ohio is navigable from Pittsburg to its mouth during eight and sometimes nine months in each year, for boats drawing three feet and upwards, and during the residue of the year, except when blocked up by ice, for boats drawing from one to three feet.

Agreeebly to a series of statements kindly furnished to the board by Mr. McFadden, wharfmaster of the port at Pittsburg, (see Appendix, document No. 71,) it appears that the navigation of the river was interrupted by shoals and ice during the years 1839, 1840, and 1841, as follows, viz:

In 1839 the navigation was obstructed by ice most of the time from January 1 to February 15, and by shoals from October 1st to November 18, the depth in the channel during this period varying from two to three feet.

In 1840 the navigation was obstructed by ice during all the month of January, and from the 15th to the 31st December, and by shoals from July 15 to October 15, during which time the depth in the channel varied from two to four feet—the last depth occurring but twice in the mean time.

In 1841 no obstruction by ice was reported. The obstruction by shoals continued from the middle of July to the middle of November, during

which time the depth in the channel varied from one and a half to four feet—this last being the greatest depth, and occurring but once in all that time.

The number of steamboat arrivals, and the amount of their tonnage, as also the number and tonnage of keel boats, barges, and flat boats, arriving during the same years, 1839, 1840, and 1841, are exhibited in the following table.

Years.	Steamboats.		Keel boats and barges.		Flat boats.	
	Number.	Tonnage.	Number.	Tonnage.	Number.	Tonnage.
1839	1,418	124,408	336	8,813	369	5,388
1840	1,393	116,435	385	10,182	377	4,146
1341	1,449	126,300	474	13,494	1,218	9,186
Total	4,260	367,143	1,195	32,489	1,964	18,720

Besides the avenues already enumerated, well-constructed turnpikes radiate in various directions from the same point, one leading in a direction for Harrisburg, Philadelphia, and Baltimore, and dividing itself into three branches, leading respectively to one of the three cites just mentioned; one crossing the Allegany, and leading to Meadville and Erie; a third crossing the Monongahela, and leading towards Wheeling; and a fourth crossing the river last mentioned, and leading to Steubenville.

The vegetable products of the surrounding country embrace all the varieties common or peculiar to the latitude of Pittsburg, which is about 40½ degrees north. Although the demand for articles of subsistence in this city is very extensive, owing to the great numbers of the population employed in commercial and manufacturing operations, yet the supplies of all the necessaries of life are so abundant that they are afforded remarkably cheap.

Among the mineral products of this neighborhood, stone coal, on account of its abundance and excellence, is entitled to the highest rank. The hills in every direction are stored with this mineral, which is easily obtained by approaching the coal veins through the numerous valleys and ravines by which the hills are divided. The elevation of the coal beds found in this neighborhood, which vary in thickness from 3 to 6 feet, is at least 200 feet above the water table of the country, as indicated by the principal streams. The supplies of coal that these beds appear capable of yielding seem almost inexhaustible; and when we consider that other veins, much thicker and more extensive, lie imbedded amongst inferior stratifications, at the depth of 350 to 400 feet beneath those hitherto worked, we are led to infer that this mineral exists in sufficient abundance to answer all demands for its use in all time to come.

We were informed that a shaft was sunk some years since near the mouth of Mill run, a little below Pittsburg, for the purpose of obtaining salt water. In boring it, the auger passed through a coal vein about 7 feet thick, at the depth of 130 feet below the surface of the ground, and at the depth of 50

feet lower, or 180 feet below the surface, it encountered another similar stratum, 10 to 12 feet thick. The coal of both veins was said to be apparently of a good quality.

The great abundance of coal existing in this neighborhood, and the facility with which it can be obtained at Pittsburg, has given occasion to the establishment of numerous glass works. Foundries, forges, furnaces, rolling mills, machine shops, &c., at which iron, copper, brass, and other metals, are wrought and converted into almost every form assumed by fabrics composed of such materials, and used as articles of trade.

Among the manufacturing operations carried on at this place, the construction of steam engines for various purposes is one of the most considerable. The materials and workmanship displayed in their construction are of a character to render them durable and efficient in a high degree, while at the same time they are furnished to purchasers on the most favorable terms. An engine of a ten-horse power, including boiler, but exclusive of spur wheels or other apparatus for communicating its power to other machinery, can be furnished at a cost not exceeding $1,000.

At Penn foundry, the establishment at which Paixhan guns (32-pounders) are now being constructed for the naval service of the United States, we witnessed the performance of a small steam engine which we deem worthy of particular notice. The dimensions of the principal parts of the engine, together with their movements, &c., were as follows:

Length of boiler (cylindrical, without inside flues)	18 feet.
Diameter of boiler	30 inches.
Diameter of working or steam cylinder	12 inches.
Length of stroke	48 inches.
Pressure of steam in boiler, per square inch	45 pounds.
Number of single strokes per minute	60 strokes.

The effective power of the engine deduced from the above, and computed agreeably to the most approved rules, is equivalent to that of 22½ horses. With this power, the work done by the engine, and actually in progress at the time of our visit, was as follows, viz: Boring the calibers of four pieces (32-pounders) in solid metal, no core being used in casting them; turning the trunnions of a fifth, and cutting off the sinking head of a sixth piece—all in progress at the same time. In addition to which, the same engine occasionally drives four turning lathes, and one planing machine for dressing iron surfaces, together with grinding stones and drilling machines. The quantity of coal consumed daily in generating the steam (the engine working day and night, or twenty-four hours per day) is said to be about forty bushels per day of twenty-four hours, or sixteen and two-thirds bushels per day of ten hours, which is equivalent to about three-fourths of a bushel per day of ten hours for each horse power.

The pig metal used for castings, at this and other foundries in Pittsburg is obtained principally from the following localities, viz: First, from the Hanging rock, on the Ohio, near the mouth of Big Sandy river; second, from various points on the Monongahela river; third, from various points on the Allegany river; and, fourth, from the works on the Cumberland and Tennessee rivers—the estimation in which the metals from these several localities is held being respectively as the order in which they have just been stated.

The wrought iron used at Pittsburg is mostly obtained from the following localities, which are also arranged in the order of the reputed values of

their iron, viz: First, from the works on the Juniata; second, from those on Cumberland river; third, from the Hanging rock; and, fourth, from the works on the Allegany and Monongahela rivers.

The principal sites to which the attention of the board was directed in the vicinity of Pittsburg, and which they visited in company with the committee appointed by the citizens of that city to confer with them on subjects relating to the armory, are briefly as follows, viz:

1. A site within the valley of the Monongahela, occupying a portion of the tract called the Scotch bottom, on the south side of the river, five miles above Pittsburg, or about four miles above the site of the lowermost locks and dam in that river. Much of this site is sufficiently elevated and rolling, while other portions, especially those situated near the river, are flat, and in places subject to overflows. Immediately below this position, and near the margin of the river, is an extensive range of powder works, the property of two enterprising gentlemen of the name of Watson, at which can be manufactured daily thirty-six kegs of rifle or fifty kegs of cannon powder. This site possesses no remarkable features that are not presented to equal advantage at several other points on this part of the river.

2. A site on the northerly side of the Monongahela, seven miles above Pittsburg, at a place called McClure's farm. A very beautiful surface is here presented, fronting on the river for more than a mile, and spreading back to the river hills, through a width of half a mile. It is for the most part elevated considerably above the reach of the highest freshets; possesses a rich soil, most of which is in a high state of cultivation; and is accessible from the river by favorable landings, which already exist or may readily be formed.

3. A site at Braddock's fields on the south side of the river, near the mouth of Turtle creek, eleven miles above Pittsburg. The aspect is here less uniform and even than at either of the positions before mentioned. Slashes or swampy grounds occur in places, and especially in the valley of the creek. The valley lands are here restricted to a much narrower width, and in their rear are bounded by upland slopes of rather moderate declivities, but much furrowed by ravines and gullies.

In reference to that portion of the Monongahela valley in which the several sites above mentioned are situated, it may be observed that it varies in width from half a mile to a mile, and embraces large tracts of fine arable land, of waving aspect, exceedingly productive, and for the most part well cultivated. The valley is generally bounded on both sides by hills and slopes rising more or less abruptly to the height of three or four hundred feet. The highlands abound with coal of an excellent quality, which, geologically speaking, is obtained from a single stratum or vein, four to six feet thick, which presents itself in the declivities and bluffs, at an elevation of two hundred feet or more above the river.

With respect to the river itself, it is now rendered navigable during its lowest stages to a very considerable distance beyond the uppermost of the sites above considered, in consequence of the locks and dams before mentioned. At each of these works a very respectable water power is at command during low water, but both locks and the dams connected with them are liable to inundation during ordinary high freshets. Moreover the abundance and cheapness of coal in their neighborhood, added to the greater constancy and more complete subserviency that can be secured at all times by the employment of a steam power, rather than by that of a water

power, seem to establish a decided preference in favor of the former, especially in this neighborhood.

Of the sites above designated, the second, or that at McClure's farm, presents the most favorable aspect, and in almost every respect appears entitled to a preference over either of the others. There is no doubt that an area sufficiently spacious for an armory can be obtained at either on reasonable terms, but the precise limits assignable to the respective sites, and the prices per acre at which they can be respectively purchased, could not be ascertained at the time of our visit.

The attention of the board was, moreover, directed to several sites in the valley of the Allegany river, which we shall notice in continuation of the order before adopted in relation to sites in this neighborhood.

4. The armory commissioners of 1823 recommended a position in the valley of the Allegany river, one mile above the United States arsenal, or three and a half miles above Pittsburg, as the most favorable site for an armory in this neighborhood. Its advantages, as set forth in their report, have been rendered somewhat less conspicuous, in consequence of changes that have taken place since the time of their visit, among which are the erection of numerous dwellings and other buildings on the grounds included within the site, the consequent enhanced value of these grounds; and, more particularly, the construction of the Pennsylvania canal on the opposite side of the river, by reason of which an intercommunication between the armory and that important work would be rendered far more troublesome and expensive than it would be at several other positions in the immediate vicinity of the canal.

In reference to this line of canal, it may be observed in this place, that its supply of water is derived exclusively from the Kiskiminetas and its tributaries, and in a dry time is sufficient only to answer the demands of the canal, on the score of lockage water, absorption, evaporation, leakage, &c. Measures are in progress, having for their object the introduction of an additional supply, to be taken from the Alleghany river several miles above the mouth of the Kiskiminetas. On the accomplishment of this object, (which will probably call for an enlargement of the prism of the canal to an extent corresponding to the additional supply introduced,) there can be no doubt that a sufficiency of water will be obtained in the dryest time, not only for the supply of the canal, but for hydraulic purposes on a respectable scale, at numerous points.

The extreme range from low to high water at Pittsburg is about 35 feet. The water surface of the canal at that place is about five feet above the reach of the highest freshets. The lockage in the valley of the Allegany is as follows, viz: 3 miles above Pittsburg is the first lock, which has a lift of 8 feet; 8 miles further up, or 11 miles above Pittsburg, is another of the same lift; 9 miles higher, or 20 miles from Pittsburg, at a place called Tarentum, are two other locks, one of 8 and the other of 10 feet lift; one mile still further up is a fifth lock, with a lift of about 8 feet—making the aggregate lockage, in a distance of 21 miles above Pittsburg, about 42 feet; to which, if we add 5 feet, the elevation of the canal at Pittsburg above the highest freshet, we shall have for the aggregate effective fall, in the distance above mentioned, and during the highest stage of the river, 47 feet.

The position of the canal with respect to the river is such, that water for hydraulic uses may be taken from it at almost every point on the line;

after being employed in the production of a power for manufacturing operations, it may be discharged immediately into the channel of the river. Numerous positions immediately on the river banks, elevated above the highest flood, and affording ample accommodations for manufacturing establishments, are to be met with at convenient distances from the canal.

5. About 8 miles above Pittsburg, on the right side of the river, and adjacent to the canal, is a spacious and very beautiful plain, embraced within a large farm belonging to James Ross, Esq., which presents an area well adapted to the reception of the buildings of an armory. Its proximity to the canal, through which supplies of all kinds can be conveyed to and from the armory, and the conveniences afforded in its immediate neighborhood for the employment of a water power in the event of an additional supply of water being thrown into the canal, added to the fertility of the neighboring grounds, and the apparent salubrity of its situation, are among the considerations that entitle this position to be noticed as a site for the contemplated armory. The board were unable to learn the terms on which this site could be purchased.

6. Another position, about 10 miles above Pittsburg, on the left side of the river, was also pointed out as a site worthy of the attention of the board. A tract of a very handsome aspect, and sufficiently spacious for the accommodation of the buildings of an armory, is here presented, and may be purchased at a rate not exceeding $50 per acre, inclusive of a large brick dwelling, and other improvements on a respectable scale. As before intimated, however, any site on this side of the river must be deprived of the important advantage of an easy communication with the canal.

7. Another site is presented on the right side of the river, about 13 miles above Pittsburg, and in the vicinity of the point where the canal crosses Deer creek. This position offers no advantages superior to those that exist at numerous other points on this side of the river, except, perhaps, that the ravine of the creek just mentioned may serve as a tail race, of ample size and conveniently situated, to convey off the water employed in manufacturing shops erected along the banks of the creek. The cost of a site in this vicinity would not probably exceed $50 per acre.

With respect to the features of the country on the Allegany river, they are similar to those on the Monongahela, except that the valley of the former is generally much broader, and the hills by which it is bounded are more abrupt and rugged than those of the latter. The coal veins are here less accessible, and the coal produced from them is regarded as inferior in quality to that from the Monongahela mines.

The best coal with which the Pittsburg market is supplied, is produced from the banks of the Monongahela and Youghiogeny rivers, and is said to weigh, on an average, 77½ pounds per bushel.

Lumber of all kinds, and of an excellect quality, is to be had on the most reasonable terms, in this neighborhood. The hills afford inexhaustible supplies of choice building stone; and the plains, both upland and lowland, furnish good brick clay in abundance.

Among the facilities and advantages offered in this vicinity for carrying on manufacturing operations, are to be included not only the greatest abundance and variety of materials adapted to such purposes, but workmen and laborers, in multitudes, well versed in such operations, together

with the most healthy situations for their residence, and a profusion of all the necessaries and comforts of life for their subsistence.

For further information respecting Pittsburg and its neighborhood, see Appendix, documents Nos. 69, 70, 71, and 108.

SITE AT BEAVER, PENNSYLVANIA.

The armory commissioners of 1823, after the most careful and thorough investigation in reference to the advantages presented in this neighborhood for the establishment of a Western armory, signified their decided preference of this before any other locality visited by them, in the event of a water power being deemed indispensably requisite to such an establishment. The particular site recommended by them is on the right bank of Big Beaver river, immediately above the mouth of Big Walnut run, and about three miles and three-quarters from the mouth of the former. The water power contemplated by them was to be produced by the erection of a dam eight feet high, at the head of the falls, one mile and a quarter above the site, from which the water was to be conveyed downward in an expensive race, cut for a considerable distance through solid rock, to the banks of Walnut run, where it was to be be employed in driving the machinery of the armory, and then discharged into the ravine of the run. The head and fall counted on as an element of the power was 16½ feet, and the constant or minimum supply of water at least 135 cubic feet per second.

For numerous other interesting particulars in reference to this position, see House Doc. No. 120, 2d sess. 25th Cong., before cited.

Since the visit of the commissioners, above alluded to, the state of things in the neighborhood of the site has undergone material changes, in consequence of extensive improvements here introduced. The dam which then existed in the river, a little above the mouth of Walnut run, was eight feet high. This dam has since been supplanted by another, 13 feet high, which backs the water nearly to the site proposed by them for the dam, at the head of the falls.

This dam, as projected by the commissioners, was intended to be eight feet high; instead of which, a dam 17 feet high has since been constructed at this point. These changes call for a corresponding alteration in the position of the site, and in the project for employing the water power, which may be readily effected without any abatement in the amount or efficiency of the water power, while, at the same time, it will ensure a very material reduction in the cost, not only of the site, but of the forebays, &c. required for the display of the water power.

Instead of the site on Walnut run, which includes nearly all the mills, workshops, dwellings, &c., of the incipient town of Brighton, a tract quite as spacious and of a more favorable aspect is presented a little above the improved part of that town, extending upwards along the river shore more than a mile, and including a small town site, called Adamsville, which, as yet, only contains two or three small houses, and a mill situated at and near the abutment of the dam.

The method deemed most appropriate for the attainment and employment of the requisite water power is similar to that recommended by the former commissioners, but is on a scale far less extensive and costly. A head race or canal, communicating with the pool above the dam, may be formed by excavations, in earth and rock, to a depth less by nine feet than

that before contemplated, and continued downward at any convenient distance from the shore of the river, to an extent which need not exceed 500 or 600 yards. Branch races or forebays, for conveying the water from the main race to the machine shops, may be formed, at such points and at such intervals asunder as may be deemed appropriate. The water, after having been applied to the wheels, may be conveyed through wheel pits and tail races, prepared by excavations, as before, and discharged into the river channel. One or more waste wiers, for carrying off the surplus water brought down by freshets, may be prepared at a point a little below the dam, or at the lower extremity of the race, or even at both of them, or at any other point, should more than one be deemed necessary. In reference to the main head race, it should, moreover, be observed, that its dimensions should be such as to admit the canal boats employed in the navigation of the Big Beaver.

The head and fall obtained by the arrangement above proposed will be at least equal to that provided for agreeably to the project of the former commissioners, viz: sixteen and a half feet. Should a greater ever be required, it may be readily obtained by increasing the height of the dam at the head of the falls. The quantity of water applicable to hydraulic purposes remains as before, viz: one hundred and thirty-five cubic feet per second, which is no doubt far less, probably at least fifty per cent. less, than the minimum supply of the river. In regard to the sufficiency of the power obtained in the manner above proposed, for all purposes to which it is applicable in an armory, there can be no doubt, even were the work required extended to the fabrication of twenty or even thirty thousand muskets annually.

With respect to cost of the site here proposed, inclusive of the water privilege to the extent above contemplated, nothing definite could be ascertained. A gentleman of the committee, appointed to confer with the board on subjects relating to the armory, encouraged us to expect from him a written communication, containing the desired information in relation to these topics; but as yet the communication has not been received.

The distance from the dam at the head of the falls to the mouth of the river is five miles, and the aggregate descent from the surface of the pool above the dam to low-water surface of the Ohio at the mouth of Big Beaver is 74 feet. This difference of levels is overcome by nine locks, of dimensions suitable for ordinary canal boats.

The freshet of 1832 attained an elevation of nearly forty feet above extreme low water at the mouth of the river; but ordinary high freshets seldom rise higher than twenty-eight or thirty feet. Accordingly, the efficient head and fall, on this portion of the river, is seldom less than forty-four feet. With this fall, and the copious supply of water furnished by the Big Beaver during almost the whole of the year, an amount of water power is here presented, sufficient for carrying on manufacturing operations on the most extensive scale. Manufacturing establishments have already sprung up at numerous points along the river, and are kept in operation at an expense comparatively of a very inconsiderable portion of the power. The following are among the establishments alluded to, viz: Eight flouring mills, six saw mills, four woollen factories, two carding machines, one cotton factory, one paper mill, three iron foundries, one wire factory, two oil mills, one bucket factory, two chair factories, one coach factory, one machine shop, two sash factories, &c.

Within the valley of Big Beaver, and in a distance of five miles from its mouth, are situated the following flourishing towns and villages, viz: Fairport immediately above the mouth, and Beaver point and Beavertown below. As we ascend the valley, they occur in the following order: Bridgewater on the west, Bolesville on the east, Sharon on the west, Fallston on the west, New Brighton on the east, old Brighton on the west, Utica on the east, and Adamsville on the west side of the river, all included under the general name of Beaver city, which contains about six thousand inhabitants, a large proportion of whom are mechanics. To these may be added the town of Phillipsburg, situated on the south side of the Ohio, directly opposite to the mouth of the river.

A line of slack-water and canal navigation has been opened, and is now in operation, from the mouth of Big Beaver, upward, along the valley of this stream, and that of the Mahoning, one of its tributaries, to a point near one of the sources of the latter; thence, by a cross cut, to the great canal of the State of Ohio; and thence by the latter to Cleveland, on Lake Erie—the distance on this route, from the mouth of Big Beaver to the lake, being one hundred and forty miles.

A similar line has been commenced with much spirit, and is already partially opened, on a route leading towards the town of Erie, on the lake—the distance on this line being about the same as that on the line just before mentioned. The distance, in a direct line, from the mouth of Big Beaver to the nearest point on Lake Erie is about ninety miles, which is the shortest distance any where to be found between the river and the lake.

The agricultural resources of this neighborhood are similar to those in the vicinity of Pittsburg. Provisions of all kinds are abundant and cheap. Lumber of all kinds may be procured here, also, on the most favorable terms. The hills binding the valley of Big Beaver afford inexhaustible supplies of stone coal. Cannel coal, apparently of a very good quality, has been discovered on Brady's run, about two miles from Sharon, where it occurs in a vein about four feet thick. The coal beds in this vicinity vary from three to six feet in thickness. Building stone, brick clay, and lime, are abundant and convenient.

The advantages above enumerated, and the facilities here presented for trade and intercourse with remote parts of the country, added to the salubrity of situation and climate here enjoyed, contribute to render this locality one of the most desirable places for carrying on business operations, of almost every variety, any where to be met with in the valley of the Ohio.

For further information in reference to sites of Big Beaver, see Appendix, documents Nos. 73, 74, 75, 76, and 108.

SITES NEAR WHEELING, VIRGINIA.

Wheeling is situated on the left bank of the Ohio, 918 miles above its mouth, or 90 miles below Pittsburg, at the point where the National road from Cumberland, westward, crosses that river. Its distance from Cumberland is 132 miles; from Harper's Ferry, 228 miles; from Baltimore, via National road and railroad, 310 miles; from the United States armory at Springfield, Massachusetts, by the nearest travelled road, 460 miles; or by steamboat, canal, and railroad routes, via Pittsburg, Pennsylvania, 770 miles; or by similar routes, via Baltimore, &c., 630 miles. Its distance eastward

from St. Louis, Missouri, by the nearest travelled route, is 576 miles, or by the steamboat route 1,092 miles; its distance from Cleveland, on Lake Erie, by the nearest travelled route, is 156 miles, or by steamboat and canal route, via Big Beaver, 202 miles.

The facilities and advantages enjoyed at this place for trade and intercourse, both by land and by water, and with the East and West, are not surpassed, or even equalled, by those presented at any other point on the Ohio river. The Cumberland or National road is an extensive thoroughfare, always open for travel and transportation between the interior of the Eastern and Western portions of the United States. The Muskingum and Beaver canals present water communications connecting the upper portions of the Ohio with the lakes, while the Pennsylvania canal and railroads, the Chesapeake and Ohio canal, and the Baltimore and Ohio railroad, present facilities for the easy and expeditious conveyance of freights between this point and most of our Atlantic cities.

With respect to the navigation of the Ohio, we take occasion to refer to the information already given on this subject in former papers, (see description of "sites near Pittsburg," and "site at Cairo,") and shall here add a few remarks in relation thereto.

We are indebted to the committee appointed by the citizens of Wheeling for a series of records in relation to the navigation of the Ohio above and below this point, from which we derive the following items of information, viz:

From the records of J. C. Wiley, Esq., wharfmaster at Wheeling, we learn that the navigation was interrupted by ice, as follows, viz:

	Days.
In 1830, interruptions - - - - - - -	35
In 1831, do. - - - - - - -	35
In 1832, do. - - - - - - -	6
In 1833, do. - - - - - - -	0
In 1834, do. - - - - - - -	0
In 1835, do. - - - - - - -	39
In 1836, do. - - - - - - -	25
In 1837, do. - - - - - - -	39
In 1838, do. - - - - - - -	44
In 1839, do. - - - - - - -	36
In 1840, do. - - - - - - -	18
In 1841, do. - - - - - - -	8
Amount of interruptions in 12 years - - - -	285

which gives for the average period of interruptions by ice, occurring annually, 23¾ days.

We also obtained from the same source the following information relating to the low-water depths in the main navigable channel of the Ohio river, during the lower stages of water in the years 1837 to 1841, inclusive. In connexion with results obtained for each year, we shall introduce also those just before stated, in so far as they relate to the same year, and in another column shall also add the aggregate interruptions both by shoals and by ice.

Interruptions to the navigation of the Ohio by shoals and ice.

Years.	Low ranges of the water.	Interruptions by shoals.	Interruptions by ice.	Interruptions by shoals and ice.
1837	Least depth, 4 ft. 6 in.	0 days	39 days	39 days.
1838	10½ inches to 2½ feet	111 "	44 "	155 "
1839	17 inches to 2½ feet	6 "	36 "	42 "
1840	23 inches to 2½ feet	77 "	18 "	95 "
1841	13 inches to 2½ feet	111 "	8 "	119 "
	Total - -	305 days	145 days	450 days.

Hence the interruptions occasioned by a reduction in the depth of water in the deepest channel, to 2½ feet and under, amount to an aggregate duration of 305 days in 5 years, which is equivalent to an average of 61 days in each year; also, the interruptions by ice, during same number of years, amount to 145 days, which is equivalent to an average of 29 days per year. Moreover, the aggregate of the interruptions by shoals and by ice, amounts to 450 days in 5 years, which is equivalent to an average interruption of 90 days, or three months, in each year.

In consequence of the changes occasioned in the state of navigation by the rising, falling, and freezing of the river, the charges for transportation vary as follows, viz :

The charge per 100 pounds for freight from Wheeling to Cincinnati varies from 20 cents to $1.

From Wheeling to Louisville, varies from 20 cents to $1.

From Wheeling to Maysville, varies from 20 cents to 75 cents.

From Wheeling to St. Louis, varies from 37½ cents to $1.

From Wheeling to Alton, varies from 50 cents to $1.

From Wheeling to Memphis, varies from 50 cents to $7½ cents.

From Wheeling to New Orleans, varies from 50 cents to $7½ cents.

From Wheeling to Pittsburg, varies from 10 cents to 15 cents.

It should be remarked, moreover, that in all stages of the river, when the least depth in the channel exceeds four feet, and the navigation is unobstructed by ice, the charges for transportation remain uniformly at the lowest rates above stated. The extreme range from the highest to the lowest stage of the river in this neighborhood is about 45½ feet—some say 48 feet.

Some idea of the extent of the commercial business done at this place, in so far as relates to the transportation of passengers and freights between this and other points on the Western waters, may be formed from the following statements in reference to the steamboat arrivals and departures at Wheeling, during the years 1838 to 1841, inclusive :

Number of arrivals and departures in 1838, 1,023.

Number of arrivals and departures in 1839, 1,511.

Number of arrivals and departures in 1840, 1,455.

Number of arrivals and departures in 1841, 1,324.

The city of Wheeling has an extent of about two miles along the river bank, and, from the nature of the surface covered by it, may with propriety

be divided into two parts, distinguished by the names of upper and lower towns. The latter has a front of about a mile on the river, and embraces a large area of level bottom land, portions of which near the river and on both sides of Wheeling creek, which traverses this part of the city, are subject to overflows during very high freshets. The upper town stands on an elevated plain or terrace, 40 to 50 feet higher than the other, and has a front on the river of about the same extent, surmounting a bluff bank of indurated clay, sand, gravel, and pebbles. Immediately in the rear of the city, and at the distance of 100 yards from the river at the upper and 500 or 600 yards at the lower town, the river hills rise abruptly from the two plains to the height of 200 to 300 feet, in the form of a majestic rampart, limiting the prospect from the beautiful plains below.

These hills present stratifications in the following order, as we rise from the surface of the plains:

1st. A stratum of clay, shale, and marl, 60 feet thick.
2d. A stratum of sandstone, 25 feet thick.
3d. A stratum of limestone, 1½ foot thick.
4th. A stratum of dark carboniferous clay, 6½ feet thick.
5th. A stratum of carboniferous schist, or slaty coal, 2 feet thick.
6th. A stratum of bituminous coal, *main vein*, 6½ feet thick.
7th. A stratum of slaty clay, 2 feet thick.
8th. A stratum of limestone, 21 feet thick.
9th. A stratum of coal deposite, slaty and poor, 2 feet thick.
10th. A stratum of sandstone, 12 feet thick.
11th. A stratum of argillaceous deposite, 14 feet thick.
12th. A stratum of silicious sandstone, 6 feet thick.
13th. A stratum of argillaceous clay, 12 feet thick.
14th. A stratum of yellowish argillaceous clay, 15 feet thick.

Hence it appears that the main coal vein (6th stratum) is elevated 95 feet above the level of the upper town. The dip of this vein is such, however, that, at the distance of about six miles below Wheeling, in the vicinity of the river, its elevation is only equal to that of ordinary high water of the river.

The trouble and expense of extracting coal from the numerous mines that have been opened in this vicinity is probably less than at any other locality near the Ohio river. At any rate, such a conclusion seems warranted from the fact that it has been procured at the very trifling cost of 1½ cent per bushel, though it cannot be supposed that a reasonable profit could be made on the article by selling it at such a price.

The abundance and cheapness of coal, and indeed of all other articles needful in carrying on manufacturing operations, have already induced the establishment of numerous factories in Wheeling and its vicinity, at which large numbers of mechanics and other operatives have heretofore found useful and profitable employment. Among these are—

One rolling mill, for the preparation of rolled iron of all sorts.
Seven foundries, for casting iron ware and machinery of all kinds.
Three paper mills, on a large scale.
Two cotton factories.
Six glass works, at which window glass and all kinds of glass ware are made in excellent style.
Ten flouring mills.
Seven saw mills.

One sash factory, for making window sash.

Six lath factories.

Three machine shops, for the constructing of steam engines, &c.

Five shops for turning in wood, brass, iron, &c.

Within a circuit of 25 miles from the city, it is said that there are no less than 144 flouring mills, at which 354,000 barrels of flour are manufactured annually.

Provisions and building materials are abundant and cheap in this vicinity, and labor of all kinds may be commanded on as favorable terms as at any other point on the Ohio. The salubrity of the climate and the healthfulness of the surrounding country, together with the general fertility of the soil, are among the inducements that will sooner or later contribute to supply this part of the country with a dense population.

Among the sites to which the attention of the board was invited in this neighborhood are the following, viz:

1st. A site on the Virginia side of the river, five miles below Wheeling, occupying a portion of a farm belonging to Mr. McMeeham. It has an extent of one mile and three-quarters on the river, and three-quarters of a mile back, and embraces about 600 acres. About three-fourths of this tract is situated within the river valley, and presents a surface composed of broad swells and flats, the former rising 20 to 30 feet above the highest freshets, and the latter subject to overflows in very high water. A strip of the flat ground, 50 to 100 yards wide, intervenes between the river and the more elevated portions of the tract, which affords commodious landings in common high-water stages. This site may be purchased at the rate of $75 per acre.

2d. A site five miles above Wheeling, on the same side of the river, and situated mostly within its valley. This site has a river front of about a mile, embraces two benches of different elevations, the lowermost being subject to overflows in very high water, and the uppermost rising about 30 feet above the highest freshet. The latter is separated from the river by a narrow strip of the former. The site extends back to the summits of the river hills, and is divided by the ravine of a run that conveys off the water of a copious spring situated within the site. A tract of 270 acres, constituting a portion of the site, belongs to a gentleman by the name of Chaplin, who will sell this tract for $75 per acre. The residue, 330 acres or more, is the property of Mr. Farmer; the price at which this can be purchased could not be ascertained.

3d. A site on the Ohio side of the river, a little below the village of Litton, seven miles above Wheeling. This site, like all others in the valley of the Ohio in this neighborhood, embraces two varieties of bottom land, viz: a first bench or terrace, subject to occasional overflows; and a second bench, or more elevated plain, above the reach of the highest freshets. In this case the upper plain rises only eight or ten feet above extreme high water, and presents a surface of only about 150 acres secure from inundation. It presents a front of about one mile and a quarter on the river, with favorable landings, and extends about three-quarters of a mile back from the river. The price demanded for the site could not be ascertained.

4th. A site on the Ohio side, two miles below Wheeling, and situated for the most part on the second bench, which is here elevated about 30 feet above high-water mark. It has an extent of a mile on the river, with favorable landings, and is 200 to 400 yards wide. This tract, together with

adjacent grounds to any desirable extent, may no doubt be procured at a fair price.

5th. A site on the Ohio side, four miles below Wheeling. This site occupies a spacious plain, 12 to 15 feet above extreme high water, which is separated from the river by a strip of lower bottom land, barely wide enough to admit of the passage of a road. It is situated immediately above the town site of Belle Air, has an extent of a mile on the river, together with favorable landings, and spreads backward to the summits of the river hills. The quantity and price of the land could not be ascertained.

6th. A site on the same side of the river, seven miles below Wheeling, and including a site surveyed and laid out into town lots, and called Pultney. The site embraces a portion of an extensive plain, elevated 40 to 50 feet above high water, and separated from the river for a distance of about two miles by lower grounds, constituting the first and second benches, as in other parts of the river valley before noticed. The distance of this elevated plain to the river varies from 100 to 200 or 300 yards. Favorable landings are to be met with at several points, some of which are within a short distance from the margin of the plain. Jacob Shriver, Esq., is the proprietor of the site and of adjacent grounds, to the extent, in all, of 2,000 acres, and will no doubt dispose of the whole or part of his lands in this neighborhood on reasonable terms. His price, however, could not be ascertained, on account of his absence.

Of these several sites, those on the Virginia side, and that on the Ohio side designated as the 5th, are more conveniently situated with respect to their proximity to the river, their elevation, and the abundance of coal found in their immediate neighborhood. But with respect to extent and eligibility of surface and general aspect, the site last mentioned is entitled to a preference. The grounds at and around all of them are cleared and under cultivation, yielding abundant crops of corn, wheat, rye, oats, hay, &c.

For further information in reference to Wheeling and its environs, see Appendix, documents Nos. 76, 77, 78, 79, 80, 81, and 108.

SITES NEAR ZANESVILLE, OHIO.

This enterprising and thrifty town was visited by the armory commissioners of 1823, who examined with care several positions in its neighborhood as sites for the Western armory, and reported in detail the results of their observations. For numerous items of information touching the conveniences and advantages here presented for the accommodation of such an establishment, we again take leave to refer to their report. (See House Doc. No. 120, 25th Cong., 2d sess.)

Since their visit, material changes have taken place in the state of things generally, and more especially in the condition of the site a little above the mouth of Slagoe's run, designated by them as the most favorable position for the establishment of the armory. This position is included within the town site, and is now so much encroached upon by the improvements made in the enlargement of the town, the construction of a canal, water works, &c., that the requisite space for the accommodation of the buildings of an armory cannot now be obtained. Moreover, the dam then existing in the river at the mouth of Licking creek was 5½ feet high. This has been reduced, and another, 8 feet high and far more substantial, sub-

stituted in its place. This dam is connected with a line of slack-water navigation extending from the mouth of the Muskingum upward, to a point within 3 miles of the Ohio and Erie canal, near Dresden, where a junction is formed between the Muskingum and the canal just mentioned, by means of a cross-cut canal 3 miles long; the whole executed and carried into operation at the expense of the State, and constituting a part of their system of internal improvements. Indeed, the entire system of internal improvements in the State of Ohio, so far as it has been carried into effect, has been adopted and executed since the date at which the commissioners above mentioned visited this part of the country.

Zanesville occupies a broad tongue or cape of valley land, formed by a detour of the Muskingum, and stands on the left bank of this river, directly opposite to the mouth of Licking creek. Small portions of the town site are subject to overflows in very high water; the extreme range, from the lowest to the highest stage at the mouth of Slagoe's run, at the lower end of the town, being about 23 feet, and above the town 19 feet.

The position of Zanesville, with reference to other important points, is as follows: Its distance from Wheeling, by the National road, is 74 miles; from Columbus, by the same road, 54 miles; from Maysville, Kentucky, by the turnpike, through Chillicothe, 144 miles; from Cincinnati, by turnpike, 161 miles; from Cleveland, by turnpike, 156 miles; from Marietta, 60 miles; from the mouth of Muskingum, by slack-water navigation, 75 miles; from Dresden, by slack-water, 16 miles; from Cleveland, by canal, &c., 171 miles.

The water power at Zanesville is sufficient for carrying on mechanical operations on a very extensive scale. The head and fall afforded by the present dam, in ordinary low-water stages, is 16½ feet; and the quantity of water furnished by the Muskingum, in the dryest time, is at the rate of 40,000 cubic feet per minute, as determined by careful measurement. With this fall, and with this flow of water per minute, the efficient power that may be produced is equivalent to that of 833 horses, and, according to the rule adopted for farming out the water power in the Ohio canal, is sufficient to drive 185 run of 4½-feet stones—each run grinding at the rate of 100 bushels in 24 hours.

Among the advantages presented at this place is a great abundance of stone coal, which is found in three distinct veins, varying in thickness from 1½ to 3 or 4 feet, and in some instances even to 6 feet, all situated in the hills, at a very considerable elevation above the water table, as indicated by the surface of the principal streams. It is delivered at Zanesvile for 4 to 5 cents per bushel.

The western margin of the coal district of the Ohio is supposed to occur at the distance of 8 or 10 miles westward from Zanesville, and may be defined in the following manner, viz: Beginning on the Ohio river, a little below the Hanging rock, or 12 to 15 miles below the mouth of Big Sandy river, the western boundary of this district pursues a direction about north-northeast, passing a few miles to the westward of Zanesville, and continues in about the same direction to the upland ridge dividing the waters of the Ohio from those that flow into Lake Erie; it then deflects to the eastward, and follows the ridge just mentioned to the eastern margin of the State. According to an estimate of Professor Mather, late geologist of the State, the coal district of Ohio embraces an area of about 12,000 square miles; 5,000 of which are supposed to contain coal

veins of sufficient thickness, and of the requisite quality, to be denominated workable veins. We could not learn that any localities of coal have ever been detected within the State of Ohio westward of the boundary above designated. It may, moreover, be remarked, that the salt springs found in this part of the country are generally situated in the vicinity of this boundary.

The valley of the Muskingum occasionally spreads to the width of a mile or more, and in its wider parts embosoms extensive tracts of beautiful intervale land, divided into two or more benches or terraces, rising one above another; the lowermost being generally narrow, and nearly on a level with the summit of ordinary high freshets; the second spreading into broad and handsome tabular plains, 15 to 20 feet above the reach of the highest floods; and the third rising into gentle swells or ridges, 40 to 50 feet above the river. The soil of each variety is rich and productive, and for the most part well cultivated, yielding plentiful crops of corn, wheat, oats, hay, and other products.

The descent of the river at Zanesville, from the pool above the dam to the surface of low water below the falls, is seventeen feet, and thence downward to the foot of Duncan's falls, ten miles below, the descent is sixteen feet more, the whole of which last occurs within the distance of a mile at and below a dam eight feet high erected at this place. From this point downward to Marietta, at the mouth of the Muskingum, the aggregate descent of the river is fifty-two and a half feet, which is about equal to the range from lowest to highest water of the Ohio at that place. Consequently, the checked or back water occasioned by the highest floods of the Ohio, even in a low stage of the Muskingum, will rise to the level of the latter at the foot of Duncan's shoals, which are about sixty-five miles above its mouth.

The committee appointed by the town council of Zanesville to confer with the board upon the subject of the armory invited our attention to the following sites, viz:

1st. A site nine miles below Zanesville, on the left side of the river, in the immediate vicinity of Duncan's falls. It embraces an extent of about half a mile on the river, from a point a few hundred feet above the dam, and a little within the limits of Duncan's Falls village, to a point near the ferry landing, nearly half a mile below the dam. With this front on the river, it extends obliquely back, widening in this direction far enough to cover an area of between six and seven hundred acres, embracing a beautiful tract of rolling valley land, together with a remarkable natural mound rising eighty or one hundred feet above an extensive plain, situated between the mound and the river, upon the summit of which are the mansion, out-houses, gardens, &c., of its former proprietor—all of which are included within the site. The whole of the site is elevated above the reach of the highest freshets. The lowermost bench, which has a width of only twenty to fifty yards, and divides the rest of the site from the river, is elevated about twelve feet above the crest of the dam, or four feet above the highest flood.

In order to obtain a water power at this place suitable for the uses of an armory, together with positions sufficiently spacious for its advantageous employment, it is proposed to construct a navigable head race, connected with the pool above the dam, and leading thence downward on the bench above mentioned, and along the foot of the ramp connecting the same with the second bench, quite to the lower extremity of the site. The race should

run parallel to the river shore, and at the distance of about one hundred feet from it; affording sufficient space for the erection of machine shops between the race and the river, and convenient positions for wheel pits and tail races for discharging the water into the river, after it has been used upon the wheels. The length of the race need not exceed eight hundred yards, and its depth below the surface of the ground sixteen feet. The cost of forming the race, together with the forebays, wheel pits, tail races, &c., connected with it, will be comparatively small, inasmuch as the ground through which they are to pass is apparently void of rocks and easy of excavation.

At the end of the dam, and near the head of the proposed race, a substantial and well-built flouring mill, (basement of stone, superstructure of wood,) on a large scale, has lately been erected, large enough to operate with seven run of four-and-a-half-feet stones. This mill, together with three acres of ground, including the site on which it stands, is the property of the Bank of Zanesville. The same bank also owns another similar establishment, with five run of stones and seven acres and two-thirds of land on the opposite side of the river, and supplied with water from the pool of the same dam. This mill is old, much out of repair, and of comparatively little value. The bank directors have offered to sell both of these establishments, together with the grounds and water privileges pertaining to the same, for the sum of $55,000—the water privileges being limited to the use and employment of a sufficiency of water, with the head and fall now afforded by the dam, to drive ten run of stones, each run grinding and flouring at the rate of one hundred bushels of wheat in twenty-four hours.

A similar water privilege, covering the right to operate five run of stones, with the requisite machinery for flouring at the rate before mentioned, is the property of Messrs. Buckingham, Sturges, and Brush, who will sell this privelege to the United States for the sum of $7,500.

The tenure by which the present proprietors hold the water privileges above designated is a perpetual right, guarantied by the State of Ohio, to the exclusive use and employment of a sufficient quantity of water to drive fifteen run of stones, grinding at the rate of 1,500 bushels of wheat in twenty-four hours, and to operate the requisite machinery for flouring the same, which right is to take precedence of all other claims whatever, to the use of the water passing in the river at this place; the State, moreover, being obligated to construct and keep in good repair a dam sufficient to ensure a supply of water to the extent above indicated. This guaranty was given by the State to the former proprietors of the water privileges at Duncan's falls, in return for the privilege allowed to the State of erecting a dam, lock, and lateral canal, as a means of improving the navigation of the Muskingum at these falls.

We would remark, in this place, that, in order to render the water power operative to the best advantage at all times, it will be proper to employ breast wheels during the lower stages of the river, and reaction wheels when the water is high—an extreme freshet giving a nett fall of only four feet.

The proprietors of the tract first designated as containing between six and seven hundred acres, (the ferry landings and privilege excepted,) will sell the whole, including the buildings and improvements thereon, for the moderate price of $45 per acre. Hence the aggregate cost of the water

privileges and their sites, together with the old and new mills, with other buildings, will be - - - - - - - $62,500
Six hundred and eighty acres, including Taylor's mansion, &c., at $45 - - - - - - - - 30,600

Amount - - - - - - - 93,100

This amount is regarded as very small, in view of the intrinsic value of the property offered for it.

2d. A site, including a portion of the town site of Taylorsville, on the right side of the Muskingum, and adjacent to Duncan's falls.. This site is far less conveniently situated, with respect to the river and the employment of a water power, than that before described. The lateral canal before mentioned passes from the pool a little above the dam, and pursues its course downward in a broad flat valley, at the base of a high ramp, separating the plain on which the town of Taylorsville is situated from the low grounds below, and, at the distance of about a mile, unites again with the river below the foot of the falls. At its lower end, the canal is conducted on an embankment 15 to 18 feet high, and 150 yards long, across a low marshy tract traversed by a small run, and terminates a little above the mouth of the run, and within the limits of the former bed of the river, by a lock of 16-feet lift, situated at this place. On the river side of the canal and lock, at this end, the escarpments of both are faced with stone from top to bottom. It is worthy of remark, that the channel of the river, which is here restricted on the left by a mural precipice of rock, and on the right by the escarpments of the canal protruding far into the old channel, is reduced to about two-thirds of its ordinary width at other points. Among the consequences that must result from this mal-arrangement, will be an increased elevation of back water at any works that may be established between the dam and the lower end of the canal, and a consequent reduction of the efficient fall during high stages of the river. The canal crosses a broad point formed by a bend of the river, from which last it is separated by a tract of bottom land, the more elevated portions of which are secure from inundation, but are not conveniently situated nor sufficiently spacious for the reception of the buildings of an armory. With the exception of a small parcel of uneven ground near the old mill before mentioned, there is no position near the dam favorable for the employment of the water power. The locality most suitable for this purpose is near the lower extremity of the canal, and in the immediate vicinity of the swampy grounds before noticed. This position is, however, objectionable, not only on account of its proximity to marshy and low grounds subject to frequent overflows, but on account of the apparent insecurity and instability of this part of the canal, from which exclusively the requisite supply of water must be derived. A portion of the elevated plain on which Taylorsville is situated would afford ample accommodations for the buildings of an armory ; but its remoteness from the river, added to the other inconveniences and difficulties already adverted to, render any position presented on this side of the river less eligible than the site proposed on the other side. A tract, containing 396 acres, and covering a part of the town site of Taylorsville, has been offered by its proprietors (the directors of the Bank of Zanesville) at the rate of $20 per acre.

3d. A site on the right side of the Muskingum, 11 miles above Zanes-

ville. It is situated at the head of the basin or pool formed by the dam at Zanesville, and on the line of slack-water navigation, from the mouth of the Muskingum to the great State canal of Ohio, which, by the way, is navigable for small steamboats from Marietta to Dresden—68 miles. The site occupies a portion of a spacious bottom nearly a mile wide, a large portion of which is elevated only a few feet above the highest floods, and the residue being subject to occasional overflows. Any quantity of land that may be wanted for an armory may be purchased at a rate not exceeding $40 per acre. It has a soil remarkably rich and productive, which, added to the flatness of its surface generally, and the occurrence of low marshy grounds of considerable extent near the bases of the river hills, seems to render its healthfulness questionable.

A dam and lock of eight-feet lift have been constructed at this point, but the water power attainable thereat would be liable to interruptions by high water; the highest freshets rising at least 17 feet above extreme low water, or 9 feet above the comb of the dam.

In reference to all lines of artificial navigation opened in Ohio at the expense of the State, we take this occasion to remark, that, agreeably to a stipulation entered into by the State Legislature and the General Government, the United States have the right to navigate them, in all times to come, free of any charge for this privilege.

By reason of the productiveness of the country in all directions around Zanesville, and the facilities of intercommunication with other parts of the United States, supplies of all kinds necessary for carrying on manufacturing operations are attainable on moderate terms. Building stone of an excellent quality and easy to work, lime, brick, clay, and fire clay, are abundant and convenient. With the exception of pine, cypress, and cedar, all the varieties of lumber found on the Western waters may be obtained here at a cheap rate.

Several other points on the Muskingum, below Duncan's falls, have been proposed as sites for the armory, on account of the water power that might be obtained at them; but, on learning that such a power would be liable to interruptions by back water occasioned by very high freshets in the Ohio river, we were deterred from visiting them.

For further information respecting Zanesville and the country around it, we refer to documents Nos. 82, 83, 84, 85, 86, 87, 88, 89, and 108, of the Appendix.

SITES NEAR DAYTON, OHIO.

This flourishing city is situated on the left side of the Miami, at its confluence with the Stillwater and Mad rivers, and occupies a portion of an extensive plain of valley land spreading eastward and southward from the junction of the two rivers, nearly a mile in each direction. Its distance from Wheeling, by the National road, is 224 miles; from Zanesville, 150 miles; and from Columbus, 95½ miles; from Indianapolis, by the nearest travelled road, 111 miles; from Terre Haute, 207 miles; from Vandalia, 303 miles; from St. Louis, 400 miles; from Sandusky, 166 miles; from Cleveland, 196 miles; and from Cincinnati, 57 miles. There are at present no less than five turnpike roads, leading in various directions from Dayton, and a sixth is nearly completed. Besides these avenues of trade and travel, the Miami canal, leading from Cincinnati to the west end of Lake Erie, passes

through the town. This work is completed and in operation from Cincinnati to Piqua, 93½ miles; and is in the progress of extension thence to Fort Defiance, on the Maumee, 127½ miles further, where it will unite with the Wabash and Erie canal, and thus form a fourth navigable communication from the Ohio river to the lake, within the State of Ohio. The distance on this route, from Dayton to the lake, will be 185 miles; from Dayton to Cincinnati, 65 miles; and from Cincinnati to the lake, 250 miles. The descent along the canal from Dayton to the basin at Cincinnati is 187½ feet, and from the basin to low-water surface of the Ohio river 110 feet; making the whole descent from Dayton to low water of the Ohio 297½ feet, or to the surface of extreme high water at Cincinnati about 235 feet, which shows that a vast amount of water power is at command, between Dayton and the Ohio river. The quantity of water furnished by the Miami river at Dayton, in its lowest stage, independently of that required for supplying the canal, is at least 10,500 cubic feet per minute. This quantity, with the fall just mentioned, (235 feet,) if employed judiciously on overshot or high-breast wheels, would give a power equivalent to that of more than 3,000 horses.

Of the Miami country generally, beauty, rather than grandeur, is strikingly characteristic of its leading features. The immediate valley of the Miami river, in particular, presents a beautiful expanse of intervale land, bounded on both sides by gently sloping hills; and, like that of the Muskingum, embosoming two or more benches or plains, rising by gentle gradations one above another, but far more spacious on the former than on the latter. These valley lands are remarkably rich and productive, and are for the most part cleared, and in a high state of cultivation. A view of some portions of this interesting valley, early in September, when contiguous fields, as far as the eye can reach, are clad in the luxuriant verdure of growing corn, is one of the most delightful prospects that can be witnessed. On returning from the valley, and reaching the uplands, a view not less interesting, though less captivating, is presented: a broad surface, generally of a rolling, but occasionally of a gently waving aspect, and stretching to the farthest limits of the horizon, here meets the eye. In richness of soil, variety of products, and healthfulness of appearance, all combined, it is not surpassed, probably, by any upland region to be met with in any other part of the United States.

The water power generated at Dayton, and applicable to mechanical operations at all times, is that resulting from a supply of at least 10,500 cubic feet per minute, with a constant head and fall of twelve feet, above the summit of the highest flood, which is equivalent to that of more than 160 horses. The increased head and fall that may be rendered operative during the lower and the increased supply furnished during the higher stages of the river, may, by a suitable arrangement of water wheels, contribute to augment the efficiency of the power to at least double the amount above stated, or to more than that of 300 horses.

The establishments already supplied with water power at Dayton are as follows, viz: 5 flouring mills, 3 chopping mills, 5 saw mills, 5 cotton factories, 2 carpet factories, 2 carding and weaving factories, 2 oil mills, 2 paper mills, 1 last and peg factory, 4 foundries and machine shops, 1 hat body manufactory, 1 gun-barrel factory, 1 clock factory, distilleries, breweries, lathes, &c.

In view of the numerous channels of intercourse, both by land and water,

centring at Dayton, of the extent and fertility of the country surrounding it, of the abundant water power here afforded for carrying on manufacturing operations on a large scale, and of the apparent salubrity of its climate and situation, no doubt can exist that it will, ere long, contain a numerous population, and sustain a conspicuous rank among the cities of the West.

The sites to which the attention of the board was directed by the committee of the city council were as follows, viz:

1st. A site on the Springfield turnpike, one to two miles above Dayton, and about half a mile below Smith's mills, on Mad river. It embraces a large tract of handsome bottom land, situated between the road just mentioned and Mad river, portions of which are liable to overflows in very high water, but by far the largest part is elevated a few feet above the highest freshets. It extends across the road also, and embraces on the southerly side of the same part of an upland plain or broad swell, elevated 30 to 35 feet above the bottom just mentioned, from which it is separated by a ramp, or slope of gentle inclination, along the surface of which, and a little above its base, the road passes. On this eminence there is ample space for the accommodation of the buildings of an armory, while the bottom land on the other side of the road will afford ample room to be occupied as gardens and fields for cultivation. The tract may be laid off in nearly a square form, having an extent of something more than a mile along the shore of Mad river, and extending back or southwardly far enough to include five or six hundred acres.

In order to provide for a water power in connexion with the site, it is proposed to take the water from Mad river, at a point near or a little above Smith's mills, and convey it thence in a race of suitable size, prepared for this purpose. The race may pass along the slope and near the road above mentioned, crossing the latter within the site, and terminating three or four hundred yards below, on the ramp before mentioned; the space between the point of crossing the road and the termination of the race being suitable for the reception of machine shops, &c. Its length will be about one mile and three-quarters, and its cost, together with that of a dam at its head, which need not be more than three or four feet high, will not be likely to exceed $20,000. In addition to the head race as above, a tail race will also be requisite, to convey off the water discharged from the wheels. This race should commence at or near the point where the head race crosses the road, and be continued downward along the foot of the ramp, and thence in the nearest direction either to Mad river or to the canal basins situated within the limits of the town. Its length will not probably exceed a mile, and its construction will not cost probably more than $5,000.

The supply of water afforded by Mad river, in the dryest time, is said to be never less than 6,000 cubic feet per minute, and the head and fall resulting from the arrangement above contemplated will be at least 21 feet. Accordingly, the power produced (which, by-the-bye, will be secure from interruptions by back water as well as by the scarcity in dry weather) will be equivalent to that of about 160 horses at all times, without impairing the water power at Dayton, as before stated. With respect to the cost of the site, also of the water privilege therewith connected, and of the right of way for the tail race, no definite information could be obtained. It is presumed, however, that they may be purchased on reasonable terms.

2d. A site at Carrollton, eight miles below Dayton, and on the same side of

the river. This position is situated in a bend of the Miami, about three miles in circuit, and three-fourths of a mile across its gorge. It occupies a beautiful tract of bottom land, mostly covered with an open woodland growth, and is bounded by the river on one side and by the Miami canal on the other. With the exception of two or three valley-like depressions of moderate extent, the entire tract is above the reach of the highest freshet. About two-thirds of its surface is level, occupying the first or lowermost bench of the river valley; the remaining third is situated on the second bench, which rises 6 to 18 or 20 feet above the first, and presents a rolling aspect. The tract is of an irregular shape, owing to indentations upon its sides, occasioned in part by the flexures of the river, and in part by the encroachments of claims of sundry individuals owning the adjacent lands.

The natural fall of the Miami, in a distance of about 2½ miles along the margin of the site, is 16 feet, which is now commanded and employed for driving a saw mill, by means of a race about three fourths of a mile long, passing across the bend transversely of its gorge. The range from the lowest to the highest water surface, at the lower end of the race, is about 14 feet; but the ordinary high-water range does not exceed 7 or 8 feet—thus affording a fall of about 8 feet in ordinary high freshets, and 2 feet only in extreme floods.

By erecting a dam across the Miami eight feet high, and about 500 feet long, at a point a little above the present race, and forming a new race across the gorge a little above the old one, and continuing the same downward along the bank of the river to a point two or three hundred yards below the saw mill, the aggregate low-water head and fall will amount to 22 feet, and the efficient fall in extreme high water will be about eight feet; besides, the arrangement here contemplated would afford ample and convenient space for the erection of machine shops, &c., in connexion with the lower part of the new race.

It is, moreover, proposed to make the new race sufficiently large for the passage of canal boats through its entire length; it is also contemplated to connect the same with the lower canal basin at Carrollton, which is situated between two locks, each of 8-feet lift. This connexion may be formed by a branch canal about half a mile long, thus connecting the head race with the Miami canal, and affording a water communication between the latter and the site.

The cost of the head race as above, together with a crib-work dam guard gate, &c., across the Miami at its head, may be estimated at $2,000; that of the branch canal at $4,000; and that of forebays, wheel pits, tail races, &c., at about $500 for each wheel, or $4,000 for eight wheels, amounting to $20,000 for the several works here mentioned.

Agreably to an estimate of Samuel Forrer, Esq., the quantity of water offered by the Miami at the head of the contemplated race, independently of that required for the supply of the canal, &c., at Dayton, is at least 9,000 cubic feet per minute, which, with a head and fall of 20 feet, would yield a power equivalent to that of 227 horses, and, with a fall of eight feet, the power would be equivalent to that of 90 horses. In case a more copious supply should be wanted, the proprietors of the site, who also own the privilege of using 1,400 cubic feet per minute, to be taken from the canal at this place, will dispose of this privilege at a fair valuation; and this additional supply can be conveyed into the head race, through the branch canal above contemplated.

The proprietors of the site offer to sell to the United States 550 acres, together with the water privileges, &c., so far as they relate to the supply of water afforded directly from the Miami river, for the sum of $40,000. They are also willing to include in the sale other property, in lots, buildings, &c., at a fair valuation. (See Appendix, document No. 91.)

In regard to the healthfulness of this neighborhood, the testimony of its inhabitants is strongly in its favor, but the flatness of the grounds included within it, the fertility of the soil, and the exuberance of its vegetable products, seem to warrant the opinion that intermittent and bilious fevers may be expected to prevail, at least during the months of August and September.

The country in the neighborhood of both of the sites above considered yields, in the greatest profusion, all the products required for the comfortable subsistence of man and beast. The neighboring forests afford an abundant timber growth of oak, hickory, ash, sugar tree, maple, beech, walnut, elm, cherry, mulberry, locust, &c. The hills furnish building stone of an excellent quality, and the fields abound with good brick clay. No coal has yet been discovered near the valley of the Miami; supplies of this article are procured from abroad at prices varying from 13 to 15 cents per bushel. No iron works have as yet been established in this quarter. Pig metal, bar iron, nails, &c., are procured by water conveyance from the Ohio river.

For further particulars in relation to the sites near Dayton, see Appendix, documents Nos. 90, 91, and 108.

SITE NEAR HAMILTON AND ROSSVILLE, OHIO.

These thrifty towns are situated, the former on the left and the latter on the right side of the Miami river, by land 34 miles from Dayton, and 23 miles from Cincinnati, or by the canal 37 miles from the former, and 28 miles from the latter.

The valley of the river and the adjacent country on both sides, in this neighborhood, are similar to what they were represented to be in the neighborhood of Dayton, of which we have previously treated, except that the uplands present an aspect considerably more rolling and diversified in the vicinity of the site now under consideration. The river in its passage through this neighborhood is more serpentine, shoally, and rapid, than in other places, and embosoms an island containing 310 acres, called Millikin's island, which is situated a little above the town site of Hamilton. This island was formed in 1805, in consequence of the diversion of the river from its former bed, and the cutting of a new channel by the force of its current through a distance of about 650 yards across the neck of a peninsula, previously situated between the river and a small creek called Four Mile creek, which peninsula has now become an island, and the valley of the creek, which contributed to form the peninsula, has been converted into the main channel of the river.

The natural fall of the river in a distance of about 5 miles, by its meanderings, commencing at a point 4 miles above Hamilton in a direct line, and terminating at the bridge uniting Hamilton to Rossville, is a little more than 23 feet. At the point first mentioned, it is proposed to erect a dam, five feet high, and about 200 yards long, which will increase the head and fall to 28 feet. The minimum quantity of water passing in the river

at the site of the proposed dam is said to be 26,000 cubic feet per minute, in the lowest stage of the river. This quantity, with a fall of 28 feet, if judiciously applied on overshot or high-breast wheels, would yield a power equivalent to that of 886 horses, which would be available at this locality even in the dryest season.

A plan for the production of a water power, as above intimated, has not only been matured and adopted, but great advancement has already been made toward its accomplishment.

The general outline of the plan is as follows:

The water is to be taken from the river at the point proposed for the dam, and conveyed thence downward, in a narrow channel, in rear of a small island, 700 yards; thence, across a low bottom, and near the easterly margin of the river valley, one mile and a half; thence, in the old channel of the river, 1,200 yards; and thence, across a level tract of elevated bottom land, about one mile further, where it will enter the town site of Hamilton. From this last point, it is to be distributed through various parts of the town by means of subordinate races, and employed for hydraulic purposes. The passage of the water into the main river, through the island channel above mentioned, and through the old river channel, is to be intercepted by high and heavy embaukments of earth. The races, embankments, &c., are nearly completed; but the dam at their head, across the river, is not yet commenced.

In connexion with the plan, a branch canal, about 600 yards long, has also been projected, the object of which is to form a navigable connexion between the race and the Miami canal basin, which is within the limits of the town. The water surface of the basin is about 10 feet above that contemplated for the race, and of course a lock of that lift will be required in order to effect a transit from one to the other.

For the accomplishment of the plan above considered, a company of enterprising gentlemen has been organized, who have assumed the name and title of the "*Hamilton and Rossville Hydraulic Company*," and who, on the completion of the works they have in hand, will have achieved the command of a more magnificent water power, together with a more ample scope for displaying it to advantage, than has been attained at any other point in the Western country.

The following resolution, adopted by the company, will exhibit the terms on which they are willing to dispose of the power requisite for the purposes of the contemplated armory:

"*Resolved*, That the hydraulic company will furnish to the United States three thousand cubic feet of water per minute, over a fall of 20 feet, upon condition that the United States will erect a permanent tight dam across the river, and keep it in good repair; and the United States shall have the right to navigate the main canal of the company, from Hamilton basin, free of charge, when a water communication shall have been completed between the hydraulic canal and the basin, if the national armory shall be established adjoining Hamilton.

"WILLIAM BIBB,

"*President of Hamilton and Rossville Hydraulic Company.*"

The dam alluded to is that already noticed as having been projected and about to be constructed at the head of the race or hydraulic canal. Its length, as before remarked, will be about 200 yards, and its height five

feet. Such a dam may no doubt be constructed by the use of crib work, in a very substantial manner, at a cost not exceeding $8,000.

In reference to the navigation of the State canals of Ohio, we again take occasion to remark, that the United States are entitled to the free use of the same, in perpetuity.

Accompanied by the committee appointed to confer with the board on subjects relating to the armory, we examined the country through an extent of about five miles above Hamilton, and in the vicinity of the town, to the distance of a mile and a half eastwardly of the river. The grounds deemed most suitable for an armory site, within this range, are Millikin's island, and the elevated bottom directly opposite, on the east side of the river, both of which have been previously noticed. In reference to the former it should moreover be observed, that almost the whole of its surface is elevated considerably above the reach of the highest freshets, and in reference to the latter, that it is more elevated than the surface of the island, both areas corresponding in their elevation and aspect to the variety denominated the second bench within the river valley. The island, as before remarked, contains 310 acres, and the bottom which is situated between the hydraulic company's race or canal and the old river, as it is sometimes called, 212 acres; making, in all, 522 acres, the whole of which may be purchased at an average rate not exceeding $50 per acre. In rear of the race, and between it and the Miami canal, is a more elevated plain, constituting the third bench of the valley, and separated from the bottom by a gentle slope, along the base of which the race passes. This plain is elevated 10 to 20 feet above the bottom, varies in width from a quarter to half a mile, is nearly a mile in length, and contains about 240 acres. A part or the whole of this tract, should it be wanted, can no doubt be purchased at a price not exceeding that just before mentioned.

With respect to the island, a small tract at its lower extremity is subject to overflows in very high water; but almost the whole of the residue is secure from inundations, and in places presents swells and ridges rising eight or ten feet above the highest floods. In connexion with the extensive pool or reservoir formed in the old channel of the river, and embracing a distance of more than a mile along the island shore, a levee, two to eight feet high, connected with the lowermost earthen embankment thrown across this channel, has been constructed through a distance of nearly a mile, for the purpose of confining the water in the reservoir, or preventing its egress and passage across a portion of the island. It is here worthy of remark, that a copious and never-failing spring of excellent water issues from the island, into the old channel, at the ordinary level of low water.

Two methods of generating and employing a water power in connexion with the site were presented for our consideration, viz: one on the margin of the bottom and adjacent to the old channel, and the other on one or both sides or shores of the island, adjacent to the old or new channel, or to both channels.

The first may be carried into effect by opening one or more branch races from the company's race to the old channel, and forming a head race of suitable extent, parallel to the river shore, and far enough from it to admit the machine shops between this race and the old channel. From this head race the water may be conveyed through forebays to the wheels, and thence through appropriate wheel pits and tail races into the old channel.

The second may be effected by one or more head races, leading from the old channel reservoir downward across the island, or on one or both sides of the same, from which the water may be displayed, as before, through head races, forebays, wheel pits, and tail races, into the old or new channel, or into both.

The latter method is preferred, on account of its being less expensive, of its affording accommodations on a much larger scale, and more especially on account of its relations to the island, by reason of which a manufacturing establishment thus situated will be more exempt from the annoyances of a contiguous population, and from the intrusions and interruptions of unwelcome visiters.

The extreme range from lowest to highest water is said to be eighteen feet at the Miami bridge, sixteen feet at Millikin's island, and twelve or thirteen feet at the site of the proposed dam. Hence the constant fall that may be rendered operative at the island will be at least fourteen feet, the fall in ordinary high water being at least twenty-feet.

The country around Hamilton and Rossville, for many miles in every direction, presents the more comely and interesting features generally exhibited by the Miami country. The woodlands, which formerly presented a dense and heavy growth of timber, shrubbery, vines, grasses, &c., have given place to cultivated fields, yielding all the necessaries of life in the greatest profusion. Corn, wheat, rye, barley, oats, potatoes, tobacco, hay, fruits of all kinds common or peculiar to the climate, peas, beans, hemp, flax, &c., are among the products of the soil; and these, together with horses, cattle, sheep, hogs, poultry, pork, beef, butter, lard, tallow, &c., constitute the leading articles produced for market, all of which can be supplied in abundance, and on the most moderate terms.

Building materials, such as limestone in strata three to nine inches thick, lime, brick clay, and lumber of all kinds, except pine, cypress, and cedar, are abundant, convenient, and of course cheap. Stone coal is to be procured only by water transportation from abroad, and cannot be afforded at this place for less than about fifteen or sixteen cents per bushel.

The facilities afforded to this neighborhood by the Miami canal, for trade and intercourse by water with remote parts of the country, are invaluable. A broad basin, nearly a mile long, and fifteen to twenty feet deep, connecting the town of Hamilton with the canal, affords a spacious and commodious port for the commercial business of the neighborhood.

For additional information respecting the site near Hamilton and Rossville, see Appendix, documents Nos. 92, 93, 94, and 108.

SITE NEAR NEWPORT, KENTUCKY.

Newport stands on the left bank of the Ohio, immediately above the mouth of Licking river, and directly opposite to the city of Cincinnati. Its relations to other important points are, of course, the same as those of Cincinnati; and in order to obviate the propriety of again reciting them, we take leave to refer to the statements already made in reference to that city.

The State of Kentucky has undertaken and commenced the improvement of Licking river, with the design of rendering it navigable from its mouth to West Liberty, in Morgan county, through a distance of two hundred and thirty-one miles. The system of improvement that has been adopted

is that of slack-water navigation, by means of dams and locks, and intermediate pools of still water. The estimated cost of the entire system, completed, is $1,792,856, but it is supposed that the actual cost will be likely to amount to $2,000,000. The aggregate descent or fall to be overcome by the improvement is three hundred and twelve feet.

The Licking river improvement was commenced in 1838, but as yet very little progress, comparatively, has been made towards its completion The first five locks from the mouth of the river upward have been commenced, and are said to be more than half completed. Very little has been done, however, towards the erection of the dams which are to be built in connexion with these locks.

The extent of slack-water navigation effected by means of this series of locks and dams, when completed, will embrace the distance from the Ohio river to Falmouth, fifty-one miles by the river, but thirty-six miles and three-quarters only from Newport by the nearest travelled road. The amount already expended on this part of the improvement is said to be $350,000, and the amount still required to complete the same is estimated at about $200,000.

The object of the Licking improvement is mainly to gain access by water to immense fields of coal and iron ore, of an excellent quality, which are said to exist on the river at and near the contemplated head of its navigation, and from which at present there is no safe and easy outlet for the conveyance of their products to market. Moreover, the river valley, which is of very variable widths, embraces fine tracts of cultivable lands; and the uplands in its neighborhood, which are generally hilly and broken, afford fine pasturage and woodlands. The timber growth embraces the following articles, viz: white red, post, and several other varieties of the oak; hickory, maple, black and white walnut, red and white beach, white and blue ash, wild cherry, sugar tree, yellow and white poplar, locust, mulberry, sycamore, cotton wood, sassafras, dog wood, &c.

The site recommended by General Taylor, of Newport, and examined by the board, is on the right bank of the river, five and a half miles above its mouth, and in the vicinity of the second lock and dam of the Licking improvement; the first lock and dam being three miles below, or two and a half miles above the mouth of the river. The lifts of these two locks are as follows, viz: That of the first or lowermost is seventeen and a half feet, and that of the second eighteen feet, making the aggregate lift of both thirty-five and a half feet. The range of the Ohio, at the mouth of Licking, from the lowest to the highest surface water, is sixty-three feet; consequently, the summit of the highest floods may attain an elevation of twenty-seven and a half feet above the crest of the dam at the site. Even the ordinary high freshets of the Ohio, which attain an elevation of thirty-five to forty feet above low-water mark, will occasion back water to the height of the top of the dam, and thus effectually neutralize the water power whenever they occur.

The site is elevated thirty to fifty feet above the reach of the highest flood, and covers a surface much divided by ravines and gullies. At the higher elevation above mentioned is an area of more even aspect, sufficiently spacious to accommodate the storehouses and dwellings connected with an armory. The machine shops for the employment of the water power (which can be rendered operative to advantage only during the lower stages of the water) may be arranged along broken slopes of the hill, which

intervene between the river and the locality of the other buildings above mentioned.

The site and circumjacent grounds to a large extent, are the property of General Taylor, who will dispose of any number of acres, not exceeding eight hundred, that may be required for the purposes of an armory, at the rate of twenty dollars or less per acre.

Provisions, building materials, and supplies of all kinds, may be obtained at this site on terms nearly as favorable as at Cincinnati, when the Licking improvement shall have been completed from the mouth of the river to the site.

The attention of the armory board of 1823 was invited to a site at the mouth of Bowman's creek, twenty-three miles from the Ohio river. Major Smith, of the corps of engineers, in his researches in reference to a site for the Western armory, examined a site at the Horseshoe bend. To the printed report of the former (see House Doc. No. 120, before cited) and to the manuscript report of the latter commissioner, we beg leave to refer for numerous details of information in reference to these positions, and to the character of the Licking river generally.

See Appendix, documents Nos. 95, 96, and 108.

SITE NEAR MADISON, INDIANA.

This site was visited by General W. K. Armistead, president of the board, and Surgeon General Lawson; no convenient opportunity having been presented for the board, in conclave, to make examinations in reference to it. The following report exhibits the results of their inquiries in relation to the site:

"This location was visited in consequence of receiving a communication from a committee of the citizens of town of Madison, who desired our attention to a site on the Ohio river, below the town about two miles, immediately on the bank of the river, which includes a tract of bottom land of three hundred and fifty acres. This position is eligible, so far as to its being elevated from ten to twelve feet above the highest freshets of the Ohio river, and may be purchased at a cost not exceeding forty dollars per acre. It is bounded on both flanks by two beautiful streams of pure water, but not of sufficient magnitude to be available as a water power necessary for the armory. The river bluffs here join the bottom land precipitously, and confine it to a width of half a mile for a considerable distance downward.

"The neighboring hills afford limestone and sandstone well adapted to building purposes. Timber of the best quality abounds on the bottoms and uplands, well adapted to similar uses, and can be procured on terms as favorable as at any other point on the Ohio. Other materials suitable for building, such as bricks, lime, and sand, of a superior quality, can be procured at a rate not varying from the prices at other localities on the river. No coal fields exist near this site. The coal used at Madison is obtained from Pomeroy's mines, three hundred miles above. This article is said to be disposed of in this vicinity at six or seven cents per bushel. The great coal fields of Indiana are northwesterly, on the Wabash, White, and Patoka rivers, distant inland eighty to one hundred miles.

"No decided advantage presented itself at this locality in reference to those at many other sites visited by the board, where neither water nor steam power could be procured to advantage. Other causes operate against

this position—the interruptions in the navigation of the Ohio, occasioned by ice, from one to three months in each year; its distance from the Mississippi, which is four hundred and twenty-eight miles, and the obstructions by shoal water below this point, which occur during the low stages of the river, in consequence of which steamboats drawing more than sixteen or eighteen inches of water cannot get over the sand bars during the summer months.

"The town of Madison is beautifully located on a fine commanding plain, with a population said to contain 5,000 inhabitants. Its health is equal to that of any other situation visited by the board, on the lower portions of the Ohio river. The country around and inland is as productive as any section of the Western country. To add to the facility of transporting this redundancy of agricultural products from the interior, a railroad has been projected leading to Indianapolis, thirty-eight miles of which are finished, and other sections now under contract are shortly to be completed, and a communication opened from Madison to the point of intersection with the Wabash and White river canal, at the capital of the State."

See Appendix, documents Nos. 97 and 98.

SITE NEAR FRANKFORT, KENTUCKY.

Frankfort, the capital of Kentucky, is situated within the valley of Kentucky river, on the left shore of the same, and sixty-six miles from the Ohio, at its mouth, near Madison, Indiana. Its distance from Louisville, by turnpike, is fifty-two miles; from Lexington, by railroad and turnpike, about twenty-four miles.

Kentucky river is one of the three principal rivers of this State the improvement of which, by slack-water navigation, has been undertaken and commenced by the State, the other two streams being the Licking and Green rivers. The improvement of Kentucky river is to extend, from its mouth upward to the confluence of the Three forks, embracing a distance by the river of two hundred and fifty-seven miles. The progress already made, in the construction of locks and dams towards the accomplishment of this work, is exhibited in the following tabular synopsis, the purport of which is sufficiently explained in the headings of the several columns:

Locks and dams.	Distance from mouth of Kentucky river.		Lift of locks.	Length of dams.	Height of dams.	Cost of locks and dams.	Remarks.
No.	Miles.	Miles.	Feet.	Feet.	Feet.	Dollars.	
1	3½	3½	16	520	26	216,221	All nearly completed; when finished, it is expected that boats will be able to pass and return between Frankfort and the mouth of the river at all times.
2	27½	31	13½	450	21	146,672	
3	10½	41½	13	450	20	127,421	
4	23½	65	14½	530	21	127,483	
5	17	82	15	420	25	128,892	
Totals	–	–	72	–	–	756,689	

Among the objects for which the improvement of this river was undertaken, is the opening of a navigable communication between the capital of the State and the Ohio river, and more especially the formation of an easy and commodious outlet for the products of the vast beds of coal and iron ore that exist at and near the headwaters of the river. These beds occupy a central position with respect to the great coal district of Kentucky; which, according to estimates of Messrs. Mather & Stealy, who have examined extensively into the mineral resources of the State, is estimated to contain at least ten thousand square miles, the iron district being nearly coextensive with the coal fields. Coal of a good quality is brought down in flat boats, during the more elevated stages of the river, and is delivered at Frankfort for ten to twelve and a half cents per bushel.

The valley of the river is generally very deep and narrow, and is bounded on both sides by abrupt and precipitous hills, rising three to five hundred feet above the low-water surface of the river. In consequence of the narrowness of its valley, and the great scope of hilly and mountainous country drained by the Kentucky river, excessive floods, higher probably than those of any other river in the United States, are suddenly produced, rising, in some instances, to the height of about seventy feet above extreme low water. The range at Frankfort from lowest to highest water, as determined by actual measurement at the bridge, is between forty-five and forty-six feet. The hills abound with limestone in horizontal strata, containing organic remains in abundance. Bones of the mastodon have been found deposited in blue clay within the river valley, at the depth of thirty to forty feet below the surface of the ground.

The site deemed most favorable for the armory in this neighborhood is on the left bank of Kentucky river, immediately below the mouth of Benson's creek, in the immediate vicinity of lock No. 4, already noticed, and about a mile below Frankfort. A tract of something more than one hundred acres is here presented, extending from the mouth of Benson's creek downward more than half a mile, and spreading from the shore of the river backward five or six hundred yards, to the bases of the river hills. This tract is said to be elevated considerably above the reach of the highest freshets, is cleared and under cultivation, and sufficiently spacious for the reception of the buildings of the armory. In addition to this tract, adjoining grounds, to any desirable extent that may be required for the enlargement of the site, may no doubt be obtained on favorable terms. The cost of the whole will not be likely to exceed twenty dollars per acre.

The crest of the dam at this place (lock and dam No. 4) is elevated fifty-seven feet above extreme low water of the Ohio, at the mouth of Kentucky river. Of course the highest flood of the former, which does not probably attain an elevation greater than forty-five feet at the mouth of the latter, will leave a pitch or fall of twelve feet at the dam, unaffected by back water from the Ohio. The quantity of water afforded by the Kentucky river, in its lowest stage, is said to be eighteen thousand cubic feet per minute. This quantity, with a head and fall of twelve feet, would yield an efficient power equal to that of 272 horses, in the dryest season.

In order to render such a power available, the following arrangement is deemed appropriate: A head race of suitable size, connected with the pool a little above the lock and dam, may be formed on the land side of the lock, and continued downward four or five hundred yards along the side of the river, and at the distance of fifty to seventy-five feet from its

margin. The depth of the race below the surface of the plain proposed for the site will be forty to forty-five feet, and will require excavations to that depth through its entire length, which, at a cost of twelve and a half cents per cubic yard, will amount to between eighteen and twenty thousand dollars. The stone work required for embankment walls, paved escarpments, &c., at two dollars per perch, will cost about ten thousand dollars.

In order to protect the race against the floods of the Kentucky river, pier heads and guard gates must be provided for at the head of the race, the height of which above the crest of the dam must be at least forty feet. The cost of these appendages, constructed in a neat and substantial manner, will be likely to amount to between $25,000 and $30,000. The interruptions to the water power, occasioned by the floods of this river, which will no doubt occur more or less frequently, will seldom continue longer than two or three days at a time. The great height to which the machine shops must be elevated above the low-water surface of the river, in order to secure them against overflows, (viz: forty-five to fifty feet,) together with the great depth to which the water wheels, &c., must be occasionally submerged, may be ranked among the unavoidable difficulties to be encountered at this locality.

Good building stone, (freestone and limestone,) as also brick clay, lime, and sand, abound in the neighborhood. Lumber of all kinds can be obtained on moderate terms. Provisions are also abundant and cheap. Most articles of these characters, however, command a price somewhat higher at Frankfort than at Louisville and other points on the Ohio. It is believed that, in the event of the Western armory being established at this place, the free navigation of the Kentucky river will be accorded to the United States by the State of Kentucky.

See Appendix.

SITE NEAR NEW ALBANY, INDIANA.

This thriving town is situated on a rising ground, separated from the Ohio river by a less elevated tabular bench, the latter being subject to occasional overflows from the river. The range of the river at this place, from the lowest to the highest water, as before stated, is a little more than sixty-four feet, which is the greatest range any where to he witnessed on the Ohio river. The town is situated directly opposite to Portland, five miles below Louisville, and about the same distance below Jeffersonville. The position in this neighborhood, recommended by the mayor and common council of New Albany as the site most favorable for the armory, is at a point in the valley of the river five miles below the city. The valley land situated between the river and its hills here spreads to the width of about three-fourths of a mile, and contains large tracts of excellent bottom lands. The proposed site has a front of about five hundred yards on the river, with favorable landings, and extends back to the river hills in such a manner as to embrace about five hundred acres, which covers the ground best adapted to the purposes of an armory, and which may be purchased at the rate of $40 per acre. Additional grounds, should they be required for the enlargement of the site, may be purchased at or near the river for $50 per acre, or back from the river and on the hills for about half that price.

A tract of a few acres covering a sort of ridge or swell, situated about midway between the river and the hills, is said to be the highest ground within the valley in this vicinity, and the only tract of bottom land that

was not inundated by the freshet of 1832. This tract contains only five or six acres, and rises only three to six feet above the high-water surface of that freshet.

The river hills adjacent to the site contain abundance of good building stone. Sandstone, limestone, and bricks, well adapted to constructions, can here be obtained on the most favorable terms. The cost of these articles, as also of the various structures to which they are applicable, is about the same as at Louisville; which is true also with respect to the cost of provisions and all other supplies.

The mechanical power that must be employed is that of steam, there being no means of erecting a water power at this place short of the construction of a canal or race, leading downward in the valley of the river from a point about midway of the falls, through a distance of about seven miles, the cost of which would be exceedingly heavy.

The advantages presented at this site are by no means comparable to those afforded at the site a little above Portland, on the other side of the river.

For further information respecting this neighborhood, we take leave to refer to the description of "a site near Louisville," and also to the Appendix, documents Nos. 99, 100, and 108.

SITES ON GREEN RIVER, KENTUCKY.

As before remarked, in treating of the site near Frankfort, Green river is one of the streams in which the system of slack-water navigation, adopted and prosecuted at the expense of the State, has been introduced. The work has been commenced in this river by the construction of locks and dams, as exhibited in the following table.

Locks and dams.	Distances from mouth of the river.		Lift of locks.	Length of dams.	Height of dams.	Cost of locks and dams.	Remarks.
No.	Miles.	Miles.	Feet.	Feet.	Feet.	Dollars.	
1	8¼	8¼	14½	526½	Unknown	176,174	Passable for steamboats.
2	51¾	59	14½	680	16	93,945	Do do
3	43½	102½	15½	351	Unknown	126,380	Do do
4	41½	143	16½	383	Unknown	128,159	Do do
5	15	158	15½	285	Unknown	139,122	In Big Barren river.
Totals	–	–	76½	–	–	663,780	

From the foregoing table it may be inferred that the crest of the dam, at lock and dam No. 3, is elevated 44½ feet above low water at the mouth of the river, which is probably less, by three or four feet, than the range of the Ohio, from the lowest to the highest water surface at that point. Of course, no position secure from interruptions by back water is to be found at any point lower down than this lock and dam, which is 102½ miles above the mouth of the river. Hence it may be inferred that the river, having so slight a declivity (its natural descent being only three inches and

two-fifths per mile) in all this distance, must of course be very sluggish, and subject to excessive floods. At lock No. 2, 59 miles from the mouth of the river, the town of Rumsey is situated, on comparatively high ground; but the entire area of this town is said to have been overflowed by a freshet that occurred in 1808, when the river at this place rose about forty feet above extreme low-water mark.

The crest or water-surface level of lock and dam No. 3 extends upwards of 41½ miles, to lock and dam No. 4, 143 miles from the mouth of the river, where we meet with the first position accompanied with a waterfall, secure from the back or checked water occasioned by the highest flood of the Ohio, and has a head and fall of 16½ feet afforded by the dam, about 14 feet of which is above the reach or level of the highest flood of that river. Accordingly, the site at lock and dam No. 4 is the lowest position on Green river at which an uninterrupted water power can be presumed to exist. The heavy floods brought down in Green river will no doubt occasion reductions in the head and fall; but it is believed that an efficient fall of 4 or 5 feet may be secured at this point, even in the highest freshets of this river.

The only grounds in this vicinity that can be regarded in any degree as suitable for the buildings of an armory is a small tract of a few acres, situated on the left bank of the river, about a quarter of a mile below the lock and dam, where the surface is generally uneven, and in places broken, but elevated considerably above the highest water mark of the river. To this may be added several other positions upon the slopes of the neighboring hills, still less favorable for such a purpose. The water may be conveyed from the pool above the dam in a race passing thence on the land side of the lock, and downward along a steep bluff bank to the position first indicated, and thence along the shore of the river far enough to accommodate the requisite number of machine shops, through which the water may be discharged from the water wheels into the river. At and near the head of the race, excavations in rock, to the depth of 18 or 20 feet, will be required in its formation; and from the lock downward to its lower extremity it must be sustained by a wall of substantial masonry, rising from the bottom of the river to the height of 36 to 40 feet above its base. Such a work, together with appropriate pier heads, guard gates, &c., will probably cost about $60,000.

The site above considered is about a quarter of a mile below the confluence of Green and Big Barren rivers. The quantity of water afforded by both, a little below their junction, in the lowest stages of the water, agreeably to measurements made by Mr. Livermore, one of the State engineers, is 28,000 cubic feet per minute. This quantity, operating with a head and fall of 15 feet, (the pitch at the dam being 16½ feet,) will yield a power equivalent to that of 450 horses. Of this quantity and power, about one-third part (viz: 9,333 cubic feet per minute, equivalent to the power of 150 horses) is derived from Big Barren river.

The lock and dam designated as No. 5 in the table at the beginning of this article are situated in Big Barren river, 15 miles above its mouth, and at an equal distance below the Bowling Green landing. This dam has a low-water pitch of 15½ feet; and the quantity of water passing it, together with the power that may be produced thereat, is as just before represented, except that a deduction of at least one-half should be made on account of leakage, lockage water, &c., required for the passage of boats,

&c., through the lock. Consequently, the available water power at this lock, in a dry season, will be equivalent only to that of about 75 horses.

The site deemed most suitable for the armory, in the vicinity of this lock and dam, is on the right bank of the river, about 500 yards below the lock, which is on the same side. Between these two points there is a strip of bottom land, intervening between the river and the hills, the surface of which is somewhat less elevated than that of the highest freshets. On this strip or bench, a head race, connected with the pool some distance above the dam, may be carried downward to the site; and the water, after being employed on the wheels, may be discharged into the ravine of a run which here enters the river nearly at right angles with the latter. The machine shops may be erected on both sides of the ravine, upon foundations rising above the highest water. On both sides of the ravine, and especially on the lower side, the hills slope gradually both towards the run and towards the river, at inclinations varying from ten to twenty degrees, and presenting numerous positions that may be occupied as building sites, although the inequalities of the surface are by no means favorable for such purposes. The head race and its appendages would prove far less expensive at this site than those proposed at the site just before considered; but the deficiency of the water supply in a very dry season, and the liability to interruptions by back water in time of freshets being even greater in Big Barren than in Green river, the locality first mentioned is regarded as preferable to that just described.

Green river, as now improved, is a beautiful stream to navigate with steamboats of small size and light draught. The only difficulties in the way of easy and expeditious navigation appear to consist in slight defects at the locks, at some of which the depth of water over the mitre sills is too small in low water, the approaches to the tail gates from below are too shoal, and the lock gates (owing probably to some derangement in the circular segments on which their friction wheels travel) are opened and shut with much difficulty.

The valley of the river is generally broad, varying from a half to 6 miles in width, and is almost entirely subject to overflows during the highest freshets. The hills rise abruptly, and in many places precipitously, from the valley, and contain inexhaustible supplies of choice building stone, both sandstone, and limestone, in strata nearly horizontal. In connexion with these strata are beds of good stone coal, from 2 to 6 feet thick, which occur at numerous points along the valley, at an elevation about equal to that of ordinary high water. A coal vein 4 feet thick has been opened at a point about 7 miles above the mouth of the river, from which large supplies have been taken. About 90 miles further up, another coal bed has been opened, which is said to vary in thickness from 7 to 10 or 11 feet. The great abundance of coal generally on this part of the river, and the facilities for obtaining it, cannot fail to render the supplies of this nature very cheap.

Big Barren river has its origin and course through an extensive region in this part of Kentucky, called the Barrens, in which carboniferous strata appear to give place to an inferior order, denominated cavernous rock, remarkable for the numerous caves and subterraneous water courses almost everywhere discoverable in this quarter. The celebrated "Mammoth cave" has its locality in this region, on the south side of Green river, and about 45 miles above the confluence of this stream with Big Barren river

Numerous other caves and grottos of less extent and notoriety are scattered in every direction through the Barrens. In these caves abundant supplies of saltpetre earth have been obtained and are still to be found. The quantity of saltpetre procured from the "Mammoth cave" alone, during the late war, is said to have amounted to more than 100,000 pounds. No other portion of the United States can vie with this in the production of this important article.

The river hills rise to the height of 200 to 400 or 500 feet above the valley, and constitute the boundaries of extensive districts of upland, agreeably diversified by hills, plains, valleys, and ravines. The woodland growth of the country which prevails pretty generally in the neighborhood of the river comprises the following varieties, viz: Sycamore, white and red beech, maple, sugar tree, white and Spanish oak, ash, elm, hickory, poplar, wild cherry, black and white walnut, post oak, locust, mulberry, dog wood, pawpaw, &c. Corn, wheat, oats, hemp, flax, tobacco, &c., are among the products of the soil, which are reared in abundance. Tobacco, hemp, pork, corn, and coal are the leading articles of trade furnished from the Green river country. The healthfulness of the country, especially in and near the valleys of the principal streams, on account of the frequent overflows to which these low grounds are exposed, is very questionable.

See Appendix, document No. 102.

SITES NEAR CASEYVILLE, KENTUCKY.

This incipient town is situated on the left bank of the Ohio river, directly opposite to a noted bluff, called the Battery rock, 107 miles above the mouth of the Ohio, 59 miles above Paducah at the mouth of Tennessee river, 49 miles above Smithland at the mouth of Cumberland river, 13 miles below Shawneetown, 95 miles below the mouth of Green river, and 280 miles below Louisville. It is situated on a tract of valley land, 250 to 500 yards wide, most of which is subject to overflows in very high water. As we proceed upward, the valley land becomes wider, and at the distance of 3 miles above Caseyville spreads to the width of about 2 miles, containing large tracts of first-rate bottom land, most of which is subject to inundation in a very high stage of the river. The river hills by which these low grounds are bounded in their rear are abrupt and often precipitous, rising to the height of 250 to 300 feet above the valley. About midway of this broad interval, and in its widest part, is a remarkable ridge, with several ramifications or spurs, called the Curlieu hills, which rise to the common altitude of the river hills or bluffs in their rear, from which they are completely separated by a broad tract of bottom land, and to which they bear the relation of an outlier or isolated knob of the same geological characters. The main ridge of this cluster lies in a direction parallel to the river, and has an extent of about three-fourths of a mile. Its summit is remarkably narrow, varying from 5 to 80 or 100 yards, which is also true with respect to its several branches, respectively. A town site, bearing the name of Palermo, was many years since laid off in this part of the river valley, the lower boundary of which crosses the main ridge of the Curlieu hills at right angles, about midway of its height. The entire valley is possessed of a soil exceedingly rich, and the fields which have here and there been opened within it yield heavy crops of corn, wheat, and oats. Northeastwardly of the hills above mentioned is a

lagoon or pool, a mile or more in length, which probably once served as a channel for the whole or a part of the river.

Below Caseyville the bottom expands less considerably than above, being somewhat less than half a mile wide at the mouth of Tradewater river, nearly 2 miles below the town. This tract is considerably less elevated than those above the town, and of course subject to deeper overflows. In its rear are situated the river hills, which are faced with bluff precipices near Caseyville, but become less abrupt as we descend; and on approaching the Tradewater their declivities become gentle and easy of ascent.

A sort of tabular bench, of considerable area, which may be enlarged to 30 or 40 acres by encroachments upon the hill sides, is presented on the northerly side of the Tradewater, about a half mile above its mouth, where the hills binding the valley of this stream meet those fronting on the Ohio valley. This bench is said to be elevated a few feet above the highest freshet, but its surface is not only very limited, but uneven, and somewhat broken. Moreover, the Tradewater is navigable for steamboats from its mouth to this place only during the higher stages of the river; at a stage 3 feet above the lowest, it is not navigable even for keel boats.

From the foregoing description of the grounds both above and below Caseyville, it is apparent that no convenient and suitable site for the establishment of an armory is to be found at or near the margin of the river, within 3 miles above and 2 miles below the town. The most favorable position for such an establishment, in this neighborhood, is undoubtedly the site of Caseyville itself, which, however, is objectionable, not only on account of its being occupied and improved as a town site, but because of the overflows to which a large portion of its surface is subject. A tract, varying from 150 to 300 yards in width, stretching through the entire length of the town, and occupying all that part situated between the main street and the river, was entirely inundated by the freshet of 1832. In rear of this tract, and back of the main street, the grounds are more elevated; and an area is here presented sufficiently spacious for the reception of the buildings of an armory, especially if we include a handsome tract containing 15 or 20 acres situated in the valley of a wide ravine or cove-like recess immediately in rear of the town.

Notwithstanding the objections that may be urged against the selection of any locality in this neighborhood as a suitable site for the armory, there are, nevertheless, advantages of deep interest and importance here presented, which are among the desiderata of such an establishment, and are therefore worthy of special notice. Here are the first or lowermost localities of coal hitherto detected on the Ohio river above its mouth. This fossil abounds in the hills of the Tradewater; and mines have recently been opened at several points, from which coal in considerable abundance and of good quality has been extracted. The coal beds vary in thickness from 2½ to 4½ feet, and have an elevation of 50 to 100 feet above the river. The localities of the mines that have been opened are as follows, viz: Cook's or Brown's mine, about 3 miles from the Ohio and three-fourths of a mile from the Tradewater; honorable J. Bell's lower mine, 3¾ miles from the Ohio, and one-fourth of a mile from Tradewater; uppermost mine of the gentleman last mentioned, 16 miles from the Ohio, and near the Tradewater—all situated in the river hills of the stream last mentioned. The outcroppings of coal are frequent along the slopes of these hills,

to an indefinite extent. The lowermost coal locality hitherto discovered on this side of the Ohio is about 18 miles below Caseyville and 2½ miles from the river, where a thin vein of coal occurs in the side of a hill, about 100 feet above the level of the river.

On the Illinois side, outcroppings of coal are of frequent occurrence, at some of which mines have been opened and worked to advantage. It is said that, in boring for salt water in the valley of Saline creek, about 20 miles from its mouth, the auger passed through a coal bed 9 or 10 feet thick, at the depth of about 120 feet below the surface of the ground.

A remarkable coal vein, the thickness of which has not yet been ascertained, occurs on the Kentucky side of the river, about 3 miles above Caseyville and 2 miles from the river, on grounds belonging to his excellency John Tyler, President of the United States; its elevation is about 120 feet above high water of the river, and its position in other respects favorable for mining. The coal is remarkably compact, hard, and heavy, weighing nearly or about 100 pounds per bushel. It ignites freely, burns with a brilliant flame, is remarkably free of impurities, and in gravity and texture appears to bear a strong resemblance to the Welsh culm, which, from elaborate experiments at Cornish, in Wales, appears to be more efficacious in generating steam than any other variety of coal. (See Wicksteed on the Cornish Engine; London, 1841.) Appearances seem to indicate the existence of large bodies of this coal (cannel coal) in this vicinity.

Iron ore is also abundant in this part of the country. The hills below Caseyville, on both sides of the river, are said to present numberless localities at which this mineral has been discovered. A furnace for smelting it has been erected in Illinois, about 16 miles below Caseyville and 4 or 5 miles from the river, which is now in operation, and furnishes in considerable quantities pig metal and castings of an excellent quality; the former, especially, being held in very high estimation for the manufacture of steam engines, &c.

Lead ore is also found on both sides of the river in this part of the country. It is supposed to contain a considerable proportion of silver, sufficient to defray the expense of working the ore exclusively for the purpose of obtaining the silver it contains. It is reported to have been used pretty extensively in the fabrication of counterfeit coins resembling silver money. After repeated fusions, it is said to become hard and sonorous, like silver.

The United States saline, at which a vast deal of salt has been made, is situated on Saline creek, 15 or 20 miles above its mouth. This creek enters the Ohio three miles above Caseyville, and immediately above the range of bluffs called the Battery rock, which here deflect from the river, and pass upward along the lower side of the creek, still retaining their bluff and precipitous character. These bluffs are remarkable for the abundance of superior firestone contained in them. This rock is a coarse sandstone, of various colors, some of its specimens being reddish, others yellowish, others grey, and others bluish, and all of about the same efficiency in resisting heat. It is firm, and so strongly connected that blocks of almost any size may be precipitated from the bluffs without breaking or being injuriously marred at their corners. It is remarkably fissile, and may be split into handsome blocks of almost any dimensions. We were credibly informed that a block of this stone, 105 feet long and four to six

feet square, has been split from this quarry. The stone, after repeated trials as hearths and jambs in numerous furnaces, in which it has been exposed to the most intense degrees of heat, has obtained the reputation of being superior to any other stone in this part of the country for such uses. Moreover, no doubt can exist of its being applicable, generally, to the purposes of buildings.

Lumber can be had in abundance in this vicinity at prices varying from $7 50 to $10 per thousand, board measure. The timber growth of the neighboring forest embraces the following varieties, viz: White, red, Spanish, and bur oak, white and blue ash, black and white walnut, pecan, poplar, cotton wood, sycamore, maple, sugar tree, elm, black and sweet gum, hickory, hackberry, beech, box, elder, dog wood, hop, hornbeard, wild cherry, with occasional copses of cypress, within the river valley, together with white oak, post oak, &c., on the uplands.

The navigation of the Ohio between Caseyville and Paducah, as well as between the former place and Louisville, is obstructed by shoals in extreme low water, so that boats drawing more than 15 or 16 inches cannot pass clear of the sand bars.

For further information in reference to the sites near Caseyville, see Appendix, document No. 108.

SITE NEAR THE SUCK, TENNESSEE.

Finding it impracticable to visit this site collectively, the board delegated Lieutenant Colonel Long for its examination, who performed this service, and in relation thereto has submitted the following report:

"Sir: In accordance with the arrangement agreed upon by the board in reference to the examination of certain sites that could not be visited by the board in conclave, I have examined a site near the Suck on Tennessee river, in the State of Tennessee, and now take leave to submit a report containing the results of my observations and inquiries in reference to the site alluded to.

"The Suck is one of a series of no less than six remarkable passes in the Tennessee river, a brief description of all of which will be attempted, for the purpose of giving a clear understanding of the nature and character of the river in their neighborhood. I shall accordingly begin with the uppermost, and treat of them in the order of their succession downward:

"1st. The Tumbling shoals are situated eleven miles and a quarter below Chattanooga, or Ross's landing, and two miles above the Suck. This rapid has an extent of about half a mile, through which the water is hurried over a bed of rocks and boulders with a rapidity very difficult for boats to stem in a low stage of the river. During the more elevated stages of the water, no impediment in the way of safe and easy navigation exists at these rapids.

"2d. The noted pass called the Suck occurs at a point two miles below the Tumbling shoals. At this pass the low-water channel is restricted, by rocky bars protruding from the shores, to the width of about 100 feet. The bed of the river is here composed of rocky ledges, through which a channel varying in width from 100 to 150 feet (the depth of which has never been ascertained) has been formed, and is sufficiently spacious for the entire low-water volume of the river to pass through it, with a speed of 13 to 16 miles per hour. The fall in a distance not exceeding 200 yards, when

the river is at a very low stage, is about five feet; and the current, of course, is too rapid to admit of the ascent of boats without the aid of strong warps and powerful windlasses. As the river rises, however, the fall and of course the rapidity of the current are both reduced; and when the river attains the elevation of ordinary high water, the current becomes quite as gentle as it is at other points in the vicinity of the Suck, and boats can ascend without difficulty. Hence this pass has obtained the designation of a low-water obstruction. The form of the river valley at this place has a tendency to give it this character; for, while the low-water channel is restricted to the very narrow limits as above stated, the high-water channel has a width and depth sufficient to admit the free passage of the largest volume of water ever brought down the river.

"3. The pass called the Boiling Pot (from a broad deep basin situated immediately below a narrow gorge of the river, in which the water is thrown into boils and whirlpools,) is situated four miles below the Suck. The formation of the river valley at this place is quite different from that at the Suck; the low-water channel at the Pot being sufficiently spacious to admit the free passage of the low-water volume, while the high-water channel is much restricted by the encroachment of the river hills on both sides of the river, which are here presented so near its margin, and rise so abruptly from their bases, that the space left between them is too limited to admit the free passage of heavy floods. Hence this pass bears the appellation of a high-water obstruction. The engorgement of flood water at this point serves to neutralize the descent of the river above, and of course to check the speed of its current; while, at the same time, the acceleration of the current, produced at this pass by the narrowness of the high-water channel, renders ascending navigation exceedingly difficult in a very high stage of the river.

"4. Three-quarters of a mile below the Pot is a shoal called the Skillet, at which the channel is narrow and the current rapid in low water. It is occasioned by a broad gravelly bar extending from the right shore, about two-thirds the distance across the river, which here spreads to the width of four or five hundred yards.

"5. The pass called the Pan is one mile and a quarter further down. The low-water channel is here contracted to the width of about one hundred and twenty yards, by rocky points protruding from both shores into the bed of the river. These points rise somewhat abrubtly from the low-water surface, and, at a short distance from the shores, unite with the mountain slopes, which are here presented in such a manner as to restrict the high-water channel to the width of four or five hundred yards, and occasion such a reduction in its size that high freshets are obstructed in their passage through the pass. In consequence, the water accumulates above the pass in the same manner as at the Pot, thus occasioning a head or fall which contributes to render the current exceedingly rapid in a very high stage of the river. This pass is also denominated a high-water obstruction.

"6. The lowermost of the passes under consideration is at Savannah island, 2¾ miles below the Pan. The river here spreads to the width of about 500 yards, and embosoms a sort of willow bar, composed of boulders, pebbles, gravel, and sand, to which the name of Savannah island has been given. The main channel is on the right side of the island, and has a low-water depth of at least 2½ feet, the channel on the other side being

much narrower and shoaler. The only obstruction to the navigation at this pass is a rapid low-water current through the distance of five or six hundred yards, in which the fall is probably about a foot.

"The entire distance on the river occupied by the several passes above considered, and the reaches or spurs intervening between them, is 10¾ miles; and the aggregate low-water fall, from the head of the Tumbling shoals to the foot of Savannah island, does not exceed sixteen feet, which is equivalent only to an average of a little less than one foot and a half per mile.

"For the purpose not only of producing a water power at this place, but also of improving the navigation of the river past all these obstructions, and for a considerable distance above, it is proposed to construct a dock and dam, with a lift of eighteen feet, at the Savannah island. The lock should be located on the left bank of the river, about midway of the island, or perhaps a little further down. The dam should extend thence obliquely upward, at an angle of about sixty degrees with the general course of the river at this place, and be carried into the opposite bank of the river. The entire length of the dam will be between five and six hundred yards, which is nearly equal to the transverse width of the river valley at this place, as measured on the surface of the highest freshet.

"At the point proposed for the lock, the river is bounded by low rocky cliffs, rising from the water's edge nearly to the appropriate height of the lock. The hills rise somewhat abruptly from the summit of the cliff, and continue to ascend till they unite with the more abrupt slopes of Racoon mountain. The declivities of the hill sides, both above and below the lock, are sufficiently gentle to admit the passage of a road at an elevation above the reach of the highest freshets. In both directions, these declivities become more gentle, and, at the distance of one hundred and fifty or two hundred yards from the lock site, spread into escarpments so little inclined that buildings, workshops, &c., can be erected upon them with considerable convenience.

"The bed of the river on the line of the proposed dam is composed of boulders, pebbles, gravel, &c., apparently underlaid at no great depth by a sub-stratum of rock, thus affording a substantial foundation for the dam. On the right shore, at the point where the line terminates, is a strip of alluvial ground about two hundred yards wide, which separates the river from the base of Waldron's ridge. This strip is subject to overflows in very high water, and of course cannot be occupied as building sites. Moreover, this being the concave side of the river, by reason of a bend which commences half a mile above and terminates about the same distance below the site of the dam, any structures on the right side would be far more exposed to the action of the current, and the drift borne upon it, in high water, than they would be on the opposite or left shore.

"An enormous water power may here be produced by means of a head race connected with the pool above the dam, and carried downward between the lock and the left shore, and thence along the margin of the river to any extent that may be required for the supply of water to manufacturing establishments, arranged along the line of the race, which, for its own support, as well as for that of the buildings erected upon it, will require massive and substantial walls reared from the rocky bed of the river to the height of 25 to 30 feet.

"The only site on this part of the river secure from overflows, and com-

bining the practicability of an efficient water power with any considerable conveniences for the arrangement of the machine shops and other buildings of an armory, is the position already adverted to as occupying the slopes of the hills above and below the proposed lock and dam. This site, however, is objectionable, not only on account of its irregular form and uneven aspect, but on account of the interruptions to the water power here available, which must unavoidably occur whenever a very high freshet prevails in the river. The freshet of 1826, the highest recollected in this river, attained an elevation of 43 feet above extreme low water at Chattanooga, and probably about 38 feet at the site under consideration. Other freshets, that have occurred in the river during the last forty years, have in no case risen higher than 36 feet at Chattanooga, and 31 feet at the site. Ordinary high freshets attain an elevation of about 30 feet at the former and 25 feet at the latter locality. Accordingly, it may be presumed that the water power will be suspended during the prevalence of very high freshets; but during the common low stages of the river, which continue for more than three-fourths of the year, a vast amount of water power, sufficient for mechanical operations on the most extensive scale, is here at command.

"At Savannah island the river is wider than at any other point in this neighborhood, and a dam erected thereat will of course have a greater length than at any other place, which is a matter of very great importance, inasmuch as the prolongation of the dam will be attended by a corresponding reduction in thickness or depth of the sheet or volume of water that passes over its crest in high water. This being the result, any works connected with the lock and dam will be less exposed to the violent action of floods than they would be with a shorter dam.

"With respect to the tendency of such a structure to reduce the speed of high-water currents at the Pot and Pan, it is obvious that such will be the result, from the fact that at the former the transverse section of the channel will be virtually enlarged by an additional area equal at least to the mean width of the channel at that place, multiplied by an increased depth of 14 feet, and at the latter by a similar addition of its mean width, multiplied by a depth of 16 feet; these two depths, at the respective points indicated, being added to the present depths at the same points, by the erection of a dam 18 feet high. Consequently, the water having a more spacious channel to flow through, the current will have a more uniform speed through these passes, which are the only high-water obstructions in the series.

"Among the resources of this part of the country are vast bodies of excellent bituminous coal, which exist in Cumberland mountain, Waldron's ridge, Racoon mountain, &c., localities of which have been detected, in numberless instances, within a distance of three to five miles from the river, between the mouth of Clinch river and the Suck. The mountain cliffs afford inexhaustible supplies of good building stone. The forests afford a great abundance of excellent timber, in which yellow pine predominates. Provisions of all kinds, for man and beast, are abundant and cheap.

"Vast bodies of iron ore, of an excellent quality, are to be found in the country drained by the tributaries of this noble river. Furnaces for working it have already been erected on the Watauga, Holston, French Broad, Nolichucky, Clinch, Powel's, Little Tennessee, Hiwassee, and other streams.

It is said that there are at present no less than sixteen smelting furnace and thirty forges now in operation on the streams above mentioned.

"Although this neighborhood seems to afford no very favorable site for the establishment of an armory, yet its relation to a great national thoroughfare, sooner or later to be opened and perfected between the Atlantic ocean and the great basin of the Mississippi, give it a claim to special attention in this paper.

"The thoroughfare alluded to is to be constituted partly by railroads and partly by water conveyance, viz: from Chattanooga, by railroads, to Charleston, South Carolina, (the distance being 440 miles,) or to Savannah, Georgia, (the distance being 420 miles;) and from Chattanooga to Paducah, at the mouth of Tennessee river, by water, (the distance being 526 miles.) Hence the aggregate distance from Paducah to Charleston, by this route, is 966 miles, and from the same place to Savannah, 946 miles; the latter distance being two miles less than the distance from Paducah to Pittsburg, Pennsylvania.

"Of the railroads from Charleston to Chattanooga, 260 miles are already completed and in operation; and, from Savannah to the same place, about an equal distance has also been opened for travel and transportation, leaving unfinished about 160 miles, most of which is graded and ready for the reception of the railing.

"Among the most considerable tributaries of the Mississippi and Ohio rivers, there is none that presents greater facilities for effecting an uninterrupted low-water navigation than the Tennessee river. From its mouth to Waterloo, 224 miles, boats drawing 18 or 20 inches can pass, with entire freedom, in the lowest stages of the river; and during the more elevated stages, which prevail almost the whole of the year, boats drawing from two to six feet can navigate it with ease and safety; its navigation, in these respects, being certainly unsurpassed, if not unequalled, by that of any other of the Western rivers.

"A little above Waterloo commences a series of shoals, called Colbert's shoals, occupying a distance of about ten miles along the bed of the river, through which the navigation is obstructed in low water by the rapidity of the current, and for want of a sufficient depth of water in the channel. Notwithstanding these impediments, steamboats of very light draught can navigate this part of the river during nine or ten months of each year. The navigation may readily improve at and through this pass, by means of a lock and dam, with a lift of 15 or 16 feet, at or near the foot of the shoals, by means of which the low-water navigation of the river would not only be extended to the head of Colbert's shoals, but even to Florence, 20 miles above; the river between these two points having a low-water depth equal to that below Waterloo. Thus a constant navigation may be secured from the Ohio to Florence, through a distance of 274 miles.

"From Florence, or the foot of the Muscle shoals, to the head of the latter, a canal has been projected, and partially constructed; but, owing to defects in the plan and execution of the works, it has been partially demolished by extraordinary freshets, and is now unfit for use. By repairing and extending the canal, (at an expense probably of about $100,000 for repairs and alterations, and of $200,000 more for its extension,) this formidable portion of the river, which has an extent of about thirty-six miles, may be rendered navigable at all times.

"From the head of the Muscle shoals to Savannah island, twenty-two

miles below Chattanooga, the distance is 193 miles, through which the Tennessee is navigable in the lowest stages of the river for steam oats drawing eighteen or twenty inches, and during nine or ten months of the year for boats of much greater draught.

"With respect to the residue of the distance to Chattanooga, (viz: twenty-two miles,) the condition of the river, the character of its navigation, and the manner of improving the latter, have already been explained in this paper. Where the improvements shall have been made as herein contemplated, on all parts of the river below Chattanooga, a constant navigation, uninterrupted either by ice in winter or shoals in summer, will be effectually opened from the Ohio river to Chattanooga, through a distance of 526 miles.

"The great thoroughfare above considered, when once perfected throughout, will not only become the channel of an incalculable amount of travel and trade between the Atlantic ocean and the great valley of the Ohio and Mississippi rivers, but will serve as an avenue through which military forces, with provisions, arms, and all other munitions of war, may be conveyed from the interior to our Southern Atlantic coast, with greater safety, economy, and despatch, than by any other route.

"See Appendix, document No. 101.

"Respectfully submitted.

"S. H. LONG,

"*Brevet Lieut. Col. Top. Engineers.*

"General W. K. ARMISTEAD,

President of the board appointed to select a site for the establishment of a national armory on the Western waters."

SITES RECOMMENDED, BUT NOT EXAMINED.

Among the localities to which the attention of the board was invited are the following, in the enumeration of which, we shall briefly annex the reasons why they were not visited.

1. *The falls of the Cumberland river.*

This was not examined, because of its remoteness from steamboat navigation; its distance from Burkesville, the head of ordinary high-water navigation, being more than 80 miles; also, on account of the extreme ruggedness and narrowness of the channel and bed of the river at this place. Agreeably to the report of H. Stansbury, Esq., United States assistant civil engineer, (see House Document No. 171, 2d Cong., 2d session,) the channel is here bounded on both sides by steep and rugged precipices, four to six hundred feet high, in most places, at and for a considerable distance below the falls, rendering the river almost inaccessible on either side. (See Appendix, documents Nos. 102, 103, and 104.)

2. *Cloud's shoals, on Holston river.*

This locality is more than 100 miles by water above Knoxville, at the head of steamboat navigation. The Holston is not navigable even to Knoxville for boats drawing more than two feet, during the low-water stages of the river, which continue four or five months in each year. Moreover, the freshets of this river rise so high, that any water power that may be generated at Cloud's shoals must unavoidably be neutralized and en-

tirely suspended during the continuance of even ordinary freshets. (See Appendix.)

3. *City of Vicksburg, Mississippi.*

This position was deemed too remote, not only from the geographical centre, but from the sources whence supplies of provision, coal, iron, and other materials, must be obtained. Its climate was regarded as too warm, and its situation, together with that of its environs, too unhealthy for the establishment of an armory. (See Appendix, documents Nos. 105 and 106.)

4. *Site near the Grand Tower, Illinois.*

A passing view of this position, together with apparently well-authenticated information, received from persons familiar with it, satisfied the board that the grounds were here too low and flat in the river valley, and too much broken and variegated upon the hills, to answer the requisites of a site suitable for the establishment of an armory. The bottom lands in this vicinity are said to have been entirely overflowed by the great freshet of 1785. (See Appendix.)

5. *A site at the mouth of Apple creek, Missouri.*

This locality embraces a strip of bottom land situated between the river and its hills, and, from information given in relation to it, is too low and too small to answer the requisites of a site for the armory.

6. *A site at the mouth of Grave creek, in Virginia.*

The request made to the board to visit this site was received too late for them to yield a compliance. It is represented to be a very beautiful position, but a large portion of the grounds most favorable for an armory is already occupied by two incipient towns—one called Elizabethtown, and the other Grave Creek. (See Appendix, document No. 107.)

Several other localities were informally recommended to the notice of the board, but their claims to attention appeared not sufficiently well grounded to warrant an examination.

A true copy from the minutes of the board.

WILLIAM L. HENLEY,
Secretary.

APPENDIX,

COMPREHENDING SUNDRY MEMORIALS AND OTHER DOCUMENTS COMMENDATORY OF THE SITES VISITED BY THE BOARD.

No. 1.

WASHINGTON CITY, *October*, 1841.

SIR: Congress, at its last session, appropriated five thousand dollars to defray the expense of selecting a site upon the Western waters for the establishment of a national armory.

Should this duty be assigned to engineers or others, I beg leave to call the attention of the Department to the Illinois river, from the foot of the rapids at Peoria to Juliet, the Rock river, the Kankakee, and Fox rivers, in the State of Illinois.

I am of opinion that a site for a national armory could be obtained upon either of those streams, equal if not superior to any other point in the West.

Very respectfully, your obedient servant,

SAMUEL McROBERTS,
Senator of the United States.

Hon. SECRETARY OF WAR.

No. 2.

The undersigned, a committee acting in behalf of the citizens of Rock Island county, Illinois, would respectfully lay before you the following facts and considerations in favor of your selecting Rock island to be the site of the Western armory.

Rock island is in the Mississippi river, about three hundred miles above St. Louis, and one hundred miles below Galena. It was the site of Fort Armstrong, and has recently been selected by the War Department as a place of deposite for the public arms.

The title to the island (which is about three miles long and from one to three-fourths of a mile wide) is in the United States.

The selection of Rock island, then, for a place for the Western armory, would obviate the necessity of any expenditure for the purchase of a site, and would save the expense of buildings for an arsenal.

The facilities of supplying the West with arms from Rock island are obvious.

By the Mississippi and its tributaries, it could supply the ten States and two Territories bordering upon them. Rock river and the Milwaukie and Rock River canal, the improvements of which will be completed before an armory can be put in operation, will furnish a water communication with Lake Michigan, through which arms can be sent to the States and Territories bordering on the Northern lakes.

We may add, that we have often heard distinguished gentlemen connected with the War Department express the opinion that there is no point in the Western States from which arms can be sent to the different military stations with less expense and greater despatch than from Rock island.

But its advantages for the manufacture of arms furnish the strongest reasons why Rock island should be selected as a site for the Western armory.

It is in the vicinity of one of the richest mineral regions in the world. For satisfactory information on this point, we would refer you to the report made to Congress in 1839, by Dr. Owen, of his geological and mineralogical survey of the country bordering on the Mississippi, above the mouth of Rock river. We would add that, since his survey, many valuable beds of ore have been discovered.

The county abounds in rich beds of ore of iron, copper, zinc, and lead; and, in the immediate neighborhood of Rock island, there is the greatest abundance of bituminous coal of the best quality.

In its vast water power, Rock island possesses advantages greater than can be urged in favor of any other place. A dam has been recently constructed from Rock island to the Illinois shore, by which a water power is made that can be used for nearly a mile upon Rock island, and for several miles upon the opposite shore. It has been carefully surveyed by distinguished engineers in the service of the United States and of Illinois, and pronounced by them all to be the best water power in the Western States.

From its having this water power, Rock island urges a stronger claim than can be presented by any place where steam must be used to propel machinery.

And in the magnitude of this power, viewed in connexion with the slight expense necessary for its application, it has hydraulic advantages greater than are possessed by any other place.

We would also urge as an important consideration in favor of Rock island, that its location is favorable for health. Eminent physicians, acquainted with its locality, unhesitatingly pronounce it one of the most healthy places in the West.

A single fact can be stated, of vast weight on this point: During the time that Rock island was occupied by the garrison in Fort Armstrong, an examination was made of the health returns sent to the War Dapartment, for seven successive years, from the different military stations. It was found that Fort Armstrong, upon Rock island, was, during that period, the most healthy military station in the United States.

We need not add, that a favorable location for health is an important consideration, where a large number are to be employed on the public works; and especially is this important in the West, where most of the public works are annually suspended during what are called the sickly seasons.

From the fertility of the surrounding country, and the easy communications with other parts of the United States, it is evident that supplies for an armory may be obtained at as reasonable prices at Rock island as at any other place.

We add but one consideration further: In selecting sites for its public works, it has ever been the policy of the Government to give the preference (other things being equal) to places distinguished for their delightful scenery and beautiful location for public buildings. It was from these considerations that the principal buildings of the armory at Springfield, Mas-

sachusetts, were located at an inconvenient distance from the place where it has its water power.

Rock island, elevating its rocky front high above the waters of the Mississippi, and looking out upon the scenery of a country described by a distinguished traveller as the most beautiful the eye ever rested upon, possesses peculiar advantages for the erection of public works, which exhibit a happy combination of utility with imposing beauty.

We would refer you to the officers of the army, who are acquainted with the advantages of the different places in the West, which are now presenting their claims for the location of the armory. We are authorized to assure you that the officers stationed upon the Northwestern frontier express their preference for Rock island.

Especially would we ask your attention to the minute report made to the War Department, last year, of the advantages of Rock island, by Captain Bell, of the Ordnance department, who is now stationed at Jefferson barracks, and we are happy in being permitted to refer you to Captain Bell, as a gentleman qualified, by his attainments and recent minute surveys, to furnish you with accurate information respecting the peculiar advantages of Rock island as a site for the Western armory.

In conclusion we would remark, that while many places, better known than Rock island for their business and enterprise, are having their advantages for an armory presented to you by distinguished and influential individuals, we confidently rely upon the assurance given us by the most important acts of your life, that, while you give due consideration to individual opinions, you will be governed by a regard to the public interests in selecting a site for the Western armory; and we therefore present the claims of Rock island to your attention, as a site possessing unequalled advantages for the manufacture of public arms, and the greatest facilities for their importation to the different military stations in the Western States and Territories.

JOHN BUFORD,
JOSEPH KNOX,
JOSEPH B. WELLS,
JOHN MORSE,
GEORGE MINTER,
Committee in behalf of the citizens of Rock Island county, Illinois.

His Excellency JOHN TYLER,
President of the United States..

No. 3.

ROCK ISLAND, *December* 15, 1841.

The owners of the mill property and dam at the head of Rock island, on the main shore of the river, on the Illinois side, think, provided they give up their entire right to the water power, and surrender the mill they have already erected to the United States, they should receive the sum of forty thousand dollars; that, provided they surrender all their right to said water power, excepting and reserving said mill already erected, and water power besides sufficient for six run of stone, they should receive twenty

thousand dollars; that provided they yield to the Government the entire water power the Government may need for their own use, and these owners have the right to use all not wanted or employed by the United States, the said owners should receive from the General Government twenty-five thousand dollars.

JOHN W. SPENCER.
D. B. SEARS.
SPENCER H. WHITE.

The COMMISSIONERS *selected by the President for the purpose of choosing a site for an armory of the United States.*

GENTLEMEN: I have not sent you the terms of the lands upon Rock river, because the prices are so extravagant that I think you will not desire to know them. Mr. Vandruff asks for [one] island $125,000, and others in proportion.

With respect, yours,

J. E. BRACKETT.

The U. S. COMMISSIONERS.

No. 4.

WASHINGTON, *October* 20, 1841.

SIR: I would beg leave respectfully to request your attention to the enclosed paper. I am well acquainted with some of the gentlemen composing the committee who sign it, and know them to be respectable.

The idea contained in it had certainly never occurred to me before; but I must confess, now that it is suggested, I deem it worthy at least of consideration.

The statements made in the paper are, as far as I know, correct.

The point is central, commanding easy and rapid communication with the lower Mississippi, with the great lakes, and with the upper Mississippi: indeed, a very large portion of the travel from the South and West to the East and North already goes by the way of Peru. The Illinois is much *surer* than the Ohio, and navigable more months in the year.

The canal from Chicago to Peru is one of the finest works in the country, and will soon be more than half completed.

The railroad from Peru to Rock river was, to my personal knowledge, considerably advanced a year since.

Indeed, it is not to be doubted but that before the armory should be built these works would both be finished.

With excellent coal, excellent stone for building, and excellent timber in abundance—water power unsurpassed, and a most rich and beautiful country surrounding it—central, and commanding access to the great arteries of the Western country, equally the Mississippi or great lakes, and removed from all danger from foreign approach—Peru may certainly be allowed to ask the attention of the Government, whose desire it will be, no doubt, to select the fittest place for its own purposes.

I have the honor to be your most obedient servant,

FLETCHER WEBSTER.

The PRESIDENT.

No. 5.

PERU, LA SALLE COUNTY, ILLINOIS, *October* 5, 1841.

SIR: Congress having, at its late session, made an appropriation for the purpose of causing an examination to be made, under your direction, for the location of a national armory in the Western portion of the United States, we, a committee of correspondence, appointed by the citizens of Peru and La Salle county, respectfully beg leave to place before you, for consideration, the advantages that this point possesses for said location.

Peru is situated at the head of steamboat navigation, on the Illinois river, which is navigable at all seasons, when not obstructed by ice, (which does not exceed seventy days,) for boats drawing three feet water at its very lowest stages. The distance from this place to its junction with the Mississippi river is one hundred and ninety-two miles; the distance to Lake Michigan, by way of the Illinois and Michigan canal, is ninety-six miles. Sixty-eight miles of this canal will be completed within twelve months, and afford at this place a sufficient quantity of water power to drive two hundred run of stone. The distance from this point to the upper Mississippi, in a direct northwest line, is seventy-four miles. Between these two points, a railroad is now being constructed, and thirty-eight miles of the road will be completed in eight months, and the balance will be put under contract by the company early next spring.

Thus it will be seen that, by the various communications, this point is within ninety-six miles of the lakes at Chicago, by way of the canal; one hundred and ninety-two miles from the Mississippi, by the Illinois river; and seventy-four miles from the upper Mississippi, by the railroad which strikes said river above two very difficult rapids which cannot be overcome in a low stage of water.

The country surrounding this point and the intermediate vicinity abounds with the best quality of bituminous coal, suitable for manufacturing purposes, and can be delivered for use at as low rates as in any part of the country west of the Alleganies.

The northern part of Illinois and the country adjacent is very healthy, and possesses the most fertile soil, adapted to all agricultural purposes, the productions of which can at all times be purchased as [cheap as] at any point in the United States, and water power to any amount can be procured of the State of Illinois at the most reasonable rates. In fact, we know of no advantages that are requisite that this point does not possess, to render all facilities for such an establishment. Its central position stands unequalled in regard to its communication with the lakes and rivers.

We respectfully request that, if a board of examiners or agents are appointed to examine the different points, you will adopt such measures as will cause an examination of this point to be made.

All of which is respectfully submitted.

A. H. S. WANGS,
LUCIUS PEARL,
H. P. WOODWORTH,
T. D. BREWSTER,
ISAAC ABRAHAM,
} *Committee.*

To President TYLER,
Washington City, D. C.

No. 6.

To the board of officers appointed by the President of the United States to make surveys for the location of a Western armory.

ALTON, ILLINOIS, *February* 1, 1842.

The undersigned, having been appointed a committee of the common council of this city, for the purpose of presenting the advantages of this point as a suitable location for the Western armory, addressed a letter to the President of the United States on the 18th of October ultimo, requesting him to instruct the officers who may be employed in the service to embrace Alton in their survey and report. In further discharge of our duties, we take the liberty to present you with an abstract from our letter addressed to the President, together with a letter from Major George W. Long, in answer to a direct application made by the undersigned for his views in relation to this subject. We would especially call your attention to the communication furnished by Major Long, believing, as we do, that it is a document containing facts and arguments which are incontrovertible, and worthy of your most serious and candid consideration; and, also, to his particular description of the coal mines in this neighborhood, together with the table of statistics and shipping list; and to the letter containing a proposition from the proprietors of the land examined by you, which last-named documents you were presented with while here.

The following is an extract from our letter sent to the President, viz:

"We would, in the first place, refer you to the location of Alton, situated as it is upon the first highlands, approaching the east bank of the Mississippi from the mouth of the Ohio, but twenty miles below the mouth of the Illinois, and a short distance above the confluence of the Missouri with the Mississippi. It has almost an unlimited extent of river navigation, which, from here to the Gulf of Mexico, is seldom if ever impeded by ice or low water. We would also allude to the fact that this water communication will ultimately be extended to the lakes, through the Illinois and Michigan canal, thus opening another way to the Atlantic sea board. We believe the advantages to be found at Alton, for the location of such an establishment, are not inferior to those of any other point on the Western waters. Besides combining all the benefits to be derived from water transportation, it may not be improper to state that this place has been designated by the Legislature of Illinois for the crossing of the National road. We have an abundant supply of coal in the immediate vicinity, and an inexhaustible quantity of stone at hand suitable for building, with an excellent quality of clay for brick, limestone, and sand, all equally convenient. The material for the manufacture of arms and other implements of war can also be furnished as conveniently as at any other place in the West. Black walnut, maple, hickory, oak, and other timber, suitable for every kind of article to be manufactured of wood, grows in the immediate neighborhood of Alton, furnishing also a plentiful supply of fuel. The best iron that is worked at Pittsburg, or at any other manufacturing place in the West, is obtained from below the falls of the Ohio, and mostly from the mines upon the Tennessee river, which are at all times open to water communication from this place. The healthfulness of the climate and the agreeableness of the location are such as will be a strong inducement for mechanics to engage steadily and permanently in the service of the Gov-

ernment; and the excellent soil of the adjacent country will ensure all articles of subsistence at the cheapest rates."

The above suggestions, together with the documents named, are submitted to your inspection, for the purpose of giving you a more full understanding of the natural resources of this section, and the numerous advantages that the point examined here by you presents for the location of the Western armory.

We have the honor to be, very respectfully, your obedient servants,

B. F. EDWARDS,
B. K. HART,
MOSES G. ATWOOD,
Committee of the Common Council of the City of Alton.

General W. K. ARMISTEAD,
Colonel S. H. LONG,
Surgeon General T. LAWSON,
} *U. S. Commissioners, &c.*

To the Committee of the City Council of Alton, appointed to present the advantages of Alton for the location of the Western armory.

ALTON, *January* 25, 1841.

At your request, I submit to you the following remarks, in relation to the subject of your appointment, which is of the utmost interest to every citizen of this neighborhood:

The requisites for the location of such an institution are principally embraced in a site convenient of egress to the entire frontiers which are to be supplied with manufactured arms and implements, and the healthfulness and comforts of livelihood for mechanical labor, together with convenience of obtaining the supplies of the materials which enter into or contribute to the workmanship of the manufacture.

This neighborhood may be considered the geographical centre of the West, which the Western armory is destined to supply with arms and materials for war on our frontiers, which at present, and for the coming century, will consist of three-fourths of a circle, of which we are the centre, extending from the great lakes of the North, around by our Indian border on the west, to Texas on the southwest, and the Gulf of Mexico on the south.

We are not only geographically the centre, but are also central in point of navigation and intercourse in relation to the commercial business of the East with the West; at the head of constant navigation on the Mississippi river for the heavy burden boats that run to New Orleans, and the terminus of smaller craft destined for the upper rivers of Missouri, Illinois, the upper Mississippi and its several small tributaries, and the Ohio, with its tributaries, in trade with the West. And, further, the future connexion we shall have through the Illinois canal with the lakes presents a consideration of great importance to the future military strength of the country; thus establishing this as a central point to a scope of country embracing more than three-fourths of the territory of the United States, as well as an equal portion of the circumference of its frontier to be protected, and through which we are in constant intercourse by the most extensive river navigation in North America, and with every prospect, at

no distant period, of being connected almost as extensively with the artificial means of communication our Eastern brethren are pushing forward with such unparalleled spirit and enterprise. The middle-aged of the present generation may even look forward to the union of the banks of the Mississippi with the Atlantic by a direct railroad, and to see realized many of the schemes of improvements in our State, as well as those of our neighbors, which have sunk under the impotency of our infancy.

With such a view of the country and its future prospects, it would seem that a location on the great highway of the waters of the West could but meet the views of all who are above sectional and selfish considerations, for an institution which should be purely national, and which should look to the future greatness rather than to the present condition of the country, and which has so direct a reference to the extensive circle bounding it; and more especially should such a central point be selected over any of its radiants, as it would be the most convenient rendezvous for a movement of any considerable force in either direction, it would save the necessity of separate locations for depots and arsenals, and freights and risks in transportation to them, which might be the cause of great embarrassments at times when navigation might be suspended. Unless the country should be overstocked with arms and implements, as probably never will be the case, or the point of approach of an enemy not be correctly anticipated, such an inconvenience might be attended with the most unhappy and fatal results. And, further, should the location be made on any of the secondary streams to the Mississippi river, the want of constant navigation would soon be felt; then the *armory* would be the *national point* to which the navigation must be made good, at any expense of the General Government, and would require additional appropriations equal to its first cost to render it properly available. Under these considerations, even in the present state of the country, it would become a question whether the advantages of a free and open navigation would not more than compensate for the superior facilities of manufacturing now in the older places on the Ohio river. These advantages over us I look upon, however, as but temporary. We have all of the elements at hand for such business, in as bountiful stores as the most favored spot between this and the Allegany mountains; and by the time the Western armory can be put in operation, in all probability, shall have them in action in as advantageous a manner.

The line of defence having a direct connexion with the Western armory, as stated above, includes the Northern lakes and the Gulf of Mexico, both of which would require the same description of means of defence, viz: armed steamboats for transportation of troops and supplies, and to maintain the lines of communication to the several posts in the face of an enemy. By the means of the Illinois canal, the same force and armament could be made to act in both directions; and, having this as a central station, and connected with the armory, presents the greatest convenience that can be attained for the purpose. The construction and outfit for such an armament can also be done here on equal advantages with any other point in the West. The forces and supplies for the defence of the several posts on the coast of the Gulf of Mexico, in particular, must be drawn from the West, and consequently this central point must be considered the most favorable for a general depot and rendezvous for this service. And on this account, in connexion with our southwest, west, and northwestern

frontiers, we are placed in the most convenient position for an open line of such extent.

Alton may be considered the head of New Orleans steamboat navigation, is situated on the first bluff land on the Illinois side of the Mississippi river, at the head of the great American bottom, which extends down near one hundred miles to a width varying to six or seven miles. The soil of this bottom is light, and subject to be cut away whenever the current of the river sets in upon it, which the ever-changing character of its channel renders liable at any point, preventing any certain and permanent landing on this side, and exposing the opposite to being interrupted by sand bars. The dangers of interruptions of this kind in St. Louis harbor, the arsenal, and even Jefferson barracks below, shows the importance of selecting some location not liable to circumstances so fortuitous in their nature. Ten years since, not far from two-thirds of the width of the river was between Bloody island and St. Louis, and now the channel on this side is not far from equal to the other; and four or five years since, the channel from St. Louis up the river was near the head of the island, from which there is now a dry sand bar extending so far up as to cover the entire front of the city. Already has Government appropriated more than double the amount for this harbor than all that ever was appropriated for similar works or improvements in the entire State of Illinois; and should the location of the armory be made there, or at any other point within limit of or opposite to the American bottom, similar embarrassments may sooner or later be anticipated with some degree of certainty. The water below the mouth of the Missouri river is also less favorable for a harbor than above, on account of the rapidity and force of the current, and the sand clay carried along in suspension in the water, which is injurious to lumber rafted thither, and also interrupts other operations of boat building, the use of dry docks in repairing and in cleansing boats after discharging freights, &c.; whereas that above is clear, and the current moderate, with a good landing, where the channel, for several miles, follows a rocky bound shore in a bend into the Illinois side, and where there is no probability of a future change.

The site above Alton, shown to the armory board, where the requisite quantity of land can be obtained for the armory, is near 150 feet above the level of the river, with ravines about one in a mile, descending to the water with a slope from 3 to 5 degrees. There is generally a space of from one to two hundred feet between the water and the bluff, which is enough for a road way, or even to establish warehouses or foundry buildings upon.

This plateau presents a fine situation for mechanics' shops, parade ground, &c., opening into the interior of the country, over which there is an extensive and beautiful view, and which also commands a prospect of the courses of the Mississippi and Missouri rivers in one direction as far as the eye can reach, and in the other the former stream and the American bottom for a like extent. In fact, the scenery from these bluffs is excelled in beauty by but few places in the country.

This situation presents one of the desirable and attractive spots in the West for the mechanic. The entire body of land in the interior, or quite across the State, is of the most fertile alluvial soil, the surplus product of which finds its outlet at this place; and its extent and fertility are scarcely equalled by the surrounding country of any city in the Union. Our neighborhood is filling up rapidly with settlers, who are establishing handsome farms, which, in addition to the heavy exports of staple articles, ensure a

supply for our home market of every thing that the soil can produce, in great abundance and at the cheapest rates; the climate being suited to all the fruits of the country, which grow in great perfection, as well as the greatest of garden vegetables or succulent roots. The growth of the country has been of extreme rapidity. It is but about ten or twelve years since Alton has become a place of any business, and the country in the neighborhood reclaimed from a desolate waste. At times there was but little more raised than what was necessary for home consumption; and the hardy pioneer seldom thought of exchanging any part of the proceeds of his farm, with the New England manufacturer or the sugar planter of Louisiana, for articles of comfort and luxury—Alton being then a mere thicket of bushes, with but one or two humble dwellings in sight of the landing. [To show] what it is now, compared with that period, aside from the state of the town itself, it is necessary but to refer to the annexed table of exports of the past season, &c., which is given as an earnest of our future destiny and importance in point of trade and commerce. It is to be remarked, that one of the staple articles (wheat) is an entire increase of the last four or five years, and, in another year, with ordinary crops, will take the lead in our exports, as nearly three times the amount has been put in for the next crop as for the last. With such an increase for another twelve years, we may look forward to a trade of magnitude and activity to place this among the most important points in the West.

The settlements of the country now forming, which will give an impress for the future, are characterized for industry, morality, and intelligence, which, together with the institutions of learning already established, render this neighborhood highly desirable for the valuable class of operative mechanics, such as would be employed at an armory of the United States. The Shirtleff College at upper Alton has buildings erected sufficient for two hundred students, and the Monticello Female Seminary is now accommodating upwards of 80 scholars; besides which, there are neighborhood schools accessible to every child within the compass of six or eight miles of the city—so thickly has the country about become settled, where but twelve years ago a few lonely and uncomfortable cabins formed its principal improvements. Thus, in point of subsistence, whether for the use of an armory itself, or to provide for a large army, we can present as favorable a point as can be found in the Western country, and for healthfulness and all of the ordinary comforts of life cannot be rated second to any.

The supply of materials for the armory can also be furnished here at as fair rates as at any other point. Coal, which enters into the consumption of such a manufacture, in portions of at least a moiety in weight and bulk, we have in our neighborhood in quantity and quality not inferior to any point on the Western waters. The country back from the river but five or six miles seems to abound with coal of a superior quality, both for fuel and smiths' work. The two railroad routes from Alton to Springfield, and to Mount Carmel, pass through this coal region, and are partly constructed to the mines, and, ere long, no doubt, will be finished to them, for the transportation of coal alone to the river, if for no other purpose. By this means, we can expect coal to be delivered here at rates as low as at Pittsburg, or, on an average, of five cents per bushel. It is generally admitted that steam power is more healthful than water power for manufacturing purposes, especially in the West, where bilious complaints are prevalent; and hence the cost of fuel becomes of serious consideration in the selection to

be made. The supply of metals must necessarily be imported: the iron from the Ohio river, the Tennessee mines, or the Iron mountain in Missouri, and other metals from different points. The lumber may be obtained from the neighborhood, or rafted from any of the tributaries of the Mississippi river, from the Missouri upwards; and such materials as are the products of the soil will be supplied, as soon as the demand should become known, at fair produce rates. This being decidedly a produce State, there will ever be a competition for the supply of every thing the market may call for.

We may thus set down the several principal items required for the manufacture of arms and implements of war, viz: timber of various kinds, iron, copper, tin, zinc, and lead, leather, hemp and its fabrics, and coarse woollens, with the fuel necessary in the operation, as conveniently to be obtained here as at any other point in the entire region of the West. It is supposed that the "Western armory" will be established on a scale to work from the raw material, and be entirely independent of other mechanical establishments for most of the materials used, so that its location may stand perfectly independent of any of the manufacturing towns now in existence; and wherever the selection may be made, the neighborhood will not be long in filling up with mechanics of every description, as well for the competition of employment at the armory as to supply the demands of the country about with the products of their labor—such is the tendency of free labor for every pursuit which the untrammelled ingenuity and skill of the American people can invent. The rates of such voluntary labor will also be lower than where it is monopolized by the few, whether landlords or slaveholders. In free labor, the rates are fixed by the multitude, and it is generally out of the power of a single individual to influence more than relates to his personal operations; but, where there are a great number at the control of one man, it is more readily in his power to obtain high wages, a power which is most certain to be exercised, and which all experience proves a never-failing source of extortion.

The census will show a greater ratio of increase of population in this State than any in the Union for the last ten years, and there is no reason to suppose that this ratio will be diminished for ten or even for thirty or forty years to come. The soil throughout the State is of a uniform richness, not equalled, probably, by any body of equal extent in the country, and is destined to become populated in density corresponding with its great fertility; and thus, as it is so free of access at all times, it must become a ready and strong arm for our future national strength and defence, being the central point of the great valley of the Mississippi river in territory, and rapidly progressing to be so in population. With these considerations of the present resources and prospects for the future, we can hope for the most favorable result towards us of the investigations now going on, by the direction of Congress, for the best location for the "Western armory" on the Western waters.

Respectfully, your obedient servant,

GEORGE W. LONG.

Dr. B. F. Edwards,
Dr. B. K. Hart,
Moses G. Atwood,
} *Committee of Common Council, &c.*

A table exhibiting the annual amount of the agricultural and manufactured productions of Alton and vicinity, which are consumed at or exported from this city, with some other articles constituting our natural resources.

Pork—8,000,000 pounds, cut and packed during the winter of 1841 and 1842.

Lard—1,250,000 pounds, rendered during the winter of 1841 and 1842.

Beef—5,000 beeves, slaughtered during the winter of 1840 and 1841. On account of the low prices, there was a falling off in this article in 1841 and 1842.

Tallow—100,000 pounds, rendered in the winter of 1840 and 1841.

Green and dry hides—10,000.

Poultry—more than 100,000 of turkies, geese, and chickens, most of which are exported to the Southern markets.

Mutton, venison, fresh fish, and a great variety of wild game, in abundance, at low prices.

Butter and eggs—the adjacent country affords a large surplus of these articles for exportation; also, a liberal supply of cheese and honey.

Wheat—200,000 bushels from the crop of 1841.

Corn—more than 1,500,000 bushels are raised within hauling distance of this port.

Oats, rye, barley, and buckwheat—upwards of 200,000 bushels, mostly exported.

Beans—8,000 bushels.

Flour—more than 28,000 barrels have been manufactured at one mill in Alton, to which large quantities are received from the adjacent mills.

Corn and rye meal and buckwheat flour—a large supply for home consumption.

Potatoes—120,000 bushels.

Onions—8,000 bushels.

Turnips—50,000 bushels.

Cabbages, sweet potatoes, beets, parsnips, tomatoes, and other garden vegetables—brought here in great abundance, and of the choicest kinds; and our corn fields abound with squashes, pumpkins, and every other species of the melon.

Apples—50,000 bushels, mostly grafted fruit.

Peaches, pears, quinces, cherries, and plums—these fruits can always be procured in abundance in their season.

Gooseberries, blackberries, and strawberries, are indigenous, and grow in great abundance in the vicinity.

Hay—2,000 tons.

Castor oil—10,000 gallons manufactured from beans grown in the vicinity.

Flax seed—1,000 bushels.

Hemp, flax, and tobacco—the receipts small, but the planters in this vicinity are making extensive preparations for the growth of these articles.

Hops—indigenous and in abundance.

Hard soap—150,000 pounds manufactured here.

Candles—70,000.

Flour and pork barrels, lard kegs, &c.—manufactured in Alton and vicinity sufficient to supply all demands.

Timber—white, yellow, and Spanish oak, black and white walnut, cherry, white and sugar maple, ash, linn, cotton wood, honey and black locust, hickory, pecan, persimmon, and many other articles of timber, indigenous and in abundance in the immediate vicinity.

White and yellow pine—from the upper Mississippi.

Coal—inexhaustible mines of bituminous coal from two to five miles distant.

Limestone, freestone, sandstone, and grindstone quarries, in and near Alton inexhaustible.

Brick and potter's clay abundant.

Porcelain clay, of superior quality, is found in abundance, and the manufacture of common Liverpool ware commenced.

Lead, in large quantities, received from northern Illinois.

Sheep skins, deer skins, and peltry—a good supply.

A table taken from a register kept by Mr. Horace Buffum, of this city, showing the number of arrivals of steamboats at Alton during the months of November, December, and January, for the last four years.

In November, 1838	- - - - -	55
In December, 1838	- - - - -	19
In January, 1839	- - - - -	33—107
In November, 1839	- - - - -	107
In December, 1839	- - - - -	72
In January, 1840	- - - - -	15—194
In November, 1840	- - - - -	127
In December, 1840	- - - - -	66
In January, 1841	- - - - -	6—199
In November, 1841	- - - - -	150
In December, 1841	- - - - -	116
In January, 1842	- - - - -	51—317

No. 7.

ALTON, *November* 28, 1841.

Having made some examinations into the resources of coal for this region, I present you with the following observations in relation thereto:

The coal region on the east fork of Wood river commences about one mile and a half from the line of the Alton and Mount Carmel railroad, and about four miles and a half from the city, and extends for several miles interior from the river. This vein or bed varies from five to seven feet in depth, and is generally on a level with the bed of the stream, which is susceptible of being reduced sufficient for the drainage of the mines. Coal can be dug here for one cent and a half per bushel, and transported to Alton by railroad for one cent; so that the article can be afforded at the low rate of four cents per bushel.

In addition to the above, the Alton and Springfield railroad, which is now graded, is on the dividing ridge between Wood run and the Big Piasa, in

the heads of the branches of which, in the vicinity of the track, numerous coal banks have been opened, which lie still more favorable for working, being entirely above and free from the highest waters in them. The distance from town to these banks is from five to ten miles. The cost of digging and transportation may be estimated the same for this as the above; and the two sources, when in operation, will create competition sufficient to keep the article always at a low rate. And from the profits of coal trading to the lower Mississippi, there can be but little doubt but this source of wealth will, ere long, be brought into action; and should we be fortunate enough to gain the "Western armory" in our neighborhood, long before there would be a demand for this article these sources would be opened for the supply.

Respectfully, your obedient servant,

GEORGE W. LONG.

M. G. ATWOOD, Esq.,
Dr. EDWARDS,
Dr. HART,
} *Committee of City Council of Alton.*

No. 8.

THE ARMORY.

At a large and respectable meeting held in the court-house in Bellville, on the 30th instant, to take into consideration the location of the armory, John D. Hughes was called to the chair, and P. B. Fouke and J. C. Butler appointed secretaries.

Governor Reynolds moved the following resolutions, and made, on their passage, in substance, the remarks we publish on the first page of this day's paper.*

Resolved, That this meeting highly approve of the recent act of Congress establishing an armory on the Western waters, and that said armory should be located in the vicinity of Bellville, in the State of Illinois.

Resolved, That a committee of seven be appointed to meet the United States commissioners whose duty it is to examine sites for the said armory, and to report to them facts, and the advantages of Bellville.

The chairman appointed the following gentlemen a committee to wait on the United States commissioners, now at St. Louis: Hon. John Reynolds, Hon. A. W. Snyder, W. C. Kinney, Esq., Aug. Hasel, J. L. D. Morrison, Colonel John Thomas, jr., and Dr. J. C. Butler.

No. 9.

PLANTERS' HOUSE, ST. LOUIS, *November* 1, 1841.

GENTLEMEN: Having been appointed a committee by the citizens of St. Clair county, Illinois, to see you on the subject of the location of the armory in Bellville, in said State, we would be pleased if we could have the

* This is an extract from the Bellville Advocate, sent by the committee to the board.

opportunity to see and converse with you on the subject, at such time and place as may suit your convenience.

We have the honor to be your obedient servants,

JOHN REYNOLDS.
W. C. KINNEY.
AUGUSTUS HASEL.
J. L. D. MORRISON.
JOHN THOMAS, Jr.

General Armistead,
Colonel Long,
Surgeon General Lawson,
} *U. S. Commissioners, &c.*

No. 10.

Washington City, *October* 6, 1841.

Sir: Presuming a board of officers will be appointed by the President, under the late act of Congress, to make further examinations for the selection of a site for a Western armory, I have to request that the board may be instructed to extend their examinations to the State of Missouri. Whether steam or water power shall be used in the establishment, I am of opinion that suitable sites will be found in Missouri, on the banks of the Mississippi river, if by steam; and on the waters of the Maramec, Gasconade, or Osage, if by water power. A site at these places would command the advantages of perpetual navigation, (except occasional slight interruptions from ice,) with proximity to iron and coal—the latter of which is found in some parts of Missouri, near the Mississippi river, and generally on the Illinois side in the bluff which skirts the American bottom; and, distant from three to six miles from the river, wood and stone for fuel and building, and furnishing charcoal, walnut timber for gun stocks, abundant and cheap provisions, healthy climate, and plenty of laborers—the great iron region of Missouri in the rear, and the vast coal formations of Illinois in front—all these secondary considerations are happily combined with the centrality of territory and of navigation which a site in Missouri would present.

The great points in the West which would require supplies of arms in the event of war are New Orleans, the Gulf coast on the frontiers of Arkansas, the frontiers of Missouri, Iowa, Wisconsin, and Illinois, the upper Northern lakes, the river St. Peter's; and to all these points an armory in Missouri would be most central, and of the most easy and direct communication.

Equally easy is it in time of peace to supply arms from this point to the militia of all the States of the West. The wonderful tendency of the rivers in the valley of the Mississippi to concentrate in the centre (of which the Cumberland and Tennessee present striking instances) show how easy it is for every State in the West to receive her supply of arms from an establishment in that part of the State of Missouri which I have indicated to you.

The proposed armory being a great national establishment, intended for perpetuity, it should be fixed *now* where it ought to be fifty or one hundred years, or a thousand years hence, and that would be in the centre of the Western territory, population, and navigation; which centre would be

found in the region where the great rivers Missouri, Illinois, Ohio, and Tennessee, collect their waters in the channel of the Mississippi.

Requesting, sir, that you will lay this communication before the President, and obtain his decision upon the application to have the State of Missouri included in the places to be examined for the purposed armory site, I have the honor to be, very respectfully, your obedient servant,

THOMAS H. BENTON.

Mr. LEA, *Acting Secretary at War.*

No. 11.

ST. LOUIS, *December* 4, 1841.

GENTLEMEN: Pursuant to the following resolution, passed by the city council of the city of St. Louis on the 3d instant, viz:

"*Resolved*, (by the board of delegates, the board of aldermen concurring,) That the report drawn up by M. Thomas, Esq., and herewith submitted by his honor the mayor to the city council, be, and the same is hereby, approved, and the committee appointed to wait on the honorable commissioners are hereby authorized to submit the same, on behalf of the city of St. Louis, to the notice of the commissioners appointed by the United States to select a site for a Western armory"—

The committee appointed by the city council of the city of Louis would consequently submit to your notice the accompanying report.

We have the honor to remain your obedient servants,

A. S. MILLS,
EDW. BROOKS,
T. O. DUNCAN,
THOMAS COHEN,

Committee from the City Council of the City of St. Louis.

To the Hon. COMMISSIONERS *of the United States to select a site for a Western armory.*

No. 12.

Report upon the facilities afforded by the vicinity of St. Louis for the establishment of a national armory.

DECEMBER 2, 1842.

The policy of the United States Government, with respect to arms and munitions of war, appears to be as follows: The erection of arsenals, or ordnance depots, at such suitable positions as will render the distribution of the *materiel* of war easy, certain, cheap, and expeditious, to every point of the whole country. Of these arsenals or depots, there are already about twenty erected. Armories are exclusively intended as places to manufacture small arms, muskets, rifles, and pistols. From these manufactories, the arms are regularly transported to the arsenals or depots, as opportunity

offers. It being the intention of the Government not to retain arms at the armories in store, it is not vitally important that such establishments should be at points always accessible by the usual means of transportation; but if a point where navigation is easy and certain, and of course cheap, can be found, and other things are equal for the cheap manufacture of arms as well as for economy in the erection of buildings and machinery, it would seem to follow, as a matter of course, that such a situation would be chosen at which to erect the Western armory. As such an establishment must be intended to manufacture arms for the use of the "West," (that at Springfield, Massachusetts, being an *Eastern* armory, and the one at Harper's Ferry, in Virginia, being a *Southern* one,) it requires no argument to prove that a geographical centre of the *West* would be the most equitable, provided the other requisites for an armory were situated or cheaply attainable at that central position. "Where is the West?" has sometimes afforded an amusing problem for our Eastern brethren to solve; but as to the centre of the vast region situated between the Allegany mountains on the east, and the Rocky mountains on the west, there can be no doubt. The city of St. Louis, in Missouri, is nearly in the geographical centre alluded to; and all that remains to be demonstrated in support of the suitableness of the vicinity of St. Louis, as a site for the Western armory, is to ascertain the facts as they exist, or will certainly hereafter obtain, as to the following points; as it is taken for granted that the United States Government, in selecting a site for the armory, have in view the public service, and not to subserve any local or sectional interest.

The requirements for a national armory would seem to arrange themselves under the following heads, to wit:

First. The *primum mobile*, or moving power for machinery. I suppose that it is taken for granted that steam power will be used. I will extract from a report now before me upon the subject of a Western armory, made by a commission in 1825, consisting of the late Colonel William McRea, one of the most talented engineers our country has ever produced; Colonel Roswell Lee, for a long time superintendent of the national armory at Springfield, a gentleman of great experience and sound judgment; and then Captain, now Lieutenant Colonel, Talcott, the present efficient head of the Ordnance department. These commissioners examined the following points for a site, viz: The narrows of Harpeth, Tennessee; below Shippingport, Ohio river; above same place, Ohio river; below Jeffersonville, Ohio river; North bend, Ohio river; Zanesville, State of Ohio; Big Beaver falls, Pennsylvania; Brighton, on Beaver, Pennsylvania; Ohiopile falls, Youghiogeny river, Pennsylvania, and several others of less note; and finally Pittsburg, Pennsylvania—at which point steam power was of course contemplated to be used, and to which power the minds of the commissioners evidently leaned. They say "the peculiar, if not most important advantage of steam power, in a general point of view, is the liberty it affords of employing it *wherever a power may be required*, and fuel at command. This independence of locality, however, is confined within certain limits as regards its practical utility. It requires a complex machine in its production, liable to accidents and interruptions from causes that are also peculiar to it, which, indeed, are of little consequence where the necessary facilities exist for the repair or renewal of its various parts that may be injured or destroyed, but which, under less favorable circumstances in these respects, may be attended with serious inconvenience and delay. Its

convenience and economy, therefore, do not depend exclusively on the cheapness of fuel."

Since this report was made, (January, 1825,) a great change has taken place in steam machinery; its complexity has disappeared, its cheapness increased, and we now see it used even for domestic household purposes.*

The question to be settled is, Does the vicinity of the city of St. Louis afford cheap fuel, and the requisite facilities for repairing and replacing the parts of machinery required at a national armory?

First, as to fuel. The bituminous coal of the vicinity of St. Louis is of excellent quality, and literally inexhaustible. In a communication received from one of the most respectable citizens of the county, who has been engaged in supplying the town for several years past, (James Russell, Esq.,) the number of acres actually explored, and now wrought upon is set down at twelve hundred; situated from one and a half to six miles from the United States arsenal on the Mississippi river, which is one mile and a half below the central part of St. Louis. The average thickness of the strata of merchantable coal is four feet, and afford one hundred and thirty-seven millions of bushels of eighty pounds each. But Mr. Russell's observations are only in his own neighborhood. The coal field of St. Louis county, commencing below Carondelet, runs northward to the Missouri river, and embraces, at least, a superficies of sixty square miles, or 38,000 acres. The same strata are found north of the Missouri river, in St. Charles county. This coal, as before observed, is at our very doors. Across the Mississippi river, in the State of Illinois, we pass a level prairie (the American Bottom, so called) from five to seven miles, when we find the bluffs or hills from sixty to one hundred and twenty feet high. Along the face of these hills, about 40 feet above the level of the prairie, we find a stratum of coal from five to seven feet thick, of superior quality. These coal banks are already opened on a line of nine miles; and personal observation has disclosed to me that the greater part of the State of Illinois is a bituminous coal field, of prodigious extent; for coal is found on the tributaries of the Wabash, of the Ohio, of the (river) Illinois, and of the Mississippi, wherever the watercourses have worn into the surface and cut sufficiently low. The same fact is stated to exist on many of the tributaries of the upper Mississippi, (in Iowa,) and known, as respects those of the Missouri, Osage, Lamine, Grand river, &c. As respects the coal banks in Illinois, immediately opposite St. Louis, I have seen one recently opened six and a half feet thick; with a carboniferous limestone roof, nine feet thick; and a floor of the same rock, (after removing some ten inches of slate clay,) under which I have good reason to believe exists another stratum of coal still above the level of the prairie, and consequently not liable to be troubled with water. The total expense of opening this bank, with stage and platform room for three teams to load at, (pl and every other expense included,) was less than one hundred dollars. An industrious miner can easily turn out one hundred bushels per day. I have dwelt upon this subject in detail, because, as sure as cause produces effect, these coal fields in the vicinty of St. Louis are destined to form a basis of manufacturing prosperity to which those branches already in operation, spirited as they are, form a mere trifle. Cheap coal has never failed to

* A steam engine is in daily use at the magnificent hotel in St. Louis (the Planters' House) for cooking, washing, &c.

produce great manufactures, if a market is at hand or attainable, both f which requisites exist at St. Louis.

The question, then, of cheap fuel, in inexhaustible quantities, at St. Louis, is settled; and the remaining point, as to the superiority of steam power for the Western armory, is: Can machinery be repaired or replaced with facility and economy from the foundries and machine shops of the city? Upon this point, in support of my opinion, I annex answers to a series of questions propounded to the proprietors of the two establishments of Messrs. Gaty & Co. and Kingsland & Co., which, I am inclined to think, settles the point affirmatively, beyond all cavil.

The second general inquiry would seem to be: Can materials required to manufacture arms be obtained, of suitable quality and at reasonable prices, at St. Louis? I refer to the document heretofore named, for a list of the materials required. The amount is for 12,000 muskets—the number proposed (in 1825) to be annually manufactured at a Western armory.

Refined iron, about	120 tons.
Steel, of all kinds	12 "
Brass and zinc	2 "
Emery	1 "
Grindstones	80 "
Sand	20 "
12,500 musket stocks	44½ "
12,000 files, assorted	3 "
100,000 bushels of charcoal, or one-sixth that quantity of pit (bituminous) coal	500 "
150 cords of wood	150 "
500 gallons of sperm oil	2 "
100 gallons of linseed oil and 4 barrels of tar	1 "
Band and buff leather	¼ "
Woollen rags	½ "
3,000 bushels of old shoes	8 "
50 coal baskets or boxes	½ "
20 tons of fire clay	20 "
30 reams of sand paper	¾ "
20 reams of wrapping paper, (for wards)	¼ "
Writing paper, stationery, tallow, and candles	½ "
Total	945½ "

To which must be added, boards for boxes, glue, nails, screws, &c., of no large amount or cost.

It will be observed that the first item on the list, and of most consequence and cost, is iron. The price of all the above articles, as estimated by the commissioners of 1825, was (at Pittsburg) $31,149 70, of which iron (at $130 per ton) was $13,000. Most of the articles have lessened in price, and iron keeps about the same ratio.

First, then, as to iron. At the Springfield armory, the iron made at Salisbury, Massachusetts, is used in manufacturing arms; it is of very superior quality. At the armory at Harper's Ferry, in Virginia, Juniata iron is used; the quality of this iron is well known. At both of these armories the Government pays $20 per ton for iron *refined*, so as to ensure a superior article. In the year 1824, there was sent to the armory at Springfield a

sample of iron from Tennessee, which was pronounced of equal quality to Salisbury or Juniata, if it had been equally refined. I am familiar with the quality of Juniata iron, having used it while in the public service. I have also, for a short time, used the Salisbury iron, at the arsenal near Albany, New York; and I do not hesitate to aver, that the iron made by Mr. Massie, on the Maramec, Missouri, and by Mr. John Perry, near Potosi, is equal in quality to either the Juniata or Salisbury iron, if equal time and care is bestowed in refining them. I was engaged with Mr. Perry for a period in this business, and I made some experiments on the ductility and tenacity of the bar iron from the mountain ore. I put it to the severest strain possible, in steam mill chains; I have seen the links elongate and compress, when resisting exceedingly severe stress, but very rarely break. I used Mr. Perry's iron in various ways, and although both his and Mr. Massie's labor under the usual disadvantages of all new enterprises, in obtaining good workmen, the iron is excellent. Iron ore is found in Missouri, in the counties of Jefferson, Franklin, Crawford, Gasconade, Washington, St. Francis, Madison, and Wayne, in sufficient bodies to justify the erection of furnaces. The ore at Massie's is in immense quantities, and of very excellent quality. The red and brown hematile ores generally prevail. The ores at the celebrated hills in St. Francis and Madison counties, called the "Iron mountains," have been so much written and published about as to be well known to every one. These ores are of a quality unsurpassed in the world, and in quantity almost marvellous. I hazard very little in predicting, that, when capital, skill, and the modern improvements in manipulating iron ores, are applied to those at the Iron mountains, the bar iron and steel trade in the United States will assume a different aspect; time will show this. There is one quality in the bar iron made from the mountain ore, I am almost inclined not to mention; but, as it is undoubted, I will venture upon it. I have observed it frequently, but do not offer any reason for it: the iron does not oxidate (rust) near so soon as bar iron usually does. If this observation should prove generally true, it will be a very valuable quality in making fire arms. These remarks upon the iron of Missouri, as will be seen, apply to the future mostly. As before observed, the Government pays $20 per ton extra for refined iron used at the armories. This additional price would enable Mr. Massie's or Mr. Perry's works to supply iron of the required fineness for small arms. In addition to this fact, I am authorized by the agents of the Tennessee iron works, in St. Louis, to say that they would contract to furnish iron of the requisite quality for six cents per pound; which is as low as any section of the country can afford *such* iron as would be received at the armories. A revolution has not only commenced, but made considerable progress in the iron business in the West. In 1825, Pittsburg furnished cheaper iron than any other place; now Tennessee undersells her. Pig iron is sold cheaper in St. Louis (received from Tennessee) than at Philadelphia. (See appendix A.) This revolution, like all others, will continue, until, finally, the great bodies of ore and timber will induce capitalists to employ the fine durable water power of the region of Missouri, (described in appendix B.)

The next articles on the list are steel, brass, zinc, emery, files, and sperm oil. These would have to be purchased at a distance and carried to *any* site for an armory. Brass and zinc will probably be dispensed with, if percussion locks are substituted for flint. Missouri, however, furnishes

copper in abundance, and one of the ores of zinc, (blende,) linseed oil, charcoal, leather, woollen rags, old shoes, fire clay, sand, coal, wood, are found in abundance, or furnished by the vicinity of St. Louis. Grindstones, paper, and pine boards, would, at present, have to be obtained elsewhere. As to the prospect of white pine, see appendix C. Grindstone quarries are found in Missouri and Illinois; but, it seems to me, those obtained in Kentucky, and shipped at Stephensport, 110 miles below Louisville, being water carriage all the way, would at present furnish a cheap article; the quality is excellent. Musket stocks are an important item. Those to be had at St. Louis are very superior. (See appendix D.) This completes the list of materials required, coal having been fully commented upon before. As to the prices to be paid for the articles brought from a distance, transportation necessarily enters into the calculation, and of that more hereafter.

The next question is as to the healthfulness of the vicinity of St. Louis. The Government is already in the possession of facts, from the reports of surgeons attending the arsenal and Jefferson barracks, situated on the Mississippi river, near the city; and I need make no remarks upon the well-known fact, that the vicinity of St. Louis, as well as the city, is decidedly healthy—i. e., that no local cause of disease exists.

The next point, as to the facility of procuring building materials, and mechanics to erect the buildings. Upon this branch, St. Louis is most happily situated. At every point on the Mississippi, from the city to Jefferson barracks, and below them, limestone quarries are found, furnishing every variety of strata, from one inch thick to three feet, and of every quality, from the hardest to that which may be sawed in the usual manner. At the quarry below the United States arsenal, I had a single block quarried out fifty-six feet long, three feet wide, and forty inches thick, when I was erecting the buildings at that place, in 1829. The spall and refuse stone furnish material for burning lime on the spot. The bars in the river furnish a clean, sharp, silicious sand, of every degree of fineness, for masonry and plastering. The clay is of superior quality for bricks. Timber can be furnished, of very superior quality, sawed to bills of exact dimensions. The wages of mechanics are very reasonable. For the extent of building in St. Louis, in 1841, see appendix E. The best buildings are now covered with slate. The arsenal has such a roof, which cost, in 1828, $17 per square; the present cost is from $13 to $14 per square, in St. Louis. Welsh slate, of the best quality, is used; galvanized iron is beginning to be used; I do not know its cost.

The next question is as to the cheapness and facility of procuring provisions. There is no point in the West better situated than St. Louis in this respect. Beef, pork, and wheat, are among our chief staples. Hams (in pickle) are sent to Cincinnati, and there cured, and sent east of the mountains as Ohio hams. Wheat is shipped this year in considerable quantities to Cincinnati. The pork dealers annually come from the Ohio to the Mississippi, Missouri, and Illinois rivers, and pack large quantities of pork. This complete revolution in the provision trade is merely the inevitable consequence of population settling upon and cultivating a prairie country, interspersed with timber amply sufficient for several generations. What competition can a densely wooded country present, to one of wood and prairie, which latter requires only to be fenced up and the soil broken, when a first-rate soil furnishes a farm ready made to the hand of man?

The tide of population rolling in upon us demonstrates that the advantages of the country are known, and the immense increase of products shows the people are not idle after they do arrive and settle. (See appendix F.)

As to the facility of obtaining mechanics generally, the rapid and steady increase of the city of St. Louis is an evidence of her ability in that respect. Let it be borne in mind that this increase is the result of actual capital, as no banking or artificial capital has been applied to building in St. Louis.

The several points into which the question of a site for the Western armory mutually divides itself having thus briefly been gone into, it would seem that but little remains to be urged in support of the opinion that the vicinity of St. Louis affords every facility that is required for the manufacture of small arms that any other point in the West can do; and a few general remarks will close this report.

I am well aware that the great natural advantages of the West have caused a magniloquent mode of speaking and writing by its citizens, which our Eastern brethren cannot see any good reason for. A simple narrative of facts as they exist and must hereafter follow seems, to superficial observers, an overcharged picture of advantages and prospects. Notwithstanding this, I will venture a few remarks upon the position of the city of St. Louis, and its chance for future greatness and prosperity. The latitude is 38° 28" north; consequently, the winters are short and vegetation is early. The immediate surrounding country is exceedingly fertile; its environs afford hundreds of beautiful sites for country seats, high, airy, and diversified in surface. On the opposite side of the river is the celebrated tract of land called the American Bottom, of a fertility unsurpassed. In a field at Cahokia we see the fact exhibited of corn being annually cultivated ninety years in succession without manure, and still producing the largest crops.

Situated on the river Mississippi, eighteen miles below the junction of the Missouri, St. Louis commands the trade of both rivers. The Mississippi is navigable from eight to nine hundred miles, passing in that distance between the Territories of Wisconsin and Iowa, and in part the States of Illinois and Missouri. The Missouri river has been navigated more than two thousand miles by steamboats of 250 tons. At and below St. Louis we find the river Mississippi but little interrupted by ice, and steam navigation affords a means of communication with the States of Arkansas, Louisiana, Alabama, Mississippi, Kentucky, Indiana, Ohio, western Virginia, and Pennsylvania. The neighboring State of Illinois is making a canal which will give St. Louis access to the State of Michigan and the whole Lake country. We find, on examination, that this immense region affords every product, from the sugar and orange of the South to the furs of the North; and, for the extent of it, there is no more healthy region on the globe. The city of St. Louis, as before observed, is nearly in the centre of this vast region; and the State of Missouri, the largest in extent (since the annexation of the Platte country, so called) of any in the Union, from its rich soil, fine timber, the general diffusion of limestone rock, and the extent and diversified mineral products, iron, copper, lead, &c., affords room for millions of inhabitants. The prosperity of a country depends upon a rich soil, generally; none need be more fertile than the largest portion of that of Missouri; added to which, are the great deposites of iron, coal, lead, and copper, together with the minor ores of pure sand, (for glass,) fire clay, marble, &c. The agriculturist will possess advantages, in a market at

home, to feed the manufacturer and miner; and the merchant will prosper by being the factor and transporter of the results of the labor and wants of all classes. Already we find St. Louis the owner of more than ten thousand tons of steam transportation, in every sized vessel, from the little "O hush" up to the magnificent "Missouri," "Meteor," and others of that class. The location of the national armory at St. Louis is, no doubt, a desirable object, but did I not firmly believe that the interest of the public at large would be subserved thereby, I would not write one word upon the subject. When, at my instance, the United States arsenal was projected at St. Louis, I foresaw and firmly urged the rapid increase of the mechanical interest of the place, from the fact of coal existing in such abundance, and the superiority of building materials and lumber of the country. The extent is much beyond my predictions, and the arsenal has assumed the rank of a first class ordnance depot. As respects a particular site for an armory, I have not entered into that point in this report, for obvious reasons; any location near St. Louis would enable the establishment to deposite the arms at the arsenal, and consequently save expense in the erection of a store-house at the armory for such purpose.

In conclusion I would remark, that I have taken it for granted that steam power will be used, as such would not only enable the Government to choose a site well adapted in all respects for an armory, but enable it to be enlarged to any future extent the wants of the country may require.

I am, gentlemen, yours, respectfully,

MARTIN THOMAS.

To the MAYOR and COUNCILS *of the City of St. Louis.*

APPENDIX TO THE ST. LOUIS REPORT.

A.

Messrs. Kingsland & Lightner state: first, the average price of good gray pig iron is $30 per ton, (2,240 pounds;) second, the coal is well adapted to make soft castings, in the air furnace, and does not injure the boilers of the engines when used to generate heat, and that the quality is annually improving; third, that marketing (provisions) is cheaper in St. Louis than Pittsburg.—Messrs. Kingsland & Lightner are from Pittsburg.

Messrs. Gaty & Co. addressed the annexed communication to me, in answer to a series of questions:

"SIR: Agreeably to your request, we herewith submit the answers to the questions propounded, to the best of our knowledge:

"In answer to the first question, this establishment has been in operation, making machinery and steam engines, about ten years.

"To the second question, we consider that a very considerable improvement has taken place in the stone coal of this region. As to the cause of such improvement, there may be many suggested and different opinions expressed. Our experience has led us to the opinion that bituminous coal of all kinds is continually improving in quality and increasing in quantity,

arising from the peculiar organization of matter. Allowing such to be the case—and of it we think there can be no doubt—it follows then, as you draw nearer the centre of a bank, or you progress in mining, that you get that which has been longest formed, consequently of a superior quality to the coal first come at. When we first commenced using the coal of this vicinity, it was poor and weak; and we now find the coal from those banks that have been longest open superior to banks just opened.

"To the third question, we have used the coal of this region for generating steam and smelting iron, and find the effect about the same as that produced by any other bituminous coal with which we are acquainted, particularly when we use care in selecting it. The metal smelted by it is sound, soft, and malleable.

"To the fourth question, we answer that pig iron ranges at from twenty-six to thirty-three dollars per ton of 2,240 pounds, and bar iron five dollars per hundred pounds. We suppose the price of pig iron ranges at about the same or lower than in Pittsburg. There is but little difference between this and Pittsburg in wages and the boarding of hands.

"To the fifth question, we have no difficulty in getting workmen at fair prices, and as capable as any in the United States at this time. But, at the commencement of this establishment, wages were very high and workmen difficult to get; consequently, you will see that a very great improvement has taken place of late years.

"Yours, respectfully,

"GATY, McCUNE, & GLASBY.

"MARTIN THOMAS, Esq."

B.

Taking the town of Potosi, in Washington county, as a centre, and drawing a circle of forty miles in diameter, will embrace about forty lead mines, nine or ten iron ore banks, (including the mountains,) two copper mines, sandstone as white as snow, a remarkable white clay, (free from any foreign matter, sand or iron,) pine forests, at least fifty mill seats, of durable water power; and the whole face of the country affording good natural roads. The Mississippi river is but thirty-six miles from Potosi, and transportation, of course, abundant and cheap. Accompanying this report you will find a few samples of the iron from two *mountains*, obtained in a recent journey to them.

C.

The owners of the mills on the St. Croix river, (upper Mississippi,) in the white pine region, state that they will bring into market next year about six millions of feet of pine lumber. They have twenty-eight saws in their mill, and about fifty men engaged in cutting logs. This business is just commencing.

D.

In the years 1834 and 1835, I furnished to the United States, at the arsenal at St. Louis, a quantity of musket stocks, required for repairing arms. In answer to a recent inquiry made of Captain William H. Bell, commandant of the arsenal, relative to the [stocks,] he states the wood to be equal to any he ever saw. Captain B. is an ordnance officer, of about twenty years' experience in such matters.

E.

There have been made at St. Louis, in the year 1841, upwards of thirty millions of bricks, twenty-five of which have been sold and used in building in the city. There are nine steam saw mills in St. Louis, which cut about eight millions of feet of lumber per annum—oak, walnut, maple, &c. There are three mills for planing boards; two white lead factories; one oil mill; four merchant flour mills, which can grind about seventy thousand barrels of flour per annum. Many other minor manufactories are in successful operation.

F.

Upwards of 110,000 barrels of flour will go to market from St. Louis in 1841, and 80,000 bushels of wheat. About 14,000 hogsheads of tobacco will be made for market. Hemp and every other product are increasing rapidly.

The two foundries melt about 1,000 tons of pig iron per annum, for machinery, engines, &c. Steamboat building has now commenced; wages are the same as on the Ohio; oak lumber, of the best quality, cheaper; engines nearly as cheap.

No. 13.

St. Louis, *December* 3, 1841.

Gentlemen: Agreeably to your request, I herewith submit a statement of the observations taken on the Maramec river.

The main source of the river is at the iron works of Mr. Massie, and is there called the "Head spring," which gushes from the side of an immense bluff, and is nearly 100 feet long, sixty feet wide, and has a minimum depth of water of fifteen feet, and discharges 5,658 cubic feet of water per minute at its lowest stage.

About 65 miles below this, at the Virginia mines, the volume of water flows 57,200 cubic feet per minute.

By the accession of the Baubuse and Big rivers, the amount of water is increased to about 112,000 cubic feet per minute.

In many places, the velocity of the stream is increased almost to a mountain torrent, but the bottoms are generally so low that it debars any hopes of erecting dams.

Of many places suitable for the erection of machinery, I have selected

two, (see A and B, herewith submitted.) A is a map of what is generally termed the Horseshoe bend. The natural fall of water from A to B is nine feet; the point is 38 feet above the lowest water mark. The excavation would be through soft limestone rock, easily removed. The amount of water is about 60,000 cubic feet per minute. B is a map of the river at Devil's island. A dam across the foot of the island would give a fall of 10 feet without injuring the bottoms above materially. Both of these sites are in finely timbered regions, and the lands adjacent are very rich and well suited for agricultural purposes.

I have thus given you a slight sketch of a small portion of this valuable river, valuable not only from its fine water power, but from its immense deposite of iron, lead, and zinc ores, and also the extensive forests of fine timber which every where cover its bottoms. Indeed, so interesting is this section of country, I really hope you can make it convenient to examine several of the most prominent sites; and should you deem it advisable so to do, I am at your service, to show you any advantages it may possess, by visiting that section with you.

I also submit a map of the river and a map of the Iron mountain.

With respect, I am, gentlemen, your most obedient servant,

WILLIAM R. SINGLETON, *C. E.*

General ARMISTEAD,
Colonel LONG,
Doctor LAWSON. } *Commissioners.*

OSAGE RIVER.

First division.

Number of shoals between Oceola and Warsaw, 25.
Aggregate length of same, 10,500 yards.
Aggregate fall of same, 27.51 feet.
Total fall between Oceola and Warsaw, 54.31 feet.
Total distance between Oceola and Warsaw, 58 miles 920 yards.

Second division.

Number of shoals between Warsaw and mouth of Magria, 30.
Aggregate length of same, 14,200 yards.
Aggregate fall of same, 33.42 feet.
Total fall between Warsaw and mouth of Magria, 49.61 feet.
Total distance between Warsaw and mouth of Magria, 63 miles 1,000 yds.

Third division.

Number of shoals between Magria river and mouth of Osage, 43.
Aggregate length of same, 19,350 yards.
Aggregate fall of same, 47.75 feet.
Total fall between Magria river and mouth of Osage, 58.42 feet.
Total dist'ce between Magria river and mouth of Osage, 108 miles 621 yds.
Minimum volume of water per minute, 131,000 cubic feet.

Maximum range of river, from high to low water, according to freshet of 1837, 27 feet; according to freshet during survey of 1840, 22 feet.

	Miles.	Yards.	Fall.
Length of first division - -	58	920	54.31 feet.
Length of second division - -	63	1,000	49.61 "
Length of third division - -	108	621	58.42 "
Total length - -	230	1,343	162.34 "

MARAMEC RIVER.

Distance of Horseshoe bend from mouth of Maramec, 96 miles.
Distance of Devil island from mouth of Maramec, 62 miles.
Fall of water from Devil's island to mouth of Big river (a distance of 5 miles) is about 12 feet.
Fall from Big river to mouth of Maramec (57 miles) 42 feet.

No. 14.

WASHINGTON CITY, *December* 14, 1842.

SIR: I beg leave to lay before you the proceedings of a convention held in St. Genevieve, Missouri, on the subject of an armory in the West, with the assurance from me that the picture is under rather than overdrawn. I most sincerely hope the commissioners will not make their report to the General Government before they have made a critical examination of the region described in the report emanating from this convention.

The mineral district of Missouri affords also, for a national foundry, advantages possessed by no other portion of our highly favored country.

Very respectfully,

L. F. LINN.

Hon. Mr. SPENCER,
Secretary at War.

No. 15.

Proceedings of the convention of delegates from the counties of Perry, Madison, St. Francis, Washington, and St. Genevieve, held in the town of St. Genevieve, 11th November, 1841.

On motion of Clement Detchemendy, Philip Cole, Esq., of Washington county, was called to the chair and Felix Valle, Esq., of St. Genevieve, appointed secretary.

C. C. Ziegler, Esq., of St. Genevieve, moved that the chair appoint a committee of three to draw a report recommending St. Genevieve, St. Mary's, and Pratt's landings, and the mouth of Apple creek, as suitable points for the location of the Western armory and foundry;

Which motion was adopted.

Whereupon, the chair appointed C. C. Ziegler, from St. Genevieve, James

Rice, from Perry, and Clement Detchemendy, from St. Genevieve, such committee.

The committee having brought in their report, on motion of Mr. Beal, of St. Francis, the same was ordered to be read; which was done accordingly, and the report unanimously approved.

On motion, the chair appointed C. C. Ziegler and Clement Detchemendy, of St. Genevieve, and Evariste F. Pratte, of Madison county, a committee to visit the board of commissioners at St. Louis, and to submit said report to said board, with such accompanying papers as they should deem pertinent.

On motion, it was

Ordered, That the chairman and secretary sign these proceedings, and that the convention adjourn *sine die*, and that a copy be forwarded to St. Louis for publication.

PHILIP COLE, *Chairman.*

FELIX VALLE, *Secretary.*

REPORT.

The undersigned, a committee appointed by a convention of delegates from the counties of Perry, Madison, St. Francis, Washington, and St. Genevieve, held in the town of St. Genevieve, the 11th day of November, A. D. 1841, beg leave to make the following statement to the board of commissioners appointed by the President of the United States to select a site for a Western armory.

They believe such a national work, for the manufacture of arms in the West, is highly expedient, and has been long demanded. The committee entertain the opinion, that the valley of the Mississippi, and the country bordering on the Gulf of Mexico, should no longer be dependent on any country beyond the mountains, or beyond the ocean, for arms of any kind with which to protect itself from aggression. The siege of New Orleans by the British, during the last war, furnishes a lesson fraught with admonition and instruction. That city was near falling a prey to the enemy, for the want of fire arms, while thousands of men stood by, idle spectators of the strife.

The committee would respectfully represent, that the State of Missouri and Illinois, with the Territories of Iowa and Wisconsin, now produce, according to the most correct data, about 33,000,000 of pounds of lead per annum, and from 6,000,000 have increased to 33,000,000 in 17 years. England makes 100,000,000 per annum, and all Europe besides, 50,000,000. It would appear very apparent, that, producing as they now do one-third of the quantity made by the greatest lead producer in the world, these States and Territories will, in 17 years more, probably equal the amount made by Great Britain, inasmuch as the country had to be reclaimed from a state of nature, and the lead-producing portions of it being four or five times the surface of the United Kingdom of Great Britain and Ireland.

The committee therefore confidently believe that the valley of the Mississippi (and mostly from the States and Territories named) will in a few years annually export to foreign countries a large surplus of this valuable

and necessary article. The committee would further state, that copper ores of the richest kinds, as sulphurets, carbonates, and oxides, are found in various localities, from the southern border of Lake Superior to the northern boundary of the State of Arkansas, and seem to be developed in the largest quantities in the counties of Washington and Madison, in the State of Missouri. At mine La Motte, in Madison county, it is found in great abundance, in veins alternating with lead ore. On the Currant, a navigable river, a tributary to Big Black, in Ripley county, Missouri, every year new and extensive discoveries are being made of this valuable metal; and but little is hazarded in the opinion that the past and present history of the lead trade will be that of the copper in future. The Ozark chain of hills may be said to commence a few miles distant from the Missisippi and Missouri rivers, and ascend gradually until they assume, in places, the dignity of mountains, the general ranges of which take a southwest direction through the States of Missouri and Arkansas. These mountains give origin to many fine streams, which descend from their northern and western sides, and fall into the Missouri rivers—the Osage, Gasconade, &c.—navigable at certain seasons of the year for steamboats, and at almost all seasons for small craft; others descend from their western and southern flanks, and, pursuing a southeasterly course, fall into the Mississippi—as the White river, with its numerous tributaries, such as James's fork, Big Black, Currant, &c.; and also the long river St. Francis, with its branches, Castor, Whitewater, and others. Another series take a direction due east, and, cutting directly through these ranges, also empty into the Father of Waters—as the Maramec, Joachim, Platte, Establishment, Aux Vases, Saline, and Apple rivers. The committee believe that no portion of the known world has been blessed by Providence with greater advantages of mineral wealth, water power, and fertility of soil, all combined, than the remarkable country watered by these streams. Trace one and all from their mouths to their sources, and iron and other minerals are found on their margins and on the plateaus and ridges that divide them. The greatest as well as the richest mineral deposites in the known world are those extraordinary ones called the Iron mountains and Pilot knob, situated near the sources of the St. Francis, Big Black, and Big river, (the latter a branch of the Maramec,) and about thirty-five miles in a line directly west of the Mississippi river. The committee will not attempt a description of these celebrated spots, now ranked among the wonders of the world, as they take it for granted that the agents for the Government will examine minutely its advantages for such a work as is contemplated. The ore is a micaceous peroxide of iron; it is therefore free from impurities and slow to rust, and the quantity found is incalculable.

The committee would respectfully state to the board, as a further inducement to a critical examination of the particular locality, that its capabilities are not confined to iron ore, but that lead, copper, zinc, manganese, saltpetre, alum, fire brick and potters' clay, grindstones and buhr millstones, marble of several beautiful kinds, granite, and porphyry, abound, with large surrounding areas of fertile land, covered with heavy timber; and, to crown the whole, lie east of all these great mineral deposites the vast coal fields of Illinois, expressly created, it would seem, to aid the industry of man in manufacturing the raw materials mentioned, with the great Mississippi river to bear them to all portions of the world.

The committee desire most respectfully to call the attention of the board

more particularly to that section of country which they immediately represent, and herewith beg leave to submit such views and facts as, in their opinion, will entitle the points they are about to name to a preference over all others for the location of such an institution as it is proposed to erect.

The committee, disregarding the opinion entertained by some, that the armory must necessarily be located in or near a large city, will proceed at once as if no such opinion were entertained. A healthy situation being deemed by the committee as indispensably requisite, the committee have no hesitation in stating that the whole country, from St. Louis to Cape Girardeau, along the river, is as healthy as any portion of the West. The bluffs or high banks of the river, except in a few places, along this whole extent of country, approach near the water's edge. Between the above places there are four points to which the committee were particularly required to draw your attention, to wit: St. Genevieve, St. Mary's landing, Pratt's landing, and the mouth of Apple creek. At either of said points, a healthy, beautiful, and convenient situation may be obtained, immediately on the bank of the Mississippi; somewhere on the borders of which stream, this committee feel assured the armory must and will be located. When we look at the vast extent of country through which that mighty river flows, the numerous navigable streams of which it is the recipient, the facility afforded at almost all seasons of the year for navigation, with almost every description of vessels, the millions of inhabitants whose trade and commerce are carried through its channels, the mind is warranted in coming unhesitatingly to the conclusion, that so great a public work, intended for the common benefit of all, should be located on its banks, where, as is the fact at the points above named, every article and material intended for such an institution can be had—some of a better quality, and at a cheaper rate, than in any other part of the United States.

This committee are fully satisfied that the State of Missouri, as a State, in point of health and agricultural and mineral resources, is not equalled by any State in the Union. That there is more iron ore and of a better quality in the State of Missouri than in all the rest of the known world, there cannot be a doubt; and that it can be manufactured into iron of a quality unsurpassed, and be furnished cheaper than in any other State of the Union, is also clear. This committee, in inviting the attention of the board to the particular point named, invite them to that portion of the State of Missouri most rich in natural wealth. St. Geneveive and St. Mary's and Pratt's landings are each thirty-five miles in a direct line from the Iron mountains. The mouth of Apple creek is about sixty-five or seventy miles distant from them, and is nearly opposite the mouth of Muddy river, in Illinois, on which are found the richest coal banks in the West. Large quantities of iron ore, of an excellent quality, are found near and along the shores of Apple creek. Lead ore has been found in quantities, near Perryville, in Perry county, through which Apple creek flows, that indicate large and extensive deposites of that valuable metal. The points are situated, as it were, in the very centre of the cheapest and most extensive steamboat transportation in every direction—one thousand four hundred miles south, to New Orleans and the Gulf; one thousand miles east, up the Ohio; seven hundred miles north, up the Mississippi; and a thousand miles west, up the Missouri, &c.—and lying between latitudes 37 and 38, in which navigation is seldom closed. Boats frequently get to these points in the winter, when, on account of the ice, they cannot get higher up.

Were the committee to rely solely upon the proximity of the above points to the Iron mountains, independent of all other advantages, it is deemed that that fact alone would of itself be sufficient to outweigh almost any other point that can be proposed; the Iron mountain so near, with ore as pure as ordinary pig metal, and in such abundance, within a single glance of the eye, as to supply the whole United States for centuries to come, and placed by nature in the centre of transportation of the Mississippi valley—a territory equal in extent to the whole continent of Europe. The ore in the present state can, for nearly the same price as pig metal, be converted into cannon balls, cannon, and other castings. The ore will yield from seventy to ninety per cent. of pure iron, and is with great facility converted into steel; and, on account of its great strength and natural resistance to oxidation, is superior to any known iron in the world for balls, fire arms, &c. Cannon balls made from the ore of the Iron mountains, (one or more of which are still to be seen in the War Department, at Washington city,) have been exposed for years to the open atmosphere and rain, and still maintain their original metallic lustre. Owing to the absence of all foreign materials in the ore of the Iron mountain, it is a well-known fact the specific gravity of cannon balls made from it is greater than that of balls made of the best iron east of the mountains. Moulds that will cast a 74-pound shot of the iron now used, will cast at least a 76-pound shot if the iron is made from the ore of the Iron mountain. This is proven by the shot heretofore manufactured.

The committee would most respectfully refer the board to the opinions of scientific men, as expressed at different times in letters and reports, in relation to the peculiar properties of this ore, and the general appearance of the country. A few of these letters and reports the committee have been able collect, and have appended them to this statement, for your examination. From an armory and foundry established at either of these places, the whole West, and indeed the whole United States, could be supplied at any season of the year. At the lowest stages of the water the largest class of steamboats can get to them. The country around is healthy and fertile; the best roads, running on gravelly ridges to the interior, to the lead mines, copper mines, Iron mountain, &c. The principal lead mines in Missouri are within thirty or forty miles of the first-named points, such as La Motte mine, Valle's mines, Perry's mines, Beasche's mines, Potosi, Old mines, &c. Stone coal, of a superior quality, is found within five to eight miles, on the east side of the river, near Kaskaskia, Illinois. Provisions are abundant and cheap. Corn is worth from twenty to twenty-five cents; wheat from fifty to seventy-five cents; beef and pork from two to four and a half cents per pound; charcoal is delivered on the river at six cents per bushel.

Any quantity of wood can be purchased, delivered on the river, at $1 50 to $1 75 per cord. Extensive pineries, which now supply St. Louis and other markets with the best yellow pine lumber, are within fifteen miles, and at Apple creek, within two or three miles. All these facts have induced this committee, and the citizens of five counties which they directly represent, to believe that their claims are not without merit; and that, if any one of these points should be selected, the selection would prove highly advantageons to the United States, and that this armory and foundry (on account of the peculiar properties of the iron) would, in a few years, be called

upon to furnish all the small arms, ordnance, and shot, for the army and navy of the United States.

In conclusion, the committee earnestly invite the board to give to these peculiar localities a personal examination; after which, they will have no fear for the result.

We have the honor to be, respectfully, your obedient servants,

CONRAD C. ZIEGLER.
EVARISTE F. PRATTE.
CLEMENT DETCHMENDY.

Report of Professor Shepard, of Yale College, and of the Medical College of the State of South Carolina.

CHARLESTON, S. C., *March* 8, 1838.

Having visited the Iron mountain of Missouri in October last, I am happy to add my testimony to that of the numerous observers by whom I have been preceded, respecting these remarkable deposites of iron ore. I am the more strongly disposed to this task, both from the surprise with which I was struck on finding such vast accumulations of mineral wealth lying wholly unproductive in the heart of a country the richest by nature in the world, and from the regret I feel that any unnecessary impediments should delay an enterprise whose execution can scarcely fail of affording an affluent reimbursement to all concerned, and at the same time of greatly promoting the prosperity of the West.

It is not necessary to say any thing concerning the topographical features of the region, in addition to what has been already stated by others. My approach to the mountains was from the east, by the way of Farmington. Before reaching the meridian in which they are situated, I crossed a bed of red granite six inches in breadth; after which, I found myself upon the same magnesian limestone I had left previously to entering the primitive, which limestone is the well-known repository of the lead mines of Missouri, as well as those in Illinois and Wisconsin. The extent of this rock, however, in the Iron mountain region, is limited to a narrow area, in consequence of the unusual development of mountain masses of feldspar, the limestone occupying only the bottoms of the valleys and the more level spaces between the hills. This compact feldspar is of a red color, and is generally much veined and clouded with black, from a large dose of iron. Its appearance is jaspery; it breaking, with a concheidal fracture and a ringing sound, into sharp-edged fragments, which sometimes resemble flint. Occasionally it assumes the aspect of a true porphyry; well-defined crystals of red feldspar occurring disseminated through the compact feldspar basis. The rock thus described is that which bears the enormous beds of which I am to speak; or, rather, the iron mountains are, in a certain sense, varieties of the formation under consideration. The "Pilot knob" may be denominated a ferruginous porphyry, or an aggregate of feldspar and specular iron; the latter occurring of a fine (stutgrained) granular structure, and containing imbedded crystals and rounded grains of feldspar, while the iron mountain is a homogeneous deposite of pure,

massive, specular iron, containing only in a few exceedingly rare cases single crystals of feldspar. We have, then, in this extraordinary region, hills, many hundred feet high, composed entirely of a compact cherry-red feldspar, variegated with veins of black, by oxide of iron; in the second place, the Pilot knob, a mountain made up in a large proportion of specular iron, the feldspar often scarcely exceeding the ore with which it is mixed; and, lastly, the Iron mountain, in which the whole mass is so nearly pure iron ore that the observer is forced to search with the closest scrutiny to detect in it even a few solitary crystals of feldspar!

In offering a statement respecting the extent and the richness of the ore, I hesitate not to say that it surpasses, for quantity and quality, every thing before known in the metallic history of the earth. The Pilot knob, as I have already said, is a peak of about six hundred feet in height, and one entire mass of iron porphyry; the granular specular iron being the ore present, not only as forming the basis of the porphyry, but often constituting wide areas of surface in a state of almost absolute purity.

In the iron mountains, however, we find a mass of this ore unmixed with any foreign matter whatever, with the exception only of the rare crystals of feldspar above mentioned. In respect to homogeneity of composition, indeed, it may be doubted if any mass of mineral matter, of its dimensions, equals it among geological formations. All the feldspar, taken together, that fell under my observation during the survey of the mountain, would not exceed a pound in weight; and, with this exception, I repeat it, I could detect nothing save the pure, anhydrous peroxide of iron, whether it was viewed in loose fragments no larger than a pea, or as forming portions of the immense underlying ledge (or bed) that sometimes emerges from the covering of broken ore, and is visible over an area of several square rods.

Desirous of being able to say something concerning the extent of the mountain as the result of my own admeasurements, I took pains to pace its surface in several directions; and I do not hesitate to state that its circuit is at least two miles. Its elevation has, in my opinion, been correctly given as three hundred and fifty feet. I need not add, that the experience of mining operations in other regions, in connexion with rocks of the class here found, fully justifies us in the belief that the bottom of the present mountain mass lies too deep ever to be reached by human exploration.

All intelligent metallurgists must be aware that the specular iron ore is a species of the highest value for the production of iron. Mohs, (the late professor of mineralogy at Freysburg, and now royal professor of the same science at Vienna,) who is the first authority on subjects of this nature, remarks, in his Natural History of the Mineral Kingdom, that "the specular iron is an ore of the highest importance, and yields a considerable proportion of the iron annually produced in the different quarters of the globe." It is obvious that the advantages possessed by the ore of this region are very great, arising out of the absence of all foreign materials, which elsewhere render the smelting of iron ores often extremely tedious and difficult, demanding for them the preliminary process of roasting to dissipate volatile ingredients, and the subsequent addition of large doses of flux to effect the withdrawal of other impurities. Here is an ore, in inexhaustible quantities, requiring for ages no blasting, and but trifling labor to prepare it for the furnace, while it is so pure from foreign substances that its reduction must be most easy, and its yield not less than 70 per cent.

No one who visits the locality can for a moment doubt, situated as it is

in a region of singular advantages for charcoal and mining supplies, and at no great remove from the most remarkable channel of inland water communication known, that it must, at a very early day, become an iron-producing and manufacturing region second to no other on the face of the globe.

CHARLES UPHAM SHEPARD.

Extract of a letter from Mr. Schoolcraft, in a correspondence with Senator Lane, dated Washington City, April 13, 1838.

The quantity of iron in the State, of micaceous oxide, between the head-waters of the St. Francis and Maramec, is probably greater than can be found on any equal area in America. The most striking localities of this ore are included within the area of a township about 30 miles in a direct line west of St. Genevieve. Specimens of this ore, smelted in a smith's forge near the Iron mountain, yielded a soft malleable iron, portions of which were manufactured into some articles of cutlery, which kept a fine edge. It was found that the iron thus obtained imbibed carbon readily, and underwent the process of conversion into steel with little labor. I have little doubt, so far as regards the iron region, that it will be found most expedient to construct a railroad from the banks of the Mississippi, at its nearest point of approximation to this district. An armory, placed under such auspices, could be approached at all seasons in that latitude, and the purpose of the defence of the Western frontier could be easily answered by steam navigation, extending through many thousand miles of the Western waters. It may deserve consideration, in the event of Congress fixing on the iron region on the west bank of the Mississippi for an additional armory, whether the manufacture of small arms, which requires the labor of numerous artisans, could not be most advantageously effected on the immediate banks of the Mississippi.

Extract of a letter from the same gentleman, dated Detroit, May 12, 1837.

In reference to the value and extent of the beds of iron ore in the State of Missouri, called the "Iron mountains," it affords me pleasure to say that my recollections of the mineralogical topography of that portion of the Western country are fresh and vivid. The time which has elapsed since my first visit to that section of country has not diminished the estimate I had originally made of the importance and value of these extraordinary deposites of iron ore, in a commercial and manufacturing point of view.

The experiments made at the time, to ascertain the per centage of pure metal in the ore, were chiefly made in a practical way, in forges; and I beg leave to refer you, for such details as came in my way, to my "View of the Lead Mines of Missouri," published in New York in 1819. These experiments justified the most favorable conclusions of the value of the ore for reduction and manufacture. Of the extent of the beds of ore, I believe it may be safely asserted that they are unparalleled within the limits of North and South America.

I regard the interesting and picturesque country on the sources of the St.

Francis as a perfect Switzerland in miniature, without its snows and its gigantic tracts of barren Alps. It throws up its primitive peaks in the midst of a wide-spreading secondary formation, which has its limits only at the foot of the Rocky mountains. It abounds in pure streams of sparkling waters, which are elevated several hundred feet above the surface of the Mississippi river. The descent of these streams, which flow collectively out of the mouths of the Maramec and St. Francis, creates sufficient water power to drive any extent of works necessary in reducing the oxide ore. The atmosphere of this region is pure, and the climate salubrious. Its valleys consist of rich soil, well adapted to corn and grain, while the hills and "knobs," so called, are covered with a fine grass, affording nutritious herbage for cattle.

I cannot refer to a portion of the Western country uniting such decided manufacturing and mining privileges, which at the same time offers so favorable a field for certain kinds of agriculture, and is blessed with so bland a climate; and I look forward to the day when it will be resorted to as the Montpelier of Missouri. When the rage for settling on the flat, new, unhealthy, alluvious soil of the West has subsided, it may be expected that emigration will pour in amongst the pastoral hills and beautiful valleys of the sources of the St. Francis. Mining and manufacturing towns must spring up at various points, which will at [all] times afford a ready and sure market for its agricultural products. There is not probably a more healthy and attractive region in America for a university and institutions of learning of every description, so far as they are indebted for their prosperity to the salubrity and topography of their sites.

Extract from the observations of the Hon. Judge Samuel G. Wright, of Monmouth county, New Jersey, on the iron ores of the United States.

I have expended much time and labor, for many years, in my researches for iron ore. I have passed over a great scope of country, say from Lake George to Alabama, and west to Missouri. I have made, personally, a great collection of said ores, and received from other persons from almost every part of the United States. The best specimen I ever had in my collection was from the "Iron mountain of Missouri," sent to me by my old friend Louis Valle, of St. Genevieve. I have been in Missouri several times, and from what I have seen, and from information derived from a number of gentlemen of the first respectability and standing in that section of country, I have no manner of doubt that the amount of iron ore in and about said Iron mountain is much greater than ever was discovered on the same quantity of land. In fact, I am fully of the opinion that there is a great sufficiency to supply the world for centuries. I think the present company, incorporated for working said mines, must ultimately reap a rich harvest.

Extract from a communication from Dr. Frederick Hall, late professor at Mount Hope College, Baltimore, October 10, 1837.

I have recently visited Arcadia, and regretted that you were not at home. I have travelled from St. Louis (90 miles) for the sole purpose of seeing

you, and examining the famous deposites of iron ore in Missouri, called the "Iron mountain" and the "Pilot knob." I had often had accounts of their richness and of their amount, which I supposed were in a great measure fabulous, or at least quite too highly colored. But my opinion is changed. As to quantity, the truth was not half told; the whole surface of the earth does not, I am persuaded, present another spectacle of the like kind—another mass of ore so immense, and so ready for the smelter's fire. The renowned bed of specular iron in the island of Elba, with which I am well acquainted, and which has been worked for 3,000 years, I can assure you, is not one-tenth so large. The sight of the vast cones, composed almost entirely of an ore intrinsically the most valuable of all ores, piled up by the hand of Nature, apparently in distinct fragments, for man's easy use, filled me with profound astonishment.

The ore of the Iron mountain is the micaceous and uncrystallized specular oxides, and will, I have no doubt, yield on an average between sixty-five and eighty-five per cent. of the pure metal. That of the Pilot knob consists of the same oxides, and also of the red oxide in still greater abundance. This last is a rich ore, furnishing with facility metallic iron, and may likewise easily be converted into a beautiful pigment. The summit of the Pilot knob is, I think, between 600 and 700 feet in elevation above its base. I had a delightful view of a broad tract of country, with lumber of various kinds, intersected by various streams of pure water, and dotted here and there by farm-houses and fields of luxuriant grass and grain.

These mountains of inexhaustible wealth were not planted here merely to fix the stranger's gaze, and excite his admiration. No, sir; they have a higher end to answer. Ten years gone by, and we shall see them surrounded by smoking furnaces without number, and forges and mechanic shops. The iron extracted will freight the vessels which float on all the navigable rivers in the immense valley of the Mississippi, enrich the proprietors, promote the comfort and convenience of the vast population of the Western States, and perhaps circulate through and benefit the entire Union.

[Dr. H. has long since ranked among the most distinguished mineralogists in the United States, and for many years was professor of mineralogy and geology in Middlebury and Washington Colleges, in Vermont and Connecticut.]

No. 16.

WHEELING, *September* 1, 1842.

GENTLEMEN: I have been authorized, by the proprietor of the St. Mary's landing property in Missouri, to offer the same to the United States as follows:

Six hundred and forty acres, fronting three-quarters of a mile on the Mississippi river, running back for quantity, for the sum of thirty-five hundred dollars; the lines to be so run as not to take in what is called the Davis buildings, and which is in fact the least eligible ground, but on account of the buildings is reserved.

The line would commence about the mouth of the St. Laurent creek, and run up the river Mississippi three-quarters of a mile, and would em-

brace the level ground which, at the time you examined it, seemed the most favorable.

I have already offered the United States the whole or a portion of the Iron mountain. I shall be pleased, however, to have you report upon it, in such manner as you, in your judgment, shall think fit, without reference to the price.

As it has been repeatedly stated that there is not timber for fuel near the "Iron mountain," I would respectfully ask you to state fully the facts, not only in relation to timber, but as to the soil, ore, and country generally. I have reason to believe that your report will at once induce the Secretary of War to make experiments on a large scale with the ore of the mountain, the result of which will no doubt have a great influence in the future location of an armory, and ultimately a national foundry. Your report, together with that made by Mr. Nicolet, will afford such authentic information as can safely be relied upon by the Department.

I have the honor to be, most respectfully, yours, &c.

C. C. ZIEGLER.

To General ARMISTEAD,
Surgeon General LAWSON,
Colonel LONG,
} *Commissioners, &c.*

No. 17.

The committee appointed by the citizens of Jackson county, Illinois, at a meeting held by them this day in the court-house at Brownsville, respectfully beg leave to represent to the commissioners, that they consider a site can be appropriated in Jackson county, eminently available for the purpose of an armory, such as contemplated by the act, and they arrive at that conclusion from the following facts:

1st. The point on which the armory could be advantageously built is situated on the Mississippi river, in Jackson county, and immediately below the farm of Samuel Leggett, and is called the Fountain bluff. This point is situated about 75 miles from Cairo city, and about 110 miles below the city of St. Louis. The banks of the river at this place present the appearance of a mural escarpment, and are composed of sandstone. The current of the river runs on the point; and, from its situation, under no ordinary circumstances can the current of the river be changed. It affords at all times a safe landing place, with abundance of water, even in the dryest times.

2d. Immediately opposite to this place, in the State of Missouri, there are inexhaustible beds of very rich iron ore, with great facility for mining and access to it.

3d. At the back of this place, and distant by land about 10 miles, are situated the coal mines of the Mount Carbon Coal Company, where they have inexhaustible veins of bituminous coal of most excellent quality. This coal is esteemed the best which the Western country affords, being perfectly pure and free from sulphur and other deleterious matter. Besides these veins, there is abundance of coal interspersed throughout the country.

4th. The whole country is abundantly wooded, and produces the kinds of wood most esteemed for making charcoal, such as oak, hickory, &c.

5th. There are two steam saw mills in the country, both on Big Muddy river; the one at the Mount Carbon Coal Company's mines, where flour and meal are extensively manufactured, and the other about midway between the mines and the Mississippi river. There are two or three water mills already in operation, and several in the progress of erection. Lumber is abundant and cheap. In the vicinity of the point alluded to, there are plenty of sandstone and limestone—materials well suited for the erection of buildings, combining both strength and durability. The iron ore of Missouri can be readily got at. The most available recourse for procuring the coal is by the Big Muddy river, which empties itself into the Mississippi river, about five miles below the point which the committee have mentioned. This stream is navigable for five or six months in the year, and boats of 100 to 150 tons freight can without difficulty then navigate it for a distance considerably beyond the Mount Carbon Coal Company's mines. The committee may further remark, that the Mount Carbon Coal Company, at the last session of the Legislature, obtained a charter for the construction of a railroad from their mines to the Mississippi river; and it is supposed that the railroad will terminate somewhere near the point suggested by the committee.

If the commissioners think the resources of this part of the country could be made available for the purpose of the armory, and should determine to visit this place for the purpose of personally inspecting the correctness of the facts above set forth, the committee are directed to meet them, which they will be very happy to do at any time when it suits the convenience of the commissioners.

D. B. TUTHILL.
RICHARD DUDDING.
JOHN M. HANSON.

To the COMMISSIONERS *under the late act of Congress, to select a site for a U. S. armory.*

No. 19.

At a large and respectable meeting of the citizens of Cape Girardeau and vicinity, held on Saturday, December 4th, at the Union Hotel, in the town of Cape Girardeau, Thomas B. English, Esq., was called to the chair, and Dr. E. Mason was appointed secretary.

The meeting being organized, the chairman explained in his usual neat and felicitous manner the objects of the meeting, when, on motion of Judge O'Bannon, a committee of five were appointed by the chairman to prepare a preamble and resolutions, and report the same; whereupon, the chair appointed the following committee: Judge O'Bannon, Dr. P. H. Davis, William H. McKnight, Simeon English, and William Surrell, Esqrs. The committee retired, and, after a short absence, made the following report, through their chairman, Dr. P. H. Davis:

Mr. Chairman: Your committee have had the subject of the claims of the town of Cape Girardeau for the location of the Western armory under

deliberate consideration, and submit, as their opinion, that this town possesses superior advantages, and that the public interest would be consulted by the location of that institution at this point.

Your committee take it for granted that the Western armory should be located as far west as at all compatible with the public interest, and at some point on the Mississippi river above the junction of the Ohio, because thence to almost every point of the compass the facilities of communication are abundant and easy, whether for the purpose of repelling invasion by the savages on our Northern or Western frontiers, or of suppressing servile insurrection among the slaves of the South, or of defending the country in whatever point it may be attacked. But at what point on the Mississippi river should it be located?

Your committee are of opinion that the town of Cape Girardeau possesses advantages superior in many very essential particulars, and in no respect inferior to any other point on this great stream—the mother of Western waters.

The great facilities of communication from this point with the South and Southwest frontiers, through the lower Mississippi, Arkansas, White and Red rivers, are perhaps greater than from any other point above it; while to the east they are equally as great. Navigation from this point is never impeded to any great extent by low water in the summer or ice in the winter seasons. In a word, this may be called the head of navigation for vessels of the largest class at these different seasons.

From this point, the communication for vessels of light draught to the north through the Missouri, upper Mississippi, and Illinois rivers and their tributaries, is free and easy at all times, except when the navigation is suspended by the frosts of winter. The town of Cape Girardeau has advantages superior in this particular to any other point; and that this is both essential and important, in case of general warfare, where every portion of the great West would demand the immediate transmission of arms for its protection and defence, must be apparent to the dullest intellect.

The country adjacent to this point abounds with timber of almost every description, and of the finest quality. Your committee look upon this as an object of no ordinary consideration and importance. But in the article of coal, so essential in the manufacture of fire arms, the advantages of this point shine out pre-eminently. It is but some thirty miles from this point to the inexhaustible coal mines on Muddy river, so deservedly and justly celebrated for the richness and pureness of the quality of the coal which they yield. To these mines the navigation is ever open and free. It is therefore apparent that this place could be supplied with that article at a price remarkably cheap.

The town of Cape Girardeau is located in the heart of a rich and populous agricultural community. The country adjacent to it abounds in mineral wealth, and especially in iron ore. In a word, it were useless for your committee to recount the numerous advantages with which this place abounds. Suffice it to say, in the opinion of your committee, they are superior to any other point claiming the location of the Western armory. Therefore—

Resolved, That the town of Cape Girardeau, in the State of Missouri, possesses superior claims to the Western armory; and that, in the opinion of this meeting, the public interest would be greatly promoted by its location at this point.

Resolved, That this meeting appoint a delegate to solicit the attention of the commissioners, appointed by the President of the United States to select a site for the location of the Western armory, to the claims of the town of Cape Girardeau, and request them, on behalf of the citizens of said town and surrounding country, to call and examine the claims of said town before they make their final report.

The report being read, on motion of A. Randol, Esq., it was unanimously adopted.

On motion of William Sunrell, Esq., Robert Brown, Esq., was appointed delegate, in conformity with the foregoing resolution.

On motion of Dr. P. H. Davis, it was

Resolved, That the chairman and secretary sign the foregoing proceedings; and that the editors of Southern Advocate, Missouri Republican, and Missouri Argus, be requested to publish the same.

THOMAS B. ENGLISH,
Chairman.

E. MASON, *Secretary.*

No. 20.

BRUNSWICK HOTEL, HANOVER SQUARE,
London, November 2, 1841.

SIR: In consequence of the failure of the banks of the Cairo City Company, (Messrs. Wright & Co.,) I was obliged to make another visit to this country, to make other financial arrangements for the business of the company. I have been detained longer than I expected, in consequence of the position of the McLeod affair. This matter being now so amicably adjusted, I have every prospect of obtaining the proposed loan for the company referred to in the prospectus which I enclose for you.

The interest you feel in all that concerns the State of Illinois induces me to write and say that funds will be obtained to carry out the objects of the Cairo City Company, and, also, the completion of the Central railroad to Peru, at the termination of the canal, provided the State will give a charter to a private company, upon certain terms.

Since I left America, Congress has appropriated funds to purchase a site for an armory in the West, and engineers have or will be selected to fix upon the best location for that purpose. Having already memorialized Congress to appoint an engineer to examine Cairo, as a proper site for the proposed armory, and believing myself that there is no position in the whole Western country having the advantages requisite for such an establishment as Cairo presents, I have herewith enclosed a pamphlet, to be placed in the hands of the *persons appointed to designate and purchase the proper site for the armory in the West*, and have taken the liberty of asking the favor of you to cause the enclosed to be so directed as to be received by the party above mentioned.

The people of Illinois, as well as myself, will feel much indebted to you for furthering the wishes of the Cairo City Company in this matter.

I am, with much respect, your obedient servant,

D. B. HOLBROOK,
President C. C. & C. C.

Hon. D. WEBSTER, *Secretary of State.*

No. 21.

LONDON, *October* 2, 1841.

GENTLEMEN: I am advised that, since I left America, Congress has made provision for the purchase of a "suitable site," to be hereafter selected, for the establishment of a national armory in the West. Having in the years 1839 and 1840 petitioned Congress to appoint an engineer to examine the site at Cairo city, at the confluence of the Ohio and Mississippi rivers, for the purpose of reporting upon its position, and the Legislature of the State of Illinois also having instructed its Representatives in Congress to advocate the memorial, I take the liberty now to bring the subject immediately before you, while the proposed location is undecided, and to present to your notice and attention such facts as may be necessary to induce an impartial examination of the site of Cairo city for the armory in question. I would first state, that if you permit the opinion of persons of antagonistical interests to Cairo (which may include almost every citizen in rival towns above Cairo upon the Ohio and Mississippi rivers) to have any influence upon your minds, the position of Cairo will be condemned unseen and unheard. The capital at command of the company, however, is so great that nothing can prevent the place being rendered as secure and habitable as any city on the two rivers that unite their waters at this point. The reports and other facts printed, and the prospectus herewith enclosed, will give every information on that subject, and will also satisfy you that every material, such as iron and coal and wood, can be delivered at Cairo as low as at any place, on an average, in the West, and the means of living at less expense; all of which will be seen by a visit to the place, and on examination made upon these statements.

But what should have the most influence in favor of Cairo for the location of this armory is, that, in case of war, the place is accessible summer and winter from New Orleans; which is not the case at any place of note above Cairo. In case of insurrection of slaves in the Southwestern States, Cairo is the first free town. The railroads projected by the State, being completed, will connect Cairo with the Northwestern frontier in a few days, and with the lakes also. The rivers, when open, all unite at this place, embracing upwards of 20,000 miles navigable water. (See Peck.)

There is nothing to render the place unhealthy; but, on the contrary, it will be as free from the usual sickness of the Western towns as Cincinnati, when it shall have been as long settled. Upon this subject, the best information is to be had from persons who have resided longest near Cairo, and at the place.

Parties in England will advance funds to complete the Central railroad from Cairo, to unite with the canal and Lake Michigan. Arrangements are making here to establish large and extensive importing houses for British manufactures at Cairo direct, and for every branch of mechanical and other business necessary in the West.

The Cairo City Company will donate a lot of ground to Government for the armory. The State of Illinois has purchased a lot for their depot, and will invest a large sum in buildings, engine shops, &c.

W. R. Holbrook represents the company at Cairo, in my absence.

Trusting that you will visit that place, and give it a proper examination, &c., I remain, very respectfully, yours, &c.

D. B. HOLBROOK,
President C. C. & C. C.

To the ARMORY COMMISSIONERS.

No. 22.

Proposal for a loan of two hundred thousand pounds to the Cairo City and Canal Company, incorporated by the State of Illinois, in the year 1837, at six per cent., secured upon the landed estate of the company.

The Cario City and Canal Company were incorporated by an act of the Legislature of the State of Illinois, United States, passed in the year 1837, with power to purchase a tract of land for building a town on the extreme southern peninsula of the State, to be called the "city of Cairo," to lay it off into lots for building, to construct dikes and levees, and to erect buildings, and make such improvements as they might deem necessary.

Under this charter, the company purchased an extensive district, containing upwards of 4,000 acres, which has been appropriated as the site of the future town, and have since added, by recent purchases, another tract beyond this limit, making the whole extent 9,732¾ acres, now held by them in absolute property, and clear of all charges, except as hereinafter specified. They have also made considerable progress in carrying into effect the other objects of the incorporation, in aid whereof sums have been borrowed, (secured by the bonds of the company,) amounting in the whole to about £156,000.

To complete the projected works, a further sum of £200,000 is required, which the company are desirous of raising on terms of great advantage to the lenders, and offering, as they conceive, unexceptionable guaranties of safety.

A plain and unexaggerated statement of facts will best explain the nature of the investment, and the securities and prospects of benefit which it holds out; and the company pledge themselves to the accuracy of the following summary, which may be tested by an examination in detail of the various documents and calculations by which it is supported.

The design of the undertaking is to make a habitable site for a town, and to erect such buildings and construct such works as may form a nucleus sufficient to attract settlers, and make the land eligible for building lots.

The spot selected for the purpose is the alluvial delta of the two great rivers Mississippi and Ohio, lying in the 37th parallel of latitude, at the conterminal point of the States of Illinois, Kentucky, Tennessee, and Missouri. Its immediate local advantages may be thus briefly summed up: The soil is of excellent quality; timber, clay for bricks, and other building materials, are plentiful, and at hand. Coal is cheap and abundant, and pig iron is brought, by the Tennessee river, at a cost of 33 per cent. less than its price at Pittsburg. But the peculiar and extraordinary advantages of its geographical position require and deserve a more detailed exposition.

Let the reader take into his hand the annexed map of Central North America, and judge for himself of the accuracy and importance of the following description:

Cairo is the point to which the channels of traffic for the vast continent west of the Alleganies all radiate as a centre. Below, there is the mighty Mississippi, rolling like an inland sea, rather than a river, more than 1,000 miles south to the Gulf of Mexico. Above, are the upper Mississippi, stretching northward to Wisconsin and the region of the lakes; the Missouri, with its branches, penetrating the Far West, even to the foot of the

Rocky mountains; the Ohio, with a gentle current, navigable upwards of 900 miles to Pittsburg, on the northeast; the Wabash running due north and south, and dividing the States of Indiana and Illinois; and the Cumberland and Tennessee, running east and west from the base of the Alleganies. Indeed, the waters of more than 20,000 miles of river navigation mingle at Cairo. It forms the southern angle of the State of Illinois, confessedly one of the most flourishing members of the Union, and possessing inexhaustible stores of agricultural and mineral wealth; and it is the gate and outlet not only of this State, but for Ohio, Indiana, Kentucky, Tennessee, and Michigan.

From the Gulf of Mexico to this point, the Mississippi is navigable at all seasons for vessels of all burdens. Beyond, the navigation is obstructed in summer by shoals and in winter by ice. A different class of vessels is therefore required for the upper and lower waters, and the transhipment of commodities will naturally and necessarily take place at the dividing point, whenever the requisite accommodations of quays, wharves, and warehouses, shall be afforded.

Again: the Legislature of Illinois has fixed, at this point, the southern terminus of the great Central railroad, known as the "Back Bone of Illinois." The sum of $1,016,904 89 has already been expended on this great work, which will be completed with as much expedition as the financial condition of the State will permit. The projected line of this railroad runs in a direction due north and south, more than 400 miles, dividing Illinois into nearly two equal parts. Its northern terminus is the town of Galena, situated on the upper Mississippi, in the heart of the rich mineral district of north Illinois; and, when finished, it will complete, in one direct and unbroken line, a chain of communication from the Gulf of Mexico to the lakes of Canada.

Branch railways are also planned, passing to or through the principal towns on the Mississippi, Illinois, Wabash, Kaskaskia, Ohio, and Rock rivers; whilst, by the Michigan and Illinois canal, the communication is carried on to the important and rising town of Chicago, on Lake Michigan. On these branches the sum of $2,799,755 85 has been expended by the State.

Even with the imperfect accommodation now afforded, upwards of 2,500 arrivals of steamers at the point of Cairo have been registered during the last year; and this number is continually augmenting with the improvements effected by the company in the erection of a quay, floating docks, and other works, and the facilities offered for repairs and supplies by their workshops and stores.

Of the amount of traffic which would centre at this place, not even an approximative calculation can be made. In a report published in 1818, when the project of building a town on the very site in question was first broached, the expected results were stated as follows:

The position selected for the site of the city of Cairo must, beyond all doubt, at no very distant day, become the emporium of Western America. As soon as the enterprising importer shall commence to open his bales and packages at Cairo, the most extensive and unlimited commerce will at once take place. The smaller steamboats, barges, and flat-bottom boats from Tennessee, laden with cotton, &c.; from Kentucky, western Virginia, Pennsylvania, the States of Ohio and Indiana, with tobacco, beef, pork, flour, tallow, beeswax, butter, hemp, horses, and mules; from the States of

Illinois and Missouri, and the States to be formed north and west of them, with all the last-mentioned articles, together with lead, shot, the fine furs and peltries of the North, buffalo robes and horns, and deers' tips, will arrive here daily, in exchange for foreign commodities, groceries, and other luxuries, so indispensable in the present state of society.

A full and constant supply of these articles, commensurate with the demands of the millions inhabiting the vast tract watered by the Mississippi, Ohio, Missouri, and Illinois rivers, and their tributary streams, will place the inhabitants of these Western States upon an equality with those east of the mountains, and prove a saving to the country of at least twenty per cent. upon every article of foreign growth or manufacture.

But if these anticipations were well founded in 1818, what must be the prospect now? In 1818, the State of Illinois was first admitted into the Union, having then a population of about 40,000. At this day its population, by the recorded census of last year, considerably exceeds half a million. In 1816, the population of Ohio was not more than 450,000. It is now 1,500,000. In 1818, Indiana contained about 100,000 inhabitants. It has now 683,000. Kentucky and Tennessee are, at this day, thickly peopled countries; and even Missouri, beyond the river, has 327,000 inhabitants. Upwards of 13,000,000 pounds of lead have been smelted in one year in the north section of Illinois and its border neighborhood. Wisconsin, Galena, Alton, and Chicago, in Illinois, are large and flourishing towns. Pittsburg, in Pennsylvania, at the head of the Ohio, has a population of 50,000, with upwards of 300 manufacturing and mechanical establishments, and steamboats exceeding 12,000 tons. In 1818, these towns were, comparatively, insignificant villages. The value of the products and manufactures of the Western States shipped during the year 1838, via New Orleans, exceeded the sum of twenty-eight millions of dollars, for the greater part of which traffic, steadily progressive, and admitting of indefinite extension, Cairo is the natural, and, when constructed, will be the necessary entrepot.

On this point, however, there neither does nor can exist any substantial difference of opinion. The more important consideration on which doubts have been entertained, or at least expressed, is the practicability and cost of the undertaking.

The delta of Cairo, like other similar sites on the banks of the Mississippi, is subject to an occasional overflow, from the rise of the upper rivers in the spring, and it is of course indispensable that the future town should be protected against this visitation.

To this point the attention of the company was naturally first directed. Accordingly, in the year 1837, a most accurate and careful survey was made by Judge Thompson, a distinguished American engineer, by direction and for the use of the company; and from this survey an elaborate chart was constructed, which has been the basis of subsequent operations. Again, in 1838, at the suggestion of Mr. Wright, and for the satisfaction of English capitalists, from whom the company were proposing to borrow money on their bonds, further surveys and estimates were made by Mr. Strickland, of Philadelphia, an engineer of high and unquestionable reputation, associated with Mr. Richard C. Taylor, an Englishman, equally trustworthy for his professional competency and known integrity. The joint report of these gentlemen is subjoined, and, together with that of Judge Thomp-

son, may be regarded as demonstrating the practicability of fencing out the water, and rendering the future Cairo more secure than New Orleans itself.

In a private letter addressed by Mr. Strickland to a friend in London, immediately after his survey, he expresses himself thus: "It is just as practicable to build a city at the junction of the Ohio and Mississippi as it was to build the city of London between Temple Bar and the Tower." The embankments, for which abundant materials are to be had on the spot, require but eight feet elevation, and every principal street will be raised so much. The whole of the peninsula (in which the company's tract is comprised) is a beautiful plain, elevated above low-water mark from 30 to 35 feet.

The earth requisite for forming the level is obtained by cutting down the banks, and reducing them to a slope of one to five; and, all necessary materials being at hand, the completion of the work is an affair of labor and capital alone.

If further evidence on this point be required, it will be found abundantly in the letters of Mr. Septimus Worsley, a gentleman selected by Mr. Wright, and received by the company as the agent of the English bond holders, to watch over their interest in America, and to report upon the state and progress of the works. Extracts from these letters are annexed, together with incidental notices of Cairo, collected from various sources, all confirmatory of the anticipations of the founders.

But as the embanking of the whole circumference of the tract appropriated to the town would be too great and costly an undertaking for the commencement, the company have, under the advice of their engineers, limited their operations to a comparatively narrow range, and have enclosed a tract of about seven miles in circumference, for the commencement and nucleus of the city. The northern boundary of this tract is formed by a ridge of elevated land, running across from the Ohio to the Mississippi, which has never, so far as can be ascertained, been overflowed. On this side, therefore, no embankment is required. Along the remaining sides an embankment has been carried, which is now fast approaching to its completion. Indeed, it is confidently hoped that in the present spring the whole work will be so far finished as to present an effectual barrier to the flood.

The efficacy of the work already executed was satisfactorily tested by the last year's rise, the highest, except one, upon record. The water on that occasion did not approach the top of the embankment, and subsided without doing any damage to the slope.

But, besides the principal levee, it will be necessary also to bank up the streets within the section to the same height of eight feet above the surface of the land, to construct drains and culverts, and to execute such other works as may make the several lots ready and eligible for building. The estimated cost of these works is ten dollars a front foot.

It is further proposed to erect, in addition to the buildings already completed or in progress, such others as may be required for the immediate accommodation of new comers, so as to form the nucleus of the town, and give an impulse to building speculation.

The calculations for all this outlay have been prepared with great care; and it is satisfactory to be able to add, as a guaranty of their soundness, that hitherto, in all that has been executed, the actual expense has invariably fallen below the estimates.

The whole cost beyond what has already been expended will not, at

most, exceed £200,000; whilst the return, as will presently be shown, may be reckoned at twenty times that sum.

What has already been done by the company, in addition to the essential work of embanking, will appear from the following summary of the improvements and state of the works, made up to the 1st of December last:

1. A hotel 175 feet by 30, to which an addition of 55 feet is now being made; the house will then be sufficient to accommodate 100 or more persons. Rent, $1,200 per annum.

2. A store for dry goods, groceries, boat stores, and baking. Rent, $675.

3. A similar store and other rooms in the same building, intended for apothecary's shop and post office, magistrate's office, &c.

This building is 120 feet long, of two stories, with stone basement, and just finished. Estimated rent, $1,300.

4. The foundation laid for twenty warehouses, each 120 feet by 25, three of which will be completed in the spring. Estimated rent, not less than $1,500 each the first year, and afterwards $2,000 per annum.

The cost of the whole blocks, exclusive of the land, will not exceed $7,000 each store; and, with the land, will command $16,000 to $20,000 each. All these warehouses can be rented or sold as soon as completed.

5. A block of frame buildings, partly occupied by the company for offices and agent's house, containing ten rooms. Those not used by the company will rent for $300.

6. Eight houses completed, which rent for $250. Several more are building, of the same class.

7. A large workshop, 120 feet by 40, with steam engine, and machinery for planing, turning, and other carpenter's work.

8 A substantial machine shop and foundry, 150 feet by 120, the most complete in the West, and fitted with the best tools of every description. These premises are let to an experienced and skilful engineer and machinist for $4,800; the company receiving, in addition, 6 per cent. on all capital furnished, and one-eighth of the nett profits of the business.

The building of engines and the repairs of boats and machinery will give full employment to these works, and prove very important and productive to the company.

9. A saw mill with one saw. This, together with 300 feet of levee on the Ohio, has been let to two ship and boat builders, at $2,000 per annum. They have already contracted for the building of two steamboats and a ship of 400 tons, which is not only to be built, but to be rigged and fitted up for sea at Cairo.

10. A large building, with two engines and four saws, the best and most extensive in the West. It supplies the company with all sawed timber, and at prices one-half less than are paid at St. Louis. It is kept in constant operation. The company have a large supply of logs and timber on hand.

11. A brick machine, which will make annually about 5,000,000 bricks. The contractor will make and lay all that may be wanted for five years, at nine dollars per thousand, estimating sixteen bricks to a foot square, whereas bricks of usual size make twenty-two to the foot. Machinery for making shingles, which will reduce the price one-half of what is paid at St. Louis, say to $1 25 per thousand. Also, a machine for making laths.

12. A neat Catholic chapel; and house, or large room, for Protestant service. Also, day and Sunday school rooms.

13. About seventy buildings, of various kinds, occupied by the workmen and laborers employed at Cairo. They pay an average interest of 25 per cent. on the cost, and are so constructed that they can be easily removed without injury.

From this statement, it is evident that the main difficulties have been overcome—what remains to be done being merely the carrying out and completion of the works in progress; that no doubt can any longer really exist (however for interested purposes it may be pretended) of the practicability and soundness of the undertaking; and that the additional cost to be incurred is reduced to an almost certain estimate.

Assuming, then, that the required sum be raised, the next question is: What return may be expected to the company for their enterprise? or, in other words, what is the value of the security offered to the lenders?

It has been already shown that Cairo, from its geographical site, offers a combination of advantages to settlers, such as no place in the whole range of the American continent does or can pretend to; and the company speak not from conjecture, but from assurance, when they state that great numbers are waiting with anxiety for the moment when the progress of the buildings and works will enable them to transport their industry and capital to Cairo. The company, therefore, would be justified in taking a higher standard for the value of their building lots than that which is ascertained to be the result in other newly formed towns, such as Alton, Chicago, Cincinnati, or St. Louis. But taking the prices thus ascertained as a maximum, and for the first years of the settlement even making a large abatement from the scale, the results would still be such as to realize the hopes of the most sanguine.

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Such, then, being the undertaking in aid of which the present loan is required, it remains only to state the terms on which it is purposed to effect it, and the nature of the security.

The whole sum which it is desired to raise is, as has been intimated, £200,000 sterling.

The company are the absolute proprietors of the land included within the limits of the city of Cairo, amounting to 3,884 acres, and also of 5,848 acres adjoining the city limits; and the capital stock of the company, embracing such land and improvements thereon, &c., is divided into 20,000 shares, representing $100 each.

A deed has been duly executed between the company and the New York Life Insurance and Trust Company, in trust, for securing payment to the holders of the bonds made issuable under such deed of trust, with interest at six per cent. In order to form a fund for the discharge of the bonds, the Trust Company are, by the deed of trust, empowered to release building lots to purchasers, on receiving from them, out of their purchase money, twenty-five dollars per running foot for lots fronting on any streets, squares, or alleys, in Cairo, or sixty dollars per running foot for lots fronting on the Ohio or Mississippi river. The funds so raised cannot be appropriated to any other purpose than the satisfaction of the bonds, and no purchase can be made of any original property in Cairo, without a conveyance from the Trust Company, and payment to them of at least the sums so limited. The whole gross amount thus made receivable by the said

Trust Company, upon sale of the lots embraced in the present limits of the city, will exceed the sum of sixteen millions of dollars.

Bonds have already been registered under the deed of trust, and delivered by the Trust Company, to the amount of £287,600 sterling, of which £155,800 have been sold, and the amount realized by the company; and the money thus raised has been applied in paying for land, and towards the making of levees and other improvements. The bonds sold are all payable in 1858, and those now proposed to be issued will be due at the same time; and no priority or preference of any kind is given to the former.

The above-mentioned sum of £200,000 is to be raised on bonds of the company, issued or to be issued, according to the provisions of the trust deed, payable on the 1st January, 1858, or as much sooner as the funds applicable for the purpose will admit, and bearing interest at six per cent., payable half-yearly in London.

The money is to be applied in completing the levees, buildings, and other works, now under contract and contemplated by the company.

The existing regulations of the company require that "all funds derived from sales or hypothecation of bonds, for account of the company in England, shall be placed to the credit of the company, with their bankers in London; which funds, or any portion thereof, when not used or reserved for the purposes and objects of the company in England, shall be held subject to the order of the New York Life Insurance and Trust Company, in New York." "And the said Trust Company are made a depositary of the funds of the company, subject only to the draft of the treasurer, in such manner and for such purposes as the president and directors may authorize."

It is proposed that the bond holders in London may appoint an individual (to be paid by the Cairo Company) to report from time to time to the bankers or agents of the company in London; to see the due application of the loan; and, generally, to represent the interests of the bond holders.

The receipts of the company, arising from the sale of building lots or otherwise, after providing for the sinking fund under the deed of trust to the Trust Company and paying the annual interests on the loans, are to be wholly laid out as received, on buildings or other works upon the estate of the company, until the end of 1843; after which, and until the sinking or trust fund shall equal the amounts of the bonds issued, the surplus receipts are to be applied in the same manner, but subject to a right in the company to pay annually thereout (after providing for the interest on the bonds) a dividend to the share holders, not exceeding 5 per cent. on the capital stock of the company, unless a majority of the stockholders in London shall concur, in writing, to a larger dividend to the share holders.

One thousand shares of the capital stock of the company are to be vested in the bankers in London, to be held by them as a guaranty for the faithful performance of the condition of the loan.

D. B. HOLBROOK, *President, &c.*

No. 23.

DEPARTMENT OF WAR,
Washington, December 4, 1842

GENTLEMEN: The enclosed suggestions relative to the mouth of Cumberland river as a site for the national armory, the selection of which has been confided to your charge, is herewith commended to your respectful consideration.

Very respectfully, your obedient servant,
J. C. SPENCER.

To Gen. ARMISTEAD,
Col. S. H. LONG,
Surg'n Gen. LAWSON,
Commissioners, &c., St. Louis, Mo.

No. 24.

BARBOURSVILLE, *November* 28, 1841.

SIR: I fulfil a request made by a most respectable citizen of Kentucky, in addressing you on the subject of selecting the best site for the proposed national armory, to be constructed in the West. He is the organ of the citizens round about the mouth of the Cumberland, which they assert is the best location for such an establishment. They pray that, before a definitive decision is made, competent agents may be sent to explore this position and its manifold advantages, which, they assert, give it a decided superiority over any other place in the West. Among these, they enumerate its centrality, and, consequently, the greater facility with which the arms to be manufactured may be sent to the points where they may be wanted; the supply of iron from works already in operation on the Cumberland, a few miles above its mouth; the best iron in the United States; exhaustless beds of coal now being worked; cheapness of provisions, &c. I will only add, as the request they make seems reasonable, it will afford me great pleasure to see it accorded to them.

I assure you of my high regard.
JOHN M. BARBOUR.

The Hon. SECRETARY OF WAR, *Washington.*

No. 25.

PLANTERS' HOUSE, ST. LOUIS, *November* 2, 1841.

GENTLEMEN: I have seen it announced in the city papers, since my arrival here, that you had reached this place on your tour for the selection of a site for the location of the Western armory.

I have a desire that the location should be made for the best interests of the country; and if in such location I should be benefited, so much the better for me. I am not one who believes an armory must necessarily be located in a city, or immediately adjacent to one, unless such city has all the permanent and lasting advantages that other situations might possess.

It appears to me that an armory placed upon the Western waters should be as far South as practicable, so as to combine health, with all the materials convenient and abundant for its construction and use. The navigation should never be entirely obstructed by ice, so that shipments of arms, &c., could not be made at any season of the year, when necessity might require it. The little town of Smithland, at the mouth of the Cumberland river, Livingston county, Kentucky, it appears to me, combines more natural advantages than any other point on the Western waters for such an establishment, to render it most useful and advantageous to the country. The location is healthy, the water good, the hills in the vicinity are filled with iron ore of an excellent quality; and in the country there is, to all present appearances, inexhaustible beds of stone coal, of quality but little inferior to that of Pittsburg; an abundance of rock, both lime and sand, for any building purposes, hearth stone for furnaces, &c.

Ninety miles up the Cumberland river is the rolling mill of Messrs. Wood, Stacker, & Co., where an immense amount of iron is manufactured, of quality equal, I believe, to any made in the Union; and within less than 20 miles of Smithland, up the same river, there is a furnace and forge, where a considerable quantity is made. The materials to construct an armory could be had as conveniently there as at any other point; the materials to be used in manufacturing can be had there a little sooner, and at less expense, than at any other point below Portsmouth, Ohio, if I am not greatly deceived; and there is no other point further north, where the navigation is not frequently obstructed by ice for several weeks at a time, when shipments could be made from Smithland any where south.

There is no point on the Western waters from which shipments could be made in every direction with more facility, certainty, or better terms. The land for the site could be had cheap. Probably a donation would be made, but that would depend much upon the spot chosen.

I am a citizen of Smithland, and have been for many years; have not made a statement, but what, according to my view of the subject, is strictly true. The interest I feel in the prosperity of my town, and that [that] of the country at the same time might be well served, is the only apology I have to offer for intruding this note upon you.

I am, gentlemen, with due regard, your obedient servant,

WILLIAM GORDON.

To General ARMISTEAD,
Doctor LAWSON,
Colonel LONG. } *Commissioners, &c.*

No. 26.

NASHVILLE, *November* 11, 1841.

GENTLEMEN: The enclosed proceedings of the corporate authorities of Nashville impose upon the undersigned the duty of representing to you the advantages of locating on the Cumberland river, at or near this place, the armory which is to be established by the Government in the West.

We are aware that a written account of the vicinity of Nashville—of its inexhaustible mines of iron and coal; of the existence of a water power, which may be readily employed for manufacturing purposes, in sight almost of the city; of the facility with which arms may be transported hence to

exposed points; and of the alacrity of our people in using them in case of need—would not determine your choice without a personal inspection.

We therefore ask that you will suspend your decision till you shall have visited our city, which we most respectfully invite you to do, whenever it may suit your convenience.

We have the honor, with the highest respect, to be yours, &c.

P. TROOST.
W. NICHOL.
ANDREW EWING.
R. J. MEIGS,
JOHN SHELBY.
B. R. G. MEIGS.
SAMUEL V. D. STOUT, *Mayor.*

To Brig. Gen. W. K. ARMISTEAD,
Surgeon Gen. THOMAS LAWSON,
Lieut. Col. S. H. LONG.

No. 27.

Corporation of Nashville.

At a meeting of the board of mayor and aldermen for the corporation of Nashville, at the City Hall, on the evening of the 26th day of October, 1841, the following resolution was adopted by the board, to wit:

Whereas, by the act of Congress, the President is authorized to appoint commissioners for the purpose of selecting a suitable place in the West for an armory: Therefore—

Resolved, That the mayor appoint a committee to set forth the advantages of locating the contemplated armory on the Cumberland river, at or near Nashville.

And the mayor, in pursuit of said resolution, appointed Dr. Troost, R. J. Meigs, Esq., Dr. John Shelby, William Nichol, Andrew Ewing, and B. R. G. Meigs, Esqs.; and, on motion, it was

Ordered, That the mayor be added to said committee, to wit: S. V. D. Stout.

In testimony whereof, I, William Garrett, recorder for said corporation of the city of Nashville, and having the care of the corporate seal thereof, have hereunto subscribed my name, and caused said corporate seal to be hereunto affixed, at the City Hall, in Nashville, the 11th day of November, A. D. 1841.

WILLIAM GARRETT.

No. 28.

Proceedings and memorial.

At an adjourned meeting of the citizens of Nashville, on the 2d of September, 1841, C. C. Trabue, Esq., the mayor of the city, was called to the chair, and John M. Bass, Esq., was appointed secretary.

The mayor then briefly stated that the object of the meeting was to take into consideration the practicability of creating water power for manufacturing purposes, by the erection of a dam and lock across the Cumberland river, above the city, and the excavation of a canal through Lewis's bottom; that Albert Stein, Esq., a gentleman whose science and skill as a civil engineer were too well known to the meeting to require any eulogy from him, at the request of several citizens, had made a survey of the ground, with a view to ascertain the practicability of the proposed work, and the amount of water power; and that he was now present with the result of his labors, and was ready to submit them to this meeting.

Thereupon, Mr. Stein laid before the meeting an accurate survey of the proposed work, with an estimate of its probable cost, and explained, with much ability, the principles upon which the proposed work should be executed, and which gave great satisfaction to the meeting.

Whereupon, J. M. Bass offered the following resolutions, which were unanimously adopted:

Resolved, That the plan and estimates submitted to this meeting by Albert Stein, Esq., for the erection of a dam and lock on the Cumberland river above this city, for the purpose of creating a great water power for propelling machinery of all kinds, are highly satisfactory, and, in the opinion of this meeting, practicable.

Resolved, That the erection of these works are so important to this city and the surrounding country, in making it a great manufacturing point, that no time ought to be lost in adopting measures to carry it into effect.

Resolved, That a committee of five be appointed by this meeting, whose duty it shall be to collect and arrange in the form of a report, to be submitted to an adjourned meeting of citizens, all the information, statistical and otherwise, necessary to present the subject properly before the Legislature and the public.

Resolved, That said committee report, also, as to the best mode of raising funds for the contemplated object, in the event [that] a proper charter shall be obtained from the Legislature, whether by a joint stock company or otherwise; and that they also ascertain the quantity of land necessary to be purchased, and the probable cost of the same.

The chairman then appointed the following gentlemen to compose the committee under the third resolution, to wit: Messrs. J. M. Bass, A. Stein, R. J. Meigs, James Woods, and Dr. Shelby.

William Nichol then offered a resolution expressive of the thanks of this meeting to Mr. Stein, for his able and satisfactory report, which he had gratuitously prepared and offered to the meeting; which was unanimously adopted.

The meeting then adjourned.

At a meeting held on the 1st October, on motion, Dr. J. Shelby was called to the chair. The committee appointed at a previous meeting made a report as follows, which was adopted:

The committee to whom was referred the subject of the practicability of creating water power by the erection of a dam and lock across the Cumberland river, above Nashville, beg leave to offer the following report, which, for greater convenience, they have drawn up in form of a memorial to the General Assembly of the State, which is respectfully submitted.

They would further state, that no better mode occurs to them of raising

funds for the contemplated work than by the creation of a joint stock company, under a charter of the Legislature. They would further state, that, in discharge of so much of their duty as required them to ascertain the price and amount of land necessary to be had, they have addressed letters to the proprietors upon the subject, and the answers of two of them are herewith submitted.

Resolved, That the proceedings of this and the previous meetings, and the report and memorial of the committee, be printed, at a proper season, and laid before the General Assembly of Tennessee.

Memorial to the Legislature of Tennessee.

The subscribers most respectfully represent, that they are prepared to lay before your honorable body a plan for creating immediately above the city of Nashville a water power of immense value for manufacturing purposes of every kind.

And this it is proposed to accomplish in a way that shall improve the navigation of the Cumberland river; constituting the first of a series of works, the best and least expensive that can be devised for the benefit of the State at large, and especially of the river counties above. In these views your memorialists doubt not your honorable body will further concur, upon examining the following statements.

And first, taking a well-known work of a similar character as a standard of comparison, by which means a more definite idea may be formed of that herein proposed, it has been ascertained, by the following accurate calculations, that the water power of the Cumberland at Nashville exceeds that of the Schuylkill at Philadelphia, by nearly one thousand four hundred horse power.

We gauged the Cumberland river at about three miles above Nashville, on the 16th of August, 1841; the river being about one foot higher than the lowest known water.

The length of the cross section, at the place where we measured the river, was 118 feet, mean depth seven feet, mean velocity 2.5 feet, and the discharge 2,065 feet of water per second.

Now, since the mean velocities of the water in a river are as the square roots of the depths, the mean velocity of the water at the lowest stage of the Cumberland river is 2.3 feet; and taking the area of the cross section at 684 square feet, the discharge at the lowest stage of the river will be 1,573 cubic feet per second.

The greatest rise of the Cumberland river, counting from the lowest water, may be estimated at fifty feet. The duration of the highest flood constitutes, however, but a few hours in a year, and happens once in the course of ten or fifteen years. The height of even forty feet constitutes but a very small proportion of the year.

The total fall of water of a hydraulic machine is the difference between the upper level of the pond or race, and the lower level in the canal or tail race.

The power is the product of the weight of water which the machine expends per second multiplied by the total fall.

Let, for instance, the expenditure of one of the breast wheels at the Philadelphia water works be sixty cubic feet of water per second, the total fall 8.5 feet, and the weight of a cubic foot of water 62.5 pounds, the power will be sixty multiplied by 8.5, multiplied by 62.5, equal 31,875 lbs.; or, expressed in horse power, $\frac{31875}{550} = 58$.

The effect of the breast wheel is the product of the weight which it can raise, multiplied by the velocity per second.

Suppose the weight of water on the piston of the double-acting forcing pump at the Philadelphia water works be 128 cubic feet when at work, and the breast wheel make with this load twelve revolutions, or that the pump make twelve double strokes per minute, of five feet each, or that it gave the load two feet motion per second, the effect would be 128 multiplied by 2, multiplied by 62.5—equal to 19,000 lbs., or, in horse power, 29.

The ratio of the effect to the power would be $\frac{16000}{31875}$=0.5—or one-half of the power lost in overcoming resistance, &c.

The power of a watercourse is the product of the weight of the water it discharges per second, multiplied by the total fall.

The Cumberland river discharges, according to the above measurement and calculation, at the lowest stage of the river, 1,573 cubic feet of water per second; and, assuming the total fall at ten feet, the water power will be 1,573, multiplied by ten, multiplied by 62.5=983,125 lbs.; or, in horse power, $\frac{983125}{550}$=1,787.

If we assume the total at fifteen feet, the water power would be 1,573, multiplied by 15, multiplied by 62.5—equal 1,474,687 lbs.; or, in horse power, $\frac{1474687}{550}$—equal 2,681.

Hence it follows, that the increase of the quantity of water, as well as that of the fall of water, augments the water power.

The river Schuylkill, at Philadelphia, discharges, at the lowest state of the water, 380 cubic feet of water per second. The total fall being 8.5 feet, the water power will be 380×8.5×62.5=201,875 lbs.; or, in horse power, 367.

From which it appears that the water power of the Cumberland river, the total fall being ten feet, exceeds that of the river Schuylkill, with a fall of 8.5 feet, by 1,417 horse power.

From the foregoing it must be evident that the Cumberland river affords, at all times, an abundant water power for manufacturing purposes.

The manner in which it is contemplated to create this water power, without obstructing the navigation, is by means of a dam and lock. The dam can be built across the river on solid rock, and is therefore not liable to the objections that the foundation of the dam would be expensive and unstable, and apt to be undermined.

The right bank of the river is solid rock, and the left can easily be protected by a strong abutment.

As to the construction of the canal from the mouth of Brown's creek to the river at the water works, we have surveyed and examined the ground, and are convinced of its practicability.

Having thus shown the practicability of the plan, your memorialists beg leave to show that it is also expedient; both as being greatly superior to steam power or any other, and as requiring an outlay exceedingly small when compared with its certain widely extended benefits to the State.

Nature presents no cheaper means to propel machinery than a fall of water. This may be illustrated in the following manner:

The effect of a steam engine of 20-horse power is equal to the effect of 25 cubic feet of water per second, falling from a height of 10 feet. But the yearly expense of a steam engine of 20-horse power is about $6,000.

Supposing the quantity of water discharged by the Cumberland river, at the lowest stage, to be 1,573 cubic feet per second, and the total fall 10

feet, the water power of the Cumberland would therefore be equal to about 63 steam engines of 20-horse power; and if this power were produced by steam engines, the yearly expense would be $378,000.

The cost of working one steam engine and pump at the Philadelphia water works, for one year, was $30,800; and it was found that, with this expenditure, not more than 1,000,000 gallons of water could be raised in the reservoir in 24 hours.

The present six water wheels and pumps can raise into the reservoir 7,500,000 gallons per 24 hours, at a yearly expense of about $1,500; while, if this quantity were required to be raised by steam engines, the annual expense would be at least $150,000.

At the Lowell manufactories the number of spindles is, according to the statistics of January 1, 1841, 178,868; and, counting 12,800 spindles, with the accessory works, to require a steam engine of 25-horse power, the above spindles would require 14 steam engines of 25-horse power; and calculating the yearly expense of one steam engine at $7,800, the annual expense would be $109,200.

The diameter of the double-acting forcing pump of the Nashville water works is 9 inches, length of stroke 6 feet, and number of strokes 20. The quantity of water [running] in the reservoir may be estimated at 100 cubic feet per minute, or 882,380 gallons per 24 hours; and, calculating the supply at 200 gallons to each private family, the supply will be equal to about 4,412 private families.

Supposing the weight of water on the piston to be 89 cubic feet of water, and it gave the load 4 feet motion per second, the effect of the steam engine will be $89 \times 4 \times 62.5 = 22{,}250$ lbs., or, expressed in horse power, $\frac{22250}{550} = 40$.

This steam engine will consume 165 bushels of coal per 24 hours, at 25 cts., will be $41 25, and the yearly expense would be $41 25 $\times$ 300 = $12,375.

The relative expense of steam and water power may be practically understood by comparing the cost of supplying Philadelphia and Nashville with water. In the Encyclopædia of Geography, published in Philadelphia in 1837, it is stated that 18,704 tenants were supplied with water in that city that year, at an annual expense of $14,000; and that they paid $92,116 rents. According to these data, the annual water tax of these 18,704 Philadelphia tenants was then $5 67.

In Nashville, the annual expense of the water works, including rents and charges, amounts to $9,606. Dividing this among 284 heads of families, is $33 82 cents for each tenant.

With respect to the expense, your memorialists add the following statement:

The dam should be built across the river, on the solid rock, in the most substantial manner.

Injurious inundations are not usual in the Cumberland above Nashville; and in order to prevent those which the dam might tend to occasion, effectual arrangements must be made.

The lock should be of sufficient size for the passage of steamboats and other craft, and built of substantial masonry.

Along the canal, to be excavated from the mouth of Brown's creek to the river at the water works, the different contemplated establishments can be erected. The canal should have a very small fall, in order to preserve the total fall along it as great as possible.

The entire cost of the dam, lock, canal, and other necessary works, will not exceed $150,000.

When a work of this nature is proposed, certain popular objections are frequently urged by those of limited observation and experience. Your memorialists submit to your honorable body, with the greatest confidence in your enlightened and liberal views, a few observations touching the general utility of the contemplated public works, their connexion with the navigation of the Cumberland river, and the influence of such improvements upon the health of the neighboring districts.

The navigation of the Cumberland, (as well as other rivers of the State,) at all times of the year, can only be properly effected by dams and locks. The particular undertaking now proposed is of the utmost importance, not only to the property of Nashville, but the whole middle portion of the State is interested in it; and it deserves, therefore, the most considerate attention of the Legislature.

By means of dams and locks, the depth of the water may be regulated in such a manner that steamboats may ascend and descend the river at all seasons of the year; and, consequently, the communication between the different points of the river will be rendered regular, the delays may be correctly estimated, and the arrival of the boats anticipated with certainty. The delay in passing through a lock may be estimated at one minute for each foot lift, and is therefore of little importance.

The ascending navigation, in the present state of the river, is attended, at a low stage of the water, with great waste of power and time, and the descending navigation with danger.

The Cumberland river and its tributaries carry along hardly any heavy matter; and therefore not the least danger is to be apprehended that the ponds between the dams will be filled up by the deposites; which will also be prevented by proper arrangements. The erection of a dam and lock in the Cumberland river, about three miles above Nashville, will be the beginning of a judicious improvement of the navigation of the river, and at the same time will create a water power, the benefits of which will be incalculable to Nashville and the surrounding country; and the opening thus effected for the transportation of produce will greatly increase the value of property in the upper river counties.

The establishment of hydraulic works at Nashville will open a ready market for the produce of the upper country along the river. The saw mills will consume the timber which is brought down the river; the grist and corn mills, the wheat and corn; the rolling mills and other establishments, the pit coal and charcoal; the cotton manufactories, the cotton, &c.; and, in fact, this improvement is now, perhaps, the only means of opening the resources of the counties up the river, by establishing an easy and safe conveyance.

The improvement of the navigation of the river by a canal is by far inferior to that of dams and locks, and even in the case of the construction of a canal; and, for this reason, it is very probable that the latter is often preferred.

The canal has to pass through the lands of different owners, from which it must be purchased; whereas, in rendering the river navigable, the greatest part of the required ground exists in the bottoms and sides of the river, and is public property. As the canals cross many private grounds, roads, ditches, creeks, &c., the canal requires, therefore, the erection of many new

bridges, roads, and culverts, above or below the canal. At the river, we find, however, all these depositions already made by nature or the industry of the inhabitants of the vicinity, and it requires perhaps only some unimportant improvements, from which it will also appear that the canal navigation is much more expensive than that of a river improved by dams and locks.

The most important advantage of the river navigation consists in the greater quantity of water and in the use of steamboats. The channel of the river is every where the lowest, and receives the waters of the tributaries, while a canal along a river is located higher, or is purposely placed higher, to be beyond the reach of floods. It is therefore very natural that the want of water in a dry season will happen oftener with a canal than a river. A sufficient quantity of water is a most essential part of the navigation, and a superfluity in times of floods is by no means so injurious as the want of the same in a canal dried up.

The navigation of rivers has been improved by dams and locks in France, Germany, Italy, and in this and many other countries; and in every instance has a proper improvement of the navigation of a river by dams and locks proved to be rather beneficial than prejudicial to the health of the surrounding country.

The many dams erected across the rivers of this country, for the purpose of feeding canals and working mills, verify the correctness of this statement.

In situations, however, where dams are usually erected for milling purposes, to gather the water of springs and rain, by which means large tracts of lowlands are inundated and changed into marshes, which are sometimes overflown and again almost dry, and this principally in the summer and fall, it is natural that the health of the surrounding country should suffer from such establishments; but let it be remembered that the water in the pond above the dam in the river does not become stagnant; for it flows even at the lowest stage of the river with a considerable velocity, and the height of the surface of the river remaining always nearly the same. That circumstance itself very materially contributes to the preservation of health along the watercourses.

In the present state of the river, the alluvial margins become exposed in the dry seasons of the year to the hot sun, which produces more or less injurious effects; and these, by the erection of a dam, would be effectually counteracted.

The inundations above the dam in time of a flood will not be greater after the erection of the dam than they were before; and, in this respect also, the dam cannot be an injury to the lowlands on the margin of the river and its tributaries.

And, finally, as the improvement of the navigation of a river by dams and locks has been successfully practised from the oldest times, and in the case of the Cumberland is far preferable to that of a canal, your memorialists cannot doubt that your honorable body will look upon this first proposed improvement with the greater favor, as a sort of "parent action," which shall produce its like—an enterprise beneficent in its bearings upon the Commonwealth.

Your memorialists beg leave to add, in conclusion, that, though the improvement which they propose is designed primarily for manufacturing purposes, yet as the dam and lock which they propose to erect will form one of a series of constructions adapted to the improvement of the whole river,

it may not be amiss to remind the Legislature of what has already been done upon the subject, and to suggest the fitness of the present occasion to consider the adoption of a general system of internal navigation for the entire State. On the 26th of April, 1834, Congress passed a resolution instructing the Secretary of War "to send an engineer to extend the navigation of the Cumberland river from Nashville up to the falls, or to the highest point on said river susceptible of being made navigable for steamboats; and that he report to the next session of Congress the result of his examination as to the practicability of improving the navigation of said river, and the advantages, in his opinion, to the citizens of the State of Tennessee and Kentucky, and to the community generally, by the improvement aforesaid." An engineer was sent; and we beg leave most respectfully to refer the Legislature to his report, in the Executive Documents of 1834–'35, Doc. No. 171, and accompanying maps and plans, both as containing much important information as to navigation of the Cumberland above Nashville, and as a complete answer to the objection which considers dams as an obstruction to navigation. The other divisions of the State are equally interested in similar improvements of their rivers, none of which, in their natural state, are sufficient for the transportation of the bulky products of Tennessee industry, whether mineral or agricultural. The adoption, therefore, of a uniform system of internal navigation, to embrace, in the first place, the chief navigable streams of the State, or, in the end, all that can be made so, seems to commend itself to your honorable body as an object worthy of enlightened patriotism. The wisdom of our State Government has hitherto happily avoided contracting a public debt, even for this important purpose; and the late action of the General Government has now placed in our hands an annual fund, our share of the proceeds of the public lands, which will enable us, without risk, to embark in such enterprises as may promise useful results, and to pay the expenses incurred in them, *pari passu* with their advancement. The patriotic heart dilates with intense delight in contemplating the beneficent effects which, by a wise application of this fund, will be produced upon the physical and moral interests of our beloved State. While this principle may be made to perfect the communications of the State, and to provide for every citizen, as near as possible to his own door, a permanent, easy, and cheap highway for the transportation to market of the products of his own industry, the interest, in the shape of tolls, will be distributed to the common schools, and give to every child in the State the rudiments of a sound education. Thus may this fund be made to produce the happiest effects upon the well-being of the people, whose felicity is the sole object of every truly republican constitution. But we perceive that we have been seduced by this fascinating theme from the proper object of this memorial, which is to pray that your honorable body will, for the reasons hereinbefore assigned, allow us to erect in the Cumberland river, above Nashville, a dam, for the creation of a water power for manufacturing purposes, to be provided with a lock sufficient for the passage of all vessels, rafts, &c., used on the river, free of tolls.

All of which is respectfully submitted.

JOHN M. BASS.
R. J. MEIGS.
JAMES WOOD.
ALBERT STEIN.
J. SHELBY.

No. 29.

WASHINGTON, *December* 21, 1841.

I have had the honor to receive your communication of the 8th instant, forwarding certain resolutions of the Legislature of Tennessee, in relation to suitable sites for the establishment of a national armory on the Western waters, and have adopted such measures as will bring the subject under the observation of the board of examiners.

I tender you the assurances of my respect.

JOHN TYLER.

To the SPEAKER
of the Ho. of Reps. of the Tennessee Legislature.

I certify that the foregoing is a true copy of a communication from his Excellency the President of the United States; which was read in the House of Representatives on the 30th December, 1841, and was ordered to be entered on the journal of the House.

S. D. MITCHELL,
Clerk of the House of Representatives.

No. 30.

DEPARTMENT OF WAR, *December* 29, 1841.

SIR: The resolutions of the House of Representatives of the State of Tennessee, addressed and transmitted to the President by the Speaker, on the 15th of November, have just been referred to this Department, together with your letter and the several papers which accompanied it.

I have the honor to inform you, that all the papers will be transmitted to the board of officers now exploring the Western waters to select a site for a public armory.

I am, sir, very respectfully, your obedient servant,

J. C. SPENCER.

Hon. B. DOUGLASS,
Speaker House of Representatives of Tennessee.

A true copy:

S. D. MITCHELL,
Clerk of the House of Representatives.

No. 31.

HOUSE OF REPRESENTATIVES,
Nashville, November 18, 1841.

Resolved, That the Speaker of the House of Representatives be requested to transmit to his Excellency the President of the United States the report heretofore submitted to this House by a select committee, designating certain points in this State as suitable places for the establishment of a national armory on the Western waters, together with a letter address-

ed to the President, in accordance with a resolution of this body, by the said select committee, on the same subject.

Resolved, further, That the Clerk of the House be directed to furnish, at the earliest convenience, to the Speaker, a copy of the report above mentioned.

The above resolutions were adopted by the House of Representatives on the 18th of November, 1841.

BURCHET DOUGLASS,
Speaker of the House of Representatives.
S. D. MITCHELL,
Clerk of the House of Representatives.

No. 32.

NASHVILLE, *December* 8, 1841.

I am directed by the House of Representatives of the Legislature of Tennessee, now in session, to transmit to your Excellency the enclosed resolutions, upon the subject of a national armory to be located on the Western waters.

Allow me to express a desire that, [if] it may comport with your views of the public interest, to direct that an examination of the several places mentioned in the resolution may be made.

Very respectfully, your obedient servant,
BURCHET DOUGLASS.

His Excellency the PRESIDENT *of the United States.*

No. 33.

HOUSE OF REPRESENTATIVES,
Nashville, November 24, 1841.

SIR: The undersigned, a select committee of the House of Representatives of the General Assembly of Tennessee, beg leave, in the most respectful manner, to call your attention to the subjoined report and proceedings of that body.

By a reference to the census reports of 1841, it will be seen that Tennessee is the fifth State in the Union. Blest with an intelligent, active, and enterprising population, rapidly on the increase; peculiarly commanding in her position, from the fact that it is the centre of the great West; watered from one extremity to the other by the Cumberland and Tennessee rivers, both bold and navigable rivers; washed on her western border by the noblest river on the continent, which, while it affords an outlet for the rich valley of the South and West, is one of the great connecting links of the North and South; possessing natural and physical resources of the most superior order, she presents, as the undersigned believe, the highest claims for the legitimate encouragement of the Federal Government, apart from any reference to the achievements of the arms of Tennessee, by which she covered herself with honor and glory, and rendered incalculable

service to the country, when she had an opportunity of exhibiting her prowess.

The undersigned believe they hazard nothing in saying that [Tennessee possesses in an eminent degree the elements] to repel with alacrity invasion from abroad, or to suppress any civil commotion which may by possibility distract us at home.

The growing interest of the West, its important and peculiar attitude, its immense territory, and its comparatively defenceless condition, all point significantly to the necessity of the establishment by the General Government of some facilities of national defence, that, in its midst, its citizens may promptly protect themselves and their property at times of violent emergency.

A national armory is essentially demanded; and should the agents of the Government recommend the location of the one now contemplated to be established by them at any point within the borders of the State of Tennessee, or on any of its navigable rivers, we feel assured in saying that the amplest facilities to render it useful to the West and to the whole country will be abundantly afforded. The undersigned have to beg your Excellency to forward the accompanying papers to the officers who have been selected by the board of directors, lately convened at the city of St. Louis, to make the necessary examinations for a location of the contemplated armory.

With sentiments of profound respect, we have the honor to be, &c.

ADAM R. ALEXANDER, *Chairman.*
J. GOODALL.
WILLIAM T. HASKELL.
WALLACE ESTILL.
ROBERT H. HASDEN.
N. FAIN.
WILLIAM H. POLK, *of Maury.*

To his Excellency the PRESIDENT *of the United States.*

No. 34.

HOUSE OF REPRESENTATIVES,
Nashville, November 9, 1841.

Mr. Alexander, from the select committee on the location of a national armory on the Western waters, submitted the following report:

The select committee, to whom was referred various resolutions touching the selection of a site for the establishment of a national armory on the Western waters, have had the resolutions to them submitted, together with sundry amendments thereto, under their respectful consideration, and, as the result of their deliberations, beg leave to report as follows:

From among the various points recommended by the different members of this House to the consideration of this committee, we have deemed it proper, in a spirit of justice, to call the attention of the House to one or more of the points recommended in each of the grand divisions of the State.

And, first, in the eastern divisions of the State, the committee would in-

vite the attention of this House to Cloud's shoals, on the Holston river, in Hawkins county; which locality, while it affords the amplest sufficiency of water power, is surrounded by a finely timbered country, possessing an almost inexhaustible mine of iron ore, together with other sources of mineral wealth. In most seasons of the year, with a moderate tide in the Holston, transportation is easy to those points on the Western waters where the navigation is unobstructed at all seasons.

2d. The attention of this House is directed to the stone fort, in the county of Coffee, as possessing natural advantages of the highest order for an establishment of this kind. The water power near it, your committee are advised, is perhaps equal to any in the State, while it is situated in the midst of a country abounding in iron ore, and a sufficiency of stone coal for every purpose. It is but forty miles distant from Chattanooga, where the Charleston railroad is intended to terminate, and is directly on the route that must connect that point with Nashville. From the stone fort, arms could be transported with the greatest facility to any portion of the Southern country, or, by the way of Nashville, to any place in the valley of the Mississippi. Its interior position would always secure it from any sudden surprise, in case of invasion or insurrection; and, with a small expense, it could be rendered almost impregnable.

3d. What has been said of the stone fort, your committee believe may also be said of the falls of the Caney fork of Cumberland river, (which are about thirty miles distant from the latter place, in the county of Warren,) except that it does not present the same natural advantages for defence.

4th. The respectful consideration of this House is asked to the point at which the central turnpike road of the State of Tennessee terminates. This site is situated on the eastern bank of the Tennessee river, about one hundred and thirty-five miles from its mouth. It is below all the shoals that obstruct the navigation of that stream, at any season of the year; and is in the midst of the very bed of the richest iron country in the West. There are now in operation some eight or ten large and valuable iron establishments, within from five to twenty-five miles of this point, mostly within convenient distances from the road and the river. It is accessible at all seasons of the year to steamboats of the largest class. The turnpike road leading from this place passes through the richest portion of middle Tennessee, from which abundant supplies of provisions could be obtained. Immediately around it are thousands of acres of tillable land, which would also furnish charcoal at an inconsiderable cost. In addition to this, there are, higher up the river, inexhaustible beds of stone coal, which could be floated down to the point mentioned at less cost than the same could be carried by land transportation ten miles. These facts above enumerated, your committee conceive, combined, furnish to this point no slight arguments in its favor.

5th. Brownsport, which is situated on the west bank of the Tennessee river, in the county of Perry, presents the same advantages, exhibited by the point last mentioned; and its claims, your committee believe, deserve equal attention.

6th. The sixth and last point which your committee would recommend to the consideration of the House is the city of Memphis, and to it the earnest attention of every member is invited. Its claims to attention have been so ably canvassed by a committee of its citizens, appointed by a public meeting for that purpose, in a letter addressed to "his Excellency John

Tyler, President of the United States," which letter is hereto annexed, that this committee deem it would be supererogatory for them to add more. To this letter the committee invoke the calm and deliberate attention of this House.

In conclusion, your committee would remark, that the localities here brought before the attention of this body have been agreed upon in a fair spirit of compromise, and with the cordial endeavor to do justice to every portion of the State. The points have been selected with regard to the centrality of position and direction in a straight line, running from one extremity of the State to the other, so that the board of directors appointed to select a site can take them in their routes when passing through the State, if they should do so, without inconvenience or loss of time.

As the board of directors have already commenced at St. Louis, as your committee are advised, the action of this House is asked upon the subject of this report at its earliest convenience, as your committee may have a speedy opportunity of communicating with it.

All of which is respectfully submitted.

ADAM R. ALEXANDER,
Chairman of the Select Committee.

No. 35.

At a called meeting of the mayor and aldermen of the town of Memphis, on the 23d of September instant, the following preamble and resolution was unanimously adopted:

Whereas the Congress of the United States has passed an act authorizing the establishment of an armory on the Western waters, and believing that the local situation of Memphis is advantageously adapted for such an establishment: Therefore—

Resolved, by the board of mayor and aldermen, That the mayor be authorized to appoint a committee of five citizens to draw up a memorial to the President of the United States, setting forth the claims of Memphis, and the advantages she possesses for the establishment of said armory.

The mayor thereupon appointed Messrs. N. Anderson, Wyatt Christian, Henry Van Pelt, J. H. McMahen, and M. B. Winchester, on said committee.

WILLIAM SPICKERNAGLE, *Mayor.*

J. H. LAWRENCE, *Recorder.*

MEMPHIS, *September* 28, 1841.

SIR: In compliance with a resolution adopted at a meeting of the board of mayor and aldermen of the city of Memphis, Tennessee, on the 23d instant, appointing the undersigned a committee to lay before your Excellency such reasons as, in the opinion of the citizens of this city, will warrant its selection as a suitable location for the national Western armory, authorized by law at the present session of Congress, they beg leave respectfully to represent:

That, being convinced of the superior advantages which Memphis com-

bines, not only for a great national armory and arsenal, but for a naval depot, for the economical construction of arms and the construction and armament of steam ships of war, with all the munitions necessary and proper for the land and naval service of the United States, your memorialists beg leave respectfully to enumerate the principal facts which have prompted them to this conclusion:

1. Memphis embraces a high bluff, at the southwestern extremity of an unbroken body of dry upland, moderately undulating, heavily timbered, and mostly susceptible of cultivation, extending to the mountains south of Tennessee river; a section of country amply supplied with running streams and springs of excellent fresh water; extending from these mountains in Alabama, quite to the Memphis bluff, on the left of the Mississippi river—a position 800 miles above the mouth of this great stream, and near the centre of ten millions of acres of a continuous body of the richest land in America, extending from Vicksburg to Cape Girardeau.

2. Memphis is the highest point on this river at which the navigation has never been interrupted by ice; and as it is 800 miles by water and 400 miles by land from the Gulf of Mexico, and 600 miles from the Atlantic seaboard at Charleston or Savannah, the United States armory here could never be taken by surprise, nor assailed by an invading foe, until half a million of United States volunteers could be assembled in time to meet and conquer the invader. It is, therefore, so near the centre of the valley of the Mississippi as to be a place of perfect safety, and yet the navigation is so entirely open and easy for the largest class of steamboats, that they may always calculate with certainty on making a voyage from this to New Orleans in three days; whilst from any other eligible position in Tennessee, Kentucky, Missouri, Illinois, or Indiana, the movement of all kinds of vessels has been impeded, either by ice for weeks, or by shoal water for months, in succession, or at least the navigation confined to the smallest class of steamboats.

3. Memphis, being below the mouth of all but two of the principal tributaries of the Mississippi river, constitutes the position at which the greatest number of volunteers, with the greatest quantity of iron, lead, copper, coal, hemp, leather, timber, lumber, horses, cattle, and subsistence, can be obtained and transported in a shorter period of time, and at less expense, than any other place in America.

4. Memphis is a position of as much health as any spot upon the Mississippi river, from the Balize to the mouth of the Ohio or to Cape Girardeau—a distance of 1,100 miles.

5. Memphis is a position to which great and more than sufficient water power may be drawn, at an expense of $45,000, by a canal of nine miles; commencing upon Wolf river, 25 miles as it meanders above the mouth, and terminating at the Memphis or Chickasaw bluff; a canal upon which millions of tons of the best of white oak, cypress, black locust, and pine timber may be conveyed to the depot on as moderate terms as similar supplies of the best ship timber can be brought thither by the way of the Mississippi river.

6. Memphis is the position selected in the years 1830 and 1831, by General Gaines, J. C. McLemore, Robertson Topp, and others, for the western termination of the Atlantic and Mississippi railroad, to extend from Charleston, (S. C.,) or Savannah, (Georgia,) via Augusta and Greensborough, (Georgia,) Decatur, Courtland, and Tuscumbia, (Alabama,) and La

Grange, (Tennessee,) to the Memphis bluff. More than one-half of the proposed road is completed and in operation, to wit: from Charleston, South Carolina, to Augusta, Georgia; thence, via Greensborough, to the southern waters of the Tennessee river—distance 300 miles; and from Decatur to Tuscumbia, 45 miles. The section from La Grange to Memphis, 50 miles, is principally graded. The whole of this great work from the Atlantic might be completed by two regiments of regulars and volunteers in another year or two. The entire completion of this important railroad, estimated at 640 miles in length, together with its three principal branches, (to wit, one from La Grange to Mobile, Alabama, and Pensacola, another from the valley of the Coosa river, Tallahassee, and St. Mark's; and the other from the valley of the Chattahoochee to New Brunswick, St. Mary's, and St. Augustine, with some two or three short branches,) will render Memphis the most important inland town, in a military or commercial point of view, of any in the United States.

7. Memphis is the position which your memorialists believe that any experienced commander, charged with the defence of the Southern seaboard, from Wilmington, North Carolina, to the Sabine, would select for the concentration, instruction, and distribution of his disposable land forces. These forces, to the number of many hundreds of thousands of first-rate volunteers, may be assembled at one month's notice at Memphis, while the Western rivers are up generally to the proper stage of a safe navigation; and at other times in two months. Here, aided by the proposed railroad and river, and the proposed armory, arsenal, and depot, these forces may be equipped, and moved to any of the principal seaports upon the Southern frontier, from Charleston to New Orleans, inclusively, in three days from the time they leave Memphis. That portion of the force destined for the defence of New Orleans would take from Memphis their arms, equipments, and munitions.

Your memorialists deem it unnecessary to draw a comparison between the foregoing rapid sketch of the obvious advantages of Memphis for a great national armory, arsenal, and naval depot, and the armory, arsenal, and navy yards, now in operation in the Atlantic States—most of which are too near the seaboard to escape the disasters that must await most of our Atlantic cities that remain, at the commencement of war with England, as they now are, destitute of the means of defence, to be assailed by steam power. Thus will the armory at Springfield, with the arsenal at Watertown and the navy yard at Charlestown, Massachusetts, fall in quick succession after Boston is taken by surprise, and burned or sacked by a large army, aided by a fleet of steam ships of war.

The foregoing facts and views have constrained your memorialists to pray that Memphis may be selected as the most eligible site in the great valley of the Mississippi for a national armory.

NATHANIEL ANDERSON.
M. B. WINCHESTER.
WYATT CHRISTIAN.
H. VAN PELT.
J. H. McMAHON.

The foregoing report of the select committee was read, and concurred in by the House.

BURCHET DOUGLASS,
Speaker of the House of Representatives.
S. MITCHELL,
Clerk of the House of Representatives.

To his Excellency JOHN TYLER,
President of the United States.

No. 36.

GENTLEMEN: The undersigned, a portion of the citizens of Paducah, feeling an anxious solicitude in the location of the Western armory, have ventured to address you upon that subject, with the view of calling your attention to the advantages of Paducah as the site for a Western armory. In doing this we are not seeking to detract from the claims of other places, but only to exhibit, as we conceive, the facts which place the claims of Paducah on a more favorable footing than any town on the Ohio or Mississippi. This may seem to partake somewhat of arrogance, but plain facts will at all times speak for themselves.

The undersigned have entertained the opinion that a Western armory is intended to operate as a national benefit, by placing the arms and ordnance used in war at a point in the West where they will be most accessible to those parts of our extensive frontier where they will most likely be needed; and that the situation presenting such advantages, and combining also the means of acquiring, at all times, iron and coal at the lowest prices, would most certainly be regarded as possessing strong claims. The undersigned have no doubt but, in looking out for a site, could water power be attained at any point having the advantages of constant and free water carriage and communications with our frontier, a most decided preference would be due to such place. But we would respectfully suggest that on the Ohio above this town, and on any of the tributary waters of the Ohio where water power can be obtained, one great, and, as they conceive, insuperable objection will ever exist. Paducah is, and ever will be, regarded as the head of New Orleans navigation in times of low water; and in the winter season, when the navigation of the Ohio is closed by ice to this place, the navigation remains open from Paducah, by reason of the junction of the Tennessee with the Ohio. The water of the Tennessee, flowing from a warmer climate, does not congeal, but prevents the formation of ice in the Ohio after the mingling of their currents.

The undersigned suppose that Congress, in making an appropriation for a Western armory, designed that the manufacture of arms should be done at a point in the West most desirable and convenient for their transportation to those parts of the Western country most exposed to the aggressions of our enemies.

The necessity for the use of arms and ordnance by any portion of the country bordering on the Ohio river must be limited, and of rare occurrence. It is to protect our Western border from savage foes, to furnish our troops along the Texas line, and in Florida and New Orleans, that the demand for arms will be made. The undersigned would respectfully state

that from the Tennessee, as well as the Cumberland, can be attained the very best quality of iron, and in the most exhaustless quantities, and at cheaper rates than any other points above the Ohio, as large quantities are constantly shipped from the Tennessee and Cumberland rivers, to Louisville, Cincinnati, and to Pittsburg. The article of coal can be had at Paducah at the lowest prices. That article is supplied from Pittsburg, Hawesville, and Tradewater. As far as iron and coal are necessary, and enter into your consideration, they can be had here as cheap, and in the same quantity, as at any other points above this place on the Ohio, and more so than at points on the Mississippi.

The undersigned would respectfully remark that, so far as iron and coal are estimated, they conceive the claims of Paducah are not inferior to any. They will now, in a very brief manner, suggest some reasons why they have come to the conclusion that Paducah is the most eligible site for the armory. That place has all the advantages of navigation up the Ohio and its tributaries possessed by any other town; and in low water, and in the winter, it enjoys a free and open navigation down stream, which no point above it can enjoy. As before remarked, in low water it is the head of navigation; and in the winter, when the Ohio is frozen over just above the mouth of the Tennessee river, and the Mississippi is closed to Cairo. From the town of Paducah, down stream, no obstacle exists to navigation, and boats leaving there could in the summer have all the advantages incident to St. Louis; and in the winter season, when the formidable impediments to navigation from ice would lock up the Ohio above the mouth of the Tennessee, and the Mississippi above Cairo, the lower Mississippi and its tributaries, that penetrate into our Western frontier, would be open to the safe navigation of Paducah.

The undersigned, upon the subject of health, have no fears. The local situation of Paducah, and the absence of ponds and swamps, and such local causes of disease, have blessed her citizens with an almost unusual health; and, so far as the cheapness of living is involved, the necessaries of life are abundant and low in prices, and furnished from a market constantly supplied from a populous country.

The undersigned have made the foregoing suggestion of facts for your consideration, and for themselves, and in behalf of the citizens, respectfully invite your personal inspection and observation to those pretensions herewith submitted; and, so far as it can be in the power of the undersigned, they will cheerfully lend every aid to the commissioners in attaining a correct knowledge of such facts as they may desire connected with Paducah.

We have the honor to remain your obedient servants,

G. B. HUSBAND.	ROBERT ENDERS.
C. G. CASTLEMAN.	T. EVVELPOTT.
H. ENDERS.	R. S. RATCLIFFE.
W. W. LAY.	FRANK D. EATON.
J. CAMPBELL.	BARNY HODGE.
J. C. CALHOUN.	SAMUEL S. GROVES.
JOHN MILLIKEN.	G. WARM.
D. R. ENDERS.	

Gen. W. ARMSTRONG,
Sur. Gen. LAWSON,
Lieut. Col. LONG,
} *Commissioners, &c.*

No. 37.

PADUCAH, *January* 20, 1842.

DEAR SIR: I have taken the liberty to address you on a subject, to this part of the country and to the State of much importance—the location of a Western armory occupying a distinguished station; and, not doubting that your representations will have their due weight with the Secretary of War and the gentlemen employed to select the site, we have, in Paducah, determined to lay before you the reasons why we esteem this place a most eligible location for the armory, and to ask your kind aid in placing our claims before the proper individuals.

Paducah is in the centre of all the best materials—iron and coal. From the Tennessee river can at all times be had iron of the very best quality, as also from the Cumberland river; and coal furnished from Pittsburg, Hawesville, and Tradewater, will be as abundant and as cheap at this place as at any point in the West. As far as iron and coal are involved in the selection of a site, Paducah has advantages inferior to no other town, and superior to many.

The use for arms and ordnance of war, it is to be hoped, will never be needed in the country bordering on the Ohio river; but if ever it should be necessary to transport them in that direction, Paducah will possess all the means of water carriage afforded by the Ohio. It is presumed that the necessity for arms will be on our Southern and Southwestern frontier, and that the armory should be located at a point from which those places will at all seasons be most accessible. With an abundance of the best materials used in the manufacture of arms, we possess, from our location, the most decided advantage over any points on the Ohio river or its tributaries above this place. Whenever a boat in low water can descend from ten miles above, or from Louisville, we would have an equal advantage in ascending the river, and the same in downward navigation in the summer season. When the Ohio from immediately above this place is obstructed to Louisville by numerous sand bars, rendering navigation almost impracticable from Paducah, comparatively, no such obstacles exist; and, at the lowest stage of water, it may justly be said Paducah is the head of New Orleans navigation—there being water sufficient for boats to pass down with safety. In the winter, when the navigation of the Ohio above this place is closed by ice, and the Mississippi to Cairo also frozen over, the navigation from Paducah remains open to New Orleans, and is never obstructed, only for a few days when those streams break up by the running ice. The junction of the Tennessee not only, by the increased volume of water, adds to the depth of the channel of the Ohio, but prevents the formation of ice below its junction. In the summer we have the most decided advantages of downward navigation; and in the winter, when the Ohio above the mouth of the Tennessee, and the Mississippi at Cairo, are frozen over, we have a safe and unobstructed navigation down the Mississippi. Paducah has all the advantage from open navigation, and is the centre of the best iron and coal, and from its location free from any local causes of disease. On the southern shore of the Ohio, with no ponds or swamps in its vicinity, it has enjoyed unusual health. The country back is rapidly increasing in population, and supplies the place in all the necessaries of life in great abundance, and at low prices. We have a con-

stant daily market well stocked with provisions. From your persona knowledge of the place, and the extent of back country dependent on the town, you will readily discern that provisions must continue abundant. We would like much to see the armory located in Kentucky; and, believing this a most suitable site, we have ventured to trespass on your time, to ask your valuable aid, if you should think with us that we have advantages here that would render it the interest of the nation to make this the location.

I have written on behalf of the citizens; and they will, in common with myself, feel under obligations to you for your kind services in this matter.

I am, with right respect, your obedient servant,

JAMES CAMPBELL.

Hon. C. A. WICKLIFFE,
Washington City.

No. 38.

DEAR SIR: The information communicated to you the other day, in reference to the topography of the country contiguous to the route of our railroad, having been entirely from recollection, may therefore not be as accurate and merit that confidence which the importance of your present researches require. Since then I have had recourse to a note book in the possession of one of my former assistants, from which I am enabled to give you the following data:

The entire fall from low-water mark of Wolf river, at or near Moscow, to the bluff at Memphis, (opposite Anderson & Walker's old stand,) is 72 feet. The height of the bluff at this point, above low water of the Mississippi river, is about 86 feet. This would make the entire fall of Wolf river, from Moscow, 72+86=158 feet. From the best information I can obtain as to low-water mark, the difference between it and the flood of 1828, supposed to be the highest known, would be about 30 feet. This would leave 158—30=128 feet, the available fall to be divided between the descent in the canal or raceway and the pitch on the wheel. If we assume 86—30=56 feet, as the average height of the bluff above high water, and the race to be four feet deep, then 56—4=52 feet, would be the efficient fall. Hence, if we assume the average fall of Wolf river to be one foot and a half per mile, and the requisite fall to be given to the race or canal to be six inches, in the same distance we must strike Wolf river with the canal at a point 52 miles above its mouth. This would be somewhere nearly opposite to Germantown. If the canal could be brought from this point in a straight line to Memphis, its distance would not exceed 15 miles; this, however, is impracticable; and whether it would be most feasible to pursue the meanderings of Wolf, or pierce through the dividing ridge with a tunnel, and follow the slopes of Nonconnah, can only be determined by instrumental examinations. Should you have need hereafter, either at this point or any other point that may be selected for the establishment of the armory, for assistants in the prosecution of the canal, &c., permit me to tender you my services, together with one or two of my former assistants on the railroad. Our present engagements are nearly at

a close, and we should be extremely happy to get hold of some new job elsewhere.

Very respectfully, your most obedient servant,

CHARLES POTTS.

Colonel S. H. LONG.

No. 39.

FULTON, TENNESSEE, *August* 31, 1842.

DEAR SIR: Not having any certain information where you will probably be at any future day, I have determined to write you at Louisville, requesting the postmaster there to forward this letter to your address. My object is to make some additional statements of facts, for the information of the board of commissioners for selecting the site for the Western armory.

Since the commissioners were at this place, I have had a more particular examination made of the coal stratum in the bluff, about three miles above this, on the river. I find the stratum of greater thickness than I had supposed it to be when you were here, it being about four feet in thickness at the lower or southern part, where it is some ten or twelve feet above low water, and shines in the bank or bluff for near three-quarters of a mile, until it dips below the water at the mouth of Coal creek, becoming somewhat thinner towards the mouth of the creek. I have had some experiments made with this coal, and find that it burns readily, giving off a strong bituminous odor, like the Pittsburg and other coals, and leaving nothing but a small quantity of light ashes, no slate or clay being found in it. I will have other experiments made with it by blacksmiths and others, and give you the results of their experiments. I am informed that there are extensive fields of this coal visible for miles in the bluffs on Coal creek, which is a fine navigable stream when the Mississippi is high. I have also discovered, since you left this place, that there are large quantities of rock in the hills, two miles east of this, on both sides of the road leading to the back country. It appears to be a kind of ferruginous sandstone, very hard; and the same kind is much used through the country for underpinning houses. I am persuaded that it will be found very useful. There is also a large quantity of the same kind, mixed with masses of pudding stone, in the bluff on the river, three miles above Fulton.

Since the commissioners were here, I have been reflecting upon the subject of their inquiries, and find it very practicable to have an abundance of water power, at a very small cost, at all times, except when the Mississippi may be very high. You will probably recollect my suggesting that the Hatchie river could be turned in at Fulton for $3,000. This is quite practicable at so small a cost, and the constructing of one lock would shorten the navigation of the Hatchie about twenty miles, make it much better and safer, thereby overcoming the rapid current and dangerous navigation near the mouth, (except when the Mississippi river is high,) and affords as much water power as might be desired. I regret very much that I had not an opportunity of showing you the localities, and of explaining the advantages of this site. I have a copy of the report made by A. M. Lea, chief engineer of the State of Tennessee, in 1837, of the survey of a route for a railroad, made from this and other places on the Mississippi river;

also, his report of the exploring and marking a route through the Mississippi low grounds, for a road from Fulton to the high land beyond the St. Francis river, in Arkansas. These I will send you as soon as I shall know where to direct them with certainty. I shall be much pleased to hear from you on the receipt of this.

With my devoirs to the other gentlemen of the commission, I am, very respectfully, your obedient servant,

WILLIAM W. LEA.

Gen. WALKER K. ARMISTEAD.

No. 40.

NASHVILLE, TENNESSEE, *February* 3, 1842.

GENTLEMEN: The undersigned would respectfully invite your attention to a site for the Western armory which is situated on the north bank of the Ohio river, in the State of Illinois; and would respectfully beg leave to say that the steamboat landing at this point is not equalled by any in the Western country. It is two miles in length, and forms a complete harbor in winter by a false point above, and is situated ten miles below the mouth of Tennessee river. The landings are of a grade and inclination that approximate nearer to that designed by art than any on the Ohio river; and the situation presents the most beautiful view of the Ohio river that can be found from Pittsburg to its mouth. The surrounding country is beautiful, and gently undulating, rolling as you recede from the river to the interior, and equalled by but few sections of the Western country. This point is also near the centre of the United States and its Territories, not only by actual geographical measurement, but also by concentration of navigation; the Tennessee, Cumberland, Ohio, and Wabash rivers, with all their tributaries, emptying in from the east, and the Mississippi and its tributaries on the north and southwest, all of which are brought in proximity with this point, without turning an angle of more than twenty-five or thirty degrees from the west, by means of steamboat navigation. At this point, the bluffs approximate, simultaneously, near to each other on both sides of the river.

It will be perceived that all kinds of metals, coal, wood, &c., can be procured at this point at a less expense than almost any other, from the fact that the navigation of the Tennessee, Cumberland, Green, Ohio, and Wabash rivers pass this point on their way to New Orleans.

All kinds of metals can be shipped from Pittsburg by means of the Ohio, or from Missouri or New Orleans by the Mississippi. Also, all articles manufactured can be conveyed from this point to any other in the whole valley of the Mississippi with greater facility than at almost any other suitable location in the whole Western country. The navigation is seldom obstructed by ice, from this point south, during the winter season. The town plat, herewith enclosed, is laid out at the premises we wish to designate to you; and, after examination, if the site should meet your approbation, we will grant the quantity of land or town property necessary for the erection (and out lots) of all buildings, &c., and also grant all the necessary fuel, timber, &c., for buildings and steam purposes for ten years.

With these remarks we would respectfully invite you to examine the location and surrounding country.

Respectfully, your obedient and humble servants,

JAMES H. G. WILCOX.
WILLIAM McBEAN.

Gen. W. K. ARMISTEAD,
Sur. Gen. LAWSON,
Col. LONG,
Commissioners, &c.

No. 41.

FEBRUARY 3, 1842.

I would beg leave to state that I have called two or three times to see you at the hotel; but, as no favorable opportunity offered, I take the liberty of writing down such propositions as we can make. You will be accommodated, and all necessary fixtures provided, should you deem the examination of the site referred to worthy of your attention. My partner, Mr. Wilcox, will give all due attention, should you, on your way down to Memphis, or ony other western point, stop a few days at Metropolis.

I would further state that there can be some fine land entered within four or five miles of the point designated; and, also, that at some future day it is probable that the location will justly be entitled to the seat of Government of the United States.

I am, very respectfully, your obedient servant,

WILLIAM McBEAN.

Gen. W. K. ARMISTEAD,
Sur. Gen. LAWSON,
Lieut. Col. LONG,
Commissioners, &c.

No. 42.

METROPOLIS CITY, *Illinois.*

GENTLEMEN: Since you were here at our place, I have concluded to make you the following proposition in regard to the locating the United States armory, should our place be the point selected: To propose the sale of our whole town site, and all the land attached thereto; also, the ferry, should it be wanting, on both sides of the river. The quantity of land on the Illinois side is about six hundred and forty-nine acres, and all fine lands. There are, perhaps, the rise of one hundred lots sold, and the town plat and about four hundred unsold. We will give a fair trade for the whole concern, and then you could locate the armory on any part that might be convenient. Should there not be land enough in our tract, there is a fine tract of land, immediately adjoining the town tract, of three or four hundred acres, that belongs to Tallmadge, a member of Congress from New York, that could be had, I am informed, on good terms.

I am, with all respect, your obedient servant,

J. H. G. WILCOX.

Gen. W. K. ARMISTEAD,
Sur. Gen. LAWSON,
Lieut. Col. LONG,
Commissioners, &c.

No. 43.

HOUSE OF REPRESENTATIVES, *December* 15.

SIR: Enclosed you will find letters from Professor Troost and Mr. Nicholson, of Tennessee, on the subject of the location of the Western armory, to which I would respectfully invite your attention.

Your obedient servant,

H. M. WATTERSON.

His Excellency JOHN TYLER.

No. 44.

COLUMBIA, *December* 3, 1841.

DEAR SIR: I beg leave to call your attention to the enclosed paper, drawn up by Professor Troost, of the Nashville University, in relation to a site on the Tennessee river for the Western armory.

Dr. Troost is a man of very eminent standing for his scientific acquirements. He is professor of chemistry, mineralogy, &c., in our university, and is the geologist for the State. His report may be relied on implicitly.

If my own statement would be of any value, I could corroborate all he has said, as I am well acquainted with the site. I have been requested by some of our citizens to forward the enclosed to you, with a hope that the claim of the place may be investigated.

Very respectfully, your obedient servant,

A. O. P. NICHOLSON.

JOHN TYLER,
President of the United States.

No. 45.

SIR: In answer to your queries respecting the termination of the Columbia turnpike road on the Tennessee river, I beg leave to state that it is my opinion that no place in the West offers as many advantages for the erection of an armory as this place. Not only is it placed on a never-failing navigation, but the contemplated turnpike from there to Memphis connects it also with the Mississippi river. It is also situated on the common outlet (by water) of all the produce of east Tennessee; every thing that is produced near the Holston, French Broad, Malauga, and Little Tennessee, must pass near this place; so that the first necessaries of life will be abundant. So it is with other productions which come from below; the river being navigable through all seasons.

But it has other and more paramount advantages for such establishment; it is the centre of a great number of our most excellent iron furnaces. This termination of the turnpike is situated about one mile and a half above Carrollville, and consequently 17 miles above the iron works of Samuel Van Leer. These works are composed of a blast furnace and steam engine,

and have at their disposal an extensive ore bank of the best kind of ore. These works are now in full operation. About the same distance, only two miles from the river, on the opposite side, are the works of Colonel Love; they are composed of two blast furnaces and steam engine, and extensive deposites of good iron ore. Their operations are now suspended by the death of Colonel Love.

About five miles below the termination of the turnpike road are the works of Mr. West; they are composed of one blast furnace and steam engine, and have command over an extensive deposite of iron ore. These works are also situated on the river.

Two miles from the mentioned termination are the iron works of Messrs. Walker & Co.; they are composed of one blast furnace and steam engine; and a few miles from the furnace the forges are found, which are driven by water power. To this, also, an extensive deposite of good ore is connected.

About twenty miles distant, on the turnpike, are the works of Mr. Loony; they are composed of a high furnace and steam engine connected with the forge—are not now in operation. Besides these works, there are, not far off, many extensive deposites of excellent iron ore. But even if no iron ore existed near the above-mentioned locality, it would always have a sufficient supply of this necessary material from the eastern part of Tennessee. All the iron manufactured in Sullivan, Johnson, Carter, Washington, Green, and Cocke counties, is brought into market by the Tennessee river, and has to pass the place now under consideration.

It is unnecessary to mention that the above establishments have an inexhaustible supply of good land for coaling and other purposes, and plenty of good limestone for building materials, and that the turnpike runs through the most fertile part of middle and west Tennessee, from Nashville to Memphis, and furnishes all the conveniences for the supply of every kind of provision.

Very respectfully, your obedient servant,

G. TROOST.

Colonel GIDEON PETTON.

P. S. I understand that the forge of Mr. Loony is still in operation.

No. 46.

EXECUTIVE DEPARTMENT,
Indianapolis, December 22, 1841.

SIR: I have the honor to enclose to you a memorial of the Legislature of the State of Indiana, on the subject of the location of an armory in the West, to be laid before the board of examiners, for their consideration.

I am, sir, most respectfully, your obedient servant,

SAMUEL BIGGER.

General ARMISTEAD.

No. 47.

A joint resolution on the subject of the location of an armory in the West.

Whereas it is believed by many that the State of Indiana would be wanting in her duty in withholding from the eye of the Government of the United States the combination of facilities concentrated at the Grand rapids of the Great Wabash river, and designating it as a spot peculiarly adapted as a site for the location of the armory contemplated by the Government to be established in the West.

The Great Wabash river is a large stream running through a great extent of cultivated country, navigable for steamboats 400 miles. Its navigation is connected with the lakes of the North by means of the Wabash and Erie canal, and every stream in the West whose waters flow into the Gulf of Mexico. From its rapids to its mouth the Great Wabash is nearly equal in size to the Ohio, with which stream it unites 268 miles below the falls, and 130 miles above its mouth.

The Grand rapids are 70 miles by land from the Ohio, and one mile above the flourishing town of Mount Carmel, in the State of Illinois. White river (the main branch of the Wabash) puts in a short distance below the rapids, and the river Patoka joins the Wabash opposite the town of Mount Carmel. Upon each of these three streams are inexhaustible beds of coal and vast forests of the finest timber; and, upon two of these rivers, in the vicinity of the rapids, iron ore is abundant. The rapids themselves give an unlimited power of water for propelling mills and every description of machinery.

In addition to the facilities for navigation, which this point possesses, the town of Mount Carmel is the terminus of two contemplated railroads furnishing, when completed, a straight and direct communication between St. Louis and Alton on the Mississippi, and New Albany and Louisville at the falls of the Ohio. This line of road is designated to obviate the difficulties, delays, and expense, incident to the navigation of the Ohio at certain seasons of the year, from low water and ice. Louisville and St. Louis, distant from each other 600 miles by water, are by this route of railroad separated by a distance of only 275 miles. For several months in the year the navigation of the Ohio is obstructed, so that steamboats are frequently ten days in making a trip between Louisville and St. Louis. By the contemplated railroad, these points would be accessible to each other daily at all seasons of the year.

It might be an object worthy of the attention of the General Government to take up and prosecute to final completion this contemplated railroad, upon which the State of Illinois has expended a large sum of money. In fact, the extraordinary advantage and saving to the General Government in the Post Office Department would far exceed the cost of constructing this line of road. The rapid increase of population west of the Ohio and Mississippi must soon demand the maximum compensation ($300) per mile, allowed for carrying the mail. The many facilities which this road give, added to the natural advantages with its general communication with the rivers of the West and South and the lakes of the North, [and] the presence of the most valuable timber, coal, and iron, in the vicinity of the great water power, [form] a combination of qualifications great in themselves, but which

are much enhanced when the geographical position is duly considered. Wherefore—

Be it resolved by the General Assembly of the State of Indiana, That the board of commissioners appointed by authority of the Government of the United States to examine a site for the location of an armory in the West be, and they are hereby, respectfully requested to examine the Grand rapids on the Wabash river, it being a point possessing many advantages worthy the careful inspection of said board.

And be it further resolved, That, if said board do not select the great falls of the Wabash river, they are respectfully requested to examine any and all places in the State of Indiana which may, in their judgment, be deemed suitable to carry out the wishes of the Government upon this subject.

Be it further resolved by the authority aforesaid, That the Governor of this State be requested to forward one copy of the foregoing preamble and resolution to General Armistead, president of said board, at St. Louis, and a like copy to the President of the United States.

JOHN W. DAVIES,
Speaker of the House of Representatives.
SAMUEL HALL,
President of the Senate.

Approved December 21, 1841.

SAMUEL BIGGER.

No. 48.

As the General Government is now seeking the most suitable situation on the Western waters upon which to establish a national armory, it becomes the duty of individuals to present those localities which embrace the various qualifications required.

Your memorialists, citizens of the State of Indiana, would be wanting in their duty in withholding from the eyes of the Government the combination of facilities concentrated at the Grand rapids of the Great Wabash river, designating it as a spot peculiarly adapted as a *site* for the armory contemplated by the Government to be established in the West.

The Great Wabash is a large stream running through a great extent of cultivated country, navigable for steamboats for 400 miles. Its navigation is connected with the lakes and with every stream in the West whose waters flow into the Gulf of Mexico. From the rapids to its mouth, the Great Wabash is nearly equal in size to the Ohio, with which stream it connects 268 miles below the falls, and 133 miles above its mouth. The Grand rapids are 70 miles by land from the Ohio, and one mile above the town of Mount Carmel, Illinois. White river (the main branch of the Wabash) puts in a short distance below the rapids, and the river Patoka joins the Wabash opposite to the town of Mount Carmel. Upon each of these three streams are inexhaustible beds of coal and vast forests of the finest timber, and upon one of these rivers, in the vicinity of the rapids, iron ore is abundant. The rapids themselves give an unlimited power of water for propelling mills and every description of machinery. In addition to the facilities for navigation which this point possesses, the town of Mount Carmel is the terminus of two railroads, forming a straight and direct communication between St. Louis and Alton on the Mississippi, and

Louisville and New Albany at the falls of the Ohio ; also, with Cairo, whose navigation is always open, and which point is at all times accessible for steamboats and sailing vessels from the sea. This line of road is designed to obviate the difficulties, delays, and expenses, incident to the navigation of the Ohio at certain seasons of the year, from low water and ice.

Louisville and St. Louis, distant from each other by water 600 miles, are by land (by the route of these railroads) separated by a distance of 275 miles. For five months in the year the navigation of the Ohio is obstructed or impeded, so that steamboats are frequently ten or twelve days between Louisville and St. Louis. By the completion of the railroads, these points would be accessible to each other daily at all seasons of the year. Should the Government fix upon Mount Carmel as the *site* for the armory, the Mount Carmel and New Albany Railroad Company, in the State of Indiana, would surrender their charter to the General Government for the completion of the work, by receiving a reasonable compensation, by valuation, for the money already expended. The extraordinary saving and advantage to the General Government in the Post Office Department would far exceed the cost of constructing this line of road. The rapid increase of population west of the Ohio and Mississippi must soon demand the maximum compensation ($300 per mile) allowed for carrying the mail. The facilities which this road would give, added to the natural advantages with its general communication with the waters of the West, [and] the presence of timber, coal, and iron, in the vicinity of great [water power, form] a combination of qualifications great in themselves, but which are much enhanced when their geographical position is duly considered. Situated between two free States, (Indiana and Illinois,) at the rapids of the Great Wabash, the armory of the United States would be equally secure from external enemies and servile insurrection.

Wherefore, your memorialists respectfully present the Grand rapids of the Great Wabash as a position possessed of many advantages worthy the careful inspection of the commissioners appointed by the President to locate the armory of the United States.

Samuel Hall	Charles Brewster
Isaac Montgomery	J. J. Pennington
John Hargrave	Joseph B. Willson
Simon Carbaugh	T. Willson
J. J. Kirkman	G. Gerauld
J. S. Williams	Joseph McGarrah
William French	John Hellman
William Daniel	Henry Williams
John Ames	James Vingaut
William Hargrave	N. B. Stevens
William W. Wright	Joseph Millewing
J. H. Evans	Joseph Martin
William Carl	John F. McGiffin
J. Aburthnot	William Allsup
William Phissips	Benjamin Howe
Samuel Kelly	Henry Simon
Js. N. Gerauld	Thomas Williams
A. C. Mills	T. Menwith
Samuel Archer	Jo. Devin

Robert Stockwell
David Archer
Joseph Maddox
John Brownlee
John Lagon
Titus Jessup
Joseph Montgomery.
Alvan L. Jones
Gilbert McMaster.

No. 49.

MOUNT CARMEL, WABASH CO., ILL., *January*, 1842.

GENTLEMEN: From the many years' struggle to locate an armory in the West, it seems now that it is at least probable a location will be made. I call your attention to a letter, herewith enclosed, from the War Department in 1823, when this point was brought into view; and, from year to year, [it has since] been presented, as peculiarly suitable for such an establishment, to the Congress of the United States. Having called your attention to it, I have awaited your arrival; and, having obtained an assurance that [you] would examine it, have deferred (to meet you personally) a trip to the East—my principal object being to raise a company to carry into operation one of the most important points in all the great West as to water privileges.

Should you, gentlemen, deem this point sufficiently suited for the object you have in view, then, indeed, I can, without any difficulty, secure a great Western improvement, calculated to manufacture iron, cotton, wool, and flour. Acting as agent for the Wabash Navigation Company, I have for many years labored hard to accomplish this object.

When George Washington, the father of our country, pointed [out] and planned the present connecting link of the lakes and Atlantic ocean, (the present Lake Erie canal of New York,) as soon as the people of the West found Louisiana attached to the *Union*, they were waked up to look for the natural route connecting the lakes with the Ohio river and the Mississippi, as a direct route from New York to New Orleans.

Our Western hunters and traders, on inquiry being made, uniformly pointed to our maps, (then, indeed, imperfectly drawn,) and declared that, from the "short portage points," this must be by uniting the navigable points of the Wabash and Maumee of Lake Erie.

Permit us, then, to say that, with the present year, I am entering the forty-fifth year of my *pioneering* in the wilderness of the West, having been a neighbor of Boon, of Kentucky, previous to his removal to Missouri, and of the second Boon of the West, Simon Kenter, of Ohio, and have myself changed my citizenship seven times in Western States. I have seen the whole wilderness of the West subdued, and savages and wild beasts of prey receding before civilization and enterprise.

As the Anglo-Saxon (American) race have advanced westward, all opposition to their progress has vanished like smoke before the wind; they will soon have reached the Pacific coast, for, as by an irresistible impulse, their course for empire is ever *westward*.

More than forty years ago, the citizens of the West looked steadily to this natural connecting link of the Great Wabash and Maumee or Lake Erie canal; and we now have the assurance of the Governors of Ohio and Indiana, that from Terre Haute to Lafayette the work is nearly finished, and from Lafayette to Fort Wayne it is already open for navigation, and

that next fall the work in Indiana will be completed—from the Governor of Ohio, that that part of the canal passing through Ohio to the lake will be completed next fall. These messages we will exhibit to you, if not already seen. Having passed the Grand rapids, the Great Wabash is open for steamboat navigation to Terre Haute almost at all seasons of the year; and from the Grand rapids to the Ohio river, boatmen tell us that, when the Ohio can be navigated from the mouth to the Wabash, the Wabash can be ascended to the Grand rapids, and that little additional expense will open the Wabash for steamboat navigation of the smaller class all the year.

In 1816 and 1817, when the great canal in New York began to agitate the public mind, fixing on this point, as a Western pioneer, and the natural route from New York to New Orleans as the *grand pass*, and pointing it out to my friends in Ohio, on my migration from that State, it excited some commotion, and the plan of the canal from Lake Erie to Portsmouth was gotten up in anticipation. But, gentlemen, it is known to you that the summit level is fed with water from the Illinois only, while on the other hand the Wabash and Lake Erie canal is the natural connecting link, and affords a shorter route to New Orleans, making what we call a "grand cut-off" of 1,000 or 1,500 miles of a dangerous water carriage, which must be encountered in passing from Lake Erie to Chicago, Illinois.

We all know that the navigation of the Northern lakes, from the time that the first vessel was embarked on them by Monsieur La Salle, has been extremely hazardous and destructive of human life; the navigation, except for lumber, should be avoided as much as possible. The first vessel referred to was wrecked and lost in a storm, and the crew premonished by a French sailor, who thought it a hard case, after navigating the grand ocean, to be brought there and drowned in a "frog pond."

No longer ago than last November, out of ten vessels at one port, navigating Lake Michigan, eight were driven ashore and wrecked. Indeed, for the preservation of human life, there ought to be a railroad from Buffalo to Maumee, along the lake, and from that point across the State of Michigan to Chicago.

Should you, gentlemen, after taking all matters into your consideration, find it an advantageous point for the West and for the Government to fix on for a location of the armory of the United States at the foot of the Grand rapids, as requested by the joint resolution of the Legislature of Indiana, herewith presented to you, I can assure you that I will do all in my power to aid you in securing such property, and at the most reasonable terms that the Government may want; and am, very respectfully, your obedient servant,

T. S. HINDE.

Gen. W. K. ARMISTEAD,
Lieut. Col. LONG, and
Sur. Gen. LAWSON, } *Commissioners, &c.*

P. S. Permit me to hand you my report, in connexion with General Bell, in behalf of the water power and other advantages of the Grand rapids of the Wabash, at the request of the citizens of the county.

* * * * * * * * *

MOUNT CARMEL, ILLINOIS, *January*, 1842.

Mr. Thomas S. Hinde having read the above to me, and we being proprietors of the town of Powhatan, at the foot of the Grand rapids, have reserved on the map of the town the *site* for the water works, and will, with this, make any generous advances as to property towards meeting the views of the commissioners in fixing the *site* for an armory, having entered into written articles of agreement to that effect, and repeatedly offered the *site* by memorial to the Congress of the United States.

JACOB LESHER.

MOUNT CARMEL, WABASH COUNTY, ILLINOIS,

January, 1842.

GENTLEMEN: The undersigned, being appointed by the citizens to select and arrange documents and other matter for your investigation, present the following statement of facts, founded on surveys and estimates made as to the water power and other resources of the county, which we deem worthy your attention.

It is unnecessary for us to describe that which you can see and examine yourselves. The Great Wabash river, the central stream of the Ohio and Mississippi valley, is presented to your view, connecting at this point the White and Patoka rivers of Indiana. This point, for the want of capital and enterprise, is far from what it might be; but the resources of the country for agricultural and grazing purposes are immense.

As to its mineral resources, we present you with an original report of David Dale Owen, Esq., of Indiana, who, having been employed in the service of the United States, and also of Indiana, as geologist, we trust will be satisfactory.

In addition to what Mr. Owen has stated, we would remark, that we conceive that good building stone, and for hydraulic purposes, may be obtained in abundance under the lower ledges of sandstone at the Grand rapids, at Crawfish creek, and also at Coffee island; and all in the immediate vicinity.

The highlands back from the Wabash, on the Illinois side, where they have been opened, afford excellent quarries of good stone. This has been done at Albion, and the stone pronounced to be good.

We at present call your attention to the water power in a region of country abounding in iron, coal, lumber, and all other resources necessary to meet your object.

Mr. Owen has, perhaps, omitted one coal bank on Patoka, about 20 miles from the mouth, measured by Mr. Hinde and Mr. J. L. Wilson, to the depth of 12 feet, (and yet its full depth not ascertained,) and the iron region in its vicinity, explored by Mr. Wilson; also, the coal regon of Coffee island, and the strong indications of zinc and copper *being* found in different parts of the country. Leaving these matters for the present to your consideration, we beg leave to call your attention to the *water power*.

1. And this would be wholly unnecessary, as you could take the dimensions and falls, were it not that the Wabash is at present up, and at high tide.

We regret that we cannot furnish notes of the first survey made by Mr.

William Beauchamp, agent of the proprietors of Mount Carmel, in 1819–'20; but can state, from those who assisted him, that, from the level at Crawfish creek to the foot of White River ripple, he ascertained the fall to be about eight feet eight inches; from Little rock and Ramsey's ripple, eight feet—making about 16 feet fall from Little Rock ripple to the ripple of White river.

2. By William Polke and Thomas S. Hinde, commissioners on the part of Indiana and Illinois, (Hiram Bell, surveyor,) a survey and report was made in 1823 to their respective Legislatures. Mr. Hinde's original notes were handed to Captain Smith, (at his request,) of the United States engineer corps, who visited the falls in the spring of 1829, and made a report to the War Department, formed on those notes, without taking the level of the river or surveying the ground; deeming, we presume, that the calculations were sufficiently accurate. Mr. John C. Calhoun, Secretary of War in 1823, had called the attention of Colonel McRae, of the engineer corps, to this point; but he and Captain Talcott had left Louisville before they received his instructions; and Mr. Hinde met them at Newport, Kentucky, surveying the ever-memorable Horseshoe bend of Licking river.

3. The route from Hanging rock to the mouth of Mill run was run and measured by an experienced engineer, the late Edward Smith, Esq., for the Wabash Navigation Company, in 1836–'37. We cannot as yet find the notes taken by him among his papers. The county surveyor, however, who attended Mr. Smith, will furnish a correct survey of two routes, one from an upper bend of Crawfish creek, and the other from Hanging rock, giving the distance accurately.

The distance will be found, from the Hanging rock to the mouth of Mill run, about three miles from the bend of the creek, (Crawfish,) about half a mile and twenty poles short of that distance. But we refer you to the map itself. By erecting a crib dam at the Hanging rock, Mr. Smith estimated the fall would be, at the *Bluff point*, at Mount Carmel, about fourteen feet and perhaps some inches fall of water.

4. From the Hanging rock to the White River ripple, we resort to a survey and report made by David Burr, Esq., engineer for the States of Indiana and Illinois, to the Legislatures of those States, in 1838. Mr. Burr, having on hand the erection of a dam across the Wabash at the Grand rapids, was by no means particular as to water power otherwise to be obtained than by the dam ten feet and a half high. As to this dam and its construction, there will be presented draughts drawn by Mr. Burr; the contemplated work being designed to improve the navigation of the Great Wabash river, at an expense of between two and three hundred thousand dollars, while, on the other hand, the opening a canal for water power, and even for steamboat navigation, would cost a very inconsiderable sum.

Although Mr. Burr's report does not give as full bearing of the falls as Mr. Smith's, nevertheless, as we have printed reports, we present this statement, founded on them; and can but remark, that his finding the high-water mark at 21 feet in 1838, the banks being higher and wider below, increases the fall, clear of back water, several feet; so that, at the Bluff point, the water works may not be obstructed during the highest floods.

High tides.—The highest rise of the Wabash river and the White river, ascertained by Mr. Polke and Thomas S. Hinde, in 1823, at this junction, was 24 feet.

Mr. Burr, in 1838, makes it less 21.57 feet.

The banks above the Grand rapids Mr. Burr estimated at 12 feet in height above low-water mark; below White River ripple, on the Illinois side, they are higher and the river one-third wider. The rise of the Wabash cannot be compared to that of the Ohio or Kentucky rivers. Colonel McRae stated to Mr. Hinde, in 1823–'24, that the highest tide of the Ohio river was 60 feet above low-water mark, and the Kentucky river frequently rose above 100 feet. The Ohio, in 1832, must have risen upwards of 120 feet, the houses being flooded in Cincinnati as high as the second story, on streets back from the river.

The falls.—Taking, then, Mr. Burr's estimates as to the falls—

1st. The falls of Hanging Rock ripple 1.7 foot. In half a mile, (this is an ambiguous description,*) Polk and Hinde, at low water, estimated the fall at 22 inches. Mr. Burr states that the water was up, therefore he had taken his level at high tide. The distance, two miles and a half from Grand rapids to the Hanging rock, by water measure, (course of the river.)

Falls of one mile and a half, not estimated by him, two feet.

The Grand rapids, in half a mile, four feet.

Mr. Burr ascertained that the natural fall of the Wabash, below the Grand rapids, at its usual level, was eight inches per mile; but from the site of his dam, as projected, the fall was 1.75 feet; but ascertained by Polke and Hinde, 22 inches; and allowing the eight inches, which, added to the 22, make 2.6 feet.

This estimate exceeds a little 10 feet in the whole fall.

Be this as it may, a wing dam half way across the Wabash at Hanging rock, formed of hewed timber cribs, filled with stone eight or ten feet high, curving at the further end, would give at least an additional head of five or six feet of water; making a fall of 15 or 16 feet below White River ripple. But, by conducting the water to the ledge of rocks at Bluff point, at Mount Carmel, it has been ascertained that there will be sufficient fall for hydraulic purposes, clear of floods, all seasons of the year. The fall, independent of floods, has been estimated from seven to seven and a half feet.

If the site be fixed at the foot of the Grand rapids, there will be a fall, on the above estimates, of eight or ten feet of water, taking in any volume of it for canal, as well as hydraulic purposes, and, from Mr. Burr's statement, only subject to obstruction from high tides six weeks in the year.

Laying aside Mr. Burr's statements as to water power, we will take Polke and Hinde's estimates, in connexion with those of Edward Smith; these at the lowest possible rates.

	Feet.	Inches
The falls at the Hanging Rock ripple - - - -	1	10
The two and a half miles to the Grand rapids, eight inches, the lowest estimate at common level - - -	1	8
The falls at the Grand rapids - - - - -	3	6
The descent one mile to White River ripple - - -		8
The fall at the ripple, now dammed to improve navigation -	1	10
	9	6

* I should think so.

	Feet.	Inches.
Brought over - - - - - - -	9	6
This, with the addition of the wing dam, will give at the lowest estimate - - - - - -	5	0
	14	6

Fourteen feet six inches at Bluff point, and eight or ten feet at the foot of the Grand rapids—a water power unparalleled in all the West.

The cost of water power.

To bring this immense water power into useful operation is the next consideration; and, as to this, the board is more competent than ourselves to make the estimates. But, from all the information we can get, we state that, by an engineer, the crib dam is estimated to cost $2,000, say - - - -	$4,000
The excavations and lock at the Hanging rock, and one mile to the basin, at $10,000 per mile, and $16,000 for locks and basin	26,000
	30,000
2d. The cost of extending the canal from the Hanging rock to Bluff point, the remaining distance, to the mouth of Mill run, nearly one-fourth of a mile short of three miles, say - -	20,000
	50,000

This a company already chartered will do on the location of the armory, or on a loan from Government, or a subscription in stock to the amount necessary for the water works—the Government having all the water power by it, gratis, if desired.

At the foot of the Grand rapids is a town laid out, *Powhatan;* also, a river addition of the town of Mount Carmel. The flats of those places and adjoining lands you have herewith exhibited. Should the Government desire to have the whole concern unconnected with other points, it can have that desire fully gratified, and secure lands possessing mineral and timber resources on more reasonable terms than at any other point west of the mountains, in connexion with so many other advantages.

At Bluff point, forty acres are reserved for hydraulic purposes, which the Government can have, and fifty or sixty acres reserved land fronting the mouth of White river, so as to connect the navigable points of these rivers. This fifty or sixty acre tract is held by the corporation in trust for school purposes, and may be had on very reasonable terms, or terms that the Government will not object to.

We have thus, gentlemen, presented you with a scarce abstract view of the matter, but we hope correctly; and surely the interest of Ohio, with her Wabash and Maumee canal, Kentucky and Missouri connecting by links of two railroads, uniting their two great Western cities, Louisville and St. Louis, at a point where the grand pass from Boston and New York to New Orleans connects the Southern with the Northern route through the Lakes. Here, at a point secure from internal insurrection, on the central stream of the great West, ought to attract public attention, and

that of the Government with recollections associated with the Great Wabash, the battle of Tippecanoe, and the death of the lamented President Harrison.

We are, gentlemen, ready to communicate any other or further information, and are your obedient servants,

THOMAS S. HINDE.
HIRAM BELL.

To the COMMISSIONER AND ENGINEER CORPS,
appointed by the Secretary of War, for fixing an armory on the Western waters.

P. S. We have, as well as Mr. David Dale Owen, overlooked one fact: that is, that there is no other point in all the West so well calculated for furnishing grit for cutlery. The French lick stone on White river is of a superior quality, and mountains of it. It has been an article of trade, and, in 1819–'20 a Mr. James Prentice, failing in business in Kentucky, established a factory on White river, and shipped dressed stone to all parts of the Atlantic States and to Europe, and sold them as Turkey oil stones. This stone is of so excellent a grit, from the coarsest to the finest, that it was retailing in Ohio at fifty cents per pound. The country around and back from the falls of the Wabash is high, rolling, and healthy, well watered and very fertile.

THOMAS S. HINDE.
HIRAM BELL.

No. 51.

According to a request made to me, in behalf of the citizens of Mount Carmel, in a letter from the Rev. Mr. Hinde, bearing date the 6th December, 1841, I beg leave to submit the following report on the mineral resources and timber of the Wabash country, to the board appointed to establish an armory in the Western part of the United States.

All the counties lying on both sides of the Wabash river, as high as the waters of Pine creek and the town of Independence, in Warren county, are situated on an immense coal field, equalling in extent the whole island of Great Britain, extending from southeast to northwest from the waters of Oil creek and Rome, on the Ohio river, to the mouth of Rock river on the Mississippi, a distance of 300 miles; and from south to north, from the waters of Green river and Tradewater, in Kentucky, to the waters of Little Vermilion, in La Salle county, Illinois, a distance of 325 miles; and from southwest to northeast from St. Louis and the waters of the west branch of Saline river, in Gallatin county, Illinois, to the forks of Fox river and Kankakee river, a distance of 240 miles. This coal field is described and its boundaries laid down in a report on the geology of Iowa and Wisconsin, made by the undersigned to the General Land Office at Washington, in February, 1840.

This coal field is supposed to contain at least seven workable seams of coal. Of these, the lowest seem to be the best.

In all the counties lying on the east side of the Wabash, as high as Fountain and Warren counties, I have myself inspected seams of coal, viz: in Posey, Gibson, Knox, Sullivan, Vigo, Parke, and Fountain; also,

in Vermilion county, on the west side of the Wabash. On the same side, below Vermilion river, I have not personally explored; but I have very little doubt that the outcroppings of seams of coal have been already discovered. That seams of coal can be reached in that section of country, is beyond a doubt.

As a general rule, the coal in the upper counties is of better quality than that found in the lower counties. It is all bituminous. The best seams of coal that I know of are on Sugar creek, in Parke county, about five or six miles from its mouth; three miles below the narrows on Roaring creek, in the same county; at the mouth of Vermilion river, Vermilion county; on Brouillet's creek, also in Vermilion county, six or seven miles from the Wabash; on Honey creek, in Vigo county, from four to eight miles from the Wabash; on the Lick fork of Busseron creek, in Sullivan county.

Coal of tolerable quality is found in many places on White river, very convenient for shipment, on the Wabash, at Merom, in Sullivan county; on the Patoka, in Gibson. On this latter stream, near the boundary between Pike and Gibson counties, there is a good seam of coal, nearly ten feet thick.

Extensive deposites of argillaceous iron ore and carbonate of iron are disseminated in some of the slaty clays which alternate with the seams of coal; and there are beds of the hydrated brown oxide of iron, similar to the Tennessee ore, toward the eastern margin of the coal field—as, for instance, on Eel river, in the southwest of Putnam county.

The most important beds of iron ore at present known, conveniently situated to the Wabash river, are on Brouillet's creek, above mentioned, six miles southwest of Clinton, on the Wabash river. It is estimated that in the vicinity of that creek about 2,000 acres of ground are underlaid by good iron ore. A high furnace is probably now in operation on this creek, for the smelting of the ore. I think, if the owners have sufficient capital at command and manage the business well, they cannot fail to be eminently successful.

Other beds of iron ore, not yet wrought, are on the Wabash, above the mouth of Coal creek, Fountain county, and on Sugar creek and its tributaries, and Roaring creek, (both in Parke county,) in the vicinity of the coal beds above mentioned.

In various localities, both on the Wabash and adjoining streams, clay iron stone has been noticed; but I am not prepared to say whether, except at the above localities near the Wabash river, it lies in sufficiently extensive beds to supply iron works.

In several places in Posey and Gibson counties, masses and nodules of this kind of ore have lately been observed, but the excavations have not been sufficiently extensive to enable one to judge correctly of the extent of these deposites.

I may here state that 600,000 tons of iron are manufactured annually in Great Britain from this kind of ore, procured in analogous situations to the formation on the Wabash. And sufficient evidence has already been obtained to render it probable that our coal field is rich in this variety of iron ore, and well worthy the attention and exploration of ironmasters, more especially since they lie within such an extensive coal district.

The best building stone that I know of on the lower Wabash is a stratum of limestone which shows itself in many places in Posey and Gib-

son counties; some of it of a gray color, some of it almost black, and capable of receiving a polish. It is not much inferior, in some situations, to Irish black marble, which it much resembles. There are several places on Big creek, in Posey county, where this rock can be inspected and quarried. It lies in beds from four to six feet thick.

The sandstones of the lower Wabash are rather too soft and micaceous to be a very durable building stone; nevertheless, where it has been used in the construction of houses, it has stood the test of twenty years, without showing much signs of decay. On the streams entering the Wabash, above Terre Haute, (for instance, on Sugar creek and Racoon and Big Shawnee creeks,) freestones of excellent quality can be procured. At Perryville, on the Wabash, in Vermilion county, and on Otter creek, in Vigo county, a dark bituminous limestone is exposed, and can be quarried in very large blocks. It stands tolerably well as a building stone, where it is not exposed to the direct rays of the sun. This rock has been employed in many of the constructions on the public works.

There is a quarry of similar, and perhaps better, rock on Honey creek, in Vigo county, about eight miles from the Wabash, which has been used in building the locks on the Crosscut canal. I think building stone of a tolerable quality could be got on the Wabash, at Merom, and also near Vincennes.

Near Columbia, on the Patoka, good freestone has been quarried, and used in building the abutments of the bridge over that stream. Building stone of a similar quality can without doubt be found in many situations on the west side of the Wabash; but, as I have not examined that part of the country, I cannot speak positively.

Excellent limestone rock for constructions can be got on the eastern margin of the Illinois coal field, but the quarries lie from fifteen to twenty or thirty miles east of the Wabash.

Good fire clay can be procured on the Wabash, at the mouth of Coal creek, and a short distance up Vermilion river; also, on Sugar creek, near the coal banks, and perhaps at other and nearer localities.

The timber of the Wabash country is equal if not superior to that of any other Western stream. In the bottoms of the Wabash, the two White rivers, Patoka, Racoon, Sugar creek and Coal creek, and Vermilion river, black walnut, poplar, maple, sugar tree, oak, and cherry, grow very luxuriantly—larger, indeed, than I recollect to have seen them elsewhere in the West. Sugar creek has received its name from the vast growth of maple found on its banks; one of its tributaries goes by the name of Walnut branch, from the thick forest of walnut in the vicinity. Land has been entered on Leatherwood, a stream south of Sugar creek, by cabinet makers in Cincinnati, solely for the valuable growth of cherry trees, which they intend to saw up and carry to Cincinnati. Every experienced woodsman to whom this region is familiar will admit that birdseye and curled maple and black walnut are found on the Wabash and its tributaries in at least as great perfection as they can be found in any part of the United States.

For further information and details, I beg leave to refer the board to two reports on the geology of Indiana, made by me, as geologist of the State, to the Legislature, in the years 1837 and 1838. I regret that I have not a perfect copy; otherwise I should have taken much pleasure in forwarding it.

All of which is respectfully submitted.

DAVID DALE OWEN.

No. 52.

MOUNT CARMEL, WABASH COUNTY, ILLINOIS,
October 29, 1841.

DEAR SIR: I addressed a note to the Secretary of War a few days ago, on the subject of a Western national armory at this place, at the falls of the Great Wabash. From the National Intelligencer of the 19th instant, I learn that you are appointed president of the board for fixing a site for the armory.

The former board appointed for that purpose had this place surveyed and favorably reported as a suitable point. The water power is equal and some think superior to the water power of Rochester, New York, when improved by a dam now under projection by Illinois and Indiana. The proprietors of the land on which the works may be fixed have heretofore tendered the sites to Congress some years back, which was had under consideration and favorably viewed; but Congress could not fix (for conflicting interests) on any one point.

The country of the Wabash and White river abounds with iron ore and coal. Patoka, another stream directly in front of this place, rising in Indiana, affords greater abundance of these articles than either of the above rivers.

Louisville and St. Louis may both be taken into consideration; it is the interest of both these cities that this point be taken, as two railroads connect or will connect all three of those points. The road from St. Louis to this point is partly finished, and the iron procured. From this to Louisville is not yet under way.

On Monday last, the 25th, at a sitting of the board of the Illinois road, an order passed for recommending both roads to the National Government for mail and military roads.

The opening to the lakes, by the Indiana canal, will afford a direct communication north. With some improvements, the direct communication to New Orleans will be open at all seasons of the year. The railroads from Louisville to St. Louis will afford direct facilities.

* * * * * * * * *

I am, very respectfully, yours,
TH. SPOTTSWOOD HINDE.

General W. K. ARMISTEAD.

No. 53.

MOUNT CARMEL, WABASH COUNTY, ILLINOIS,
October 29, 1841.

DEAR SIR: Mr. Thomas S. Hinde and myself became the purchasers of about 1,200 acres of land, embracing the Grand rapids or Great falls of the Wabash, about two miles above this place.

We have heretofore offered to the General Government the proposed site. It has been surveyed and reported for a site for a Western national armory. Having reserved the ground necessary for such an establishment, we feel disposed to let the Government have it on the most reasonable erms.

Presuming you will visit a place so well calculated for a national armory, to satisfy your own mind, I can only join Mr. Hinde in assuring you, that for water power, connected with other advantages, there is no point to exceed it west of the mountains, as far as I know.

A trifling expense will bring the water power to bear on any quantity of machinery, for any purposes whatever; the coal and iron sufficient. Our title to the location is good, and we are ready and willing to submit our title papers to the inspection of the Attorney General.

Yours, respectfully,

JACOB LESHER.

General W. K. ARMISTEAD.

No. 54.

We, the undersigned, agree to convey to the United States 640 acres of land, situated at the Grand rapids of the Wabash river, in Wabash county, Illinois, as a donation, in case the Western armory of the United States shall be established at said point; the said land to be bounded as follows, to wit: on the south by Fifth street of the town of Selima, and extending back to the west line of said town, thence north to a point opposite the middle street of the town of Powhatan thence eastwardly to the Wabash river, thence down the Wabash river to the beginning. The residue running along the back line of McIntosh's 1,190-acre survey; also, the right of abutment at or below the Hanging rock, for a dam across the river, together with rock for building said dam; also, land on the north line of said McIntosh's tract, so as to include Crawfish creek.

It is understood that any lots heretofore sold by the proprietors of the towns of Selima and Powhatan, are to be taken at appraisement by the United States, the buildings on any of the lots excepted; also, four acres and ninety-hundredths excepted, which is owned by Smith and Hilt, in Powhatan. the title to which said lands to be submitted for inspection according to law.

THOMAS S. HINDE.
JACOB LESHER.
WILLIAM WILSON & CO.

By their attorney in fact:

HIRAM BELL.

To the PRESIDENT OF THE ARMORY BOARD.

No. 55.

[A communication similar to that numbered 48, signed by "George Flowers, for and in behalf of the board of directors of the Mount Carmel and Alton Railroad Company."]

No. 56.

GENTLEMEN: We have understood that the commissioners for the purpose of selecting a site for a Western armory are now at St. Louis. We are owners of about seven hundred acres of land adjoining the town of Evansville, on the Ohio river. We feel satisfied that it presents one of the best points for the location of the armory on that river. Below all dangers of navigation, accessible at all times from the Mississippi, no point, we believe, can be selected which will combine so many advantages.

We offer, first, all the land necessary for the erection of the armory free of expense to the General Government.

Secondly, we offer the finest white oak timber on the Western waters, from two hundred acres of land, for the use of the armory.

Abundance of coal can be had, of the very best quality.

Abundance of iron from the Cumberland river can be had.

Provisions, fuel, and every thing else, in great abundance, and cheaper than can be obtained at St. Louis, Louisville, or Pittsburg—the three points contemplated.

Will you do us the favor to present this communication to the Secretary of War, and get him to order a reconnoissance of the property mentioned at the mouth of Pigeon, adjoining the town of Evansville, on the Ohio river, by the commissioners, while making their survey, and let a report be made to him?

We will guaranty the title to whatever property may be wanted for the use of the Government, free of expense. Your early attention to this will oblige us.

Respectfully, yours,

JOHN LARD.
J. H. SCOTT.

Hon. A. S. WHITE, }
O. H. SMITH, } *United States Senate.*

TERRE HAUTE, *December* 24, 1841.

The undersigned, in referring the above letter to the President, have great pleasure in seconding the request of the writers, who are gentlemen of the first respectability, and of undoubted pecuniary responsibility. They will faithfully execute any contract they may make with the Government.

ALB. S. WHITE.
O. H. SMITH.

His Excellency JOHN TYLER.

No. 57.

INDIANAPOLIS, *August* 30, 1842.

SIR: The only information that I can give you in relation to the levels of the canal at Evansville is from the report of the engineer who made the first survey for the canal. I am not certain, nor can I ascertain from

any reports that I can find, that the present level of the canal is the same as that established in the first survey. I think, however, it is. At all events, it varies but little.

The survey above referred to makes the surface of the water in the canal 10.90 feet above high water, and 62.90 feet above extreme low water, in the Ohio. This would make the rise of the river 52 feet. I presume the highest flood of the Ohio taken is that of 1832.

Very respectfully, your obedient servant,

T. A. MORRIS.

Gen. W. K. ARMISTEAD.

No. 58.

INDIANAPOLIS, *August* 27, 1842.

DEAR SIR: I am requested by Mr. Charles J. Battell, of Evansville, to communicate to you the following information:

Estimated cost of the Central canal from White River feeder to Pigeon feeder—work yet to be done, $1,298,000.

From Pigeon feeder to Evansville is completed. Distance from White River feeder to Pigeon, is 73 miles; from Pigeon to Evansville, 20 miles.

Cost of finishing Crosscut canal from Terre Haute to Central canal, $688,672.

Very respectfully, your obedient servant,

T. A. MORRIS.

Gen. ARMISTEAD.

No. 59.

TERRE HAUTE, INDIANA, *August* 12, 1842.

GENTLEMEN: We are the owners of half the property near the town of Evansville, on which we have laid out a town called "Lamasco city." We have been informed that you recently visited that place, with the view of selecting a favorable site for the location of a national armory. If that situation should be selected, we will convey to the Government all our interest below Pigeon creek; and I am authorized to make the same offer on behalf of John Law, Esq., another of the owners. We have written William H. Law, Esq., who resides at Norwich, Connecticut, who will communicate the same proposition to the War Department. We understand that 600 acres will be necessary for the works; we own upwards of 350, and have no hesitation in saying that the residue will be made up by the citizens of Evansville. The conveyances can be made for the whole quantity required, so soon as the Government shall signify their wishes to that effect.

We are, very respectfully,

J. H. SCOTT.
HUGH STEVANS.

To the COMMISSIONERS, &c.,
Wheeling, Virginia.

No. 60.

LOUISVILLE, *August* 6, 1842.

GENTLEMEN: The enclosed statements in relation to the claims and advantages of the city of Louisville to the location of the Western armory were presented to the President of the United States by the honorable John Rowan, at the request of the mayor and common council of said city, and are herewith submitted for your consideration.

With sentiments of respect, I remain, gentlemen, your obedient servant,

D. L. BEATTY, *Mayor.*

Gen. W. K. ARMISTEAD AND OTHERS,
Commissioners on the subject of the Western Armory.

No. 61.

To his Excellency John Tyler:

John Rowan, at the special instance of the honorable the mayor and common council of the city of Louisville, State of Kentucky, would most respectfully represent to the President of the United States, (to whom has been referred, by the act of Congress approved on the 9th day of September, 1841, the duty of causing to be selected a site for a Western armory, subject to the approval of that body,) that Louisville, in the State of Kentucky, has many and just claims to be considered the most suitable place for that establishment. That city is, as it is known, situated at the falls of the Ohio river. From that place, arms and munitions of war can be transported to the upper part of the State of Indiana, to the State of Ohio, to western Pennsylvania, and to western Virginia, whenever that river shall be in volume sufficient to be navigated by steamboats from either of those places; and at all times down the river, from that point to the lower parts of the State of Indiana, to the States of Tennessee, Mississippi, Alabama, Arkansas, Louisiana, Illinois, Missouri, and to the Territories up the Missouri and Mississippi rivers; and from Portsmouth, through the Ohio and Erie canal, to Lake Erie; and through that lake to the States and Territories bordering upon it, and the lakes above and below it; and at the lowest stage of water in the Ohio river, via the great Indiana canal, when it shall be completed, (and it is in a rapid progress towards completion,) to Lake Erie and the contiguous lakes and Territories; so that arms and munitions of war can be transported by water from Louisville to every State in the West, and to several of the more Eastern and Northern States, with more facility, despatch, and security, and (it is believed) at less expense, than from any other point in the West.

As early as the year 1824, the attention of the Department of War was directed to Louisville, as the most proper place in the West for such an establishment.

In the year 1819, President Monroe, when at Louisville, after a careful inquiry and examination as to the fitness of other places in the West, expressed a decided opinion in favor of that place as the most proper for a Western armory and arsenal; and it was under his direction, and by the authority of a resolution of Congress, that a survey was made for that purpose.

In January, 1835, the act incorporating the Louisville and Portland Canal Company was passed by the Legislature of Kentucky; and, at the same time, the General Assembly of that State ceded, by joint resolution, to the United States the entire jurisdiction in and over the land and territory requisite for a national armory, there contemplated to be established in connexion with the canal, and it was confidently expected by the Department of War that Congress would forthwith make the necessary appropriations; but the distracted state of parties, and other causes, combined to produce a delay, though not an abandonment of the project. Indeed, in pursuance of the expectation that an armory would be established at the falls of the Ohio, entertained by the Secretary of War, Colonel Bomford, chief engineer of the department, (ordnance,) made distinct proposals to the canal company for the use of the requisite water power from the canal, for the purposes of the armory, and his proposal was acceded to by the company; but, owing to the causes above stated, the subject was postponed.

Now, if in the year 1825, and anterior to that time, Louisville, before the resources, facilities, and aptitudes of that place had been developed, and before the canal was commenced, was deemed the most eligible situation in the West for this great national establishment, what, it may be asked, ought to be the opinion of its fitness, now that the most sanguine anticipations *then* entertained of its resources have been more than realized?

A few of these peculiar advantages may with propriety (as the undersigned thinks) be here enumerated.

1st. The water power from the canal for propelling machinery is nothing less than the whole volume of the river, and is, of course, inexhaustible, and can be obtained at little, if any, expense, as the United States are now the owner of $\frac{29}{100}$ of the canal, and must, in justice to the commercial interests of the Western hemisphere, own, ere long, the whole of it.

2d. A site for the works, (of unimproved land,) most admirably situated, commanded by the water of the canal, with a *fall* of 27 feet, accessible at all times to navigation, can be obtained in any desired quantity, at a moderate price.

3d. No section of the Western country, nor indeed of the Eastern country, is more healthy than Louisville has been for the last nineteen years. The draining of some adjacent ponds in the years 1822 and 1823 rescued that place from intermittent fever, to which it was subject anterior to that time.

4th. As to the subsistence of workmen: The cheapness of provisions and the means of obtaining supplies from all parts of the valley of the Mississippi cannot be surpassed by any place that can be named. Indeed, the well-known fertility of the three conterminous States, Ohio, Indiana, and Kentucky, ought to silence all doubt upon that point.

5th. Iron: Pig, bloom, and bar iron can be had in great abundance, and with great facility. Within 15 or 20 miles from Louisville, there are masses of iron ore, and a furnace and forge, where castings and iron of the best quality are made, from which pig and bar iron can be transported by water to Louisville. The ore, forge, and furnace, just mentioned, are immediately upon Salt river, a stream navigable from that point to its mouth, which is only 20 miles below Louisville. There are, also, upon a navigable fork of the same river, and about 10 miles from the works just mentioned, another furnace and forge, in the midst of exhaustless masses of iron ore. But the

upper portions of Kentucky and the State of Ohio abound in iron ore and in forges and furnaces, from which iron of all the requisite descriptions can be brought down to Louisville in steamboats, when that part of the river is in navigable volume.

Iron, too, abounds in the State of Tennessee, whence much of it has annually, for many years back, been transported to Pittsburg and manufactured there. How much easier and cheaper to take it to Louisville?

Bituminous coal, in exhaustless quantities, and of excellent quality, is found upon the Kentucky river. The stream of that river is being slacked by the State from its mouth to the coal mines, and is expected to be completed during the next summer to that point. When that slackage shall have been completed, coal can, at all stages of the water, be brought to Louisville in any desired quantity, and at a cheap rate. There are also coal mines on the Ohio river, about 70 miles below Louisville, said to be of good quality, from which any quantity needed can be obtained at all stages of the water, and at cheap rate. The immense unfelled forests of Kentucky, on the margin of the Ohio river, stand pledged for the requisite quantity of charcoal. Such sands as might be needed for moulding, &c., are at the spot in great quantities. Fine clay, necessary for burnishing, &c., and building materials, too, are as abundant and cheap as at any other place in the West, an estimate of which, on a former occasion, was furnished to the War Department. Many of the above enumerated facilities are known to the undersigned, and all of them can be verified, if required.

But, upon the supposition that a site may be found equally convenient and suitable for the contemplated establishment in each or in some one of the Western States, (which is not admitted,) still it is respectfully urged that Louisville ought to be selected. Kentucky was, as it is known, for many years the Western frontier of the States of the Union, and sustained, single-handed, with but little support from Virginia, and without any from the General Government, a protracted war with the Indians *then* occupying the territory now constituting the Western States. For an early part of that war, she constituted a part of Virginia, under the denomination of county of Kentucky, separated by a mountainous wilderness from Virginia proper. Too remote for intercourse with or aid from her, she was thrown upon her own resources, meager in every thing but enterprise and valor. In these she was exuberant, and, under their inspiration, may be said to have conquered her own peace, and, by her successful incursions into the country of the savages, to have won from them their dominion, not only her own, but the territory of which the States of Ohio and Indiana are now composed. It was at the expense of the toil, the blood, and the valor of Kentucky, that those States, together with the State of Missouri, were afterwards settled in peace. The treaty made by Wayne had been almost matured by the previous conquests of Kentucky. His victories were but the last of the series which led to that peaceful result; for numerous preceding and preparatory victories had been achieved by Kentucky volunteer expeditions. It is therefore insisted that the claim of Kentucky to have the armory located at Louisville is paramount to that of any of the Western States, even upon the admission that their local aptitudes should be equal to those which Louisville presents. (The admission, however, is by no means conceded.)

No. 62.

The results of the daily tables that have been kept above and below the falls of the Ohio, are as follows, viz: When there are four feet water in the channel, the fall is twenty-four feet; and at the highest water ever known, giving forty feet in the canal, the fall is one foot four inches.

4	feet	water	in the	channel	give a fall	of 24	feet 00	inches.
5	do	do	do	do	21	"	00	"
6	do	do	do	do	18	"	00	"
7	do	do	do	do	16	"	6	"
8	do	do	do	do	15	"	00	"
9	do	do	do	do	14	"	00	"
10	do	do	do	do	13	"	6	"
11	do	do	do	do	13	"	00	"
12	do	do	do	do	12	"	00	"
13	do	do	do	do	11	"	00	"
14	do	do	do	do	10	"	00	"
15	do	do	do	do	9	"	4	"
16	do	do	do	do	8	"	6	"
17	do	do	do	do	7	"	10	"
18	do	do	do	do	7	"	4	"
19	do	do	do	do	6	"	10	"
20	do	do	do	do	6	"	4	"
21	do	do	do	do	6	"	00	"
22	do	do	do	do	5	"	8	"
23	do	do	do	do	5	"	4	"
24	do	do	do	do	4	"	10	"
25	do	do	do	do	4	"	6	"
26	do	do	do	do	4	"	4	"
27	do	do	do	do	4	"	00	"
28	do	do	do	do	3	"	10	"
29	do	do	do	do	3	"	8	"
30	do	do	do	do	3	"	6	"
31	do	do	do	do	3	"	4	"

Thus on to forty feet, [with a] diminution in each foot; making the fall at the highest water one foot four inches.

The rise in the river is not uniform, but varies almost every season; and it does not obtain its maximum height oftener than once in ten years. An annual rise reducing the fall to six feet may be calculated on. It sometimes rises above that; but the rise reducing the fall below six feet will not average in each year, for the last twelve years, ten days. A safe calculation [may be] made on eighteen feet fall for eight months in each year, twelve feet for two months, and from six to eight feet for the remaining two months.

No. 63.

CINCINNATI, *November* 6, 1841.

GENTLEMEN: At the request and on behalf of the citizens of Cincinnati, I have the honor to transmit to you, by this mail, a copy of their

proceedings, (in pamphlet form,) presenting the claims of this place and vicinity for the establishment of the proposed Western armory.

Believing you will give the subject its due consideration, and also that you will make a personal examination at this point, I remain, very respectfully, your obedient servant,

R. BUCHANAN, *Chairman.*

To Gen. W. K. ARMISTEAD,
Col. S. H. LONG,
Dr. LAWSON,
} *Commissioners, &c.*

No. 64.

Western Armory.

CINCINNATI, *September* 30, 1841.

At a meeting of the citizens held at the council chamber, on Thursday evening, September 30th, in pursuance of notice thereof, Robert Buchanan, Esq., was called to the chair, and T. H. Yeatman appointed secretary. The following resolutions were adopted:

Resolved, That, in the opinion of this meeting, the city of Cincinnati presents advantages for the site of a national armory equal, if not superior, to those of any other place in the Western States; and we owe it as a duty to ourselves and the public to make this situation and its resources known to the national authorities.

Resolved, That a committee of thirteen citizens be appointed to collect information in regard to the eligibility of this city and its neighborhood as a site for a national armory, and report the same, arranged and imbodied with such arguments as they may deem proper, to an adjourned meeting to be held when the committee are ready to report; and that their attention be directed especially to the following subjects, with such others as they may think important, viz:

1. The advantages of Cincinnati as a port from which arms may be shipped and distributed to the Northern, Western, and Southern frontiers of the United States.

2. The water power which may be furnished from the Miami and White-water canals.

3. The resources of the city, in iron, coal, wood, and other materials used in the construction of arms.

4. The facilities which may be afforded by Cincinnati as a large manufacturing city; having already in successful operation a large number and great variety of manufactories, and employing a numerous body of well-trained, skillful, and ingenious workmen.

5. The advantages of Cincinnati on account of the facilities of access by land and water; its salubrity at all seasons; the cheapness and abundance of all the necessaries of life; and its numerous facilities for the transaction of business.

6. The claims of Ohio, as a State, on account of its superior representative numbers, and in consideration of its long line of exposed frontier.

Resolved, That the chairman appoint the committee of thirteen, and be one of said committee.

Whereupon, the chair named the following gentlemen to compose said committee:

James Hall, Anthony Harkness, Clark Williams, D. Lapham, Jedediah Banks, Milton N. McLean, J. C. Vaughan, E. D. Mansfield, Jacob W. Piatt, T. H. Yeatman, Jacob Strader, M. T. Williams, and Robert Buchanan.

The meeting adjourned, ordering the proceedings to be published.

ROBERT BUCHANAN, *Chairman.*

T. H. YEATMAN, *Secretary.*

An adjourned meeting of the citizens of Cincinnati was held at the council chamber, on Thursday evening, September 21, 1841, Robert Buchanan president, and T. H. Yeatman secretary.

Judge Hall, on the part of the committee appointed at a former meeting on the subject of a Western armory, presented a report, which was adopted.

On motion, it was

Resolved, That the same committee cause the said report to be printed, and take measures to place the same before the President of the United States and Congress, and also before the commissioners appointed to examine the sites proposed for a Western armory; and that they take such measures for placing the claims of Cincinnati before the commissioners and national authorities as they may deem advisable.

R. BUCHANAN, *President.*

T. H. YEATMAN, *Secretary.*

CINCINNATI, *September* 21, 1841.

The committee appointed by the citizens of Cincinnati "to collect information in regard to the eligibility of this city and its neighborhood as a site for a national armory," have performed that duty, and respectfully present the accompanying report, as the result of their inquiries.

JAMES HALL.	E. D. MANSFIELD.
ANTHONY HARKNESS.	JACOB W. PIATT.
CLARK WILLIAMS.	THOMAS H. YEATMAN.
D. LAPHAM.	JACOB STRADER.
JEDEDIAH BANKS.	M. T. WILLIAMS.
MILTON N. McLEAN.	ROBERT BUCHANAN.
JOHN C. VAUGHAN.	

REPORT

In selecting a site for a national armory, there are two chief objects to be kept in view:

1. The comparative facilities for the manufacture of arms afforded by the several places proposed; and—

2. Their geographical position in reference to the points to which the arms are to be distributed.

Both these propositions involve considerations of great importance, because it would be in vain to select a site at which arms could be manufactured more cheaply than at other points, if that advantage should be over-

balanced by the superior expense of transporting them to the places at which they are to be used, or if delays of more or less frequency and duration would probably result from the position of the site in relation to the great natural and artificial highways which connect the extremes of our country.

The committee have therefore taken both the above branches of the inquiry into careful consideration, and, as the result, respectfully present the following facts and arguments.

The armory is to be upon the Western waters; and we assume that water is to be used as a motive power and for transportation, and that, in adopting the phrase "Western waters," particular reference was had to the Ohio and Mississippi and their navigable tributaries, on account not only of the water power, but also of the immense and unrivalled advantages they afford for transportation, for commerce, and for the various transactions of business which are inseparably connected with manufacturing operations. We assume, further, that, to secure the full benefit of these advantages, the spot to be selected should be upon one of the large rivers, affording navigation during the greater part of the year for heavy steamboats, and easily accessible at all times by land or water, and which has already secured to itself the facilities of trade and manufacturing. An armory of itself would not afford sufficient inducements to individual enterprise in its vicinity to become the nucleus of a future town, nor would it draw to itself, as a centre, any system of communications by road and canal; and if the Government acts upon the principles which would direct a judicious individual, it will seek the spot at which these advantages have been ascertained and established.

We believe that Cincinnati possesses a greater amount and a superior combination of these requisites than can be shown at any other point. Any place higher up on the Ohio will be less eligible as to navigation, and the further we ascend this river the more formidable will be this objection, until we reach Pittsburg, where it becomes, as we apprehend, insurmountable. The argument of centrality entirely ceases when we reach that point, which is on the extreme verge of the great Western valley, and at the greatest possible distance from important positions of the frontier. The obstruction of the navigation by ice continues longer, by at least two months in the year, than in the downward navigation from Cincinnati; and the interruption by low water in the summer is even greater, in the comparison between the two places. The same comparison holds good in regard to all canals and other communications by water with these places. The difference of the direct distance to Lake Erie is but small, and the actual distance to be travelled, by any communication now existing or in contemplation, is about the same; leaving them no advantages for transportation to the Northern frontier to counterbalance the serious objections to their position in relation to the South and West.

The objection of remoteness from navigation and business applies equally to all places which are interior, as respects the Ohio and Mississippi, or which are situated high up those rivers. As we recede from the great arteries of commerce, we find the distance and difficulties of transportation increased, the supply of workmen and materials more precarious, and the facilities for the transaction of business greatly reduced.

We suppose, also, that the Government, in proposing the establishment of a Western armory, is actuated by a double motive: first, by the obvious

propriety, as a matter of economy and convenience, of manufacturing arms within the district of country in which they are to be used, so as to avoid the expense and delay of distant transportation; and, second, by a disposition to distribute impartially the national expenditures, which have been made chiefly in the Atlantic States.

These being the presumed objects to be kept in view, we suppose that the location will be made within one of the Western States, and that all other places, however well situated, will be thrown out of competition. But we shall, with confidence, feel at liberty to claim the advantage of this argument, in urging for Cincinnati a preference over any other place not possessing superior advantages for manufacturing and distribution, nor being within one of the Western States. Such is the case in regard to Pittsburg, which, lying within the State of Pennsylvania, has no fair claim to a disbursement of the public money intended for the benefit of the Western States, and which we shall also show is less favorably situated for an armory than Cincinnati.

It is also worthy of remark, that, so far as the Government may be actuated by the beneficent policy of making this disbursement for the benefit of the Western people, Cincinnati affords peculiar advantages for carrying out these views. Situated in a corner of Ohio, having Kentucky within sight, and Indiana within a few miles distance, and trading almost equally with these three States, they would each derive benefit from having the disbursement made at this point. The provisions consumed would be furnished from all the three States; and the important item of iron would be supplied in nearly equal proportions from Kentucky and Ohio.

We proceed now to enumerate some of the advantages of Cincinnati:

First, as to the facilities of this place for the manufacture of arms. It might, perhaps, be sufficient, under this head, to rely upon the general proposition, that Cincinnati is now the greatest manufacturing place in the Western country. It is not only first in amount of capital, the number of persons employed, and the variety of its mechanical products, but it is unsurpassed in the excellence of its fabrics, and in the skill and ingenuity of its workmen. By means chiefly of this manufacturing population, and the unrivalled productiveness of the surrounding country, a city has sprung up here, within the memory of some of its living inhabitants, which now contains nearly sixty thousand souls; and wealth great in proportion to its numbers is exhibited in its vast business operations, its elegant and commodious private dwellings, its fine public edifices, its numerous and expensive improvements of every description. The millions of property existing here, at a spot which was a wilderness but a century ago, have been created by the labor, ingenuity, and enterprise of the people. No part of it has grown up under Government patronage, and but little has been brought here by emigrants. All has been the result of labor judiciously applied, by a population originally poor, at a spot combining an unusual coincidence of natural advantages. And the object of this brief statement is not to boast of those advantages, but to present the fair inference, that the same natural facilities for manufacturing purposes which have so rapidly promoted individual success afford the best evidence of the suitability of the spot for similar operations on the part of the Government. No argument *a priori* can be half so satisfactory as the results of actual experiment; nor can the Government derive from any investigation, however able, information so con-

clusive as the great volume of facts which so prominently attest our prosperity and so plainly indicate its causes.

We proceed now to inquire into the several points which are considered of primary importance in the selection of a site for an armory:

1. As to the water power.

Some misapprehension seems to have prevailed in regard to the amount of power required for an armory; and claims have been set up for places not otherwise conspicuous in consequence of their possessing this requisite to an extent greater than necessary. The committee have had access to the best information on this subject, as our city contains many large foundries and establishments for constructing engines and machinery of every description, some of which employ from 150 to 200 hands each. Their work is similar in kind to that done at an armory; and a portion of it, such for instance as the boring of large cylinders for steam engines, requires as great power as ever would be used at an armory; yet the motive power requisite for such work is small, and forms an inconsiderable item in the expenses. We have also examined a valuable report made in January, 1825, by Colonel McRae, and Lieutenant Colonel Lee, and Captain Talcott, commissioners appointed by the Government to examine sites for a Western armory. Assuming the armory at Springfield, Massachusetts, which then worked 250 hands, as the model, they estimate the desired water power as equal to that which would propel twelve pairs of millstones of five feet diameter, but intimate an opinion that this would be a liberal allowance. Some of our most experienced machinists here suppose that half that power would be abundant, judging from what they actually use in similar work. Perhaps the improvement in machinery in the last seventeen years may account for this discrepancy. But, taking the higher estimate, (that of the commissioners,) we can furnish from the Whitewater canal, which will be completed within the present year, all the power that would be required. This canal, as originally projected, was to extend from Cambridge city, on the National road, in Wayne county, Indiana, to Lawrenceburg, on the Ohio, in the same State; and it is finished from Brookville to Lawrenceburg, 40 miles. Under a charter from Ohio, a canal, uniting with that of Indiana, has been cut from Whitewater to Cincinnati, a distance of 25 miles, which passes North bend, one of the points examined by the commissioners above mentioned. In their report, North bend is favorably mentioned in comparison with the same places which are now prominently presented in competition for the armory, although among the estimated expense of the erection was included that of bringing the water to North bend from a distance necessary to give the required head, which would have been about $250,000, but which has now been done by the construction of the Whitewater canal. This power, which is as yet wholly unappropriated, is sufficient to run ninety pairs of millstones of four and a half feet diameter, or double that number, should an increase be needed, by an additional expenditure of about $60,000.

The surface of the water in the Whitewater canal will be about 54 feet above the low water of the Ohio. The annual rises of the Ohio, at this point, are estimated at from 35 to 45 feet, and the continuance of the water at the highest point is very brief—usually but 3 or 4 days. The interruptions from the ordinary freshets occur so seldom, and are of so short duration, as to be considered of no importance. The great rise of 1832 attained the height of 60 feet, but no similar [one] had occurred before that time

since the year 1795, when the high water attained an elevation of about 54 feet, and the Indians spoke of an extraordinary rise at an anterior but distant date. These remarkable freshets, caused by very rare combinations of atmospherical phenomena, appear to occur at intervals of 40 to 45 years. Their effects are by no means destructive to permanent buildings, as the velocity of the stream is confined to the natural channel, and the portions of water which overflow the land have little or no perceptible current. We mention this as the only inconvenience attending the location on this canal; but it will be found to exist at every other site having similar advantages for navigation; and we consider it but slight in itself, and greatly overbalanced by the superior advantages of Cincinnati in other respects.

A gentleman* of great scientific attainments and accuracy of research, who investigated this subject carefully in 1832, in reference to the great rise of that year, supposes that these extraordinary freshets do not occur more frequently than once in 50 years. It is worthy of consideration, whether the annual floods of the Ohio will not probably be gradually decreased by the removal of obstructions from its channel, and also by clearing of the country, and the consequent increase of evaporation.

It is to be remarked, that the above estimates apply to a location on the Whitewater canal at Cincinnati, and that the danger of interruption from high water would become less as we recede from the city towards North bend. The canal having a descent of 1 inch per mile, there would be 15 inches of elevation gained by placing the armory at the latter place; and, the river having a descent of from 3 to 4 feet between the same points, the whole gain, as between the surface of the canal and the low-water mark of the river, would be about 5 feet. The elevation of the canal there would be 59 feet, and the highest ordinary rises being 45 feet, there would be 14 feet of water power left above such rises. The result is, that at Cincinnati a wheel of 9 feet diameter, which we suppose would be sufficient, or at North bend a wheel of 14 feet, would never be interrupted, except by the extraordinary freshets. At North bend, the buildings placed on the ground would be never incommoded by high water, and at Cincinnati they could be protected from that inconvenience by a basement of 3 or 4 feet.

An important recommendation of the Whitewater canal is found in the fact that the water power is distributed along the last level of the canal, which reaches from North bend to Cincinnati, a distance of 15 miles, so that a location may be chosen for these works either in the city or at North bend, or at any other intervening point which may be considered preferable. This option of a city or country location, or of a spot combining the advantages of both, is considered as deserving the special attention of the Government.

If, however, a site within the city is desirable, it can be procured entirely above the rise of the highest water, in an eligible situation, with a power from the Miami canal sufficient to turn 6 pairs of 5-feet millstones.

2. As to the resources of this place in iron, coal, and other materials.

The iron of the region embracing the mouth of the Scioto, and extending on both sides of the Ohio for 50 miles, is superior in quality, for the purpose of making the finer description of castings, to any in the United States. It is unsurpassed by any metal known to most experienced manufacturers who have used it; and we risk but little in asserting that it must be used in

* Dr. Locke.

the national armory, wherever it may be established. It is now carried to Pittsburg in large quantities, and has been substituted for the iron of that region in all works that require the best kind of metal. Whether the contemplated armory be established at Pittsburg or at Cincinnati, it would necessarily be resorted to as the best, and, indeed, the only suitable metal to be had at either place; and the difference between the two places would be, that to the former place it would be carried against the current of the Ohio 500 miles, while to the latter it would be floated with the current 120 to 150 miles. The actual difference in the price of this article is usually about $4 in favor of Cincinnati; when the navigation is interrupted by low water or ice, it is greater; and, at the date of this report, this description of pig metal is selling here at $25 per ton, when it is quoted at Pittsburg at $31 to $33. Placing the difference at $4 per ton, which is the lowest estimate, there is an advantage of nearly one-sixth, as between Cincinnati and Pittsburg, in favor of the former, in the price of the most expensive article used in the manufacture of arms.

In the article of malleable bar iron, Pittsburg has heretofore stood unrivalled, the Juniata iron having been decidedly preferable to any other; but the bar iron now manufactured from the Scioto or French Grant metal is in all respects fully equal to that made from the Juniata ore, and can be supplied here in any desired quantity, at the same price at which the Juniata iron can be afforded at Pittsburg.

With regard to both pig and bar iron, the supply at this point is abundant and inexhaustible. There are now in the French grant, and the adjacent region in Kentucky, twenty-seven furnaces, furnishing one hundred tons of metal per day; and any possible increase of demand will, no doubt, be met by a corresponding addition to the means of bringing the ore into marketable form.

The next important article is coal. The kind which is used for working iron, both here and in Pittsburg, is the coal of the Monongahela; no other coal is so suitable for such work. It is supplied to the manufacturers here at an average of nine cents per bushel, and to those at Pittsburg at four and a half cents; and as this article has been supposed to be of primary importance, a preference has been claimed for Pittsburg on account of its greater cheapness at that place. But this view is founded in error. One ton of coal is required to work one ton of iron. A bushel of coal weighs seventy-eight pounds; a ton of coal, therefore, is twenty five and two-thirds bushels, which, at nine cents per bushel, would be $2 31; and, at four and a half cents, would be $1 15½.

The question, then, as between those places, would stand thus:

At Cincinnati, there would be a saving in the cost of the pig metal of $4 per ton; at Pittsburg, there would be saved on coal $1 15½—making a difference in favor of Cincinnati, on each ton of iron used, of $2 84½. We have also other sources of supply of these essential articles. The State of Kentucky is now carrying on an improvement of the Licking river, which empties into the Ohio, opposite this city, by means of which that stream will be made navigable by dams and locks for 231 miles from its mouth. The completion of this work may be speedily looked for. Five locks are under contract, and nearly completed, which will carry the navigation 51 miles into Kentucky; and the remainder of the work will probably be pushed forward to an early completion. The region penetrated by this work is rich in iron and coal. Iron is found in large quantities on the

banks of this stream, 140 miles from its mouth; and inexhaustible beds lie higher up. Furnaces and forges have been at work for a number of years. Some of the iron which has been brought to this city has been found to be of excellent quality. Of this there are two kinds; one of which is a very superior article, similar in kind to the French Grant iron, and fully equal to it. The coal is also abundant and of good quality.

Of the various other articles used at an armory, such as black walnut wood for gun stocks, charcoal, linseed oil, paper, &c., it will be seen that all these are among the staple products of our soil or manufactures; and the inference is fair, that a regular supply, at moderate prices, may be depended upon.

3. Of the facilities which may be afforded by Cincinnati as a large manufacturing city.

We have already stated the fact that this is a large manufacturing city, having now in successful operation a great number and variety of manufactories, employing a numerous body of well-trained, skilful, and ingenious workmen. This advantage is so obvious, that it need hardly be urged further than to establish the facts upon which it is asserted.

By the census of 1840, it appears that the manufactures of Cincinnati amount to the annual value of $14,541,882; but, by a more detailed statement made since by Mr. Charles Cist, in a work entitled "Cincinnati in 1841," those manufactures, and the number of citizens employed in them, are specified with as much accuracy as is probably attainable, as follows:

Manufactures.	Number of workmen.	Annual value.
In wood, principally or wholly	1,557	$2,222,857
Iron	1,250	1,728,549
Other metals	461	658,040
Leather, entirely or principally	888	1,068,700
Hair, bristles, &c.	198	366,400
Cotton, wool, linen, and hemp	359	411,190
Drugs, paints, chemicals, &c.	114	458,250
Brick, earthen ware, stone, &c.	301	238,300
Paper	512	669,600
Provisions	1,567	5,269,627
Science and the fine arts	139	179,100
Buildings	1,568	953,267
Miscellaneous	1,733	3,208,790
	10,647	17,432,670

We annex in an appendix, for more particular reference, the tables showing the particulars under each of the above heads, and of which the foregoing is the general aggregate, showing the number of persons now employed in our manufactories and mechanical business and arts to be 10,647, and the annual value of our products to be $17,432,670.

It will also be seen that those products embrace almost every variety of mechanical labor and ingenuity known to our country; and, when it is considered how much every division of mechanical industry is dependent on kindred branches, it will be seen that this is no unimportant recom-

mendation. However complete a Government armory may be, and however numerous the branches of art it may embrace, it will not always be prepared for the construction of every article that may be needed, and resort must sometimes be had to private establishments. At Cincinnati, this kind of assistance can be well supplied, as there is no art or branch of art which may be required in the public work that is not prosecuted here.

On the great principle of division of labor, so successfully practised in England, another important suggestion presents itself—namely, the economy and perfection of workmanship which would be obtained by procuring by contract from individuals and private establishments the separate parts of many of the articles fabricated at an armory, and putting them together at the public workshops. The variety of branches of art carried on here, the perfection they have attained, and the great number of workmen engaged in them, would yield facilities for the minutest subdivision of labor that might be desirable, and for a competition that would bring the labor to its minimum price, while the patronage thus extended by the Government to private enterprise would stimulate its energies, and greatly tend to enlist the favor of the public towards the operations of the Government.

It is also a fact, that our manufactured articles are of superior quality. It was long since discovered, that, if the products of our workshops were only equal in workmanship to those of the Atlantic States, from which all our supplies had been drawn, we could not compete with them successfully, as they had the advantage of an established reputation, and, consequently, of a settled public opinion in their favor. It became necessary to excel them, and to this end the energies of our mechanics and manufacturers were judiciously exerted. The best materials were brought into use, the most improved inventions and the most skilful workmen were imported from the Eastern factories, and a systematic effort was employed to produce the finest specimens of art. So successful have been these endeavors, that many branches of art have been brought to the highest degree of perfection, and the Eastern articles, which had competed with ours, have been driven from the market. The ambition to excel, and the conviction that by excelling only we could establish and sustain a high character as a manufacturing place, have pervaded all our workshops, and raised up that efficient body of intelligent and well-trained mechanics, of which we are justly proud.

In placing their armory here, the Government would secure the benefit of all the skill and experience which have been collected by private enterprise, and they would be certain, in any emergency occasioned by the loss of workmen, or by the necessity of increasing their working force, of being able to procure the best artisans for any branch of work; and it is also worthy of consideration, that the sciences, as connected with the useful arts, have been extensively cultivated here; and that, in addition to an admirable system of public schools, there are institutions fostered here for the special instruction of young mechanics.

The completeness of machinery in many of our workshops is but imperfectly known, even among ourselves; but the subject is one which, to do it justice, requires greater minuteness of description than is attainable in a brief report. There are branches of art which can only be carried on successfully by the aid of complicated machinery of great power and accuracy. Such machinery is seldom the result of a first attempt, because much of its success depends upon the climate, the quality of the materials

composing it, and other circumstances, which vary in different places. Its perfection here has been attained by repeated and persevering experiments; and there is now scarcely any mechanical process, however difficult, which cannot be effected by our excellent and powerful engines.

All these considerations give to Cincinnati very decided advantages for manufacturing over any other place at which the mechanical arts are not in operation, or where they are pursued upon a narrower scale.

4. The advantages of Cincinnati on account of the facilities of access by land and water, its salubrity at all seasons, the cheapness and abundance of all the necessaries of life, and its numerous facilities for the transaction of business.

As the first of these points will be included under our observations in regard to the transportation of materials and arms, we shall touch it here but briefly. It is obviously desirable that the armory should be located at a point central and easily accessible from various directions, and possessing facilities for the conveyance of mails and passengers. These conveniences would greatly expedite the transaction of business at all times, but during the existence of a war they would be indispensable. The success of an important military movement, or even of a campaign, might depend on the rapid conveyance of intelligence between the depot of arms and the army to be supplied.

In this particular, Cincinnati presents unrivalled advantages. Our mails are now carried to Baltimore and other Eastern cities by a connected chain of railroads and macadamized turnpikes, so that the mail from Baltimore reaches us in 3½ days; and the improvements in progress, by increasing the proportion of railroad conveyance, will, in a few years, greatly shorten even this rapid transit of intelligence. The completion of the Little Miami railroad from Cincinnati to the intersection of the Cumberland road at Springfield, which may confidently be looked for within the next two years, will shorten the time by several hours. The same road will be completed to Sandusky in three or four years, and will thus open a rapid communication with the Northern frontier. A fine turnpike, in a rapid progress, between this place and Lexington, Kentucky, and more than two-thirds of which is done, will unite there with the great road from Maysville to Nashville; and there are, in all, 1,125 miles of canals, railroads, and turnpikes, branching off from Cincinnati in every direction; besides which, the Ohio and Mississippi, with their tributaries, furnish highways which extend throughout the West and South; and the active enterprise of our citizens, keeping pace with the latest improvements in machinery and ship building, has improved these facilities by the construction of fast steamboats, and particularly of a small class of boats which pursue the downward navigation throughout the whole of the low water of ordinary years.

The healthfulness of Cincinnati and its vicinity, at all seasons, is unsurpassed. In the summer and fall, we are entirely exempt from the epidemics which prevail at more southern locations.

In selecting the locality for an establishment at which a considerable number of workmen with their families will be collected, the facilities for procuring the various articles of food form an important consideration. In this respect, Cincinnati stands unrivalled; it is the largest provision market in the United States.

It will be seen from the subjoined tables, referred to above, that the various articles of food manufactured and prepared for market at this place amount annually to - - - $5,261,626

From data procured at the collector's office of Miami canal, we have ascertained the quantity of a few of the principal articles of produce brought to Cincinnati in the year 1840, and from dealers in those articles an estimate of the quantity arrived by wagons, chiefly from the same valley, which are as follows:

Flour, by canal - -	165,762 barrels.		
Flour, by wagons -	40,000 barrels.		
		205,762, at $3 50	720,167
Whiskey, by canal -	74,026 barrels.		
Whiskey, by wagons -	7,400 barrels.		
		81,426, at $7 00	569,982
Pork, by canal, 17,687 barrels, at $12 per barrel - -			212,224
Pork, by canal, 787 hogsheads, at $40 per hogshead - -			31,480
Pork, by canal, 2,192,160 pounds, in bulk, at 5 cents - -			109,608
Beef, by canal, 865 barrels, at $10 per barrel - - -			8,650
Beef, by canal, 12,138 pounds, at 5 cents per pound - -			606
Lard, by canal, 20,638 kegs, at $3 per keg - - -			61,914
Pork, lard, and beef, by wagons - - - -			1,000,000
Corn and oats, by canal and wagons - - - -			300,000
The receipts of the same articles through the Portsmouth canal, from the 1st December, 1840, to the 1st of October, 1841, as ascertained from the collector's office, amount in value, at the above prices, to - - - - - -			734,890
Add one-sixth for the unexpired two months of the year -			122,481
			9,141,629

The completion of the Whitewater canal, within the year, will bring to this market the produce of 400 square miles of the most productive counties of Indiana, which, compared with the country drained by the Miami canal, is as twenty-five to eighteen in favor of the Whitewater canal. The Miami valley is the oldest and best settled, but the difference in this respect is daily decreasing; and, as the provisions received by the Miami canal greatly exceed one million, it will be a moderate estimate to set down those which will be received by the Whitewater canal at the annual value of one million.

And if to this be added a variety of small articles, which are known to form an immense aggregate, but of which the particulars cannot be obtained, such as potatoes and other vegetables, poultry, butter, eggs, cheese, apples, and dried fruit, and also the further increase by the Lexington turnpike and Licking river improvement when completed, another million of dollars may be safely computed, and the whole amount of provisions brought here, for sale or shipment, will be found to be at least eleven millions of dollars annually, which, at the present value of the army ration, would provision an army of more than 150,000 men throughout the year. So that this city alone can furnish the provisions for any number of troops which this Government will ever be obliged to maintain in a war with the greatest Power of Europe.

The various facilities for business at this point may be inferred from the activity and magnitude of its operations. An economical Government, desirous to obtain its ends by the cheapest means which are consistent with their most perfect accomplishment, should avail itself of all the facilities which nature, aided by private enterprise, has accumulated, at a spot happily situated for the purposes in view, and thus avoid unnecessary expenditures for overcoming natural obtacles and creating the artificial advantages which attend the established relations of business. Business cannot easily be forced out of its regular channels, and in making the attempt the Government would pay an extravagant premium for a purpose not desirable in itself. They will find here in complete operation all the institutions of social order, and all the ramifications of well-organized business, of some of which they would at other places be and remain destitute, while others they would be compelled to create, perhaps imperfectly, at an inordinate expense..

A republican Government, looking to the good of all its citizens, however humble, should have a care for the comfort, the prosperity, and the morals of those who are in its employ. Of the 250 workmen collected at this armory, many will have families, making an aggregate of not less, probably, than 1,000 souls, whose social condition will be seriously affected by the choice of the location. It would be a pernicious and anti-republican policy, which, to benefit a favored section of country, or to secure a non-essential advantage to the Government, should place all these individuals at a spot where they would be deprived of health, of a cheap and comfortable subsistence, of the advantages of society, or of the means of education and religious instruction. We offer them all these; for it is to the existence of all these that we owe the continual influx of a valuable population of the working class.

They will find a community of mechanics, and a system of institutions built up by the labors of this class of citizens, and adapted especially for their benefit. At most of the places spoken of, south of this location, the mechanic arts have been but little encouraged, labor is not respected, and the condition of the working man is not so comfortable as it is with us. Our temperate latitude ensures a favorable medium of temperature for labor and for health. Our abundant markets and numerous workshops supply food, clothing, furniture, all the necessaries and many of the luxuries of life, at a cost within the reach of the mechanic. The many useful and liberal institutions established here, in which mechanics bear a part, give employment to their leisure hours, and elevate them to their proper standing in society.

Another important advantage to the mechanic here consists in the variety of arts and professions carried on at this point, which affords to a family of several individuals, following different branches of business, the opportunity of finding employment at the same place. The father of a numerous family may consult the capacity and disposition of each, and train them all up to different callings, without being forced into the painful and demoralizing necessity of breaking up the family circle.

Our city offers a further inducement, which, others being equal, should give it a decided preference over other places not possessing the same important institution. We have a system of common schools, sustained by taxation, at an annual expense of $25,000, employing 69 teachers, and offering gratuitous instruction to all the children between six and sixteen

years, residing within the school districts. Nine spacious and well-constructed brick edifices, built for the purpose, in different parts of the city, accommodate these schools, in which solid instruction is given in all the branches of an ordinary English education, by faithful teachers, under the supervision of efficient boards of examination and inspection. The means of instruction are not only ample, but well administered; the schools are fully equal to the best private schools of the same grade, and furnish all the education that is desirable, in most cases attainable, for the common purposes of life. They have, to a great extent, superseded the private schools. There are, however, a number of the latter, much improved by the competition of the public schools, and which, with two excellent colleges, complete our admirable facilities for education.

Second. The next general subject to which the attention of the committee has been directed has reference to the geographical position of Cincinnati, and the facilities which it affords for the distribution of arms.

In the report of Colonel McRae and others, already referred to, we find that the advantages for distributing arms are considered as of minor importance. The commissioners say:

"We do not perceive any reasons of a military nature that can materially affect the relative value of different sites, in consequence of their respective distances from the points at which the consumption of arms would probably occur in time of war.

"To consider the relations of an armory in the same light with those of a magazine or arsenal would be an error; the means of production being the principal requisite for the one, and those of conveyance for the other."

This opinion is certainly entitled to great respect, and we should not object to its adoption in the fullest extent; for, if the means of production be considered as alone important, Cincinnati would stand without a rival, as we have here the facilities for mechanical production, both natural and artificial, ascertained and developed to the utmost extent. But if it be meant that the facilities for distribution are of secondary importance when compared with those for manufacturing, we shall not dissent from the proposition, but shall proceed to vindicate the superiority of our position in this respect also.

The primary purpose of an armory is to manufacture arms, but the transportation of them to the points at which they would probably be required is also important; and, when these advantages can be combined, we conceive that neither of them should be overlooked.

The superior facilities of Cincinnati for forwarding arms in opposite directions would be important, in obviating to some extent the necessity of having depots at points nearer to the seat of war, and more exposed to danger. If the transportation to the lake shore can be effected in 24 hours, a depot near to that frontier would hardly be considered necessary. The supplies could be renewed, from time to time, whenever required, and damaged arms could be returned for repair; while, if a longer time was to be consumed in reaching the seat of war, there would be a greater expenditure of time and money, the supply would be slower and less certain, and the danger of failure in a critical emergency would be increased.

A glance at the map will show the central position of this city, in regard to the frontiers which must be supplied from a Western armory. The most important of these is the frontier dividing this country from the possessions of Great Britain. Of the great lakes which separate Upper Canada

from the Western States and Territories, Lake Erie is the most southern, bounding a portion of Ohio, and approaching to within 200 miles of Cincinnati on a direct line; while beyond this State, to the east or west, the boundary recedes to the north. On the other hand, the Ohio river, after running southwest for about two-thirds the distance between its head and Cincinnati, suddenly changes its course to the northwest, and continues that direction until it passes North bend, when it again turns to the south. Thus, after descending the Ohio 600 miles, and passing its shoalest water, we are here, in consequence of the southward curve of the frontier line and the northward bend of the river, brought to within 200 miles of the frontier, while there is no eligible point for an armory on the same river further up, which lies nearer to that line; nor is there any point above or below by which it can be so easily reached.

As we recede south or west from Cincinnati, the access to the northern line is rendered more difficult, and the disadvantages of an ascending navigation and of transhipment incurred; and there is no point north of this place affording equal facilities for navigation to the South and West. From Pittsburg, or any place in that region, the navigation of the Ohio is suspended by low water, during the summer and part of the autumn of every year; while from Cincinnati the interruption from this cause is only occasional, and then for short periods. Having reached Cincinnati, no advantage for navigation would be gained for downward navigation by selecting a site lower down, because, when boats can get out of the Ohio from any place above the mouth of the Cumberland, they can also get out from Cincinnati. During the present season, for instance, when the river has been as low as usual, and within four inches of the lowest state known in the most unfavorable seasons, the smaller class of boats have continued to run downwards without cessation, while the communication with Pittsburg is entirely cut off.

The obstruction of the navigation by ice commences earlier and continues later, and occurs more frequently, at Pittsburg than at Cincinnati; giving to us an advantage of six or eight weeks more of navigation in the course of each winter. This objection applies to all the canals and other communications by water, and also to the use of water for water power; and affords an insuperable reason against the selection of a place in that latitude. The difference of one degree and a half of latitude, and of an elevation equal to at least one degree of latitude, together with the vicinity of the head waters of the Ohio to the cold regions of the mountains, sufficiently indicate the causes why the temperature must be so much lower than ours as to produce the effects we have stated; and the fact that the largest portion of the tributary streams of the Ohio enter it far from the south affords reason for presuming a still greater difference in the temperature of the water and the formation of ice.

It is one of the peculiar recommendations of this spot, that, while we are far enough from the frontier to be entirely secure from the possibility of danger from the enemy, we are near enough for the purpose of affording supplies; and that, while protected by distance and by a large interposing population, the great resources of the Ohio and the energy of its people are daily adding to its facilities for intercommunication. The channels which commerce is continually opening and improving, for the transportation of the immense products of our soil and industry, will always be amply sufficient for the Government in peace or war.

The communication between this place and Lake Erie is now open, by means of the Ohio river and the canal from Portsmouth to Cleveland. The distance by this route is 420 miles.

The Miami canal is completed to Loramie—97 miles; in two years more it will probably be finished to Defiance, at the junction of Maumee and Auglaize, a further distance of 95 miles, where it will intersect the Lake Erie and Wabash canal; thence, by the Maumee river, to Lake Erie, is 58 miles—making the whole distance 250 miles.

The Little Miami railroad, intended to unite Cincinnati with Sandusky, is now in rapid progress. The whole length of this road will be 210 miles, of which 54 is now finished, viz: 38 miles from Sandusky and 16 from Cincinnati; 40 miles more will be completed next year, viz: 15 miles from Sandusky and 25 miles from Cincinnati; and 36 miles more is graded—making, in all, 130 miles complete and in progress; leaving 80 miles, which will probably be finished in two or three years. The completion of this work, which will probably take place as soon as the armory, will afford the means of transporting arms from this place to the lake in 24 hours. We come, then, to the conclusion—

1. That in regard to supply of metal and other materials, and of workmen, the facilities for manfacturing, the climate, health, subsistence, domestic comforts, and social advantages, Cincinnati presents a combination of favorable circumstances which places her far above competition. If some of these advantages exist elsewhere, there is no other place at which they are all united.

2. The water power is sufficient.

3. That, for conveyance and distribution, the advantages of Cincinnati are equal to those of any other place—superior to those of most other places.

If to an establishment for the fabrication of small arms, it should be contemplated to add a foundry for cannon, all the above facts and arguments would apply more forcibly in our favor, as the quantity of iron required and the weight of transportation would be greatly increased; and our metal is peculiarly adapted for that purpose. The castings made from the French Grant iron have a superior lightness and tenacity, with a smoothness and polish which recommend it as an uncommonly excellent material for cannon.

In the report of Colonel McRae and others, before referred to, we find our views fully corroborated. They say, speaking of North bend:

"This site offers, in several respects, peculiar advantages. The extent and fertility of the adjacent country [and] its proximity to Cincinnati will assure to it a plentiful supply of provisions, and the command of all necessary supplies of materials and labor.

"The navigation of the Ohio is free from many of the impediments which exist at higher points. The health of the place is comparatively good, and the volume of water afforded by the Miami at its lowest stage is abundant."

These remarks were made seventeen years ago, when the resources of this vicinity were but partially developed. The vast area of fertile country of which it is the centre, its national facilities for trade and navigation, and its latent water power, were sufficiently obvious; but its extensive manufactories, its artificial communications with distant points, and the water power of the canals, have since been added. Since then, the popu-

lation of Cincinnati has been quadrupled; and the increase of its wealth, mechanical energies, and commerce, has been still greater.

In another respect, the change produced by a few years is remarkable. The commissioners assume that the Juniata iron and the coal at Pittsburg must be used at the armory, wherever situated; and in all their estimates they give to Pittsburg the important advantage of furnishing these articles, while to all other places the cost of the freight of these articles is added. However true this was in 1824, it is no longer so; Pittsburg has ceased to be the great emporium of iron. A richer metal has been found in our vicinity, in beds of inexhaustible magnitude; and we now supply to Pittsburg, not only that material, but a large proportion of the provisions which feed her laborers.

We close with the remark, that, in case of war with Great Britain, Ohio will form an important member of the United States. Her frontier will be exposed; her population of one million and a half will stand in the front rank of danger. Self-defence will oblige her citizens to stand forth in protection of the national liberty and honor. The Government must look to us for men and provisions. Our firesides, our soil, and our workshops, must furnish the sinews of war. Those rich resources and great energies which have fed the streams of our commerce and manufactures will furnish abundant stores for the sustenance of troops and navies. If the communications with the frontier are not sufficiently numerous and rapid, they will then necessarily and promptly be made so by the public treasure and the protection of the people. And if it be desirable, as a matter of pride or of interest, to have this national establishment among us, Ohio, as foremost of the Western States in population, in resources, and in exposure, has a fair claim to the preference.

No. 65.

CINCINNATI, *August* 11, 1842.

GENTLEMEN: The following notes respecting the Cincinnati and Whitewater canal are respectfully submitted:

The surface of the water in the canal at the south end of the tunnel at North bend is 58.11 feet above extreme low water of the Ohio river, on the 30th September, 1838.

The great flood on the 18th February, 1832, was 60.11 feet above the low water on the 30th September, 1838. The banks of the canal being about two feet above the water in the canal, the top will be level with the flood of 1832.

The flood of 1815 was 5.67 feet below that of 1832 at North bend, as ascertained by actual measurement of permanent water marks. The flood of 1793, as near as could be ascertained from verbal statements, was three feet below the flood of 1832.—(*Judge Matson.*)

The highest rise of water in March, 1842, was 13.50 feet below the surface of the water in the canal at North bend. This rise was about the height to which the river usually attains; and no flood since 1832 has exceeded this more than one foot.

The proposed feeder, to introduce water from the Miami river, will be three miles and sixty chains long.

The dam will be eight feet high above the surface of the river below Matson's mill dam. Its length will be 500 feet.

The fall in the bottom of the canal, from the junction of the proposed feeder to the city, is 7-100ths of a foot per mile.

The cross section of the canal is twenty-six feet wide on the bottom, forty feet at the surface of the water, and the water four feet deep; making an area of 132 feet.

The capacity of the tunnel below the surface of the water is 5.50 feet depth, and 24 feet width; making the same area, 132 feet.

D. LAPHAM, *Engineer.*

To the ARMORY BOARD.

No. 66.

WAR DEPARTMENT, *August* 19, 1842.

SIR: I transmit, herewith, a copy of resolutions of the General Assembly of the State of Ohio, presented to this Department by fifteen members of Congress from that State. The source from which the resolutions come demands great consideration; and I have to direct the attention of the "board of officers for selecting a suitable site on the Western waters for the establishment of a national armory" to the point and site indicated.

Very respectfully, your obedient servant,

J. C. SPENCER.

Brig. Gen. W. K. ARMISTEAD, *U. S. Army,*
President of Board, &c., Cincinnati.

No. 67.

Resolutions in relation to the contemplated Western national armory.

Resolved by the General Assembly of the State of Ohio, That our Senators and Representatives in Congress be, and they are hereby, requested to use their best endeavors to procure the detail of a corps of topographical engineers, to make examinations, surveys, and estimates, in the coal and iron region of this State, and of Greenup county, in Kentucky, with a view to the selection of a site for the location of the contemplated armory in the West, at or near a point on the banks of the Ohio river, near the present termination of the Ohio canal, and at or near a place commonly known as "Bradford's ship yard," situated below the mouth of the Scioto river, in the county of Scioto; and that the consent of this Legislature is hereby given to any sale and conveyance of his land, by James Bradford, to the United States, for the purposes of the armory.

Resolved, further, That a copy of the above resolution be forwarded to each of our members of Congress, and to the President of the United States, to the Secretary of War, to the Colonel of the Ordnance Department, and to the Colonel of the Topographical Bureau.

RUFUS P. SPALDING,
Speaker of the House of Representatives.
JAMES T. FARRAN,
Speaker of the Senate.

MARCH 7, 1842.

SECRETARY OF STATE'S OFFICE,
Columbus, Ohio, March 8, 1842.

I hereby certify, that the foregoing is a true copy of the original resolutions on file in this Department.

J. S. WARRE,
Secretary of State.

No. 68.

PHILADELPHIA, *December* 20, 1841.

Gentlemen of the Board of Commissioners charged with the selection of a site for the Western armory:

In view of both the public as well as individual interest, I am impressed with the belief that I could not but promote, to a certain extent, the object of your search, by respectfully pointing out to you, as a suitable site for a national armory, a spot which, for its never-failing water power, stands, perhaps, unrivalled on our Western waters.

It is situated in the northern section of the State of Kentucky, on the south side of the Tug fork of the Big Sandy river, which there, and to its confluence with the Ohio, forms the boundary between the States of Kentucky and Virginia. From its mouth at the Ohio upwards, for twenty-seven miles, the Big Sandy is navigable for flat-boats at all seasons of the year. At that point the river forks into the Louisa fork and the Tug fork of the Big Sandy; and there is situated the thriving town of Louisa, which is, moreover, the seat of justice for Lawrence county, Kentucky. Twelve miles further up the Tug fork, we arrive at a tract of land of a mountainous character, well timbered and abounding in iron ore, which belongs to the estate of my late father-in-law, D. Caldwell, formerly of this city, deceased—as one of whose executors I now have the honor to address you.

An exact copy of the original patent, and a diagram, elucidating the relative position of the tract under consideration, are herewith enclosed. From the letter, you will perceive that Rockcastle creek, after a short pasage through Mr. Caldwell's land, falls into the Tug fork, probably not exceeding twenty yards above the falls of Tug, which are about one hundred yards wide across the river to the Virginia side, at a height of from twelve to fifteen feet. There are sufficient bottom lands on both sides of Rockcastle creek for the erection of the most extensive buildings; while saw mills, erected on the spot, could furnish any quantity of lumber which might be required. Air and climate are salubrious.

Should this communication be deemed worthy of a favorable notice, I would beg leave respectfully to suggest the propriety of securing, by purchase, a farm or tract of land on the opposite or Virginia side, containing about 500 acres, which, besides its value for its agricultural produce, would prove of the very highest importance, on account of controlling the water power on both sides of the river. Territorial cession of such land, acquired by the Federal Government, it is believed, can be easily obtained from the respective States.

With respect to the terms upon which the Caldwell tract can be obtained,

I feel authorized to say, for the present, the demand of the heirs and executors will be reasonable, and that none but a clear title will be offered.

With assurances of the highest personal respect, I have the honor to be, gentlemen, your most obedient servant,

EDWARD F. RIVINUS,
Executor of the estate of D. Caldwell, deceased.

To the BOARD OF COMMISSIONERS
for selection of a site for national armory on Western waters.

No. 69.

PITTSBURG, *March* 3, 1841.

GENTLEMEN: A committee was appointed by the citizens of Pittsburg for the purpose of procuring information, to be submitted to the board of officers selected to make examinations with a view to the establishment of an armory on the Western waters. This committee will be happy to facilitate the examination which you may institute in reference to this place and its vicinity, and respectfully desire to be permitted to lay before the board such information as we possess, and as shall be collected, in relation to the various subjects to which your inquiries may be directed.

Pittsburg has always been regarded as possessing peculiar advantages and facilities, which render it worthy of a favorable consideration. We hope it may not be incompatible with your instructions to visit this place in the prosecution of the duty assigned to you. The committee will esteem it a great favor to be informed of the time when the board might be expected here.

With great consideration, I remain your obedient servant,

HARMAR DENNY,
Chairman of Committee.

To General ARMISTEAD,
Colonel LONG, and
Doctor LAWSON, } *St. Louis.*

No. 70.

SIRS: In compliance with your request, I herewith transmit you a statement of the arrivals of vessels of various classes at the port of Pittsburg, and the tonnage of the same, for the years 1839, 1840, and 1841.

Very respectfully, your obedient servant,

THOMAS McFADDEN, *Wharfmaster.*

Gen. W. K. ARMISTEAD,
Sur. Gen. T. LAWSON,
Col. LONG. } *Commissioners, &c.*

Arrivals and tonnage of steamboats, and depth of water in the channel, for the year 1839.

Months.	Arrivals.	Tonnage.	Water in the channel.					
			1st of month.		15th of month.		Water highest.	
			Feet.	*Inches.*	*Feet.*	*Inches.*	*Feet.*	*Inches.*
January - -	67	5,449	Ice	-	5	6	Ice.	
February - -	96	7,586	Ice	-	6	3	12	6
March - -	209	20,734	7	6	7	2	11	0
April - -	199	17,928	9	6	8	4	9	6
May - -	182	16,973	4	10	4	2	11	2
June - -	179	17,641	8	9	13	6	16	0
July - -	155	11,916	8	6	5	0	9	0
August - -	92	5,881	6	0	3	1	5	11
September -	117	8,664	3	0	4	9	9	6
October - -	21	1,524	3	6	2	6	3	4
November -	46	5,002	2	0	2	10	5	2
December -	55	5,060	4	9	3	10	5	2
	1,418	124,408						

Arrivals and tonnage of keels, barges, and flat boats, for the year 1839.

Months.	Arrivals of keels and barges.	Tonnage of keels and barges.	Arrivals of flat boats.	Tonnage of flat boats.
January - -	11	245	30	335
February - -	14	310	21	475
March - -	38	868	34	610
April - -	42	893	43	745
May - -	45	955	57	820
June - -	22	477	27	285
July - -	24	650	18	365
August - -	32	1,215	28	335
September - -	37	1,350	24	210
October - -	43	1,130	19	240
November - -	19	490	31	578
December - -	9	230	27	390
	336	8,813	369	5,388

Arrivals and tonnage of steamboats, and depth of water in the channel, for the year 1840.

Months.	Arrivals.	Tonnage.	Water in the channel.					
			1st of month.		15th of month.		Water highest.	
			Feet.	*Inches.*	*Feet.*	*Inches.*	*Feet.*	*Inches.*
January.*								
February	101	7,941	6	10	14	6	27	0
March	193	16,607	10	0	4	10	10	6
April	229	20,320	16	0	6	8	17	6
May	195	19,714	15	0	9	6	17	6
June	176	13,971	6	6	3	6	6	7
July	80	4,067	4	0	2	3	4	8
August	42	2,699	2	6	2	0	4	0
September	60	4,416	2	10	2	1	4	0
October	111	8,114	2	6	2	10	4	10
November	150	12,687	8	6	4	10	8	10
December	56	5,899	4	10	Ice		Ice.	
	1,393	116,435						

* River closed by ice.

Arrivals and tonnage of keels, barges, and flat boats, for the year 1840.

Months.	Arrivals of keels and barges.	Tonnage of keels and barges.	Arrivals of flat boats.	Tonnage of flat boats.
January.*				
February	20	423	28	291
March	33	1.041	43	617
April	48	913	44	602
May	30	533	35	525
June	40	750	23	225
July	32	1,080	14	114
August	53	1,567	30	243
September	59	2,127	31	311
October	38	1,093	39	467
November	21	445	52	434
December	11	210	38	317
	385	10,182	377	4,146

* River closed by ice.

Arrivals and tonnage of steamboats, and depth of water in the channel, for the year 1841.

Months.	Arrivals.	Tonnage.	Water in the channel.					
			1st of month.		15th of month.		Water highest.	
			Feet.	*Inches.*	*Feet.*	*Inches.*	*Feet.*	*Inches.*
January - -	41	4,386	Ice	-	11	0	15	0
February -	50	4,453	8	9	Ice	-	10	0
March - -	212	20,274	4	10	6	6	21	0
April - -	230	21,463	15	0	9	4	16	0
May - -	215	20,063	15	0	10	6	14	0
June - -	184	14,176	4	6	2	10	7	0
July - -	99	7,096	4	10	2	3	4	10
August - -	31	549	2	4	1	6	2	4
September -	18	1,306	1	10	1	7	3	8
October - -	78	5,395	3	5	2	10	4	0
November -	161	14,294	3	2	4	6	8	6
December -	130	12,845	5	2	11	0	13	0
	1,449	126,300						

Arrivals and tonnage of keels, barges, and flat boats, for the year 1841.

Months.	Arrivals of keels and barges.	Tonnage of keels and barges.	Arrivals of flat boats.	Tonnage of flat boats.
January - -	12	260	29	320
February - -	11	213	27	265
March - -	27	623	122	1,320
April - - -	48	1,013	131	1,319
May - - -	49	1,090	121	1,180
June - - -	50	1,100	138	885
July - - -	49	1,480	147	750
August - -	57	2,115	131	752
September - -	60	2,460	114	687
October - -	44	1,510	72	448
November - -	43	1,100	111	817
December - -	24	530	75	443
	474	13,495	1,218	9,186

Arrivals and tonnage of steamboats, and depth of water in the channel, for the year 1842.

Months.	Arrivals.	Tonnage.	Water in the channel.					
			1st of month.		15th of month.		Water highest.	
			Feet.	*Inches.*	*Feet.*	*Inches.*	*Feet.*	*Inches.*
January - -	56	5,940	5	8	7	3	16	0
February - -	117	11,563	7	6	12	0	25	0
March - -	189	20,232	7	6	11	0	18	0
April - -	293	20,743	6	2	9	0	12	0
May - -	226	22,060	6	0	4	6	17	0
June - -	196	18,995	5	0	5	0	12	6
July - -	108	10,947	4	9	4	0	7	6
August - -	102	7,432	3	0	3	8	8	0
	1,287	117,911						

Arrivals and tonnage of keels, barges, and flat boats, for the year 1842.

Months.	Arrivals of keels and barges.	Tonnage of keels and barges.	Arrivals of flat boats.	Tonnage of flat boats.
January - -	4	90	29	150
February - -	7	150	64	345
March - -	27	610	96	1,005
April - - -	46	1,160	106	1,380
May - - -	51	1,125	118	1,675
June - - -	36	740	117	1,660
July - - -	32	690	109	1,400
August - -	28	610	107	1,380
	231	5,075	746	8,995

No. 71.

Some information for the United States armory commissioners, on the subject of boats on the Western waters.

The improvement in construction of boats and engines, and the reduction in prices of labor, subsistence, and materials, have combined to increase very much the capacity and very much diminished the price of steamboats in the last few years.

The reduction in price of engines, from 1836 to 1842, is at least 30 per cent., and in some instances 50 per cent.; reduction in hull, building, &c., from 50 to 75 per cent.; all other things say from 20 to 50 per cent.

The great variety in size, shape, and finish of the boats in use renders it impossible to state the cost of construction or expense of running boats of a given tonnage.

We have several classes of boats, and some idea may be formed by giving a medium of the different classes.

A small-class boat costs about $3,000, without a cabin, (or with a cabin $5,000,) capable of carrying 100 tons on 28 or 30 inches water, and to run on 12 to 14 inches water without cargo. Expense of running such boat each 24 hours would be about $25, if stone coal were used for fuel; if wood, about $30. Some small boats are run at less expense.

The ordinary middle-class steamboats on the Ohio and tributaries—say 125 feet keel, 22 feet beam, and 5 feet hold; two boilers, 42 inches, 22 feet long; cylinder, 18 inches, 6 feet stroke; with plain neat cabin, finished and furnished—will cost about $11,000; carry on 4½ feet water 220 tons, and run on 22 inches without cargo. Expenses of running such a boat would be, each 24 hours, about $60, using wood, and with stone coal about $50. Expenses vary very much by times and circumstances, number of passengers, prices of wood, provisions, &c., at the different points.

An ordinary 300-ton boat, finished and furnished in the usual way, will cost about $20,000, draw about 3 feet water without cargo, and about 5½ feet when loaded. Expense per 24 hours (on average of trips) about $75.

There is great economy in using coal, where the furnace is suited for it. It is thought that 100 bushels of coal are equal to 8 cords of wood.

Six-hundred-ton boats, finished in the usual style, cost about $27,000 to $30,000. Draught of water, when light, about 3½ feet to 4 feet; when loaded, about 7½ feet. Expense of running (on average trip of 24 hours) about $100. Large boats seldom use stone coal.

Detail of cost of a 200-ton boat—say 125 feet keel, 22 feet beam, and 5 feet hold; two boilers, 42 inches diameter, 22 feet long; cylinder, 18 inches diameter, 6 feet stroke; with good comfortable cabin, and well finished and furnished.

Engine, say	$4,000
Hull	2,200
Cabin	1,200
Painting and glazing	400
Carpets, beds, bedding, and furniture	2,000
Blacksmith, bell, anchor, chain, &c.	700
Cooking and other stoves, tin ware, hardware, and queen's ware	500
Contingencies	500
	11,500

Crew for such boat.

Captain, per month	$75 00
Clerk, per month	50 00
Mate, per month	30 00
Two engineers, per month	80 00
Cook and steward, per month	50 00
Carpenter, per month	25 00

Four boys in cabin and cook-house, per month - - -	$32 00
Chambermaid, per month - - - - -	10 00
Eight deck hands and firemen, per month - - -	120 00
	472 00

Fuel for such boat.

Say 15 cords of wood for 24 hours, at $1 25 per cord; ordinary expenses for store bills, subsistence, oil, packing yarn, &c., about $600 per month.

Insurance, from 1 to 1½ per centum per month.

Some of the smaller class boats have officers and crew at lower wages; and larger boats have a greater number of men, and generally pay higher wages than those stated to officers and crew.

Ordinary prices of freight from Pittsburg to Louisville, in 1842.

Heavy goods, from 8 to 10 cents per 100 lbs.

Dry goods, from 12½ to 20 cents per 100 lbs.

Freights and *passages* have been about the same price up that they have been down.

In low water the prices of freight and *passages* have heretofore been high; but it is reasonable to presume the prices of freights and passages will remain moderate, as we have a great number of small boats, and of very light draught, that are run at very small expense, and can do business in low water at a moderate price.

Freights are engaged from Pittsburg to New Orleans at 20 cents per 100 lbs., and from New Orleans to Pittsburg at 25 cents per 100 lbs.

Cabin passengers were taken down for $15, and brought up from New Orleans to Pittsburg for the same price, in the spring. Many boats carried at those prices, but it cannot be expected the prices will remain so low; and, as the number of boats is so great, it is not reasonable to expect prices will be high.

This statement is made from my own impressions and knowledge, without making particular inquiries specially, but I can say I am not far from correct.

Very respectfully,

JAMES MAY.

To the Armory Commissioners.

Statement of the quantity of rolled and hammered bar and bolt iron imported into the United States.

Years.	Bars and bolts, rolled.	Bars and bolts, hammered.	Total, each year.	Remarks.
	Tons.	Tons.	Tons.	
1833 -	28,028	36,124	64,152	Bar, rod, hoop, sheet, and wrought iron, produced in the United States, according to the census report for 1840, was 197,233 tons; but a more correct account states the amount at 208,440 tons.
1834 -	28,896	31,784	60,680	
1835 -	28,410	31,529	59,939	
1836 -	46,675	32,938	79,613	
1837 -	47,839	31,326	79,165	
1838 -	36,174	21,319	57,493	
1839 -	60,289	35,558	95,847	
1840 -	32,828	28,819	61,647	

The hammered bolts and bars are brought from Sweden and Russia; the rest chiefly, if not altogether, from Great Britain.

From 1st October, 1830, to 1st October, 1841, the average quantity imported annually was as follows: 37,410 tons rolled iron, 31,461 tons hammered iron, and about 11,237 tons of pig metal.

Statement of the quantity of cast and bar iron produced in Pennsylvania and other States west, and the number of furnaces, &c.

Number of furnaces.	Number of furnaces, forges, &c.	Cast iron.	Bar iron.
		Tons.	Tons.
In Pennsylvania - 213	169	98,395	87,244
In Ohio - - - 72	19	35,236	7,466
In Kentucky - - 17	13	29,206	3,637
In Tennessee - - 34	99	16,128	9,673

This amount is for 1839, and taken from the census report for 1840; since which period, ten or twelve anthracite furnaces have been put in operation in Pennsylvania.

Total amount in the United States, bar iron.	Total in Pennsylvania, bar iron.	Total in Ohio, Kentucky, and Tennessee.
197,233 tons.	87,244 tons.	20,776 tons.

In the counties of Centre, Huntingdon, and Mifflin, there are now made about 25,000 tons of pig metal, and 20,000 tons of blooms and bars; to these add the quantity made in Bedford county, &c., the aggregate will be about 25,000 tons of bar iron. In these counties the best Juniata iron is produced.

No 72.

BEAVER, *November* 9, 1841.

SIR: The undersigned were appointed a committee by their fellow-citizens of Beaver county, for the purpose of presenting the claims of the county to the location of the Western armory at the falls of Beaver.

The committee have observed, with pleasure, that a commission has been appointed by his Excellency the President of the United States, for the purpose of making the necessary examinations, and reporting upon the same, which commission, we understand, was to meet at St. Louis, on the 1st of November, to await further instructions from your Department.

The committee would take the liberty of observing that the commission appointed upon a former occasion, (in the year 1823,) after a thorough examination of all the localities on the Western waters then presented to their consideration, did, in their report made to the Secretary of War, strongly recommend, if not decidedly prefer to all others, the location at Brighton, Beaver county, Pennsylvania, for the purposes of an armory.

The committee would further state, that every consideration which then operated to produce that decision continues in full force, and is greatly increased by the facilities afforded in procuring materials, and distributing the arms when manufactured, by the public works constructed since that period, which now connect the Eastern waters with those of the Ohio and of the lakes.

The undersigned have therefore to request, that you will instruct the commissioners now appointed to examine the location at Brighton, at such time as may suit their convenience, and before they report upon the subject. It will afford the committee great pleasure to furnish the gentlemen composing the commission with any information in their power relative to the location at the falls of Beaver.

With sentiments of respect, yours,

JOHN DICKEY,
R. DUNAGH,
JAMES PATTERSON,
OVID PINNEY,
EDWARD HOOPER,
WILLIAM ADAMS,
H. E. LACOCK,
} *Committee.*

Hon. J. C. SPENCER, *Secretary of War.*

No. 73.

PHILADELPHIA, *November* 18, 1841.

SIR: As the only member of the committee to report a proper location for a national armory on the Western waters with whom I have the pleasure of being acquainted, I ask leave to submit, through you, some remarks on the subject.

Colonels McRae and Lee and Major Talcott, commissioners for a similar purpose, in their report laid before Congress by the President's message, dated the 18th January, 1825, stated the result of their examination of every place on the Western waters suggested with any reasonable plausibility for the site for the armory, and gave details and estimates of advantages, costs, and expenditures, at each locality not rejected as unfit for the object in view.

After careful and laborious investigation, they recommended the vicinity of Pittsburg for the site of the armory, if steam power were adapted to drive the machinery, or Brighton, on the Beaver river, about four miles from its *debouché* into the Ohio, if water power were chosen, and they preferred the use of water power. These two points combine at each all the advantages desirable for such an establishment—the presence or immediate vicinity of stone coal and iron ore; proximity of furnaces and forges and rolling mills, affording the best iron in the world; the presence of numerous skilful artisans; a healthy country, with abundant agricultural resources, filled and surrounded by a population adequate to defend the position; and, above all, having facilities for transporting with great despatch the productions of the armory to any place where they may be required.

Since the date of that report, the public works in Pennsylvania have been constructed, whereby transportation between Philadelphia, Baltimore, Washington, and Pittsburg, is effected in three days and a half; and, in case of military operations requiring speed, it may be accomplished in less time. From Pittsburg to the mouth of Beaver it is effected in two hours and a half; from the mouth of Beaver to the point designated it may be done in an hour. Since the same date, have been made the Ohio canal, the Beaver canal, the Pennsylvania and Ohio canal, (the Beaver extension to a point not distant from and in progress of completion to Lake Erie,) and various canals and roads west and south of these works; affording routes for speedy transportation from Pittsburg, or from the Beaver river, to the North and the Lake frontier, (where arms are most likely to be wanted,) to the West, to the South, Southwest, and Northwest—diverging from the great channels of the Ohio and Mississippi, by which the armory at either Pittsburg or Beaver may forward supplies wherever required. If necessary, they may be sent eastward by the Pennsylvania canals, railroads, and turnpikes. Since the same date, beds of bituminous coal of from five to six feet depth have been discovered in Beaver county, near the proposed site, and beds of cannel coal, particularly adapted to iron works, rock and bag iron ore, of a superior quality, limestone, fire clay equal to that employed in making the Stowbridge bricks, sandstone for furnaces, hearths, and grindstones. So that to the inducements which actuated the former commissioners to prefer the Beaver to all others, are now added those with which no other locality can compete. Since the report cited, the Beaver river has been rendered navigable chiefly by slack water. The successive dams have made or improved a vast water power, affording several positions for an armory.

For estimation of the water power, I refer to the *report*; remarking, however, that the quantity computed to pass through one race on the west side of the river at Fallston, (fed from a leaking dam,) another race existing on the east side, and considerable water flowing in the bed, is a minimum much below what might have been assumed. The dam at Old Brighton, now belonging to James Patterson, constructed or perfected by the State, will afford water applicable to works on the adjacent flat, and on the ravine of Walnut run, as projected by Colonel McRae, &c. The dam is about 15 feet high, and may be raised.

Doubtless the State will give, for a purpose so advantageous, the use of all the water not necessary for navigation at any of the dams—which, when they are kept in repair, are ample for both purposes.

The dam is about 15 feet high; and the flat at Adams's, about a mile above Old Brighton, affords another site.

There is still another place at and near New Brighton, on the east side of the river, not obvious at the time of the former report, probably because the bank of the river was not sufficiently opened, but which deserves examination. As the proposition is, I believe, new, (although, at my suggestion, I presume, the inhabitants of the vicinity have already addressed your board on the subject,) I must trouble you with a description somewhat in detail.

The annexed drawing will sufficiently exhibit the locality to your practised eye. [Drawing omitted.]

Take a race (marked red) out of the canal below the Brighton bridge and above the upper locks, excavate it along the bank inside, or landward of the canal and locks, down to the point where Blockhouse run terminates the table on which New Brighton stands. If more room is required, carry the race around the point, and by a short aqueduct over the narrow gorge of the ravine of Blockhouse run, and continue it, as additional works are required, toward the Ohio. It cannot be prolonged, without considerable expense, further than at a point about 40 perches above the Bridgewater bridge, about 100 perches from the mouth of Beaver. The length of this race would be about three miles. It might be discharged into the river at any intermediate point, or prolonged as additional wheels are demanded; or, if concentration of power be desirable, many wheels may be placed together on the line colored blue, with a head and fall of about 40 feet, by cutting down the bed of Blockhouse run for a tail race. At the upper or northern part of the race, the wheels might be placed in pits, and the tail water carried by iron or other * * *, under the race and canal, into the river. Below the upper wheels, the tail water may be delivered into the locks on the canal as far as the lower lock; and below this the tail water would be discharged into the river. The laboratories would be placed on the banks or table lands, far out of reach of floods, along the whole line of the race, with a head and fall on the wheels of from 10 to 40 feet. Works requiring light power to be placed abreast of the upper locks, so that the water consumed by them should be poured into the locks—a very simple contrivance being applied to shut off the reflux and to discharge the tail water, when the upper locks are filled, into the lower locks. The next series of wheels would discharge their tail water into the canal or locks, without resorting to culverts or shut-offs. The next series of wheels would discharge their tail water into the pool made by the State dam, below the bridge at Bridgewater. By this arrangement, every drop of water drawn

from the Brighton dam would be returned to the locks or to the pool formed by the dam at Bridgewater. The navigation would never be interfered with by the water power used by the armory, and water power and advantages not to be attained by any other situation on the Western waters will be secured.

I will add, that I do not own, nor am I interested in, any property on the route proposed.

Yours, respectfully,

B. CHEW.

Colonel S. H. Long.

No. 74.

Beaver County, Pennsylvania, *August* 25, 1842.

To the board appointed to ascertain a site for a national armory on the Western waters are proposed the following sites upon the Beaver river:

1. The site called Old Brighton, belonging to Mr. James Patterson, and its environs, situated on the west side of Beaver river, about 4 miles from its *debouché* into the Ohio.

In the report of Colonels McRae and Lee, and Major Talcott, dated January 7th, 1825, this site was preferred to every other, if water power were to be applied. The subsequent construction of the Beaver division of the Pennsylvania canal may render necessary a modification of the plan of the former board. An ample supply of water, in the dryest possible seasons, for the armory and the canal, may be ensured by raising Adams's dam 3 feet, and taking the water thence into the ravine of Walnut run.

2. The site at Adams's dam, on either side of the river.

3. Take the water from the canal at New Brighton, above the upper lock, near the carpet factory, conduct it in a race, secured from leakage, along the bank east of the canal and of the river, down to the ravine of Blockhouse run; thence, as space shall be required, the race may be continued in a trunk over the ravine, and along the bank side to a point about 40 perches north of the Bridgewater bridge.

Thus would be obtained a head and fall of 40 feet on a length of about 3½ miles; the tail water of the upper wheels being discharged into the canal or locks, and of those below the lower locks into the slack-water pool—thus depriving the canal of no water, the whole quantity used being returned by tail races.

4. Take the water from Adams's dam by a race cut in the hill side east of the canal, to New Brighton; then, along the plain on which the town stands, to the ravine of Blockhouse run. If necessary, carry it over that ravine, and along the side of the hills, to a point 40 perches above Bridgewater bridge. Head and fall 60 feet 9 inches and 1 quarter. The tail water to be discharged into the canal and slack-water pool. No water thus to be abstracted from the canal, except on the lock at Adams's dam; and, if necessary, may be returned at that point.

5. Site near Newcastle.

B. CHEW.

To the Armory Board.

No. 75.

Actual fall of Big Beaver, ascertained by John Melon, for the former board, in 1824 ; *(copied from notes.)*

	Feet.	Inches.
From oil mill to top of Pugh's dam - - - -	15	1¾
From Pugh's dam to top of Townsend's - - -	7	9
From Townsend's to top of Brighton - - - -	10	2
From Brighton to still-house - - - - -	3	6
From still-house to Dr. Adams's - - - -	7	2¾
	43	9½
To the above add—		
Height of dam at Dr. Adams's - - - -	17	0
Height of dam at Bridgewater - - - -	15	0
Height of dam at Dr. Adams's, above low water in the Ohio at the mouth of the Beaver - - - - -	75	9½
The height of the top of Adams's dam above the pool from Bridgewater to New Brighton - - - -	60	9¼

The greatest flood was in 1832, when the rise was 28½ feet above the comb of the dam at Bridgewater.

On Townsend's race, in front of New Brighton, fed by surplus water flowing over and through the dam at Mr. Patterson's, (Old Brighton,) after supplying the canal, are six wheels. Two wheels drive seven pairs of mill-stones. One wheel drives three pairs of 4-foot stones; the other wheel four pairs of stones—some of larger diameter. The former has 5-100ths of the water power, the latter 7-100ths. The saw mill and carpet factory, below the flour mills, have 5-100ths. The factory beyond has 9-100ths. Total, say 26 100ths. Several other shares of the water, however, have been sold, but are unoccupied. The head and fall are * * * * *

The water power in Townsend race is one half of the water in the river below Patterson's dam. The other half belongs to the Fallston company. The water power in Townsend's race is divided into one hundred shares. The works have never been impeded in the lowest stage of water; the canal being amply supplied, except when the dam feeding the race was so much out of repair as to require an almost entire reconstruction. Since it was repaired, no deficiency has occurred. The power is supposed fully equal to supply the one hundred shares. The twenty-six shares used give the ratio of the power. Five shares, or 5-100ths, are fully competent to drive 3 pairs of 4-foot stones; then as 5 : 3 : : 100 : 60 run of 4-foot stones. These details are given to prove there is an abundant supply of water, after feeding the canal, in the dryest time.

	Feet.	Inches.
The lock at Patterson's lets down into the level of the canal which terminates at the lock next below the carpet factory	2	6
This lock and 3 others let down into the slack-water pool at Lukin's store, 4 locks, each of 9 feet 6 inches - -	38	0
	40	6

The flood of 1832, the highest ever known, when both the Ohio and the Beaver rivers were inundated, was twelve feet below the level of the race proposed from the canal near the carpet factory, and 29 feet below the race proposed from Adams's dam.

No flood has ever continued more than ——— days.

Bituminous coal abounds in the hills adjacent to the Beaver river. A stratum 5½ feet thick is found about a mile from the river, five miles from New Brighton. Cannel coal is found on Brady's run, about a mile from the river, and in many other places. Bog iron ore abounds on the banks of the river, and rock ore in its near vicinity. Fire clay accompanies almost every coal bed. Sandstone splitting freely into slabs of 10 feet to 15 feet in length, of any thickness, is found in many places on the verge of the river. Many quarries furnish stone adapted to grindstones of any desired sizes. Brick clay abounds, and there is timber to supply any demands for charcoal.

If it should be deemed necessary to guard against the contingency of extreme low water, abundant reservoirs may be made by raising the dams at Adams's, and at the mouth of Connequennessing creek. When the canal is completed to Connequant lake, the waters of French creek will be introduced into the Beaver, and any desirable supply may be drawn thence.

To the Armory Board.

No. 76.

Georgetown College, *October* 2, 1841.

Highly Respected Sir: Allow me to say a few words in relation to the site of the Western armory, authorized by Congress to be selected by you. Being interested with Mr. D. Steenrod and the Hon. Lewis Steenrod in about 150 acres of land adjoining the city of Wheeling, and through which the Baltimore and Ohio railroad is located, we are desirous to have the armory placed on our property. We have about 350,000 tons of coal so situated that it can be thrown into the factories from the mouth of the mines; and the manufactured articles taken from the doors of the factories in boats, to go North, South, and West, by water, and East by land by the way of the National road or the railroad. We have inexhaustible quarries of fine stone for building purposes. We are disposed to donate the land and all the coal in the mine at a moderate price, and for many years, to the United States. We feel assured that Wheeling will be preferred for the armory, under all circumstances, provided the persons employed to detail to you facts in relation to the several points on the Western waters be practical engineers, and who have no possible interest to operate on their judgments; therefore, one from the East would be most likely to make a correct representation of all matters appertaining to the location.

So soon as your appointed agent be prepared to examine any property, and shall say how much land will be required for the establishment, and how much coal will be necessary to its operation annually, we will reduce our proposals to writing, for your determination and acceptance. I hope Pittsburg will not be selected. We have all the minerals she possesses, and are lower down the river by 100 miles, and almost as convenient to the Crosscut canal, by which goods are or can be conveyed to Cleveland or the lakes.

She already enjoys the benefit of the marine hospital and arsenal. With advantages for an armory equal if not superior to those she possesses, we have to ask a portion of Government patronage and support. There

are on file, in one of the offices at Washington, a voluminous statement of the advantages Wheeling possesses over Pittsburg and other places on the Western waters; they were prepared at the time of locating the marine hospitals in the West. To those documents we respectfully ask your attention, as also to the Wheeling directory now forwarded, and to the extract from Mitchell's Geographical Reader, page 120. With sentiments of profound respect, permit me to assure your Excellency of my best wish for yourself and family, both in time and eternity.

Your obedient servant,

H. M. JAMERSON.

His Excellency JOHN TYLER.

No. 77.

Report upon the facilities afforded in Wheeling for the establishment of a national armory, from a joint committee of the city council and the citizens, adopted February 6, 1842.

The undersigned, a committee appointed by the city council of Wheeling to prepare and report information relative to the capacity of our city for the manufacturing of muskets, to submit to the board of officers selected by the President of the United States in pursuance of the law of the last session of Congress to investigate and report a suitable site for the location of a national armory in the West, having in view the interests of the Government, and a desire that the merits and demerits of the place they represent should be fairly before the board, and an opportunity given satisfactorily to canvass them, submit the following facts for consideration.

We assume the following to be the principal requisites:

1. Motive power.
2. Material, the heaviest of which is iron.
3. Cheapness of labor, affected principally by health and price of provision and real estate.
4. Ground suitably located.
5. Transportation from the place of manufacture to arsenals and important points of defence on the frontiers.
6. Convenience of machinery already in use, for repairs of machinery in the armory and the manufacture of new machinery.

Before presenting our claims on any of these grounds, we find it necessary to answer an argument gravely urged by those in the far West. They assume that it was the intention of Congress to confer, in the establishment of the Western armory, its patronage upon some State exclusively Western. We presume such could not have been the fact, as Congress, being elected by the whole people, for the benefit of the whole, is undoubtedly charged with the duty of legislating for the benefit of all, or of the General Government, which, as the agent of the people, it has been selected to administer. It is, in a case like the one under consideration, one party to a contract; and the State, section, or community, which presents claims for the location, another. It therefore appears evident, that it is the duty of Government to select, regardless of patronage, that place where its operations can be carried on with the least possible expense, and it, at the same time, be rendered most useful to the country.

But even admitting this argument of patronage, we still claim that, from the fact of a highly cultivated, fertile, and populous portion of Ohio lying opposite this city, and being dependent upon it for a market, as many of the people of Ohio would be benefited by its location here as would be were the armory placed within their State, and upon the Ohio river. We would also suggest, that, if it is consistent with the duty of the Government to confer its patronage upon any State, by an exclusive expenditure of money collected from the whole, it is not less within the province of its duty to confer it upon a section of a State; and western Virginia, with a territory of 40,000 square miles, totally dissevered from the East by impassable mountains, and in all her business, interests, and feelings, associated with the principal Western rivers, has received at the hands of the Government, national or State, not one tithe of the patronage that has been conferred upon the States of Ohio, Indiana, and Illinois, in the National road, and none of those gratuities which have been conferred upon all the Western States from the public domain, which domain was bestowed upon the Union by the State of which our district forms a part. We therefore feel convinced that, should those who are empowered to make the selection of an armory site admit the principle of Government patronage, a due regard to justice would indicate to them the selection of western Virginia as the object, in preference to all others.

Leaving this ground, however, as we consider it the duty of those invested with power to disregard it, we proceed to show the considerations of interest which should, as we believe, decide the question of location in favor of this city.

Motive power.—The description of the motive power, whether of steam or water, we should not have thought it necessary to refer to in comparison, were we not assured that some of the Western cities had urged the convenience of the latter for that power as an argument in their favor; nor do we consider it necessary to argue the point, or enter into a detail of the comparative merits of steam, but shall rest satisfied with referring your attention to the expressed opinions of practical men, and the vast increase in the use of steam power during the last twenty years. The original cost of a site embracing water power, even if such a one can be obtained in a situation combining the other requisites for the manufacture of arms, will be much greater than the cost of a site upon the bank of the Ohio, at Wheeling, together with a coal bank so situated that coal can be placed at the furnace for one cent and a half per bushel. The expense of machinery for the use of steam bears but a small proportion to that for water, when dams, canals, and wasteways, are included. But a further and irresistible argument is found in the fact, that, with water as a motive power, the works would be liable to and must suffer detention by ice, back water, and drought, for a portion of the year. These stoppages, as all manufacturers attest, involve not only inconvenience and expense, but injury to hands and machinery—the one by the corruptions of idleness and its attendant dissipations, the other by rust and dilapidation. Steam is not liable to these evils; if used discreetly, it is untiring, and always ready for action. Perhaps no better illustration of the superiority of steam can be found near us than is exhibited near Zanesville, Ohio, where a water mill is seen on one of the wasteways of the canal, which required neither labor nor expense to prepare for use, and beside it a steam mill yielding a greater per cent. on the investment.

Assuming that the board will concur in the above position, we proceed to the examination of the advantages for the supply of power possessed by Wheeling and its vicinity.

The committee appointed for that purpose will direct your attention to several sites in the vicinity of the city, the comparative merits of which we do not wish to discuss further than is necessary to show their several advantages. There is one adjoining the city on the north, in the vicinity of Messrs. Blake, Griesmer, & Co.'s rolling mill, where there is an excellent landing for boats of any size, bottom land for all the necessary buildings, with a coal vein of six and a half to seven feet in thickness, of the best quality, at such an elevation that, by forty feet of gradual descent, it may be thrown into the furnace. Adjoining, on the south, will be found other sites with equal facilities, with more bottom land if desired, and but few rods of transportation to the river. There are others adjoining the city on the east, and on the line located for the Baltimore and Ohio railroad, which afford equal facilities except in transportation of (from one-fourth to half a mile) arms and iron. The owners of these sites will present proposals of an advantageous nature. It is with pleasure that we are enabled to present such situations to your notice with others; believing, as we do, that none more advantageous are in the Western country. We are conscious that Pittsburg, of all places on the Western waters, may come nearest Wheeling in advantages for heavy manufactures that require the use of motive power; yet there the cheapest estimate of the price of coal that we have yet seen is from six to six and a half cents per bushel, and the supply being constantly lessened, by the heavy drains made upon it by private enterprise largely fostered by State improvements and patronage, leaves no doubt but it must continue to increase in price until it is entirely exhausted at all accessible points. Of this result at Wheeling there can be no apprehension, inasmuch as it is situated within a short distance of the centre of the great coal measure of the Ohio valley, which is 300 miles in length by 150 in breadth, extending from up the Allegany, on the north, to Carr's run, in Kanawha county, on the south; from Monongahela, on the east, to Tuscarawas and Muskingum counties, in Ohio, on the west. As Wheeling is near the centre, so is the coal vein deeper than at any place near its circumference. There is not a hill in sight or in the vicinity of Wheeling in the bosom of which may not be found a deep and rich vein of coal of the finest quality for manufacturing purposes, situate nearly as shown in figure A appended. The coal exported from Wheeling to the West (Cincinnati, Louisville, and points further west and south,) amounted, in 1836, to 1,500,000 bushels, and in 1841 it exceeded 2,000,000 bushels. A reference to appendix B and C will, however, more fully show the cheapness and inexhaustible quantity of our coal than any argument or citation of general facts. By appendix C you will perceive that coal is furnished to the works of Messrs. Blake, Griesmer, & Co., for one cent and five-eighths per bushel; to another house in this vicinity, we are informed, at one cent and a half per bushel, including all expense. Estimating the amount of coal for motive power to be 200,000 bushels annually, which is probably the lowest estimate, the cost of it in this city would be, at 1½ cent $3,000

In Pittsburg, at 6 cents - - - - - - 12,000

Difference in favor of Wheeling - - - - - 9,000

In Cincinnati coal is 10 cents	$20,000
Difference in favor of Wheeling	17,000
Cost in Louisville 11 cents	22,000
Difference in favor of Wheeling	19,000
Cost in St. Louis (as we gather from the current reported price) 10 cents	20,000
Difference in favor of Wheeling	17,000

This cheapness of fuel, entering also into the cost of labor, other things being equal, will produce, in the employment of 250 hands, allowing each 200 bushels annually, a saving in that branch of expense of $3,125 per annum.

Cost of materials.—In the report of the board appointed by President Monroe, consisting of Colonel McRae, Lieutenant Colonel Lee, and Captain Talcott, made January, 1825, we find an estimate of the materials for 12,000 muskets, the amount estimated in 1825 to be manufactured annually at an armory.

Refined iron	120	tons.
Steel of different kinds	12	"
Brass and zinc	2	"
Emery	1	"
Grindstones	80	"
Sand	20	"
12,500 musket stocks	44½	"
12,000 files	3	"
100,000 bushels charcoal, or one-sixth pit coal,	500	"
150 cords of wood	150	"
500 gallons sperm oil	2	"
100 gallons lard oil, 4 barrels tar	1	"
Band and buff leather	½	"
3,000 bushels old shoes	8	"
50 coal boxes or baskets	½	"
20 tons of fire clay	20	"
30 reams sand paper	¾	"
20 reams wrapping paper	½	"
Writing paper, stationery, &c.	½	"

To which are added a few other items of small weight and cost.

That the present extension of the Western frontier and the unexampled increase of population will render double the above number requisite is a fair presumption; hence, double the material will be requisite. The following estimates are therefore based upon a manufacture of 24,000 annually.

This will require 240 tons of iron. The iron near the mouth of the Scioto is now generally used throughout the West; and, wherever the armory may be located, that iron will probably be used, and may safely be relied upon, both for quality and quantity, as it has been tested by the best workmen, and the bed is known to extend for fifty miles on both sides of the Ohio.

See appendix C.

This iron is brought here from the works at four dollars per ton, on an average, throughout the year.

It is evident from the difference in distance, and in the character of navigation, which will be shown hereafter, that, when the cost to this place is four dollars per ton, the same to Pittsburg must be five dollars per ton, or

even more. For that reason pig iron in Pittsburg is usually quoted at one or two dollars more per ton than in this place. The work of the armory, however, requires refined or worked iron. The establishment of Messrs. Blake, Griesmer, & Co., will show, on an examination, what are the means presented here for working the pig metal. When every requisite is found so fully abundant, should not that establishment be able to supply the demand at the cheapest possible rates, others, brought by the demand, will soon be found.

This iron will doubtless be used wherever the armory may be located, as the tests to which it has been submitted in Philadelphia and at Harper's Ferry show that it is equalled only by the Juniata in the Union. This article would then be found less abundant, and commanding a higher price at St. Louis, or at any point on the Mississippi, than at this place, in the pig, because the transportation is greater; but, for use in the refined state, must, we believe, be refined here, and then transported to the site—the great difference in the price of labor, &c., rendering that the most economical. We think the board, from these remarks, will at once perceive the advantages we present, and with confidence refer then to facts, as evinced in every day's experience.

For the manufacture of 24,000 muskets, 200,000 bushels of coal (charcoal) or 33,000 bushels of bituminous coal, will be required, weighing about 1,000 tons. That the latter would be preferable in point of economy and utility there is the test of experience to prove; and, as this is an item so important in the material of manufacture, while we respectfully refer you to the statistics under the head of motive power for the cost of the same here and elsewhere, we ask your attention to the following table, showing the comparative amount of charcoal, earth, and coke, in the coal measure here and on the Missouri. We are mostly indebted for it to the report of Dr. Hildreth, of Marietta, geologist of Ohio.

Places.	Per cent. of carbon.	Bitumen and earth.	Per cent. of coke.	Specific gravity.
Zanesville - -	60	40	53	1.22
Clarksburg - -	55	45	53	1.22
Pittsburg - -	60	40	55	1.28
Wheeling - -	60	40	53	1.23
Clearfork, Ohio - -	55	45	53	1.38
Jackson, Illinois -	55	45	50	1.38
Missouri - -	46	54	38	1.44

We are informed that the Missouri coal is rarely or never used in castings.

On the coal at Wheeling the above geologist remarks, (p. 83 of his report:) "The main coal deposites vary from six to seven feet in thickness; structure compact, and highly bituminous; between the laminæ the remains of vegetable structure, usually called mineral charcoal, are seen in abundance. The specific gravity of this coal is 1.23. Twenty grains decomposed one hundred grains of nitrate of potash, which give about sixty per cent. of carbon, and make it a valuable coal for coking."

From the above data we estimate, in this one item of coal for casting, the expense in Wheeling $2,012½ less annually than in Cincinnati, and upwards of $3,200 less than in St. Louis.

Steel.—The estimate is twenty-four tons. This, as well as zinc, brass, and emery, must be imported wherever the armory is located in the West, as well as files and sperm oil. The further west it is located, the more expensive of course will be their importation. Experiments are, however, being made in the manufacture of steel, in this city, which give promise of full success; in which case the importation might be dispensed with. The importation, at the present rate of freight, over the National road, will be found quite as favorable as any other route to the West, and peculiarly favorable on the completion of the Baltimore and Ohio railroad to Cumberland, which we are assured will be done during the coming summer. This also has the great advantage of being open when all other avenues between the East and West are closed.

Grindstones, among the heaviest items of materials required, will be found in the same hill with the coal, as will be observed by an examination of stratum No. 5, figure A, which is described as a fine argillaceous sandstone, in thin strata, with fine plates of mica in horizontal seams; but they prefer those found two or three miles above the city, on the bank of the river, or four or five miles from the city, in Ohio. These last are considered superior, for their purposes, to the Marietta or Kentucky grindstones. In the extensive and celebrated edge-tool factory of Joshua Moule, in Belmont county, Ohio, they are used entirely; and the proprietor expresses his conviction that they are superior to any others found in the Union. His long experience, both in the East and where he now resides, in the manufacture of edge tools, entitles his opinion to great weight.

Musket stocks.—These are of walnut—found in abundance in every direction from this city. That growing in fields otherwise cleared, or separate from other trees, is preferred, as possessing greater strength. They are manufactured here to an extent which would increase with the demand, as the machinery for the preparation and main working of the material is ample. The cost, therefore, will depend solely upon the price of labor.

Wood may be had in abundance at $1 50 per cord. Charcoal is delivered to the works in this city, where used, at 5½ cents per bushel.

Linseed oil is manufactured in this city, from seed grown in the immediate vicinity; and it is believed that the works will soon be able to supply any demand at 90 to 100 cents per gallon.

Woollen rags and *old shoes* are, as will be seen in our streets, articles of domestic manufacture, though in truth it might be difficult for our present population to supply 6,000 bushels annually, and we may therefore be grateful to him who discovered a substitute in the article of prussic potash, which is imported, and but a small quantity required. It is used at Harper's Ferry.

Fire clay is found in abundance but a few miles above the city, on the banks of the river, and from that fine brick are manufactured and sold in the city at a very low price. We are not aware of the existence of any beds of a similar article further west.

Sand, for castings, is found abundantly in the city, and in all directions from it. The cost is here very trifling.

Limestone is abundant in the same hills with the coal, as represented in stratum No. 7, figure 1, and is described as a thick deposite of 24

feet, in distinct beds, deposited at different periods, and with different chemical affinities. The upper bed is five feet, dark carbonaceous. The second is light dove color, fine-grained, argillaceous and calcareous, six feet. The next is five feet, ash-colored; and when burnt makes a strong and valuable lime. The bottom stratum is eight feet, dark, compact, carbonaceous, charged highly with iron. The price of lime in this city is from six to eight cents per bushel; in St. Louis, 18 to 25 cents—being an advance of 100 per cent.

Sand paper is manufactured here, and shipped in quantities for the supply of the West. (See appendix D.) Writing and wrapping paper are also manufactured here, to a greater extent, as we believe, than any other place in the West. You will perceive, by appendix E, that most of the paper of kinds made here finds its market in the West, and must necessarily be lowest at this place.

Candles are also manufactured in the city to the amount of about 322,000 pounds annually, and sold in Ohio and at the East. About nine cents per pound is considered a fair price by the manufacturers.

Labor.—Having summed up in the above the principal materials, with their prices here and elsewhere, that enter into the cost of the manufacture of arms, we will proceed to the very important item of labor.

By reference to C, in the appendix, you will find the price of labor in the rolling mill, for experienced workmen, $1 50 per day. This, however, being more laborious, is entitled to and receives more compensation than any other description of labor. This price compares favorably with the prices in other cities of the West. The other workmen of the city do not, however, receive a compensation equal to the above, by from 25 to 50 per cent. Our iron foundries are employing at $1 25 per day. Carpenters receive, by the day, in this city, an average of one dollar. In St. Louis, prices at this time are, for similar hands, $1 50 to 1 75. Laying brick, per thousand, in St. Louis, is paid for at $3 50 to $5; in Wheeling, at $2 to $2 50. Excavation, in St. Louis, 20 cents per yard; in Wheeling, 12 to 15 cents. Stone for walls or rough masonry, in St. Louis, $2 50 per perch; in Wheeling, $1 75. Drayage is 100 per cent. higher. These facts show that labor in Wheeling is generally much cheaper than in the towns on the Mississippi, and will compare favorably with any other place of the size. Two or three causes operate upon labor, viz: health of location and the cost of provisions and of rents or real estate. We are prepared to show that these all tend to the cheapness of labor in this city.

The territory, for 50 miles in every direction from the city, is believed to be among the most fertile in the country; and in that section a failure of the staple crops has never been known by the oldest inhabitants. The nearest approach to it has been during the last season. Within 25 miles of this city may be found no less than 144 flouring mills, manufacturing annually 350,000 barrels of flour, much of which finds its market down the river, passing Cincinnati and St. Louis, and again is sent to and through Pittsburg to the East—facts which will show that this is a centre of fertility, with which neither of the points can compete. Other provisions are in proportion, necessarily, as they also depend in price upon favorable climate and fertile soil. The health of this section of country is no less remarkable than its fertility, owing to its favorable climate, and the absence of those exciting causes of disease which have and must for many years render life miserable in the lowlands of the Far West, (Illinois, Indiana, and Missouri,) and which have rendered the majority of the towns on the lower Mississippi

almost literally pottersfields. To show the force of our claims in this respect, we respectfully refer you to the following tables of deaths and burials in the grounds of this city, which furnish the last resting place for the inhabitants within the space of three miles from the city, on this side of the river, as well as the city itself, embracing in the range a population of about 10,000 persons at the present time.

You will observe in the following that the health of the city is not more remarkable than the fact that very few more deaths occur in those months denominated in most places the sickly season than in other months—a fact which shows that none of those maladies which prevail in the West and South are found here.

Interments of all descriptions, in the city of Wheeling, for four years ending January, 1842.

1838.	No.	1839.	No.	1840.	No.	1841.	No.
January -	8	January -	15	January -	9	January -	6
February -	17	February -	10	February -	10	February -	12
March -	11	March -	18	March -	7	March -	15
April -	6	April -	11	April -	8	April -	14
May -	11	May -	8	May -	12	May -	7
June -	6	June -	16	June -	12	June -	5
July -	27	July -	21	July -	19	July -	12
August -	30	August -	25	August -	24	August -	16
September	16	September	19	September	18	September	21
October -	17	October -	10	October -	14	October -	15
November	14	November	13	November	11	November	14
December -	8	December -	4	December -	13	December -	11
Total -	171	Total -	170	Total -	163	Total -	148

The cost of lumber and other building materials, which enter into the cost of labor, as well as the general expense, must be examined next. This article is cheaper here than at any place west of us, as is shown by the fact that most of the lumber consumed in the whole West passes here on its way from the Allegany to its destination. As this is a heavy article of transportation, the price necessarily increases with every mile; twenty-five or thirty millions of feet pass down the Ohio, annually, to the Mississippi, lower Ohio, Wabash, Illinois, &c., where it finds a ready and profitable market. A close comparison of the two markets of Wheeling and St. Louis gives the following result:

Wheeling.

Common pine, per thousand - - - - -	$6.
Clear pine, per thousand - - - - - -	$12.
At retail, average per thousand - - - - -	$11.
Joist and scantling, per thousand - - - -	$12½.

St. Louis.

Common pine, per thousand	$22.
Clear pine, per thousand	$31.
At retail, average per thousand	$45.
Joice and scantling, per thousand	$15 to $20.

Being from one to two hundred per cent. higher in St Louis, or any where on the Mississippi, than it is here. At Cincinnati, from 50 to 100 per cent. higher. No advantages of transportation where weight and bulk is so small as in the proceeds of an armory, can overbalance the advantages in this and other items of expense, attained by the selection of this city.

The following articles also enter into the expense of building, and we proceed to show the comparative prices:

In Wheeling.

Common pressed brick, per thousand	$3 50.
Common, laid in buildings, per thousand	$5 50 to $5 75.
Shingles, per thousand	$2.
Nails, 10d., per pound	5 cents.
Nails, 5d., per pound	6¼ cents.
Glass, 8 by 10, common	$3.
Glass, 10 by 12, common	$4 25.
Laths, per thousand	$2.
Sand, per load	25 cents.
Castings, per ton	$60.

In St. Louis.

Common pressed bricks, per thousand	$6 to $7.
Common, laid in buildings, per thousand	$10.
Shingles, per thousand	$3 75 to $4.
Nails, 10d., per pound	8 cents.
Nails, 5d., per pound	9 to 10 cents.
Glass, 8 by 10, common	$4 50.
Glass, 10 by 12, common	$5 50.
Laths, per thousand	$4 50.
Sand, for building, per load	37½ cents.
Castings, per ton	$100.

The immense difference in cost of nearly all the articles required in building, in this city and St. Louis, can scarcely be imagined, even from the above tables; but it will be readily observed that, where choice is had between Wheeling and any point on the Mississippi, for building, common regard to economy would not hesitate to select Wheeling.

Cost of ground.—The observation of the board upon the coal stratum which is found to extend several miles up and down the river will convince them that favorable locations can be had in or near Wheeling, at prices much more satisfactory than those at which sites equally favorable can be obtained in any of the largest cities in the West; particularly when it is observed that the coal stratum here is situated 20 to 60 feet above the bottom land—a situation the more desirable for working, and giving very important advantages, peculiar to this vicinity.

Transportation.—This subject will call for a degree of your attention, because, although the annual amount of transportation subsequent to the manufacture, would not be very great, it is desirable that it should be placed at a point always, easily, cheaply, and speedily accessible, from any point of the compass. That such is the position of Wheeling we expect to be able to show. The northern borders of Ohio, Michigan, and Indiana, may be gained more easily and cheaper from Wheeling, as we believe, than from any other point below this, whether on the Ohio, Illinois, or Mississippi rivers. The first route is by the Ohio to Beaver or Pittsburg; thence by the Mahoning and Ohio canals to the lake at Cleveland, without land transportation. Distance to Cleveland, 170 miles; time, 2¾ days. The National road, through Ohio, connecting with the canal at Zanesville, presents another route, opening the interior of Ohio and Indiana. The Stillwater navigation and railroad works, chartered by the State of Ohio, to connect the Ohio with Lake Erie, will also, doubtless, be completed ere many years elapse, presenting another desirable and speedy route from Wheeling to the lake.

Your attention has doubtless been directed, while on the upper Mississippi, to the chimerical and ruinous efforts of Illinois to attract the trade between the West and New York, from its present natural direction, to the circuitous course of the Northern lakes and rivers. The work of this nature most highly lauded and approved for this purpose, is the canal connecting the Illinois river with Green bay. That all these efforts must be futile, we shall at once be convinced, when we reflect upon the high northern latitude of St. Mary's and the Mackinac, rendering the navigation extremely unprofitable and unsafe during the whole year, and utterly impracticable in every month except July and August. The ice leaves the rivers and bays in June, and the fall storms commence early in September.

No artificial channel, as we think, can succeed in attracting the Western trade and travel with the East, from the Ohio river, because that river has hitherto been, and will probably continue to be, the best channel for that purpose. When we pass Cincinnati, on the Ohio, we stand, of course, on equal vantage-ground with other places in the West for communication with points on any of the tributaries of the Mississippi, or on the Western waters, and it remains only for us to show what is the character of navigation between this city and Cincinnati. We might quote authorities (the testimony of captains and pilots) to show that it is safe and expeditious; but we will be content with quoting the remark of one disinterested witness, the author of American Encyclopædia, who says: "Wheeling is the first town on the Ohio river where certain embarkation can be calculated on at low water. It has a very fine and fertile surrounding country."

We solicit your attention to tables 1 and 2 in the appendix. The first showing the boats that have arrived here during each month in the year, for the last four years, and the fact that navigation by steamers is rarely suspended; the second showing the prices of freight from this city to the principal places in the West.

For the time required we respectfully refer you to appendix F, being the statement of an experienced commander and trader upon the river.

The fact that the mail arrives at this place in 44 hours from Baltimore, a time shorter than to any other point on the Western waters—that to this distributing office consequently centres the greatest amount of communication

between the East and West—is not a wholly unimportant consideration, but one that it is necessary for us further to press upon your attention.

Convenience for repairs.—Reference to the previous portions of this document and the appendix C, D, and E, will furnish a sufficient index upon this head; and we do not deem it essential to enlarge upon it further than to enumerate a few of the principal establishments connected with such machinery as will be required in an armory.

Blake, Griesmer, & Co., manufacturers of iron and nails, employ 75 hands. Annnal product, $115,000.

A Mr. Phillips, iron founder and steam-engine builder, is in the employment of an average of 60 hands, and has acquired a reputation, especially in machinery, equalled by few or none in the Western country. Many of his engines are in operation on all the rivers tributary to the Mississippi, as well as on that river, on the Gulf of Mexico, and throughout the South.

Helm & Richardson, iron founders and engine builders, employ an average of 40 hands, and have also acquired an enviable reputation as machinists throughout the South and West.

D. Richards is engaged in the same business with success.

In addition to the above, we have selected the following from our list of manufacturers, as being those whose services may be required in machinery or buildings for the armory.

Sweeney & Mathews, T. & J. Miller, and B. Woodcock, iron founders. Sales extensive to the South and West.

George Dultz, Culbertson & Greers, Sweeney & Mathews, T. P. Norton, Cavet & Duffield, and G. W. Johnson, copper, tin, and sheet iron workers. Sales as above.

J. Moore and Hornbrook & Dillon, sheet lead and pipe.

Lambdin, Brady, & Lamb, Armstrong & Co., and A. & R. Fisher, paper manufacturers. (See appendix.)

M. & R. H. Sweeney, J. Ritchie, W. Sims, Shriver, Motter, & Campbell, (crown glass,) and H. M. Miller, glass manufacturers. The sales of these establishments are very heavy in the South and West.

D. Hubbard, saw mill, sash and laths. Sales principally in the West.

Baker & Roberts, white lead.

Murray & Conants, linseed oil.

Knote & Sauger, J. Smith, W. M. Robb, leather workers.

Besides the above, we find 129 establishments in the city for different descriptions of manufacture, running, in all, 28 steam engines.

In conclusion, the committee solicit of the board a personal examination of the city and its environs, and they fearlessly trust the result of the impartial wisdom of the board and the Government.

JAMES E. WHARTON.
THOMAS SWEENEY.
THOMAS HUGHES.
A. M. PHILLIPS.
J. S. SHRIVER.

General Armistead,
Surgeon General Lawson,
Lieutenant Colonel Long,
} *Commissioners, &c.*

APPENDIX.

B.

WHEELING, *January* 2, 1841.

SIR: In reply to your note of the 15th ultimo, I have to say that we will dispose, for the use of a national armory, of 10 acres of ground, near the city, contiguous to a good coal bank, and on the line of the Baltimore and Ohio railroad, for $200 per acre, and contract to supply coal in the bank at a half cent per bushel for 50 years.

Yours, respectfully,

H. M. JAMERSEN.

Mr. JAMES E. WHARTON.

C.

WHEELING, *December* 23, 1842.

SIR: Agreeably to your request, we submit the following answers to your questions relative to iron and coal; which are submitted after the most careful investigation:

1. The cost of coal per bushel, in our furnace, is one cent and five-eighths, and we believe that the same quality of coal may be had for the same cost in many eligible situations in and around the city.

2. The average cost of iron in blooms, per ton, at Hanging rock, is $26; average cost of transportation throughout the year, is $4 per ton. We have never known any difficulty in obtaining a full supply at this point for $30 per ton. Iron in bar $80.

3. We have been able at all times to employ able hands at $1 50 per day.

4. The iron at Hanging rock is considered by those who have used it, both east and west of the mountains, equal for all purposes to any iron in the Union.

5. We have always been able to get repairs to our machinery, or new machinery made, as cheaply and promptly as the same could be done in any place. Our works have been in operation ten years.

Respectfully, yours,

BLAKE, GRIESMER, & Co.

Mr. JAMES E. WHARTON.

D.

WHEELING, *December* 20, 1841.

SIR: In answer to your inquiry relative to my manufacture of sand paper, I can state, that it amounts to about 1,000 reams per year, of which amount I ship to Pittsburg 200; about 100 to Louisville, 100 to St. Louis, 100 to Cincinnati, sufficient for the supply of the markets, and the remainder is used in Wheeling. The manufacture may be increased to any extent that may be required.

Yours, respectfully,

F. B. HORNBROOK.

Mr. JAMES E. WHARTON.

E.

WHEELING, *December* 22, 1841.

SIR: Please find below answers to your questions of the 15th instant:

1. We manufacture every description of paper, amounting in all to the value of $45,000 per annum.

2. We send about $25,000 worth, annually, to Western markets—the principal portion to points on the Mississippi, above and below the mouth of the Ohio river. The trade of the other mills in this city is very similar in character.

Very respectfully,

LAMBDIN, BRADY, & LAMB.

JAS. E. WHARTON, Esq.

F.

WHEELING, *December* 25, 1841.

SIR: In a fair stage of water a good boat will make the trip from Wheeling to New Orleans in seven days; to St. Louis in five days; to Louisville in two days and a half, running time.

JAMES LLOYD.

Mr. J. E. WHARTON.

No. 78.

Suspension of navigation at the port of Wheeling by ice, from the winter of 1829–'30 *to the winter of* 1841–'42.

Winters.	Commencement.	Termination.	Days suspension.
1829–'30	January 22	February 23	32
1830–'31	December 30	January 9	10
1831–'32	December 5	January 4	30
1832–'33	- - -	- - -	Not closed.
1833–'34	- - -	- - -	Not closed.
1834–'35	January 6	January 25	19
	February 3	February 23	20
1835–'36	January 23	February 16	24
1836–'37	February 1	February 8	8
1837–'38	February 22	March 10	16
1838–'39	December 8	January 12	35
	January 25	February 12	18
1839–'40	December 27	January 8	12
1840–'41	January 2	January 8	6
1841–'42	- - -	- - -	Not closed.
Number of days suspended by ice in 13 years.	- - -	- - -	230

The account is taken from the wharf of the city of Wheeling.

J. C. WILEY, *Wharfmaster.*

SEPTEMBER 1, 1842.

No. 79.

WHEELING, VIRGINIA.

The following table shows the exact depth of water at the times named, between this city and the mouth of the Ohio. A boat, in other words, drawing the water in each stage, will pass and repass below without danger or difficulty.

Table of depths of water.

Date.		Depth.				Date.		Depth.			
1837.						1837.					
February	18	7	feet	6	inches.	April	4	12	feet	0	inches.
	20	8	"	0	"		6	10	"	0	"
	22	8	"	6	"		7	12	"	0	"
	23	13	"	0	"		8	15	"	0	"
	24	15	"	0	"		9	18	"	0	"
	25	20	"	0	"		11	15	"	0	"
	26	18	"	0	"		12	13	"	0	"
	27	16	"	0	"		15	12	"	6	"
	27	12	"	0	"		16	11	"	0	"
	28	11	"	0	"		17	10	"	6	"
March	2	10	"	0	"		19	9	"	0	"
	3	8	"	6	"		26	7	"	6	"
	4	7	"	6	"	May	1	8	"	0	"
	5	6	"	6	"		8	10	"	0	"
	6	6	"	0	"		17	33	"	0	"
	7	6	"	6	"		19	26	"	6	"
	8	8	"	6	"		20	18	"	0	"
	9	13	"	0	"		21	14	"	6	"
	10	19	"	0	"		22	12	"	6	"
	11	18	"	0	"		24	9	"	0	"
	12	15	"	0	"		27	12	"	0	"
	13	15	"	0	"		28	13	"	6	"
	14	20	"	0	"		29	12	"	6	"
	15	23	"	0	"		30	11	"	0	"
	16	19	"	0	"		1	10	"	0	"
	19	13	"	0	"		0	9	"	0	"
	20	11	"	0	"		15	7	"	0	"
	23	12	"	0	"		22	6	"	6	"
	24	13	"	0	"		30	7	"	0	"
	26	12	"	0	"	July	9	20	"	0	"
	28	11	"	0	"		20	10	"	0	"
	29	12	"	0	"		25	7	"	0	"
	30	13	"	0	"		31	6	"	0	"
	31	14	"	0	"	August	7	4	"	6	"
April	1	15	"	0	"		12	5	"	0	"
	2	17	"	0	"		14	6	"	0	"
	3	16	"	0	"		28	16	"	0	"

TABLE—Continued.

Date.	Depth.	Date.	Depth.
1837.		1838.	
August 30	12 feet 6 inches.	November 10	9 feet 0 inches.
September 8	10 " 6 "	15	5 " 0 "
18	9 " 0 "	20	11 " 0 "
30	6 " 6 "	25	5 " 0 "
October 27	20 " 0 "	30	3 " 6 "
30	12 " 0 "	December 8	3 " 0 "
November 22	14 " 0 "	1839.	
December 10	10 " 0 "	January 15	21 " 9 "
1838.		18	13 " 0 "
January -	Closed.	23	6 " 0 "
February 12	10 feet 0 inches.	February 13	8 " 0 "
March 11	18 " 0 "	18	4 " 8 "
21	19 " 0 "	25	5 " 6 "
April 1	11 " 0 "	28	19 " 0 "
7	6 " 6 "	March 5	13 " 0 "
12	10 " 0 "	12	10 " 0 "
19	14 " 0 "	18	9 " 0 "
25	15 " 0 "	24	15 " 0 "
May 9	26 " 0 "	30	9 " 0 "
17	8 " 0 "	April 4	9 " 0 "
20	17 " 0 "	11	6 " 8 "
26	20 " 0 "	17	8 " 0 "
June 1	16 " 0 "	22	5 " 6 "
7	9 " 0 "	29	4 " 6 "
12	10 " 0 "	May 5	13 " 0 "
19	14 " 0 "	10	7 " 0 "
26	10 " 0 "	17	23 " 0 "
July 2	7 " 0 "	23	6 " 0 "
8	5 " 0 "	31	15 " 0 "
14	3 " 3 "	June 3	8 " 0 "
18	3 " 0 "	9	11 " 0 "
24	2 " 5 "	17	23 " 0 "
29	2 " 3 "	23	8 " 0 "
August 4	2 " 6 "	30	6 " 0 "
13	2 " 4 "	July 6	6 " 0 "
20	2 " 10 "	12	3 " 8 "
27	2 " 1 "	20	4 " 0 "
September 13	1 " 2 "	31	7 " 0 "
19	1 " 0 "	August 5	6 " 0 "
29	0 " 10½ "	16	3 " 0 "
October 11	0 " 10½ "	22	2 " 2 "
18	1 " 6 "	29	3 " 8 "
24	2 " 2 "	September 4	2 " 6 "
29	1 " 6 "	12	11 " 0 "
November 5	2 " 6 "	17	3 " 9 "

TABLE—Continued.

Date.	Depth.	Date.	Depth.
1839.		1840.	
September 22	6 feet 0 inches.	July 5	3 feet 9 inches.
28	3 " 3 "	11	2 " 7 "
October 3	3 " 0 "	22	2 " 2 "
5	2 " 10 "	30	1 " 11 "
12	1 " 11 "	August 7	2 " 2 "
14	1 " 10 "	17	2 " 4 "
15	1 " 10 "	24	2 " 3 "
16	1 " 10 "	30	3 " 6 "
17	1 " 10 "	September 3	4 " 0 "
18	1 " 10 "	15	1 " 11 "
31	1 " 5 "	24	2 " 3 "
November 6	1 " 5 "	30	2 " 0 "
16	2 " 9 "	October 5	3 " 0 "
20	6 " 0 "	8	5 " 0 "
26	4 " 6 "	15	2 " 9 "
December 5	5 " 0 "	22	3 " 0 "
12	5 " 0 "	31	6 " 0 "
20	4 " 0 "	November 2	11 " 0 "
24	3 " 0 "	7	7 " 0 "
1840.		14	7 " 0 "
January -	Closed.	23	6 " 0 "
29	9 feet 0 inches.	30	8 " 0 "
February 2	28 " 0 "	December 3	5 " 6 "
9	15 " 0 "	8	4 " 6 "
11	38 " 0 "	17	11 " 0 "
17	14 " 0 "	19	8 " 0 "
22	20 " 0 "	25	5 " 0 "
March 2	15 " 0 "	30	4 " 3 "
10	10 " 0 "	1841.	
15	6 " 0 "	January 10	22 " 0 "
19	6 " 0 "	16	16 " 0 "
23	7 " 0 "	26	9 " 0 "
30	17 " 0 "	31	8 " 0 "
April 1	24 " 0 "	February 4	13 " 0 "
6	16 " 0 "	18	4 " 0 "
13	7 " 0 "	25	4 " 0 "
20	7 " 0 "	March 3	5 " 0 "
27	15 " 0 "	7	6 " 0 "
May 3	26 " 0 "	13	5 " 6 "
11	17 " 0 "	20	5 " 6 "
20	8 " 0 "	22	8 " 0 "
27	6 " 0 "	26	32 " 0 "
June 9	7 " 0 "	April 1	30 " 0 "
17	3 " 8 "	13	15 " 0 "
25	3 " 6 "	14	14 " 0 "

TABLE—Continued.

Date.		Depth.				Date.		Depth.			
1841.						1842.					
April	20	12	feet	0	inches.	February	3	11	feet	0	inches.
	29	8	"	0	"		12	14	"	0	"
May	2	18	"	0	"		17	14	"	0	"
	13	18	"	0	"		23	11	"	0	"
	15	16	"	0	"	March	2	8	"	0	"
	22	6	"	0	"		7	28	"	0	"
	31	5	"	6	"		11	21	"	0	"
June	3	4	"	6	"		19	8	"	0	"
	10	3	"	4	"		28	10	"	0	"
	17	3	"	0	"	April	3	7	"	6	"
	22	6	"	0	"		11	16	"	0	"
	30	5	"	0	"		20	12	"	0	"
July	7	3	"	6	"		30	8	"	0	"
	17	2	"	4	"	May	2	8	"	0	"
	24	2	"	0	"		7	17	"	0	"
	30	1	"	8	"		15	5	"	6	"
August	5	1	"	9	"		20	5	"	0	"
	12	1	"	9	"		28	6	"	6	"
	30	1	"	4	"	June	1	6	"	0	"
September	8	1	"	2	"		9	4	"	6	"
	15	1	"	1	"		14	8	"	0	"
	30	2	"	6	"		17	6	"	0	"
October	3	2	"	4	"		24	7	"	0	"
	14	1	"	9	"		30	8	"	0	"
	20	3	"	0	"	July	3	5	"	6	"
	24	2	"	4	"		8	9	"	0	"
	31	3	"	0	"		12	8	"	0	"
November	1	2	"	8	"		20	3	"	6	"
	8	3	"	0	"		25	3	"	0	"
	14	4	"	6	"		31	2	"	5	"
	25	5	"	0	"	August	2	3	"	0	"
	30	8	"	0	"		8	3	"	6	"
December	3	6	"	0	"		12	4	"	0	"
	10	8	"	0	"		16	4	"	6	"
	17	16	"	0	"		19	3	"	6	"
	30	10	"	0	"		20	4	"	0	"
1842.							22	4	"	6	"
January	3	6	"	0	"		23	4	"	0	"
	21	6	"	0	"		24	4	"	0	"
	31	7	"	0	"		25	3	"	6	"

An accurate copy from the wharf register.

JAS. E. WHARTON.

To the ARMORY BOARD.

No. 80.

Estimated price of supplies for subsistence in the Wheeling market, derived from the surrounding country, in 1841–'42—*minimum and maximum prices.*

Articles.	Minimum.	Maximum.	Remarks.
Pork, per hundred	$1 50	$2 50	Is exclusively sold to Pittsburg and other points.
Bacon, per hundred	2 50	6 00	
Beef, per pound	01	02½	
Mutton, per pound	01	02½	
Veal, per pound	01½	02¾	
Venison, per pound	04½	06	
Turkeys, each	25	50	
Geese, each	18¾	25	
Chickens, each	06	10	
Eggs, per dozen	03	12½	
Fresh fish, per pound	03	08	
Salt fish, mackerel No. 1	8 00	16 00	Other fish bear a favorable comparison with other markets.
Butter, per pound	05½	18¾	
Cheese, per pound	05	08	
Lard, per pound	04½	07	
Tallow, per pound	08		
Oil, for burning, per gallon	75	1 50	
Honey, per pound	06¼	12½	
Flour, per barrel	2 50	4 50	
Wheat, per bushel	37½	90	
Corn, per bushel	20	33½	
Corn meal, per bushel	25	37	
Oats, per bushel	12½	25	
Rye, per bushel	30	40	
Buckwheat, per 100 pounds	1 00	2 00	
Barley, per bushel	20	30	
Peas, green, per peck	10	37	
Beans, dried, per bushel	50	75	
Onions, per bushel	25	30	
Sweet potatoes, per bushel	50	1 00	
Irish potatoes, per bushel	12	25	
Tomatoes, per bushel	12½	50	
Turnips, per bushel	12½	25	
Cabbage, apiece	01½	02	
Beets, per bushel	25	31	
Parsnips, per bushel	25		
Apples, per bushel	20	40	
Peaches, per bushel	25	75	
Pears, per bushel	50		
Cherries and plums, per quart	01	06	

ESTIMATE—Continued.

Articles.	Minimum.	Maximum.	Remarks.
Other fruits - - -	–	–	Plentiful, and consequently cheap. In season they may be had in market at a lower price than in any other market in the vicinity.
Hay, per ton - -	$5 00	$10 00	
Flaxseed, per bushel -	75	1 00	
Tobacco, per pound - -	06	50	
Candles, per pound - -	08	10	
White oak bark, per cord -	3 50		
Red oak bark - -	5 00		
Sawed lumber, per thousand	5 50	6 00	
Coal, per bushel - -	02½	04	
Wood, per cord - -	1 00	2 00	
Clay for bricks - -	–	–	Abundance—to be had at a very low price.
Wool, per pound, - -	20	30	
Groceries and dry goods -	–	–	The facilities for transportation of these articles render them easy to be obtained, and the competition for a few years past has tended to reduce to a small profit.

No. 81.

SEPTEMBER 1, 1842.

GENTLEMEN COMMISSIONERS: The undersigned will agree to sell to the United States his farm, lying on the Ohio river, above the city of Wheeling, containing 275 acres, at $75 per acre. It fronts on the Ohio river 200 poles, and runs back 226 poles on the south line, and on the north 220 poles.

JOSIAH CHAPLINE.

No. 82.

ZANESVILLE, OHIO, *November* 25, 1841.

MY DEAR SIR: I send you (enclosed) the memorial to the President upon the subject of a Western armory, and the examination of this place since the improvement of the Muskingum river.

We rely upon your utmost exertions and influence to procure an early examination of this point, which we cannot but think is both just and reasonable.

Please to let us know whatever may transpire, which you may believe is important to our interests here in this particular.

We have nothing worth communicating since you left.

Accept, my dear sir, my best wishes for yourself and family.

JOHN HAMM.

HON. J. MATHIOT.

No. 83.

ZANESVILLE, OHIO, *November* 15, 1841.

SIR: The undersigned, citizens of Zanesville, beg leave most respectfully to call your attention to this place, in connexion with the proposed establishment of an armory in the West.

When that subject was agitated some years since, the commissioners appointed by the President visited this place, and made an examination into its capabilities, as connected with that object; and it is believed that Zanesville stood high amongst the number to which the choice would have been confined.

Since that period changes have taken place, which render Zanesville still more desirable, as combining advantages for the establishment of a national armory certainly not surpassed, if equalled, in the country.

The Cumberland road, passing through the town, affords easy transportation to the East and West. The State has expended a million and a half of dollars in improving the navigation of the Muskingum river, connecting us, by a series of dams, with the Ohio at Marietta, and the Ohio canal at Dresden, 15 miles above us. The locks pass steamboats 175 feet long and 34 feet wide. The dam across the river at this place has been so raised, and the water, by means of the canal, may be taken out so much lower, that the power for propelling machinery has been doubled since the examination by the former commissioners.

We omit, on this occasion, all reference to the extensive beds of coal and iron in the immediate vicinity, as they are fully considered in the report made by the former commissioners, to which we beg leave to refer the President.

Certainly no place in the whole great West can be named, combining to the same extent as Zanesville these qualities: water power, coal and iron, and easy communication with the Ohio river and Lake Erie.

We therefore respectfully ask that you, Mr. President, will direct the commissioners to make the necessary examinations of this place, before presenting their report.

Charles B. Goddard	William Keith
John Hamm	B. Vanhorn
J. Ragurt	G. A. Hall
James Taylor, jr.	C. D. Palmer
J. P. Springer	James Ramage
George James	James Henderson
Charles C. Gillend	William Gaboher
Nathaniel Wilson	J. B. Cochran
Charles G. Wilson	Uriah Parker
Daniel Applegate	J. Z. Hopkins
Josiah Spaulding	James Stutson
Samuel Sullivan	Israel Hoge
Alexander Sullivan	James Hampson
George Reeve	Hugh Reed
Lewis Cox	Stephen Burwell
Horatio J. Cox	W. P. Bennett.
Thomas Bell	

To the PRESIDENT OF THE UNITED STATES.

No. 84.

ZANESVILLE, *December* 29, 1841.

DEAR SIR: The people of this place are making efforts to have a fair shake in regard to the establishment of a national armory in the West. We take it for granted that the persons engaged in making the examination will be here, as a former report, made to Congress in 1825, seemed to give the preference to Zanesville over every other place examined by the commissioners. We may now, perhaps, be considered too far east; but still the improvements made since that time give us, we think, strong claims. Doctor Mitchell and myself are of several committees which have been desired to request you, if necessary, to see that the Department of War, in their instructions to the persons engaged in making the examination, give us a call. We have seen your letter to Dr. Hamm. No news.

Respectfully, &c.

ALEXANDER HARPER.

Hon. J. MATHIOT.

No. 85.

HOUSE OF REPRESENTATIVES, *January* 6, 1842.

DEAR SIR: I enclose you a letter from Judge Harper, of Zanesville, Ohio, on the subject of a Western armory. The people of Zanesville are exceedingly anxious to have an examination made at that point. Will you, at your earliest convenience, inform me whether the commissioners appointed for this purpose have been instructed by the Department to examine any particular points, and, if so, whether Zanesville, Ohio, is included in the number?

Very respectfully, I remain yours, &c.

J. MATHIOT.

Hon. J. C. SPENCER.

No. 86.

OFFICE OF THE BOARD OF PUBLIC WORKS,

Columbus, December 1, 1841.

The undersigned, appointed a committee by the town council of Zanesville, Ohio, to confer with you upon the subject of your commission, beg leave respectfully to call your attention to the following facts and circumstances:

A similar commission, consisting of Colonel McRae, Colonel Lee, and Major Talcott, was created under the act of Congress of 3d March, 1823; and their report, dated 13th July, 1825, may be found among the documents of the 2d session of the 18th Congress, No. 263. (See Gales & Seaton's American State Papers, folio edition, Military Affairs, volume 2, page 729.) So much of their report as relates to Zanesville will be found chiefly at pages 741, 744 to 780, and 791.

Since that report was made, great changes have taken place. The State of Ohio having erected a new and permanent dam at this place, [and] finished the canal terminated below Slagoe's run by two locks, all the expense estimated in the former report for these objects may be now thrown entirely out of the question, and the inquiry substituted: Upon what terms could the water power be procured from the State? To enable us to lay before you certain and definite information upon this head, we addressed a letter to the board of public works, in session at Columbus, and extended our inquiry to all the dams erected by the State upon this river. The reply of the board was as follows:

The board will agree to lease water power at the different points on the Muskingum improvement, (to be used in the operations of an armory,) at the following prices: For sufficient water to propel one run of four-and-a half-feet stones for wheat, reference being had, as to quantity, to that leased under similar circumstances on the Ohio canal for one run of stones:

At Symmes's creek dam - - - - -	$125	per annum.
At Zanesville - - - - - - -	200	do.
At Taylorsville - - - - - - -	150	do.
At Taggart's - - - - - - -	100	do.
At McConnellsville, (not enough remaining.)		
At Taggart's second dam - - - - -	100	do.
At Luke's chute - - - - - -	100	do.
At Beverly - - - - - - -	125	do.
At Lowell - - - - - - -	150	do.

WILLIAM RAZEN, *President.*

To the COMMISSIONERS *appointed by the President of the United States to examine and report upon the subject of the proposed national armory.*

The several dams enumerated in the foregoing letter are the dams erected by the State across the Muskingum river, beginning with the upper at Symmes's creek, eight miles above Zanesville, and terminating with that at Lowell, below which, however, are two dams, one at Duvall's and one at Marietta. Both are, however, occasionally subject to impediments, as sources of water power, by the back water from the Ohio river. By reference to the "quantity leased on the Ohio canal," we understand the board to mean 500 cubic feet per minute under a ten-foot head, to be used upon a breast wheel.

All the water power required by the United States, for the purposes of an armory, can be obtained at either of the dams enumerated in Mr. Razen's letter, excepting McConnellsville, and the data are given by which the prime annual cost to the Government can be ascertained. Supposing that a power equal to that required to propel twelve run of stones, four and a half feet diameter, is requisite, the cost would be at Zanesville $2,400 per annum, equal to a capital invested, at six per cent., of $40,000. The cost of making the dam, canal, and lock, was estimated

by the former commissioners (see report, p. 741) at -	$147,845 47
They also allowed 10 per cent. for contingencies - -	14,784 54
Making the whole cost of the fixtures for the water power	162,630 01

And thus saving to the United States, by their ability to use water power already created, the sum of $122,630 01.

At Taylorsville, in consequence of an agreement entered into by the State when the public work on this river commenced, there is water power owned by individuals sufficient to propel fifteen run of stones. One-third of this can be purchased for $10,000; one other third, in connexion with a mill on the west side of the river, for $18,000; and the remaining one-third, in connexion with a new and extensive flouring mill, at a sum not precisely known to the undersigned, but supposed to be about $50,000.

Should the commissioners prefer a site where they would have the entire control of the water power, it is believed they can acquire it by contract with the State at both of Taggart's dams, Luke's chute, and Beverly; it being understood that no water has yet been rented at either of those places. But one lease has been granted by the State at Symmes's creek, which, it is not doubted, could be purchased at a reasonable rate.

With respect to the land necessary for the workshops, dwellings of the officers and workmen, and all other uses for which land may be deemed necessary for the purpose of an armory, the undersigned have ascertained that 100 acres could be procured at Symmes's Creek dam for $10,000; 132 acres at Zanesville for the like sum; and 100 acres at each of the other places indicated, at a price somewhat less. The land at Zanesville, supposed to be most convenient for the use of the Government, lies about one-fourth of a mile below the town, on the east or left bank of the river, and would require the water to be conveyed that distance in a trunk. The right of way could be procured at a trifling expense. Within this 132 acres are abundant quarries of coal and stone now open.

Upon the geological character of this part of Ohio, its mineral resources, the abundance and cheapness of its coal, iron, and lime, its superior sandstone for building, &c., we beg leave to refer you to the report of John W. Foster, Esq., contained in the second Geological Report of Ohio, extending from page 73 to page 107. (We hand you, herewith, three copies of the second Geological Report, which you can retain.)

The undersigned deem it unnecessary to dwell upon the many advantages possessed by Zanesville for an establishment such as the Government contemplates erecting.

Its situation upon the great National road, traversing the United States from east to west, over which all the property of the United States, her troops, and military stores, may, by law, be forever transported free of toll; its easy and constant communication with Lake Erie, being connected with the Ohio canal by slack-water navigation and the Dresden canal; its connexion with the Ohio river, by means of the dams before mentioned, and permanent locks suited to the transit of steamboats of a large class, will all doubtless be considered by you in determining upon its eligibility as the site of a national armory.

We will only add, that the undersigned will cheerfully furnish you such additional information or explanations as may be required.

We are, very respectfully, your obedient servants,

DAN. APPLEGATE.	DAN. CONVERS, *Pres't.*
JAMES RAGUET.	ALEX. HARPER.
ADAM CLARK.	A. CADWALLADER.
GEO. W. MANYPENNY.	ROBERT MITCHELL.
C. W. SEARLE.	JAS. TAYLOR, Jr.
JOS. SPALDING.	CHAS. B. GODDARD.
JNO. HALL.	J. S. COPELAND.

ZANESVILLE, OHIO, *January* 15, 1842.

No. 87.

ZANESVILLE, *September* 14, 1842.

GENTLEMEN: I have ascertained that the property at Duncan's falls, on the Muskingum river, belonging to the Bank of Zanesville, can be purchased on the following terms. I understand that Mr. Sturgis has transmitted to you a statement of the conditions of purchase, on behalf of himself and others. The directors of the Bank of Zanesville will sell—

No. 1. The new flouring mill, on the left or east side of the river, with three acres of land, and water power to propel five run of stones, for - - - - - - - $40,000

No. 2. The old mill, on the right or west side of the river, with $7\frac{68}{100}$ acres of land, and water power to propel five run of stones, (being lots Nos. 1 and 2, Foster's plat,) for - - 15,000

No. 3. Three hundred and ninety-six acres of land, on the right or west side of the river, near to and adjoining Taylorsville, (being lots Nos. 5, 6, 7, 8, 10, 11, and 12, Foster's plat,) at $20 per acre - - - - - - - - 7,920

Or they will sell—

No. 1, as above, with water power to propel ten run of stones, for 53,000

No. 2, as above, with water power to propel ten run of stones, for 50,000

Enclosed you will find a plat (by Foster) of the above property, and also a plat of the property on the east side of the Muskingum river.

Very respectfully,

DANIEL CONVERS,
Chairman of the Committee.

To Gen. ARMISTEAD,
Col. LONG,
Dr. LAWSON,
} *Armory Commissioners.*

No. 88.

ZANESVILLE, OHIO, *September* 7, 1842.

GENTLEMEN: We will sell to the United States, for the purpose of an armory, the land designated by you at Duncan's falls, and estimated to contain from 650 to 680 acres, at $45 per acre—say 680 acres, at $45 = $30,600. This will include the east mansion-house on the mound, now occupied by Mrs. Taylor, and its offices, garden, stables, &c. The following will be its boundaries:

Commencing at the southeast corner of their whole tract; thence up the Muskingum with its meanders to the east line of the mill tract, owned by the Bank of Zanesville; thence northerly, with the east line of said mill tract, to the north side of the main street of the town of Duncan's falls; thence westwardly, with the north line of main street, to the centre of the road leading to the mound; thence northerly, in the centre of said road, over said mound; thence north, to the north line of their tract; thence east, to the northeast corner of their tract; thence south, to the place of beginning—reserving the right of the ferry landing near the lower corner.

They will also sell their perpetual right to sufficient water power to propel five run of millstones, with the necessary machinery, at $1,500 per run—say $7,500.

Should the United States prefer obtaining any additional water power they might need from the State of Ohio, either by lease or purchase, instead of purchasing the mill and water power belonging to the Bank of Zanesville, they can have the privilege of taking a canal or race through our other grounds, or to the land heretofore described, and allow us such compensation as the agents of the Government shall deem just and reasonable; or we will sell the fee of said ground, as may be wished for that purpose, for such sum as they shall deem fair and reasonable.

A BUCKINGHAM.
SOLOMON STURGIS.
D. BRUSH.

Messrs. LONG, ARMISTEAD, LAWSON, *Armory Commissioners.*

No. 89.

COLLECTOR'S OFFICE, ZANESVILLE, *September* 5, 1842.

DEAR SIR: I herewith transmit to you a statement of the amount of tolls received by the State upon each ton of 2,000 pounds, on the following articles, ascending and descending the points named below:

On merchandise, including dry goods, groceries, hardware, cutlery, and glass ware—

From Cleveland to Zanesville	$8 77
From Zanesville to Cleveland	8 77
From Zanesville to Marietta	3 60
From Marietta to Zanesville	3 60
From Symmes's creek to Cleveland	8 49
From Cleveland to Symmes's creek	8 49
From Symmes's creek to Marietta	4 08
From Marietta to Symmes's creek	4 08
From Taylorsville to Cleveland	9 29
From Cleveland to Taylorsville	9 29
From Taylorsville to Marietta	3 12
From Marietta to Taylorsville	3 12

On iron and castings of every description, except pig and scrap iron, and on blooms and half blooms, (which are a rate lower,) machinery, mechanics' tools, bar iron, nails, rods, sheet and rolled iron, spikes, anvils, sledges, crowbars, and other iron tools, &c.—

From Zanesville to Cleveland	$4 82
From Cleveland to Zanesville	4 82
From Zanesville to Marietta	2 25
From Marietta to Zanesville	2 25
From Symmes's creek to Cleveland	4 64
From Cleveland to Symmes's creek	4 64
From Symmes's creek to Marietta	2 55
From Marietta to Symmes's creek	2 55
From Taylorsville to Cleveland	5 10
From Cleveland to Taylorsville	5 10
From Taylorsville to Marietta	1 95
From Marietta to Taylorsville	1 95

On flour, bread, wheat, brans, peas, flaxseed and other kinds of domestic seeds, salted and fresh provisions, lard, cheese, tallow, beeswax, butter, &c.—

From Cleveland to Zanesville	$2 88
From Zanesville to Cleveland	2 88
From Zanesville to Marietta	1 35
From Marietta to Zanesville	1 35
From Symmes's creek to Cleveland	2 81
From Cleveland to Symmes's creek	2 81
From Symmes's creek to Marietta	1 53
From Marietta to Symmes's creek	1 53
From Taylorsville to Cleveland	3 06
From Cleveland to Taylorsville	3 06
From Taylorsville to Marietta	1 17
From Marietta to Taylorsville	1 17

The above statement is confined to the *three principal classes of articles* transported on the Muskingum improvement and Ohio canal, between the points specified.

Articles of every description belonging to the Government of the United States, transported on the above-named improvement, are free from toll.

Respectfully submitted.

JOHN T. ARTHUR, *Collector.*

Colonel DANIEL CONVERS.

No. 90.

Report to the city council of Dayton.

GENTLEMEN: Your committee, appointed by the president of the city council, under a resolution passed at a former session, to make inquiries, collect statistics, ascertain the water power now in use in Dayton and that which is unemployed in the vicinity, the various facilities afforded by our canals and turnpike roads, the number and variety of existing manufactories in operation, the abundance and cheapness of the sustenance necessary for any number of inhabitants who may be induced to seek this city for a home, the many moral, educational, and religious advantages of our community, as exhibited through our public institutions, schools, and churches, the resources of our city for furnishing the materials necessary at the Western armory in the construction of arms and the means of transporting them when manufactured to those points where they may be required, beg leave respectfully to make the following report:

It has been universally conceded that the water power furnished by that beautiful and well-named stream, Mad river, (so called because of its great descent and rapid current in the vicinity of Dayton,) is greater, and may be applied to machinery at much less cost, than at any other city in Ohio, or perhaps in the West.

A company has been formed to conduct the water from Mad river at a point one-fourth of a mile above the corporation line into a hydraulic basin on the table of land immediately east of the populated portion of our city. When brought to this basin, the water may be used with a fall of

17½ feet, which is equal to a power that would propel 40 pairs of millstones. This table of land is unoccupied, and is sufficient for any number of manufactories, and all buildings that would be required for the workmen and their families.

The above is the water power we propose offering to the commissioners for the Western armory; and, if more is required, an additional fall, equal to a power which would propel sixteen pairs of millstones, can be obtained by extending the race up the river about one-half mile, so as to take the power now used by the Smith estate; and, in future, if necessary, this power may be doubled, by purchasing that which is now employed by Mr. Harshman one mile above the point proposed to take the present power. The situation of this is different from that of any power upon a canal, because it is not dependent upon it for water, and therefore will not meet with annual interruptions occasioned by cleansing the canal—say from five to eight weeks; nor will it be liable to be stopped if a break occur, as is the case with all lock privileges; and, unlike river water power in general, it will not be subject to back water occasioned by high floods, because the point proposed to use this water will be one-fourth mile distant, and be entirely separated from Mad river by the present canal, and, when thrown from the wheels, would flow into this canal, and, as we shall describe more minutely in another part of this report, again propels a second and third time machinery almost equal to that we have been describing.

The above answers what we conceive to be very strong objections to many places, urging their claims as eligible points for the location of the Western armory.

We ask what would be the condition of an armory, or any other manufacturing establishment, operating highly-finished and costly machinery, with the river rising from three to five feet above the surface of the water from which the power is taken? The hands, we suppose, are not to be employed subject to a deduction for detention from labor by high water; and, consequently, a very serious loss must be sustained from such an interruption, and by the damage done to the machinery. The same loss of time and money must be submitted to, provided the armory is located on the canal, being subject to a stoppage of from five to eight weeks during the long days of summer, while the canal is being cleansed and repaired.

Not one of these objections can be raised in opposition to the water power proposed; and a very material advantage in favor of this site would be, that the necessary grounds for all purposes of an armory can be purchased adjacent to the basin spoken of for comparatively a small sum, as it is unoccupied except for farming purposes.

The number and variety of the manufactories now in successful operation within our city (as will be shown before closing this report) will give all the assurances necessary, that any private aid which may be required can be given promptly, and in a workmanlike manner.

The situation of and means for access and transportation from Dayton are a sufficient guaranty that all articles used at an armory will be furnished as regularly, and at as moderate prices, as at any point on the Ohio river, with two exceptions, probably—coal and pig metal; and to this will only be added the freight upon sixty-three miles of canal; and the policy adopted by the board of public works of Ohio, to reduce the toll on such commodities as would not otherwise be transported by the canal, will much reduce the additional cost of these articles. And when the connex-

ion, recommended by Governor Vance, is made by a cross-cut from some point on the Ohio to the Miami canal near Sidney, we may anticipate that the cost of coal and iron will be about the same as at Cincinnati.

To make up the difference of ten cents freight upon each 100 pounds of pig metal, and the advance in price of coal, we can effect a saving of at least one-third, if not more, in the price of a majority of the necessaries of life; and the economy or saving of expense in furnishing two hundred and fifty men and their families with food would be almost incalculable for a number of years, or great length of time.

The arms to be manufactured at the Western armory must, in course of time, be required principally on the Northern frontier; first, because this is the only boundary between our Government and the settled territory of a foreign nation, and because our intimate commercial intercourse with and the delicate and difficult questions which too frequently result from these relations of commerce and boundary render a war far more probable with Great Britain than any other nation.

The Miami canal, running north, and through the Wabash and Erie canal, communicating with all the upper lakes, furnishes the means of transporting arms to any point upon our Northern frontier, during the summer months. The Mad river and Lake Erie railroad, which is to terminate here, will afford other facilities during the whole year for any communication necessary between the armory and the lakes; the canal connecting Dayton with the Ohio and Mississippi rivers, and by them with the unprotected Indian territory on our Western and Northwestern frontiers, where arms will be required; and if any obstruction occur in the Ohio river, we connect directly with the National road running west, across the Mississippi river, to Jefferson city. The same road, extending east, would furnish a safe and direct conveyance for arms for this armory to any depots that might be established in that direction. There are three other turnpike roads connecting Dayton with the North and South, and thus keeping up a regular and daily mail communication with all parts of the country.

The situation of Dayton, at the junction of the Great Miami, Stillwater, and Mad rivers, the centre of the Miami valley, and surrounded by an industrious agricultural community, with all the facilities for the conveyance of their products to it, must make Dayton, at a day not far distant, equal, if not superior, in population and wealth, to any inland city east of the Mississippi.

The general health of this city for the past ten or fifteen years has been such as to invite inhabitants of all classes, and from every part of the country, to settle among us, and make their future home; and, in addition to the good health, we can with gratification refer to our public schools, (which we hope in a few years to be perfected, and not inferior to the best in the country,) to our beautiful and well-filled churches, and to our public institutions for the promotion of useful knowledge among our citizens.

We now proceed to give the evidences of the germ which is rapidly to swell this into a populous and great manufacturing community:

1. The improvements already made upon the water power from the Miami and Mad rivers, and the canal within the immediate vicinity of Dayton.

The water now employed and belonging to the Cooper estate is taken from Mad river, one-fourth of a mile above the city limits, and is conducted into the canal, and by it into hydraulic basins, furnishing power which

would propel twenty pairs of millstones; and when used by the various mills, factories, and machine shops, is again thrown into the canal, and, with a portion now used in propelling the clock factory, and the distillery, and the chopping mill in the southern part of the city, may be made to propel four additional pairs of millstones. Some of the machinery used in the different factories is of what may be styled the old kind, and therefore, when renewed, with all the late improvements, will add much to the present power. Before the water reaches the hydraulic basin, a small proportion is taken from the canal, and propels Cooper's flouring mill, (which is capable of grinding 54,750 bushels of wheat per annum,) a wool carding and dressing factory, and the Miami cotton mill; the water from the flouring mill and carding factory passing into the river without detriment to the canal or machinery.

The water power from the hydraulic basin propels the Messrs. Pease's flouring mill, Thomas Clegg & Son's Washington cotton factory, machine shop, and foundry, Estabrook's oil mill, A. & Z. Crawford's shoe peg and last factory, and chopping mill, Mr. Seargent's turning lathe, Clark & Stevens's paper mill, Mr. Burrows's saw mill and lathe machine, Mr. Curtis's wool carding and dressing factory, Rakestraw & Plunket's Enterprise cotton mill, Mr. Stickler's gun barrel factory, Collins's turning lathe, the Cooper Cotton Company's machinery, the Dayton Carpet Company's factory, Mr. Spinning's clock factory, and General Lowry's mill and distillery. And within a short distance of the eastern limits of the city stand the Messrs. Alexander's paper mill, the cotton factory, flouring mill, and distillery owned by the late George W. Smith, and the distillery, flouring, saw, and oil mills owned by Mr. Jonathan Harshman; and upon the south is Mr. Peasley's chopping mill and Mr. Patterson's saw mill, and upon the opposite bank of the river are Mr. Tate and Huffman's flouring and saw mills, and the saw mill owned by Mr. Haskins. The product of those factories, which will be driven by the power now unemployed, if a revision and increase of the tariff be made, so as to protect home industry and manufactures of all kinds in opposition to the free trade principle recommended by the English Government, [will also be added to our manufactures.] This nominally a "free trade" system is, in practice, one in which the breadstuffs and other products of our country are taxed in England to entire prohibition at every point of demand, above the actual starvation of her inhabitants, while she seeks to have her manufactures, such as "Victoria prints," "Prince Albert stripes," and Kidderminster carpetings, admitted into our ports without duty. The freedom of such a trade is all on one side.

The following table is taken from the fourth annual report of the board of public works, made to the Legislature January 12th, 1841; it being "a statement of most of the different kinds of property transported on the Miami canal in 1839 and 1840," from Dayton, as taken from the collector's book, with their value annexed.

TABLE.

Articles.	Quantity.	Value.
Flour, barrels	134,861	$539,444
Whiskey, barrels	57,820	404,761
Pork, barrels	6,284	75,408
Ale, barrels	957	7,656
Oil, barrels	354	10,620
Wheat, bushels	5,538	3,876
Corn, bushels	500	100
Rye, bushels	4,103	2,051
Barley, bushels	2,659	1,595
Bran and shorts, bushels	2,207	176
Pork and bacon in bulk, pounds	1,602,057	64,082
Lard, pounds	595,081	35,704
Butter, pounds	83,945	8,394
Cheese, pounds	11,719	1,050
Pig iron, pounds	7,725	231
Castings, pounds	39,058	1,952
Merchandise, pounds	308,194	36,983
Furniture, pounds	199,880	19,980
Iron and nails, pounds	12,974	778
Feathers, pounds	2,693	673
Furs and peltries, pounds	46,092	25,300
Cotton yarn, pounds	94,161	23,540
Dried fruits, pounds	1,000	1,030
Machinery, pounds	40,820	29,360
Agricultural implements, pounds	16,665	2,450
Leather, pounds	2,947	736
Sundries, pounds	861,237	93,180
Feet lumber	30,894	430
Number of hoop poles	119,148	1,787
Number of staves and heading	64,766	520
Number of empty barrels	14,433	8,659
Number of brooms	7,406	925
Number of cords of wood	26	52
Number of tons of hay	5	40
Number of perches of dressed stone	83	264
Number of millstones	2	500
Total shipped by canal	–	1,404,267
To this sum may be added that which was taken by wagons upon the five turnpike roads leading from our place, say one-fourth, equal to	–	351,074
Total exports	–	1,755,361

In comparing this table with the receipts by the canal at Cincinnati, we find that of the two great products of the Miami valley (flour and whiskey) we have shipped to that city one-half of the whole.

To give more particular information respecting the business of our city, we report the following tables, showing the value of the produce, and number of persons employed in the manufactories, mechanical shops, mercantile operations, and grocery business, &c., of our city, together with the various improvements prosecuted by the city authorities, private companies, and individual enterprises, all showing the stability, soundness, and prosperity of Dayton and its inhabitants, and that, with industry and economy, she has passed through expansions, suspensions, and contractions, without much loss.

Number of manufactories, mechanical shops, mercantile operations, and grocery business, &c.	No. of hands.	Value of produce per annum.
Five cotton spinning factories	131	$101,000
Two carpet weaving factories	34	35,000
Two carding, dressing, and weaving factories	15	11,000
One hat-body manufactory	4	15,000
Five flouring mills	22	176,000
Three chopping mills	4	3,000
Five saw mills	13	26,500
One gun-barrel factory	5	9,000
Two oil mills	7	21,775
Two paper mills	17	31,700
One last and peg factory	8	4,000
Two turning lathes	5	2,600
Four foundries and machine shops	44	84,000
Four soap and candle factories	11	19,000
One clock factory	5	2,500
Four distilleries	16	45,500
Two breweries	17	37,000
Thirty carpenters	153	91,800
Ten boot and shoe makers	96	42,385
Six saddle, harness, and trunk makers	29	31,563
Five tanners and curriers	34	49,860
Eighteen clothiers and tailors	55	24,300
Nine blacksmiths	37	22,460
Five carriage and wagon makers	29	23,150
Four coopers	30	11,300
Five tinners and copper smiths	13	5,000
Three hatters	23	19,000
Four chair makers	16	8,100
Two ropewalks	3	3,000
Six bakeries	13	10,350
Eight cabinet makers	31	17,700
Plasterers	12	7,500
Four gun smiths	6	2,200
One buckskin glove maker	7	4,000

STATEMENT—Continued.

Number of manufactories, mechanical shops, mercantile operations, and grocery business, &c.	No. of hands.	Value of produce per annum.
Two white and lock smiths - - - -	3	$1,500
One Venitian blind maker - - - -	1	600
One mathematical instrument maker - - -	1	300
Six jewellers - - - - - -	11	5,500
One cap factory - - - - - -	2	1,200
Four stone cutters - - - - -	20	7,016
Painters and glaziers - - - - -	25	14,340
Two French buhr millstone shops - - -	6	12,500
Four stove and sheet iron stores - - -	20	45,300
Three stone quarries, delivering 10,700 perches per annum - - - - - - -	56	18,725
Four brick yards in making and putting up 3,500,000 bricks - - - - - -	95	23,700
Nine miscellaneous establishments - - -	15	9,000
Total - - - - -	969	1,137,924

Five drug and chemical stores - - - -	$30,560
One hardware store - - - - - -	20,000
Three iron stores - - - - - -	105,250
Three book stores - - - - - -	16,500
Two queensware stores - - - - -	30,000
Twenty-two dry goods stores - - - - -	367,300
Thirty-one grocers and produce dealers - - -	441,600
Four lumber yards - - - - - -	23,700
	1,034,910

There are four newspapers published in Dayton, viz: the Journal and Advertiser, tri-weekly and weekly; Dayton Transcript, semi-weekly; and the Herald, weekly.

For improvements within the city during the past year, there has been expended as follows:

For 1,878 rods of street graded and gravelled - - -	$10,945
Four bridges - - - - - - - -	7,174
Cleaning gutters, streets, &c. - - - - -	231
Improvements on public square - - - -	256
Officers' fees, fire department, &c. - - - -	1,210
	19,816

Private expenditures upon walks, streets, gutters, churches, cemetery grounds, &c., 1,184 rods of guttering and curbing walks	$4,531
Cooper establishment, cutting channel for New Mad river	5,000
County abutments for bridge over same	1,013
Citizens building five churches in 1840 and 1841	46,500
The Woodland Cemetery Association has purchased forty acres of beautiful and well-situated land, southeast of the city, and has expended in improvements	2,500
	59,544

The above tables show the number of persons employed in the mechanical and manufacturing interests of our city to be 969.

Annual value of manufactures	$1,137,924
Dry goods, hardware, crockery, groceries, and produce dealers, &c.	1,034,910
Produce not included in above, and shipped by canal and turnpike roads	887,680
Expenditures within the city upon public account	19,816
Expenditures within the city upon private account	59,544
Total value for 1841	3,139,874

In order to convince the most skeptical of the future prosperity and rapid increase of Dayton and its manufactures, as well as to show that she stands not alone, but is surrounded with advantages and resources equal to those enumerated as within the city, we have taken the following account of the water power now employed in our county from the list furnished by the county assessor, of the number of the flouring mills, oil and saw mills, carding and fulling factories, distilleries, and breweries.

Forty-nine flouring mills in active operation, and grinding 1,162,525 bushels of grain per annum	$911,893
Six oil mills	37,200
Seventy-two saw mills	108,300
Ten carding and fulling factories	19,000
Thirty-seven distilleries, consuming 429,600 bushels of grain	300,720
Five breweries	65,000
Total	1,442,113

The banking facilities of Dayton have been less, probably, than those of any other city in Ohio, because of the perseverance of the Dayton Bank to pay specie during the general suspension of the banks throughout the country; and therefore the business men have been compelled to rely upon their own means, and that of the agricultural community of the vicinity, for the capital necessary to prosecute the regular business of Dayton, as exhibited in this report.

Columbus and Cleveland cities, with about the same population as Dayton, (6,067,) are reaping the benefit of a banking capital of nearly a million each, while Dayton, transacting a business annually to the amount of $3,139,894, has but one bank, with a capital of only $168,000.

Your committee might state facts in connexion with the general diffusion of capital, showing why Dayton has been less affected by the universal derangement of the business and currency of the country, for the past five years, than any other portions of the State; but they deem it unnecessary, and only say that if more time could have been taken, the duties might have been performed more satisfactorily.

H. L. BROWN,
S. T. HARKER,
H. STRICKLER,
} *Committee.*

DECEMBER 2, 1842.

No. 91.

CARROLLTON, MONTGOMERY COUNTY, OHIO,
September 12, 1842.

We offer to the General Government all the land we own at Carrollton, except the town lots south of Main street in Carrollton, and except the lots of ground on which Perry Pease lives, being six acres and ninety-hundredths of an acre, including, with the said land, the water power and improvements, containing say 550 acres, for the sum of $40,000.

The lots on which Perry Pease lives can be had for say —— thousand dollars, and the village lots and improvements in the town of Carrollton be bought for say $10,000.

ALEXANDER GRINES,
PERRY PEASE,
HORACE PEASE.

No. 92.

HAMILTON, OHIO, *September* 1, 1842.

GENTLEMEN: The undersigned have been appointed a committee, on the part of the citizens of this place, to present for your consideration the advantages of Hamilton as a location for a national armory.

The facts relative to the water power, and its employment at this place, are briefly presented in the enclosed report which we submit for your consideration.

In addition to the facts stated in the report, it is proper to add that the whole work has been put under contract, and it is now rapidly progressing to completion. The water will be let into the hydraulic race early next spring, if not before.

We visited Cincinnati for the purpose of meeting you there, but were, unfortunately, a day after your departure.

We will be pleased if you can at an early day pay us a visit, and examine the water power and other advantages of Hamilton.

Very respectfully, your obedient servant,

JNO. M. MILLIKIN.
JOHN WOODS.

General ARMISTEAD,
Colonel LONG,
Doctor LAWSON,
} *Commissioners, &c.*

No. 93.

Report made to a meeting of the citizens of Hamilton and Rossville, on the subject of a Western national armory, December 1, 1841.

The committee appointed at a meeting of the citizens of Hamilton and Rossville, in reference to the location of the Western armory, in connexion with the contemplated work of the Hamilton and Rossville Hydraulic Company, report, that there are many important considerations involved in the question of the location of a Western armory to which it is not deemed important that your committee should devote much attention, inasmuch as they have been so forcibly and unanswerably presented in the report of the committee appointed by the citizens of the city of Cincinnati, and which, in the opinion of the undersigned; apply to any point in the neighborhood of that city with equal force. For instance:

1. That it should be "within one of the Western States."

2. "The claims of Ohio as a State, on account of its superior representative numbers, and in consideration of its long line of exposed frontier."

3. The advantages of the southwestern part of this State over any other points higher up the Ohio river, because the navigation of the river and our canals is less interrupted by ice and extreme low water.

4. The facilities with which arms may be forwarded to the North, on the lakes, or to the South, or Southwest.

5. The difficulties of an ascending navigation and transhipment, in the delivery of arms on the Ohio frontier, from any point south or southwest of Cincinnati.

These propositions, with many others of like general character, showing the superior claims of this portion of the State of Ohio, are so fully and ably enforced in the report referred to, that we regard it as being wholly unnecessary to enter into their further discussion.

The town of Hamilton, situated on the Miami canal, twenty-one miles north of Cincinnati, connected and identified as it is in business and in interest with Rossville, located on the opposite side of the Great Miami river, possesses, in the opinion of your committee, all the important advantages enjoyed by Cincinnati, while it enjoys some to a much greater extent, and others not to be found within the limits of any city.

While we proceed to present what we esteem to be our superior claims to the location of the Western armory at this place for reasons which we consider controlling, we entertain the opinion that we do not come into conflict with the interests of our "Queen city." Located in her immediate neighborhood, connected with her in every species of trade and commerce, and identified as Hamilton and Rossville are with her interests, we cannot doubt that Cincinnati will be greatly benefited by the increase of our population, the development of our resources, and especially by the immediate and profitable employment of our unsurpassed water power.

Without further preliminary remarks, we proceed at once to the consideration of the local advantages for the establishment of a national armory at this point; referring, as before premised, to the report of Judge Hall, for the arguments demonstrating the superior claims of the southwestern corner of Ohio to the favorable considerations of the Government.

I. Water power.

Without possessing the information necessary to the formation of a correct estimate of the probable amount of water power which may be required to operate the machinery of an armory, we entertain the opinion that the General Government will require—

1. An abundant quantity for present and prospective use.
2. That it should be free from interruption by high or low water.
3. That the constancy of an ample supply should not be liable to frequent interruptions arising from breaches, repairs of locks, tumble dams, and other works, connected with navigable canals.
4. That the annual expenses for water power should be reasonable.

With reference first to the quantity of power, secondly to its freedom from the influences of high or low water, and thirdly to the ability of the company to furnish at all times an abundant supply, it will be sufficient to refer to the following reply of Samuel Forrer, Esq., to interrogatories propounded to him in reference to the proposed hydraulic works. The scientific attainments, proverbially correct judgment, and practical experience of Mr. Forrer, as an engineer, eminently qualify him for the formation of an opinion entitled to the full confidence of the public.

REPORT OF MR. FORRER.

DAYTON, *November* 12, 1841.

GENTLEMEN: In answering your inquiries in relation to the water power intended to be created at Hamilton by the Hamilton and Rossville Company, I shall notice your interrogatories in the order stated, without quoting, in all cases, the entire interrogatories.

Never having gauged the Miami river near Hamilton, I shall be under the necessity of making use of the information derived from Messrs. Erwin and Earhart, who have made the only experiments within my knowledge, any where below Dayton. Their process of gauging, and their well-known practical accuracy in mechanical experiments, entitle their estimates to the fullest confidence. These gentlemen fix the minimum discharge of that stream, near the point where the water would be taken out of it, at 25,000 cubic feet per minute; and, in my calculation, I shall adopt their estimate. I had once supposed that there was even a greater quantity than this due to the least discharge of the Miami at Hamilton; but observations made at this place, on one of the principal branches of the river, during two seasons of extreme low water, showed results which would require the estimate, at the time of those observations, to be considerably less than 25,000 feet for the amount of water at Hamilton. This year, although an unusually dry one, the principal branches of the Miami were not reduced as low as they were when formerly gauged by myself and others in this vicinity; but the recurrence of as low water as the present season is so seldom, that I should not hesitate to assume the minimum discharge of the river before adopted as the fair average.

The second inquiry—the number of millstones this power would be capable of operating. The power required to drive a millstone is governed by so many circumstances—size of stone, work performed, &c.—that it will be necessary to notice this inquiry much more at large than if there *were* a settled rule to guide millers and millwrights in this matter.

The leases of water power on the Miami canal (except one or two of the first made) fix the millstone power at a rate of grinding equal to one hundred bushels of wheat in twenty-four hours. In some cases, a specific quantity of water is provided for in the lease, as in Cincinnati, where the millstone power is fixed at 330 cubic feet per minute over an overshot wheel of 9½ feet diameter; and at Dayton, where it is 300 cubic feet, on a 10½-foot wheel.

On the Ohio canal most of the leases are made to provide for "a sufficient quantity of water to operate a millstone of 4½ feet in diameter, grinding at the usual rate; the machinery to be of the most approved construction, and the actual quantity of water to be determined (at some future day) by a competent engineer, to be selected by the State." The quantity thus due has not been yet determined, and there is therefore no restriction. Under these leases, it is said, millers are grinding at the rate of 150 to 250 bushels of wheat per day, and must, therefore, now use from 50 to 100 per cent. more water for a millstone power than is used on the Miami canal. The same practice prevails east of the mountains, wherever the quantity of water will admit of using it profusely.

In the estimate I shall give, I adopt the Dayton and Cincinnati millstone power, as fixed in the State leases, and apply it to your fall of 28 feet, reduced to an available fall of 21 feet; or, in other words, I shall assume the heights of the wheels at 21 feet, which will raise them above the ordinary freshets in the river. The quantity of water which would then be required by the rule adopted is 150 cubic feet per minute for each millstone power; and this, divided into 25,000, gives, as the result, a power at Hamilton capable of operating 166 pairs of millstones.

Interrogatories 3d, 4th, 5th, and 6th, refer to the character of the route for the canal, cost of construction, site for hydraulic structures, and advantages of this privilege over water privileges on navigable canals.

The whole length of the canal, necessary to embrace the 28 feet fall, as adopted in the plan of your company, will exceed very little 4 miles. The canal, to convey 25,000 cubic feet per minute, must be of sufficient capacity to pass a volume of water measuring in its cross section 280 superficial feet, or 70 feet average width by 4 feet deep. By the levels taken by Messrs. Erwin, Skinner, and Daniels, which are entitled to entire confidence, it results that the canal will, in its construction, require the removal of 230,000 cubic yards of earth. The excavations will be of the cheapest kind, and the materials of the best quality, for safe and permanent embankments.

Omitting for the present the construction of a new and permanent dam, the whole cost of the water to the site selected would not exceed $24,000, including all contingencies which can reasonably accrue.

The site selected to use the water power upon, in its application to mills and other hydraulic machinery, is remarkable for eligibility for the purpose intended. The whole of the immense power at command can be applied to use, without the least necessity for crowding the numerous establishments which may be erected there into dangerous or even inconvenient proximity.

The advantages of water power taken directly from a durable stream, for the single [purpose] of applying it to machinery, over those derived from a navigable canal, are many, and in some cases great. In the first place, the artificial water way is short, and therefore not liable to breaches and

frequent repairs, subjecting the occupant of water privileges to interruption in their business to any thing like the extent incident to long lines of canal. The many mechanical structures on canals, such as locks, aqueducts, water gauges, &c., requiring renewal at irregular and uncertain but not unfrequent periods, are so many obstacles to a regular supply of water for mills and other machinery; and these, being of secondary consideration to the navigation, must give way, no matter how ill-timed the interruption, to the interests of the miller and manufacturer. These objections are, however, comparatively small when the water is taken from canals near a permanent feeder, but become greater as distance increases.

Individuals leasing from the State are, moreover, sometimes liable to serious inconvenience and loss, in consequence of the negligence or ignorance of public agents, who, being to a great extent regarded by the usages of courts as the proper judges of the necessity or propriety of their own acts, are therefore, in their individual as well as public capacity, not responsible for any loss sustained by the lessee. It must be claimed, however, for canal power, that the ample resources and faith of the State are pledged to maintain its contracts with individuals leasing water; and *ultimate* relief for losses occasioned by mismanagement of agents may be obtained by petition to the Legislature, while in some cases the means of a company may be inadequate to the object. But, to guard against losses from this source, a company may make a contingent provision in their leases to individuals which shall give them the right to make repairs when delays by the company extend to an unreasonable time.

The principal positive advantage of canal power is in the convenience of water carriage at the very door of the miller or manufacturer. The cost of drayage, even for a short distance, is no inconsiderable tax upon the income of an establishment engaged in manufacture of any heavy article of commerce. In case of the Hamilton and Rossville Hydraulic Company's project, this objection, too, may, and no doubt will, be avoided, as a connexion with the Miami canal, immediately below the nearest lock, can be constructed at an expense comparatively trifling.

Interrogatory 7th. "Will the power which can be conveniently created here equal, in quantity and adaptation to profitable use, any water power within your knowledge?" I have already stated what is the probable amount of power at your site. I will now add that I am not acquainted with any situation where there is a power equal in extent to this, wholly free from the liability to interruption of back water or other causes, nearer than some of the great falls in New York. I have also stated that there is ample room for the application of the water, and will add that I know of no situation where water works can be more easily and safely connected with the water when brought to the site contemplated to be occupied; nor do I know any situation where any of the manufactures suited to an inland location, and not involving the use of ore or large quantities of coal, can be more advantageously conducted.

Situated only 23 miles from the Ohio river at Cincinnati, with turnpike roads and canals for means of communication, and in the midst of the most fertile, highly improved, and populous district in the State of Ohio, it seems to me nothing more is wanting than the creation of this water privilege, so completely in your power, to make Hamilton one of the choicest places of the Miami valley, and consequently of the West, for the

capitalist or man of business to invest his money or apply his skill and industry.

As a part of your object is stated to be the invitation to the location of the national armory now in prospect, I will barely state that in a report of a former board of commissioners it is stated that a power capable of operating twelve pairs of millstones, of five feet diameter, would be sufficient for an armory. This twelve-stone power is exceedingly vague; but, by consulting the millwright's guides and the history of the practice of millers east of the mountains, it will be found to be about equal to a thirty-stone power, as estimated at Cincinnati and Dayton.

This, you perceive, will be but a small portion of the water power your company can control, and will leave an immense surplus for all other purposes which can possibly be desired, even though the source of supply should be reduced to one-half of the amount gauged—which is not at all probable under the most extended succession of dry seasons that has yet occurred within the knowledge of any inhabitant of this part of the country.

SAMUEL FORRER.

J. Woods, J. M. Millikin, and L. D. Campbell, Esqs.

Relying, as we confidently do, upon the correctness of the opinion expressed by Mr. Forrer, based upon his own knowledge, observation, and experience, as well as upon the surveys and examinations of the other gentlemen referred to in his report, we hazard nothing in affirming that there is no place upon the Western waters, where the same amount of water power can be procured, by the expenditure of an equal amount of money, combining so many important qualities as that proposed to be created at this place. These qualities must be regarded as those especially necessary in a power intended to operate machinery of any kind required in an armory, or in the prosecution of any manufacturing business whatever. We regard our proposed water privileges as so far excelling, not only in quantity, but in all essential or desirable qualities, all other water power heretofore brought to the attention of the Western public, that we consider it wholly unnecessary to enter into any further comparative calculations to show the superior advantages which are now offered to the favorable consideration of the commissioners appointed to select a site for a Western armory.

As to the favorable terms upon which any quantity of power can be procured, we will observe that, in the establishment of an armory the original cost and the current expenses [of which] are to be borne by the people, the Government should not overlook the amount that may be annually saved in the item of water rent. In consequence of the immense amount of power which will be created by the comparatively small amount of money, the Hamilton and Rossville Hydraulic Company will furnish any amount of power necessary upon exceedingly favorable terms. At Dayton, we are informed that power sufficient to propel one run of stones of four and a half feet diameter rents for $200, and the same power in Cincinnati rents for $250. For the reasons before given, it will be furnished here, either to the General Government, to manufacturing companies, or to individuals, at about the average price of $150. Presuming that a power sufficient to operate thirty run of stones will be required for a Western armory, (according to the report made January, 1825, by Colonel McRae and others, and the statement of Mr. Forrer,) it would cost in Dayton

$6,000 per annum, in Cincinnati $7,500, and in Hamilton $4,500—showing an annual saving in water rent, of $1,500 over Dayton, and of $3,000 over Cincinnati. In addition, it should be remarked, that the power furnished by the State at either of the above points, is guarantied only for eleven months in the year; that interruptions from many other causes often arise, during the year, which prevent mills from running even eleven months in the year; and that at Hamilton a sufficient quantity can be furnished for an armory, which will be liable to no interruptions from high or low water, or other ordinary causes.

II. The eligibility of Hamilton as a site, with reference to the location of machine shops and other necessary buildings, and the adaptation of the ground for the favorable application and use of water power.

Upon this subject we hazard nothing in challenging a comparison with any point that may be designated. We again refer, in support of our opinion, to the report of Mr. Forrer, whose opportunities for examining hydraulic works in the Western country have been such as to enable him to speak with great confidence upon the character of our site. Mr. Forrer remarks, that "the site selected to use the water power upon, in its application to mills and other machinery, is remarkable for eligibility for the purpose intended—the whole of the immense power at command can be applied to use without the necessity for crowding the numerous establishments which may be erected there, into dangerous or even inconvenient proximity," and that "he knows of no situation where water works can be more easily and safely connected with water, when brought to the site contemplated to be used."

By reference to the plat of the route of the hydraulic race and of the grounds contiguous, the extraordinary advantages for the favorable application and use of the power will at once be apparent. For instance, from A to B, as indicated upon the plat, a distance of 2,000 feet, the water can be used with a fall of 28 feet; from B to C, a distance of 2,000 feet, the water can be used with a fall of 15 feet; along the lines D, E, F, G, a distance of 2,200 feet, the water can be used with a fall of 13 feet; and along the bluff bank, as designated upon the plat, a distance of 4,000 feet, the water can be used with a fall of 23 feet. By calculation, it will be seen that there will be 10,200 feet of said hydraulic race, upon which every variety of building may be erected, for the application of water power, and giving ample room for every desirable establishment, without bringing them into "inconvenient or dangerous proximity."

III. The advantages of this place, arising from the comparative low price at which the site may be purchased and necessary buildings erected, and the exceedingly low prices of rents and of all necessaries of life.

In consequence of the peculiarly favorable situation of grounds for buildings, and the application of water power, as before shown, the General Government can be accommodated with any quantity of land, from ten to one hundred acres, upon which to construct an armory, at prices most favorable, and far below what would be demanded at any place in Ohio affording equal advantages. These lands would be wholly unencumbered by improvements not required by the Government, which would enable those superintending the work, so to construct and arrange their machine shops and other tenements as to avoid interruption or inconvenience by those owning lands contiguous to their establishments.

The abundance of timber, stone, and other materials required in the construction of buildings, and their consequent cheapness, together with the

great facilities afforded by the Miami canal and the hydraulic works, connected as they will be by means of a lock, will enable the Government to make, on exceedingly favorable terms, such improvements as the nature of the business to be prosecuted may demand.

The low price of property in this place, and consequently of rents, in connexion with the great abundance of provisions of every description always obtainable, at fair prices, will enable machinists, and other operatives of every description, to sustain themselves and families at as cheap a rate as it can be done in any part of the Western country. These advantages of location must be of mutual benefit to the employer and the employed. The difference in expense of living can be best demonstrated by calculation. For instance, we take the estimated force required at 250 workmen, (as given in the Cincinnati report,) who, together with their families, will probably make about the number of 1,000. Making a safe estimate, by allowing each family to consist of ten members, the number of tenements necessary for their comfortable occupancy will be 100.

In Cincinnati the average annual rent for such tenements could not be less than $125 each, making a total of - - -	$12,000
In Hamilton and Rossville, the average rent would not exceed $60 per tenement - - - - - -	6,000
Showing a difference in the annual expenses for house rent, between Cincinnati and this place, of - - - -	6,000

Presuming, for the purpose of illustrating our views, that it would be fair to allow to the machinist and other operatives all the benefits arising from the great abundance and cheapness of the necessaries of life, and to the General Government the advantages of the low prices of property and of rents, so that the employer and the employed will be equally benefited, it will then be apparent that the Government will save, by the location of her proposed armory at Hamilton, in twenty years, the sum of $130,000 in the item of expenses incurred for labor in that period.

Having examined the comparative facilities afforded at Cincinnati and at Hamilton, with reference to the character and cost of water power, cost of site, cost of materials for the erection of an armory, and value of labor, let us estimate the total difference of cost that must be incurred in the establishment of an armory, and maintaining the same for twenty years, and it will be seen how much would be saved by its location at Hamilton instead of Cincinnati:

Extra cost per annum of water power in Cincinnati - -	$3,000
Add one-eleventh as the amount charged, there is, for 11 months -	272
Total in water-power rent per annum - - - -	3,272
Add for difference in rent for 19 years more - - -	62,168
Making total amount for 20 years - - - -	65,440
Add interest upon the annual difference of $3,272 for each year, from payment of said sum - - - - -	37,108
Showing a difference, in cost of power for 20 years, of - -	102,548
Add for extra cost of labor at Cincinnati from extra cost of house rent, being $6,500 per annum - - - - -	130,000

Add the interest upon the annual difference or each year, from payment of same - - - - - - -	63,100
Making a total difference, in water power and cost of labor for 20 years, of - - - - - - - -	295,448
Add to this the difference in the cost of site - - -	25,000
Add difference in cost of erecting and finishing necessary buildings, say - - - - - - - -	20,000
Total difference in 20 years of - - - - - -	340,643

IV. The facilities afforded at Hamilton for the distribution of arms and for the delivery of materials used in their manufacture.

Relying as we do upon the truth of the position assumed in the Cincinnati report in relation to this branch of the subject, we believe that the important materials of coal and iron can be delivered at Cincinnati upon as favorable terms as they can be furnished in any other place, and that no place possesses greater facilities for the distribution of arms than is enjoyed by that city.

If we shall therefore be enabled to demonstrate that there will be no substantial difference in the cost of the delivery of coal and iron at this place and the city of Cincinnati, and that other materials can be furnished here at a lower rate than at that point, we apprehend that an interior position will not be regarded as objectionable. By means of the hydraulic race, connected as it will be with the Miami canal by a lock, as indicated upon the plat, the boats will be enabled to come immediately to the doors of all workshops and mills which may be located at any point on said race; and hence the Government can deliver coal and iron from the Ohio river, (the point at which it would be received by its agents,) at the very door of the workshops of the armory, at as low a rate in Hamilton as if the same were located above high-water mark, upon favorable ground in Cincinnati.

To deliver materials from the river to a favorable point in Cincinnati would require carting. Supposing, therefore, that an armory would consume 10,000 bushels of coal, what would it cost to deliver it at the place of use? By those who have been heretofore engaged in that business, we are informed that the price for carting has been from one and a half to two and a half cents per bushel. Adopting the medium price of two cents per bushel, the delivery of the 10,000 bushels will cost $200. What would the delivery of the same number of bushels cost at Hamilton? By reference to the law relating to the protection and regulation of the canals of Ohio, it will be found provided "that all boats, floats, or other property of the United States, shall be permitted to navigate or be transported on either of the canals of this State free from the payment of tolls," and hence the only expenses to be incurred by the United States is the towing of boats from the Ohio river to Hamilton, and the unloading of the materials at the doors of the shops. A good canal boat will carry 1,500 bushels of coal, and the cost of transporting which is estimated as follows:

Three hands for 3 days, at 75 cents per day - - -	$6 75
A team of 3 horses, at $1 50 per day, for 3 days - -	4 50
Making, for the transportation of 1,500 bushels - - -	11 25

In order to avoid an under estimate, we allow, in addition, to cover all possible contingencies - - - -	$3 75
Which will make entire cost in no event to exceed - - -	15 00

Estimating, therefore, the transportation of 10,000 bushels as above, it requires only the sum of $100 to deliver the same from the Ohio river at the very door of the workshops in Hamilton, while it will cost for the carting of the same in Cincinnati the sum of $200.

We may, in a slight degree, be mistaken as to the cost of delivering those important and heavy materials required in the manufacture of arms at the two points named; but there can be no question that the General Government can deliver all the coal and iron needed in their workshops upon the Hamilton basin and the proposed hydraulic race for the sum it now costs to deliver the same to the manufacturers in Cincinnati.

Other important materials, such as black walnut wood, charcoal, linseed oil, and paper, can be furnished here at a price below what they would cost in Cincinnati. These articles would necessarily cost something for their transportation to Cincinnati, which would be saved to the Government by their purchase and use here.

It therefore appears, from unquestionable facts, and from conclusions justly drawn, that our interior position, so highly superior as it is in other important particulars, is not objectionable on account of a want of facilities to distribute arms and to obtain the important materials used in their manufacture.

Your committee, in addition to the points presented, should not omit to remark, that, while we enjoy so many physical advantages, we claim to have at hand all the means for our social and intellectual improvement that can be found to exist in other places of like population, and that our towns offer inducements of the highest character and greatest importance for the location among us of business men of every profession and calling in life.

In conclusion, the undersigned—in view of, first, the extent, safety, and low price of our water power; second, the eligibility of Hamilton as a site for the favorable location of machine shops and the application of power; third, the advantages arising from the cheapness of the site, cost of improvements, low price of rents, and the necessaries of life; fourth, the facilities afforded for the distribution of arms, and for the purchase and delivery of materials—cannot entertain a doubt of the eminent advantages which our location presents for the establishment of the Western armory; and they therefore, with great confidence, present our claims to the favorable consideration of the commissioners appointed to examine and report upon the relative advantages existing at the various points inviting its location.

A. McCLEARY,
J. B. CAMERON,
WILLIAM BIBB,
WILLIAM TAYLOR,
JACOB MATTHIAS,
H. S. EARHART,
R. B. MILLIKIN,
JOHN W. ERWIN,
JOHN WOOS,
JOHN M. MILLIKIN,
} *Committee.*

No. 94.

HAMILTON, OHIO, *November* 15, 1842.

GENTLEMEN: In answer to your inquiries left with us when you visited Hamilton, I have the honor to report that we have the written agreement of the owners of the lands to convey a site for the Western armory on the following terms:

Names of owners, &c.	Acres.	Price per acre.	Aggregate price.
Millikin's island - - -	310	$40	$12,400 00
David Bigham - - -	53	70	3,710 00
George R. Bigham - - -	53	65	3,445 00
James Bigham - - -	53	60	3,180 00
William Bigham - - -	53	65	3,445 00
Total - - -	522	-	26,180 00

This embraces the site between the river and canal northeast of Hamilton.

In addition to the above, John Woods will sell a very favorable site, bounded west by the Miami river, north by the south line of Hamilton, containing 450 acres, at $50 per acre. The water can be taken through the middle of the tract along a similar circular bluff, and displayed over wheels 20 feet in diameter. An eligible communication with the Miami canal can be had here also.

In relation to the power and the communication with the Miami canal, the board have passed the following resolution:

Resolved, That the Hydraulic Company will furnish to the United States 3,000 cubic feet of water per minute over a fall of 20 feet, upon condition that the United States will erect a permanent dam across the river, and keep it in good repair; and the United States shall have the right to navigate the main canal of the company from the Hamilton basin free of charge, when a water communication shall have been completed between the hydraulic canal and the basin, if the national armory shall be established adjoining Hamilton.

The work is in rapid progress, and will be completed early next season.

Please acknowledge the receipt of this, that we may know that it reached its destination.

Should any further explanations be desirable to you, they will be promptly made.

Respectfully, your obedient servant,

WILLIAM BIBB,

President of the Hamilton and Rossville Hydraulic Company.

General ARMISTEAD,

President of the Armory Board.

No. 95.

NEWPORT, KENTUCKY, *April* 28, 1842.

SIR: I do myself the honor to transmit to you a copy of a communication I took the liberty to address to the board of commissioners, appointed by your Excellency, under the law of Congress, in relation to an armory on the Western waters. You will see by an answer addressed to me by William L. Henley, secretary of the board, that they "would, in the course of their examinations, visit the site referred to and report thereon should it possess the requisite qualifications." Since the receipt of this letter, I have heard nothing from them. The last notice of them, they were at or going to Nashville, and would then go on to the falls of the Wabash, and I expect they would then proceed up the Ohio and examine the site near this. Whether they have returned to Washington or not, I am not informed. I understood Surgeon General Lawson had [gone] on to the city. I have thought it my duty in justice to [state] the advantages I really think one of the locks and dams on Licking, near this place, posesses over any other position within the range of my personal observation; and from a residence of full 50 years, and having traversed much of the Western country, I think I have been enabled to form a pretty just estimate of the comparative advantages of the various sections and positions suitable for the proposed establishment.

If a direct line is extended from southeast to northwest, passing through the mouth of Licking and Cincinnati and extending to the lakes, and another line bisecting it from the east to the west at this place, it will be found this point will be nearer the centre of population of the United States for the next century than any point in the Union; and if the seat of Government for the United States should be removed in course of that period, I have no doubt it will be placed within a few miles of this point. I assure you I am decidedly of opinion that nothing of the kind ought to be attempted for many years, and, had I a vote in the matter, [I] would give it my decided negative for the period of my life and for many years to come; but, if the United States remain united, (and God forbid they should be ever severed for a thousand years, and indeed to the end of time, for I should consider it one of the greatest calamities which could befall our beloved country,) that [such] an attempt will be made, in course of some years, I have no doubt. When your Excellency is in possession of the various reports by the commissioners and other light you possess yourself, you will be able to form a correct judgment of the point embracing the most advantages in the various points in view. I have travelled the country from this to Detroit in various directions, and to other points on our great lakes, and assure you there is not a foot [of] really poor land in the whole extent; and as to the lands in all the other directions, they will not lose in comparison to those in any part of the Union. And as to the various kinds of timber, it is unsurpassed, and, indeed, not equalled, to my knowledge, in any part of the Union. There is iron ore lying in masses, above ground, not more than 20 miles above this and within a few miles of Licking; and it is confidently believed, that an abundance of coal will be found within a few miles of this place, in the Licking hills, but below steamboat navigation, when our slack-water navigation is completed. There are now opened fine bodies of this useful mineral; but at the present time it is brought down the Ohio and sold at 6½ cents per bushel, and 9,000 or 10,000 bushels are now stored here bought at that price. Taking all

things into consideration, I am convinced there is no point on the Western waters, possessing so many important advantages as one or more positions near this point, many of which your Excellency will see enumerated in my letter to the commissioners, a copy of which I have taken the liberty to enclose to you.

I have the honor to be, with great respect, your obedient servant,

JAS. TAYLOR.

To his Excellency JOHN TYLER.

No. 96.

To Brevet Brigadier General Armistead, Lieutenant Colonel S. H. Long, and Surgeon General T. Lawson.

NEWPORT, KENTUCKY, *November* 6, 1841.

GENTLEMEN: At a numerous meeting of the citizens of the town of Newport and its vicinity, on the 29th October, 1841, at the court-house of said county, General James Taylor was, on motion, called to the chair, and Charles Helm appointed secretary. On motion, James Taylor and six others were appointed a committee to draw up a report setting forth the advantages that the position on the river Licking, in the vicinity of Newport, in the county of Campbell, and State of Kentucky, possessed, for the erection of a Western armory for the United States; and it was further resolved that General James Taylor be appointed a committee to correspond with the above-named gentlemen, forming a board for the purpose of selecting a suitable site on the Western waters for the establishment of the national armory in pursuance of the provisions of the act passed at the late session of Congress, and that the President has directed the formation of a board for the purpose, consisting of the above-named gentlemen of the United States armory. In conformity to the said resolution, I have the honor to inform said board that the report required to be made is in progress and will be ready to be made in a few days, and will be presented to the honorable board whenever it will do us the honor to visit our place; and the undersigned, as chairman of said committee, with as many of the board as can attend with convenience, will attend the said board of officers and show them the different sites in the vicinity of this place, which they think possess equal if not superior advantages to any position on the Western waters. Although the proposed report will set forth the advantages more at large than I can do in the compass of a letter, yet as some of your members may not have a full knowledge of the advantages possessed by several points on the Licking river near this place; and for the purpose of your bearing in mind some of those advantages, I will briefly state—

1. That said Licking puts into the Ohio, immediately opposite to the city of Cincinnati, the largest and most flourishing town in the Western country, (New Orleans excepted,) where provisions, artisans, and every kind of material can be had on the cheapest terms of any point on the Western waters; that Newport and Covington, two handsome towns, are situated immediately at the mouth of Licking, the one above and the other below; that immediately at the mouth of said river stands the United States public buildings, erected for an arsenal, magazine, officer's quarters, and

barracks, standing upon about six acres of land, embracing a fine harbor for boats of 13-feet water at all seasons of the year. The adjacent grounds can be had on reasonable terms to any reasonable extent required. It is one of the healthiest positions in the United States.

2. Locks and dams are in progress on the Licking to the number of five, and will be completed in the course of next year; and the engineers report that good steamboat navigation will be had for 250 miles, extending up to the iron, coal, and pine regions, when completed. On this river and on the adjoining hills from near the mouth to the head, there is more good timber than in any part of the United States I have ever seen; consisting of the finest white and the various kinds of oak, walnut, locust, poplar, and, high up, the pitch pine. There are several furnaces and forges now in successful operation below the point where steamboat navigation will terminate—the iron equal to any in the United States. Lock and dam No. 1 is only two and a half miles from the mouth of Licking. Up to that point, there is no ripple or obstruction at any season of the year; and there will be great water power for works for an armory, mills, and machinery of every kind. The flats of land on each side of the river are extensive, and entirely above inundation, and rising gently to the hills. Lock and dam No. 2 is five miles on a direct line, and six by the river. The fall at this place is five feet nine inches, besides the height of the dam, which I think is twenty-eight feet. This will give an immense water power. At this place I own the land on both sides of the river, except a few acres donated to the State of Kentucky, on which is erecting the lock and dam; and the United States shall have whatever land they may need for their works, and a reasonable quantity even as a donation, if they require it. There is the finest timber, of various kinds, immediately adjoining the works on both sides, within a quarter of a mile of the works. At lock and dam No. 1 my son (Col. James Taylor) owns the land on the east or upper side, and my daughter (Mrs. Williamson) on the west side; and I can vouch, should this position be preferred, that as much land as the United States may want they can have on reasonable terms. Should it be desirable, a canal can be made at a moderate expense from either of these locks and dams to the United States grounds at the arsenal, and have great water power at that spot, which would be a saving to the United States of say at least $50,000.

3. The Ohio and Lake Erie canal puts into the Ohio at Portsmouth, only about one hundred and twenty miles above this place, and enters Lake Erie at Cleveland. The Whitewater canal is nearly completed to Cincinnati from North bend, where the Great Miami is brought through the ridge of land, less than a mile, (say three-fourths of a mile,) by a tunnel, which is nearly completed. This canal is intended to connect the Maumee of the lake and Wabash canal. One branch of this canal puts into the Ohio at Lawrenceburg, about two and a half miles below the mouth of the Great Miami, and is finished for about forty-five miles up north, and going on to its completion. A railroad is in progress from the city of Sandusky, near the mouth of Sandusky bay, to Cincinnati. It is in operation from thence to Tiffin, a distance of near forty miles. Several sections of the road are in progress; and a portion of the road is nearly completed from Xenia to Cincinnati, and the rails actually laid into the city, a distance of about fifty miles, and no doubt the whole route will be completed in two or three years.

The Miami canal, terminating at Cincinnati and intending to connect

with the Maumee canal, has been in operation several years as high up as Dayton, Ohio, and has progressed beyond Piqua, a distance say of forty-five miles, and will be completed in two or three years. The National road at Springfield, about sixty-five miles from this place, (an excellent turnpike road,) intersects that road at that point; and several turnpike roads, extending into the interior of Ohio, are in progress from opposite this point. An excellent turnpike road is now in progress from the mouth of Licking to Lexington, Kentucky; full half of the distance is completed, and [it] will be finished in all next year.

One of the best turnpike roads I was ever on extends from Lexington to Maysville, in this State, and is progressing, to intersect the National road at Columbus and Lancaster, Ohio; and, from Lexington, various turnpike roads are extended into the interior—one through the Old Wilderness, towards Abingdon, in Virginia; another branching off to Knoxville, in Tennessee; and another extending towards Nashville.

The great Louisville, Cincinnati, and Charleston railroad, having its terminus at Lexington for the present, but intended to be terminated at the mouth of Licking, is in successful operation for 128 miles to Hamburg, opposite to Augusta, Georgia. It branches off at Branchville, and will be in operation as high up (towards the mountains) as Columbia, the seat of Government of South Carolina, and no doubt will be ultimately completed.

Locks and dams are completed on the Kentucky river (only distant below this about fifty miles) up to Frankfort; and the slack-water navigation of the Green river is completed a considerable distance up that river. A canal is now in progress connecting Lake Michigan with the Ohio river at Evansville, about 350 miles below this. Many more facilitities might be named.

I would respectfully ask, is there any other position on the Western waters embracing so many advantages as some point near the mouth of the Licking? One of the most practical engineers in the United States assures me Licking will afford an abundant supply of water for steamboat navigation the year round, and of course for all kinds of machinery. Under all these advantages, have we not high claims for the proposed establishment? Again: Kentucky is the oldest Western State—was at least as patriotic in the late war, pouring out her blood in torrents to vindicate the honor of the nation [against its] haughty and imperious foe.

I have the honor to be, with great respect, gentlemen, your obedient servant,

JAMES TAYLOR.

ST. LOUIS, MISSOURI, *December* 1, 1841.

SIR: Your communication to the board of commissioners appointed to select a suitable site on the Western waters for the establishment of a national armory has been received, and laid before them. In the course of their examinations, they will visit the site you mention, and report thereon, should it possess the requisite qualifications.

By order of the board:

WM. L. HENLEY, *Secretary.*

To MR. JAS. TAYLOR,
Newport, Kentucky.

No. 97.

MADISON, INDIANA, *December* 1, 1841.

GENTLEMEN: At a late public meeting of the citizens of this city, the undersigned were appointed a committee to present, for your consideration, the claims of this city as a site for the location of the armory about to be established on the Western waters.

In pursuance of the above authority, we beg leave to call your attention to this point. We think our pretensions are supported by reasons which, with you, will have weight. They are in part—

1. The location being central, with a water communication with the South and West, even in the lowest stages of the Ohio and Mississippi rivers.

2. By means of our railroad now in progress of completion, we shall have an easy and quick communication with the interior of the State and the Northern lakes.

3. The Kentucky river being now open, by means of her slack-water navigation, the best of coal can be had at all times at rates much less than any other town above this on the river, below where it is found.

4. The healthfulness of the city.

5. Cheapness of living.

There are many other reasons which can be better urged by a personal interview.

We therefore, in the name and on behalf of the citizens of this city, respectfully request of you a personal examination of our claims; and are, respectfully, your obedient servants,

J. F. D. LANIER.
WILLIAM HENDRICK.
VICTOR KING.

Gen. ARMISTEAD,
Surg. Gen. LAWSON,
Lieut. Col. LONG,
} *United States Commissioners.*

No. 98.

MADISON, *November* 10, 1842.

GENTLEMEN: Yesterday I promised you, by mail, a copy of the geographical report for this State, which I hope will come safe to hand.

I now set down to give you a list of prices at this place, collected with some care; also, a price-current cut out of our newspaper of yesterday, which you will find on the other page.

Good stone can be had, delivered, at 62½ cents per perch; stone masonry laid in lime and sand, $1 50 per perch; good brick, delivered at $2 75 per 1,000; same laid in wall, with lime and sand, $4 50 per 1,000.

Pine lumber, from $7 50 to $15 per 1,000; poplar lumber, from $5 to $8 per 1,000; oak lumber, from $7 50 to $10 per 1,000.

The greatest abundance of oak, poplar, walnut, and locust lumber, abounds in this vicinity.

Stone coal can be had in boats at from five to six cents per bushel.

The tract of land you looked at, lying below town, between the two creeks, can be had at from $40 to $50 per acre.

Very respectfully,
J. F. D. LANIER.

Gen. ARMISTEAD and Dr. LAWSON.

Wholesale prices current, corrected weekly for the Banner.

Bacon, hog round, per lb.	2½ cts.
hams, per lb.	4 to 5½ cts.
sides, per lb.	2½ cts.
shoulders, per lb.	2 cts.
Beeswax, per lb.	24 cts.
Butter, per lb.	5 to 8 cts.
Batting, per lb.	12½ cts.
Beans, white, per lb.	30 to 35 cts.
mixed, per lb.	20 cts.
Buckwheat flour, per lb.	1½ ct.
Bed cords, per dozen	$2 50 to $3.
Castings, per lb.	3½ cts.
Corn meal, per bushel	15 to 20 cts.
Coffee, per lb.	11 to 12½ cts.
Candles, dipped, per lb.	8 cts.
mould, per lb.	9 cts.
stearin, per lb.	23 cts.
sperm,	38 to 45 cts.
Chocolate, per lb.	14 cts.
Cheese, per lb.	5 to 7 cts.
Cotton yarns, per dozen	9 to 11 cts.
Flax seed, per lb.	62 to 65 cts.
Feathers, per lb.	20 to 22 cts.
Fish, mackerel, No. 1, none in market.	
mackerel, No. 2, per barrel	$16.
mackerel, No. 3, per barrel	$10.
Flour, per barrel	$2 75.
Ginseng, per lb.	13 to 16 cts.
Grain, wheat, per bushel	40 to 42 cts.
corn, per bushel	15 cts.
oats, per bushel	8 to 9 cts.
Hay, per cwt.	20 cts.
Iron, bar, per lb.	4½ to 6 cts.
pig, per lb.	5 cts.
Lard, per lb.	4 cts.
Molasses, New Orleans, per gallon	22 to 25 cts.
sugar-house, per gallon	28 to 33 cts.
Nails, 10, 12, 16, and 20*d.*, per lb.	5¾ cts.
8*d.*, per lb.	5¾ to 6 cts.
6*d.*, per lb.	6¼ cts.
4*d.*, per lb.	7¼ cts.
Oil, linseed, per gallon	80 cts.
sperm, per gallon	$1 37 to $1 62.
tanners', per barrel	$22 to $25.

Oil, lard	56 to 62 cts.
Onions	15 to 20 cts.
Potatoes, per bushel	10 cts.
Rice, per lb.	5 cts.
Rags, per lb.	2 to 4 cts.
Raisins, per box	$1 25 to $1 50.
Rosin, per barrel	$4.
Sugar, New Orleans, per lb.	5½ to 6½ cts.
Havana and loaf, per lb.	11 to 18 cts.
Salt, per bushel	20 cts.
Sal æratus, per lb.	9 cts.
Steel, American blister, per lb.	7 cts.
English blister, per lb.	18¾ cts.
German, per lb.	18 cts.
shear, per lb.	22 cts.
Tea, young hyson, per lb.	60 to 70 cts.
gunpowder and imperial, per lb.	56 to 65 cts.
country, per lb.	90 cts. to $1 06.
Whiskey, per gallon	14½ to 15 cts.

No. 99.

CITY OF NEW ALBANY, *November* 8, 1841.

GENTLEMEN: At a regular meeting of the mayor and council of said city, on the 1st of November, a committee was appointed, consisting of S. Whitman, Esq., Hon. James Collins, jr., M. C. Fitch, P. Tallone, and D. M. Hale, Esqs., whose duty it was made to correspond with your board, and to solicit your attention to our city and its environs, with an eye to the location of an armory here. The committee convened at the office of the Hon. James Collins, jr., on the 2d, and appointed S. Whitman chairman, and directed him to address your honorable board on the objects of the meeting.

In obedience to said order, I have the honor to state that, in the name and behalf of the city of New Albany, you are hereby most respectfully requested to visit our city before you make a final selection of a site for the Western armory; and we are sanguine in the belief that there is not any situation on our Western waters that presents as many advantages as this point. We are aware that water power, if to be found on our Western waters, would be preferable to any other, for the purposes of an armory; but where is a sufficient, steady, and permanent water power to be found on our Western waters? Steam power, then, is the only power that can be safely relied upon, and made at all times available. Below our city the country becomes more and more subject to yellow fever and other diseases at certain seasons. Above, the waters are too shallow in summer.

Pig iron is cheaper here than at Pittsburg, Cincinnati, or at St. Louis. Coal is as good here as at Pittsburg; for all our good bituminous coal comes from there.

We have an abundance of timber of almost every kind; and better water cannot, perhaps, be found any where. We are confident our population (which is about 5,000) is as moral, sober, and industrious, as any in

the West. We are in a free State, where an abundance of free labor can be had, which is far better than slave labor.

In comparison with St. Louis, we believe that our city possesses at least two important advantages over her. One is, that the stone coal in the region of St. Louis is all a kind of bastard anthracite, containing a considerable [quantity of] black sulphur, and has not the property of coking, which renders it unfit for working wrought or cast iron.

Ordnance made with such coal would be too hard and brittle; the iron would be rotten, and liable to rust. Swords, guns, locks, bayonets, gun barrels, and in fact all work manufactured with such coal, will by no means compete with armor manufactured with Pittsburg coal; and that is the kind we use here. The cost of good coal here is from 8 to 12½ cents per bushel. At St. Louis, the same coal will probably cost from 37½ to 43¾ cents.

If water power can be had any where on our rivers, it is to be had about the foot of the falls of the Ohio; but the expense of abutments and races, and the great rises of water that often occur, render such power less desirable than steam power. These are the views of the people of this city and of the committee.

We therefore respectfully request you, as a body, to visit our city, and see, for yourselves, that these things are true.

I have the honor to be, sir, very respectfully, your humble servant,

STEPHEN WHITMAN,
Mayor, and Chairman of the Committee.

General ARMISTEAD and SUITE.

P. S. It would gratify us much if you would be pleased to inform us by letter of your reception of this, and whether you [will] visit us or not, or where and when you would receive any communication from us, personally or by letter.

I have the honor to be your obedient, &c.

S. WHITMAN,
Chairman of Committee.

Brevet Brigadier General W. K. ARMISTEAD.

No. 100.

CORYDON, *September* 6, 1842.

DEAR SIR: I had some conversation with the Rev. Mr. Shirley, yesterday morning, upon the subject of selling a tract of land about five miles below New Albany, on the Ohio river, belonging to the heirs of Iris Aydelots, deceased; in regard to which, I have to say that my father and myself are the administrators of said estate, and although we have been opposed to selling any of the real estate heretofore, in a case of this kind, where the whole community would probably be benefited, we would willingly sell.

We can have it in our power to make a clear and indisputable title to the property. We have only to apply to the court for an order to sell, which we can get immediately upon application, at the first term in October next, upon stating the object of sale.

There are about 500 acres in the tract, which we could sell for $20,000 in cash, which would be about $40 per acre. This is a less price than any land in that neighborhood has been sold at for some years past; $100 per acre has been offered for land adjoining, and land four miles below was sold for $50 per acre.

It seems you wrote my father some days since upon this subject; but as he could not, from the tenor of your letter, understand the object of the intended purchase, he of course refused to sell. If you had stated to him that it was for the purpose of locating a "United States armory," he would have written you, in substance, what I have.

With great respect, yours, &c.

JACOB & P. S. KINTNER, *Administrators.*

P. S. We shall be pleased to hear from you soon.

No. 101.

NASHVILLE, *January* 10, 1842.

The undersigned beg leave respectfully to call your attention to the Suck in the Tennessee river, as possessing advantages of a high order for the establishment of a national armory. The water power at this place, which is believed to be sufficient to propel any required amount of machinery, and the stone coal in the immediate vicinity of the Suck, and near to the river, for a considerable distance, both above and below, are supposed to be advantages, in the erection and continuance of an armory, not possessed by any other place in Tennessee, or perhaps in the West. Iron ore abounds throughout East Tennessee, and there are at this time a large number of furnaces and forges in operation; and the number might be increased to an extent sufficient to supply half of the Union with iron, without perceptibly diminishing the amount of ore.

The undersigned would earnestly but respectfully entreat you, that, in the performance of the arduous and delicate task of selecting a site for a national armory, you would give the place above designated such examination as its claims may merit.

JOHN R. WILSON,
RID. WATERHOUSE,
LEWIS RISSAN,
ROBERT W. POWELL,
WM. WILLIAMS,
Of the Senate.

WM. J. STANDEFER,
ISAAC A. MILLER,
S. W. WILLIAMS,
JOHN F. PATE,
N. A. SENTER,
JOEL HERNBREE,
WM. WARE,
CRAVENS SHERRELL,
JOS. SCRUGGS,
R. H. HODSDEN,
JOHN JONES,
S. MILLIGAN,
Of the House of Reps.

To General W. K. ARMISTEAD,
Surgeon General LAWSON, and
Colonel S. H. LONG,
} *Commissioners, &c.*

No. 102.

WASHINGTON, *December* 8, 1841.

SIR: I am informed that you have been appointed to examine the Western States, with a view to the location of an armory. I take the liberty to call your attention to the country watered by Green river, in the State of Kentucky, and request that you will examine it before making your report. In the county of Mecklenburg there are inexhaustible quantities of coal and iron, and the dam across the river at Rumsey affords water power to any extent. So does the dam at the mouth of Muddy river. The falls of Cumberland river are well worth examination and consideration. In the vicinity, I am told, coal and iron are abundant.

With respect, your obedient servant,

J. R. UNDERWOOD.

Gen. ARMISTEAD.

No. 103.

WASHINGTON CITY, *December* 14, 1841.

GENTLEMEN: As you have been appointed by the President of the United States, and are now engaged in selecting a suitable site for a national armory, permit me, respectfully, to call your attention to the falls of Cumberland river. That point is situate in the district I have the honor to represent, and on that account I feel myself called upon to present it for examination, that its advantages may be decided upon. Independent of any wish to serve a people who have honored me with their confidence, I am well assured that the point above named comprises manifold advantages. The Cumberland river is a noble stream, affording a sufficient quantity of water at all seasons of the year for an armory. You will see by the report of Mr. Howard Stansbury, U. S. assistant engineer, (which I herewith enclose you,) that it takes its rise on the western slope of the Cumberland mountain, in the State of Kentucky, and, after a precipitate and rapid descent to the plain below, flows with a comparatively gentle current and slight fall, through the counties of Knox and Whitby, until it reaches the falls, where it is precipitated over a cliff of Pudding rock, with a perpendicular fall of fifty-six feet. It is estimated to flow in upper Kentucky 220 miles, when it enters the State of Tennessee, through which, having run about 170 miles, it enters Kentucky, and fifty miles below discharges its waters into the Ohio; thus describing, in all, a course of 440 miles. These two noble States, whose citizens have given most signal proof of their valor and patriotism, never having failed at the slightest tap of the drum to hasten to repel the invading foes of their country, have perhaps had less of the public money expended within their borders than any of their sister States of equal size. This site, however, is recommended upon other and higher considerations. In addition to the water power above mentioned, you will perceive, by the engineer's report, that the surrounding country abounds in iron ore of the richest quality, scattered in great profusion, and is accompanied with an inexhaust-

ible supply of bituminous coal. Permit me, in conclusion, to say to you, it does seem to me, that, by selecting the site, you will not only consult the public interest, but economy of the country's resources.

Very respectfully, your obedient servant,

BRYAN Y. OWSLEY.

Brig. Gen. ARMISTEAD,
Col. LONG,
Sur. Gen. LAWSON. } *Commissioners, &c.*

No. 104.

WASHINGTON CITY, *December* 16, 1841.

DEAR SIR: I solicit your attention and consideration to a letter from my colleague, the Hon. Mr. Owsley, who resides near the falls of Cumberland, in Kentucky, in relation to a proper site for an armory on the Western waters. I have, from motives of delicacy, declined addressing you and your associates in favor of the falls of Cumberland, because I have some personal interest in the land at that place. I have deemed it a most eligible place for such an establishment, but presume that you will explore that and other places before you decide. Mr. Owsley resides near the falls, and has a better personal knowledge on the subject than I have; and to his representations I refer you, aided by your own observations.

I have the honor to be, with high respect, your obedient servant,

JOHN POPE.

Gen. ARMISTEAD.

No. 105.

At a regular meeting of the board of mayor and council, held at the city hall, on Monday, August 1, 1842, on motion of Mr. Arthur, it was—

Resolved, That General Armistead, Colonel Long, and Surgeon General Lawson, commissioners appointed by the President of the United States for the purpose of examining and locating the Western armory, who are understood to be now in the city of Memphis, in discharge of that duty, be respectfully invited to extend their visit as far as our city, believing that it presents as many claims and advantages for such a location as any other site on the Mississippi river.

Resolved, secondly, That the mayor of the city be, and he is hereby, authorized and requested to communicate to said commissioners, by deputation or otherwise, a copy of these resolutions.

A true copy from the minutes.

Given under my hand and the seal of the city of Vicksburg, this 2d day [L. s.] of August, 1842.

MILES C. FOLKES, *Mayor*.

General ARMISTEAD,
Colonel LONG,
Surgeon General LAWSON, } *Commissioners, Western Armory.*

No. 106.

MAYOR'S OFFICE, VICKSBURG, *August* 2, 1842.

GENTLEMEN: Permit me to respectfully call your attention to the enclosed resolution of the board of mayor and council of this city, inviting you to visit us. Should you thus honor our city, I flatter myself that you will not be displeased with it and the surrounding country, nor the people. You will be received with much good feeling and cordiality by the citizens of this city, and I doubt not by the people at large in the country.

The peculiar location of Vicksburg, with all its advantages of mild and healthy climate, good soil, abundant productions, &c., of the country around, and its easy access, by navigation on the great Father of Waters, at all seasons of the year, for the largest steamboats, vessels, and ships of war, together with the almost inexhaustible resources for building materials of the best kind, render it a fit site for the location of the Western armory, which you are about to establish. Although it is true that for the first time the epidemic yellow fever prevailed during the last autumn, with much violence in this city, which might form an objection in the minds of some as to its location, still, with that exception, her citizens have enjoyed almost unparalleled good health for many years past; and should they in future observe the necessary precaution, as experience has shown will be indispensable to the health of any city, such an epidemic, in all probability will never occur with us again, and can therefore form no material objection. Perhaps no place in the United States enjoys at this moment better health than does Vicksburg.

Nor do I deem it amiss to call your attention to another very important advantage that may, at no very distant day, accrue to this point, viz: that of connecting this place with the seaboard at the city of Charleston, in South Carolina, by a direct and continuous route of railroad between the two places, now already contemplated, which you will at once perceive, by a glance at the map of the country, [is] not only feasible but highly probable. This will bring us in close connexion with the Northern cities—say in about seven days to the seat of Government. Already have the people of South Carolina and Georgia extended the said work from Charleston to Columbus in the latter State, and at this end of the route we have progressed as far as Jackson, our own seat of Government; and an extension east of Pearl river, in the direct route, is now in the course of completion to Brandon in this State. Besides this, the two per cent. fund from the United States Government to the State is appropriated to the extension of the said road as far as it will complete the same, and a similar fund due to Alabama for the same purpose in that State. This, you will perceive, without any other aid from the two States, will go far to connect these two extremes of this great undertaking.

Should this object be accomplished at no very distant period, you will at once see the great advantages to the Government of the means thus afforded, of the speedy transportation of intelligence, troops, ammunition, artillery, &c.

In view of all these advantages, I sincerely hope that you may visit us and judge of them for yourselves, after having given them mature thought and consideration, as I feel assured you will; confidently believing, as I do,

you cannot be otherwise than pleased and gratified with your visit to this city.

Very respectfully, your obedient servant,

MILES C. FOLKES,
Mayor of the city of Vicksburg.

Gen. ARMISTEAD,
Col. LONG,
Surg'n Gen. LAWSON,
} *Commissioners Western Armory.*

No. 107.

GRAVE CREEK, VA., *September* 7, 1842.

GENTLEMEN: The undersigned, citizens of the Flats of Grave creek, in Marshall county, Virginia, respectfully request that you would (if convenient) call and examine this place in reference to the proposed selection of a site. It would be unnecessary here to state the advantages our place might afford. If you find it convenient to accede to our request, they will be presented, when the hospitality of our citizens will be tendered to yourselves.

We remain, gentlemen, respectfully, your obedient servants,

W. H. OLDHAM.
E. H. CALDWELL.
WALTER GRAY.
J. HOGE.

To the COMMISSIONERS *appointed to select a site for the location of a Western Armory.*

P. S. For information in reference to the location at this place, we refer to your secretary, Mr. Henley.

W. H. OLDHAM.

No. 108.

Ordinary prices of provisions, building materials, iron, fuel, &c., at several sites examined for the establishment of the Western armory.

LOCALITIES APPROXIMATE TO THE SITES.	Corn, per bushel.	Wheat, per bushel.	Oats, per bushel.	Potatoes, per bush.	Pork, per pound.	Beef, per pound.	Lard, per pound.	Butter, per pound.	Tallow, per pound.	Hay, per ton.	Bricks, delivered, per thousand.
	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Dols.	Dols.
Rock Island, Miss. river	16½	56	16½	20	2½	3	6¼	11	9	6	4
Peru, Illinois - -	20	50	16	20	2	3	6¼	12½	8	3	4
Alton, Illinois - -	20	62	25	20	2¼	2½	6	10	8	8	4½
Bellville, Illinois -	20	62½	22	20	2½	3	6	10	8	8	4½
St. Louis, Missouri -	22	75	25	25	2½	3½	6¼	12½	8	8½	4½
St. Genevieve, Missouri	22	62½	25	25	3	3	6¼	12½	8	8	4½
Cape Girardeau, Missouri	22	62½	25	25	3	3	6¼	10	8	8	4½
Cairo, Illinois - -	22	62½	25	25	2½	2½	6¼	12½	8	10	5
Smithland, Kentucky -	20	62½	20	25	2½	2¼	6¼	10	8	10	4½
Nashville, Tennessee -	25	62½	28	25	2½	2½	7	12½	10	10	4½
Paducah, Kentucky -	20	62½	20	25	2½	2¼	6¼	10	8	10	4½
Memphis, Tennessee -	20	62	31¼	25	2¾	2½	7	12½	9	12	5
Fulton, Tennessee -	20	62½	35	20	2½	2½	8	10	10	12	4½
Fort Massac, Illinois -	20	62½	20	25	2¼	2	6¼	10	8	10	4½
Florence, Alabama -	25	62½	28	25	2½	2½	6	12½	9	10	4
Mount Carmel, Illinois -	12½	62½	12½	12½	1¾	1¾	5½	8	6	5	3½
Evansville, Indiana -	20	62½	20	22½	2½	2½	5½	12½	7	7½	3½
Louisville, Kentucky -	20	62½	25	25	2½	2½	6	15	8	10	4½
Cincinnati, Ohio -	18	62½	16	18	2	2	5	12½	7	8	4
Portsmouth, Ohio -	25	62½	16	18	2½	2	6	8	8	6	4
Pittsburg, Pennsylvania	31½	62½	20	25	3	3	8	12½	10	8	4½
Big Beaver, Pennsylvania	31¼	62½	18	25	3	3	8	8	8	7	4
Wheeling, Virginia -	25	62½	18	18	2½	2¾	7	12½	8	7	4¼
Zanesville, Ohio -	27	54	10	17	1¾	2	6¼	10	8	6	4
Dayton, Ohio - -	17	54	10	17	1¾	2	6¼	10	8	6	4
Hamilton, Ohio -	17	54	10	17	1¾	2	6¼	10	8	6	3½
Frankfort, Kentucky -	25	62½	17	25	2½	2½	8	12½	10	7	4
Caseyville, Kentucky -	20	62½	20	25	2½	2½	6¼	10	8	6	4½
Harper's Ferry, Virginia	45	62½	25	37½	4	4	10	17	10	11	5½

No. 108—Continued.

LOCALITIES APPROXIMATE TO THE SITES.	Lime, per bushel.	Pine, per thousand, board measure.	Poplar, per thous'nd, board measure.	Hard lumber, per thousand, board measure.	Shingles, per thousand.	Pig iron, per ton.	Bar, iron per lb.	Cut nails, per lb.	Castings, per lb.	Stone coal, per bushel.	Charcoal, per bushel.
	Cts.	Dols.	Dols.	Dols.	Dols.	Dols.	Cts.	Cts.	Cts.	Cts.	Cts.
Rock Island, Miss. river	12½	20	12	10	3½	–	7	–	–	8	5
Peru, Illinois - -	12½	30	20	20	4	30	6	8	6	8	6
Alton, Illinois - -	12½	25	18	12	4	28	5	7	4	5	5
Bellville Illinois -	14	28	12	12	4	30	6	8	4	5	6¼
St. Louis, Missouri -	14	25	12	12	4	28	5	7	4	10	6¼
St. Genevieve, Missouri	14	28	12	12	4	28	5	7	4	13	6
Cape Girardeau, Missouri	16	30	12	10	3	25	5	6¼	4	12½	5
Cairo, Illinois - -	20	25	12½	12½	3	24	5	6¼	4	7	5
Smithland, Kentucky -	20	25	10	10	2½	24	5	6¼	4	7	5
Nashville, Tennessee -	20	40	10	10	3	25	5	6	4	20	6
Paducah, Kentucky -	20	25	10	10	2½	25	5	6	3½	7	5
Memphis, Tennessee -	25	28	10	10	3	30	6	6	5	15	5
Fulton, Tennessee -	28	28	10	10	3	–	–	–	5	12½	5
Fort Massac, Illinois -	20	25	10	10	2½	25	5	6	3½	8	5
Florence, Alabama -	15	35	9	9	2¾	24	6	7	5	20	5
Mount Carmel, Illinois -	20	30	10	10	2½	30	6	–	–	6	5
Evansville, Indiana -	20	25	10	10	2½	25	5	6	3½	7	5
Louisville, Kentucky -	20	24	10	10	2¾	25	5	6	4	10	5
Cincinnati, Ohio -	15	22	8	8	2½	25	5	6	3½	8	5
Portsmouth, Ohio -	15	22	8	8	2½	26	5	6	3½	6	5
Pittsburg, Pennsylvania	15	20	8	8	2½	26	4½	5½	3	4	5½
Big Beaver, Pennsylvania	8	20	8	8	2½	26	5	6	3½	4½	5
Wheeling, Virginia -	10	20	8	8	2¼	25	5	6	3	2¼	5¼
Zanesville, Ohio -	10	25	8	8	2	26	5½	6¼	3½	4½	5
Dayton, Ohio - -	10	25	8	8	2	26	5½	6¼	3½	16	5
Hamilton, Ohio -	12½	25	8	8	2	26	5½	6¼	3½	15	5
Frankfort, Kentucky -	12½	30	8	8	2¼	27	6	6¼	4	12½	5
Caseyville, Kentucky -	18	25	10	10	3	24	5	6	3½	7	5
Harper's Ferry, Virginia	20	40	15	20	4	25	5	5½	4½	18	7

A true copy from the memorials and other documents submitted to the board.

WILLIAM L. HENLEY, *Secretary.*

REPORT

OF

THE SURGEON GENERAL,

ON THE

Subject of the proceedings of the armory board.

SURGEON GENERAL'S OFFICE, *February* 6, 1843.

SIR: I have the honor to lay before you an abstract of the proceedings of the board, appointed to "select a suitable site on the Western waters for the establishment of a national armory," during the first series of their examinations; together with a report from myself touching the relative advantages of all positions that were submitted to the examination of the board as suitable sites for the armory.

As I have no history in detail, descriptive or statistical, of the places that were visited on our last tour of examinations, to present, and have refused to sign the report set forth by my colleagues, it would seem to be proper that I should state the reasons why. I have not produced a descriptive detail of places myself, or given my sanction to that prepared by the majority of the board.

At the close of the first series of our examinations, the board convened at Paducah for the purpose of bringing up their proceedings and reporting progress to the Department of War.

As the proceedings were being recorded by the secretary of the board, I suggested various amendments or alterations in the matter, form, and phraseology of the report. Many of my suggestions were approved, and others again objected to by the majority of the board; enough, however were adopted to justify me (inasmuch as I was desirous of preserving harmony as the only means of putting forth some actual result of our labors) in sanctioning the report; and it was accordingly signed by all the members of the board, and taken on by me to the city of Washington.

After the second series of examinations had been brought to a close, the board adjourned to meet again at Harper's Ferry, to gain some items of practical information at the armory; and at this place it was afterwards determined by my colleagues to remain and bring up the final proceedings of the board.

As the secretary was again about to prepare the record, I, as before, proceeded to suggest alterations in the matter and style of the report. These amendments were objected to by my colleagues, however, and the secretary of the board was ordered (without any consultation or discussion with me on the subject) not to adopt the suggestions or recommendations offered by me, in preparing the record. This led to an angry discussion between my colleagues and myself, and the controversy eventuated in my proposing the three resolutions certified to by the secretary of the board, in the paper herewith enclosed.

The last resolution being adopted, I withdrew from the board, returned

to this place, and renewed my duties in the Surgeon General's office. From the decision on the second resolution, it will be perceived that I was debarred from the use of the notes of my colleagues, and of the records of the board; and, without the communications and statistical documents from the legislative bodies of States, authorities of cities, incorporated companies, and from individuals before me, or the assistance of the secretary of the board, it was manifestly impracticable for me to prepare a description, in detail, of all the places that were visited by the board during their last tour of observation.

As the descriptive history of places prepared by my colleagues, and called by them, I believe, *Descriptive Memoirs*, however, contains a pretty fair statement of facts in relation to the sites last examined by the board, it is not so necessary that I should put forth an elaborate report on the capabilities and advantages of the same positions. Nor should I desire to present the abstract of the proceedings of the board accompanying this, (marked A,) but that my colleagues have, as I understand, altered in several material points, the record signed by all the members of the board, and which, as it contained the official registry of their acts and opinions, constituted the legitimate proceedings of the board.

After separating from my colleagues, early in December, I did not return to the board again until a few days ago, when I was officially notified that the proceedings were near being brought to a close, and that my concurrence in the views of the majority, and my signature to their final report was desired.

I hastened to obey the summons, and with the hope that I could bring myself to unite with my colleagues in the production of something that would, by a unaminity of sentiment, claim for our opinions a reasonable share of respectful consideration. On hearing the report prepared by my colleagues read, however, I found it to be not only at variance, in matter and in style, with my own taste, but to present views that I could not concur in; and I had reluctantly to withhold my signature from the document.

Having thus refused to unite with my colleagues in a joint report of our proceedings, it became necessary for me to prepare a statement of my own on the subject of our investigations. I accordingly embodied my views as contained in the special report, (marked B,) and which is now put forth, with all its imperfections upon it, as the expression of my deliberate opinion on all the questions submitted to the consideration of the board.

Very respectfully, your obedient servant,

THOMAS LAWSON,
Surgeon General.

Hon. J. C. SPENCER,
Secretary of War, Washington.

I have to request that this communication may accompany the other documents withersoever they have to go.

At a meeting of the board of officers appointed to select a suitable site on the Western waters for the establishment of a national armory, held at Harper's Ferry, on the 7th of December, 1842, Surgeon General T. Lawson made the following propositions to the board, to wit:

1st. That his presence was absolutely required at the city of Washington, and believing that should the future sessions of the board be held at Washington he could give all necessary attendance to the proceedings of the board, while he at the same time superintended the business of his office and the concerns generally of the Medical Department of the army, respectfully moved that the board, as soon as they ascertain, from the experiments now in operation, the water power and steam power required for an armory, adjourn from this place to the city of Washington, and there bring up their proceedings, and make their final report.

The question being taken on this resolution, it was decided in the negative.

2d. That he feels confident that he cannot agree with his colleagues as to the style and manner of the proceedings of the board, and fearing also that he will not be able to harmonize with them in relation to the form of the final report, or arrive at the same conclusions with them touching the relative advantages of the various positions presented to their consideration, respectfully requests that, after the minutes of the board (or the minutes kept by Lieutenant Colonel Long) are recorded by the secretary of the board, they be turned over to him that he may make a separate report in relation to the advantages and disadvantages of each point examined by the board.

The question being taken on the adoption of this resolution, it was decided in the negative.

3d. That he finds himself on the present occasion, as heretofore, in the minority touching the duties of the board, and that he is confident that any suggestions from him will be overruled by the majority to the close of the session, and that he feels satisfied that his time can be more advantageously employed at the Surgeon General's office than in an indefinite attendance upon the proceedings of the board at Harper's Ferry; therefore he respectfully begs leave to withdraw, for a time at least, from the board.

The question being on the adoption of this resolution, it was decided in the affirmative.

A true copy:

WILLIAM L. HENLEY,
Secretary of the Armory Board.

A.

Abstract of the proceedings of the board of officers appointed to select a suitable site on the Western waters for the establishment of a national armory, with descriptions of a portion of the sites examined by them.

The board assembled at St. Louis on the 1st of November, 1841, pursuant to the following orders:

GENERAL ORDERS No. 63.

HEADQUARTERS OF THE ARMY,

Adjutant General's Office, Washington, October 15, 1841.

The following order has been received from the Department of War:

DEPARTMENT OF WAR, *October* 14, 1841.

In compliance with the provisions of an act of Congress, approved September 9, 1841, the President directs the formation of a board of officers for the purpose of selecting a suitable site on the Western waters for the establishment of a national armory.

The board will be composed as follows:

Brevet Brigadier General W. K. Armistead, *President.*

Surgeon General Thomas Lawson,
Lieutenant Colonel S. H. Long, topographical engineers, } *Members.*

William S. Henley, Esq., *Secretary.*

The board will assemble on or before the 1st of November next at St. Louis, Missouri, where they will receive their instructions.

J. C. SPENCER,
Secretary of War.

By command of Major General Scott:

W. W. S. BLISS,
Assistant Adjutant General.

The board being organized for business, the president laid before them, as constituting the basis of their actions, the following instructions from the Secretary of War:

DEPARTMENT OF WAR,
Washington, October 18, 1841.

GENTLEMEN: The following general instructions are communicated for your guidance in performing the duty assigned to you in the order from this office of the 14th instant.

The authority for your appointment is contained in the following clause of an appropriation act passed at the late session of Congress, viz: "For defraying the expenses of selecting a suitable site on the Western waters for the establishment of a national armory, a sum not exceeding $5,000 is appropriated; and the President of the United States is hereby authorized to cause such selection to be made, and to communicate all the proceedings which may be had thereon to the Congress of the United States, to be subject to its approval."

Your examinations for the above object are confined to no other geographical limits than those indicated in the act of appropriation, viz: that the armory shall be "on the Western waters."

With regard to local considerations, the first is obviously that of the capability of the site to furnish the necessary power for driving the machinery required in the manufacture of arms; this may be either water or steam power, the choice of one or the other being determined by the relative cost of using it.

The transportation of a given quantity of materials for the manufacture of arms being much more expensive than that of the finished work pro-

duced from them, the facility of procuring such materials, and especially those which are required in the greatest proportion, (such as iron and coal,) is an important element in the selection of a site for an armory.

The healthfulness of the position is another consideration of great importance, with reference to the efficiency of the establishment, in supplying the wants of the country, even if the plain dictates of humanity could be neglected.

The resources of the adjacent country for furnishing the supplies required for the support of the persons employed at an armory will claim due attention. The actual facility which every site may afford for supplying workmen is not deemed to be of primary importance, as an establishment of this kind, in a position favorable to health and subsistence, will soon draw around it the requisite mechanics, and persons of all classes concerned in its operations.

The situation of the armory should evidently be such as to admit of easy and cheap transportation to and from it, for the purpose of procuring supplies, and of distributing arms to the Western States and Territories, and to the arsenals and other military posts within their limits.

No definite instructions can be given as to the extent of ground which should be set apart for an armory, as that will depend very much on the peculiar character of the site selected. Two plans have been proposed for such an establishment: one, to make it capable of manufacturing the arms complete, as in the national armories at Springfield and Harper's Ferry; the other, to confine the work to stocking and assembling the parts of arms, which would be procured in a finished state from private workshops. But whichever of these plans may be followed in the first establishment of a Western armory, its site should possess all the local requisites for enabling the Government ultimately to render it complete in itself. For this purpose, there should be sufficient space for suitably arranging the necessary workshops, storehouses, and magazines, and also for erecting dwellings for the principal officers of the armory. If circumstances permit, it will be advantageous for the United States to possess such a quantity of ground about the establishment as to prevent inconvenient intrusion from neighboring settlements; and the expediency of iron and coal mines, especially the latter, within the precincts of the armory, is worthy of consideration.

In your report of the examinations which you are called upon to make, you will be pleased to arrange the information obtained in such a manner as to present a clear view of the whole subject; and you will designate the site for an armory which you may think entitled to preference, giving your reasons for the selection. You will annex to the report topographical sketches of the sites which chiefly recommend themselves to your notice, showing, as nearly as you can, the boundaries of the ground which it may be advantageous and practicable to purchase at each place; and you will state the price at which it may probably be obtained, to whom it belongs, and such other information on this subject as may appear to be useful for accomplishing the object in view.

In order to put the board in possession of all the information which has been obtained by the War Department on this subject, the reports of two previous examinations of sites for a Western armory have been handed to the Surgeon General for the use of the board. One of these is the report of Commissioners McRae, Talcott, and Lee; the other a report by Major

J. L. Smith, of the corps of engineers. These are accompanied by a report on the same subject made by the Military Committee of the House of Representatives at the first session of the twenty-fourth Congress. Your attention is also invited to the letters, herewith enclosed, from Mr. Hall, of Cincinnati, on behalf of a committee of citizens of that place; from the honorable S. McRoberts, of Illinois; from the honorable Thomas H. Benton, of Missouri; and from a committee of citizens of Rock island, Illinois.

It is desirable that the report of the board should be received before the end of the month of May next, in order that the decision of the President may, if possible, be communicated to Congress in time to be acted on at its next session; but, for this purpose, it is not intended to urge undue haste in the discharge of the important duties committed to the board.

The appropriation for defraying the cost of this examination will be applicable to the payment of a per diem allowance of $1 25 to each of the members of the board while employed on this service, to defraying the necessary contingent expenses for stationery, &c., and the compensation of the Secretary, who will be allowed $5 per day, and a mileage of 10 cents whilst travelling on duty. The members of the board will receive from the Quartermaster's department the regular transportation allowance of officers travelling under orders, and a commutation for fuel and quarters at the usual rates.

The secretary of the board will disburse the contingent funds which will be advanced to him as they may be wanted, on the requisition of the president of the board, and he will account for them in the usual manner.

You will keep this Department informed of your movements, in order that it may be known where letters will reach you.

Very respectfully, your obedient servant,

J. C. SPENCER.

Brig. Gen. W. K. ARMISTEAD,
Sur. Gen. THOMAS LAWSON,
Lieut. Col. S. H. LONG,
} *Board, &c., West'n Arm'y, St. Louis, Mo.*

The president also laid before the board, for their consideration, sundry memorials and other communications recommending positions as sites for the Western armory.

The attention of the board having been directed to several positions on the upper Mississippi and Rock and Illinois rivers, and the approach of the winter season admonishing them that their operations in the more northern regions of country might be suspended by ice and snow, if delayed for any length of time, the board determined to proceed at once to the examination of the sites on the upper Mississippi, and in the northern section of the State of Illinois.

The board accordingly embarked on the 2d, and arrived at the Des Moines rapids of the Mississippi, on the 5th of November; where, being detained until the 8th of the month, such information was obtained in relation to the advantages of the country around, as to induce them to order a survey of that portion of the river, including the whole extent of the rapids.

From the report and the map of a survey, executed by Lieut. R. E. Lee, of the corps of engineers, in 1837, and other authentic sources, and especially from the report of the survey made under their immediate orders, the board

have derived the following items of information touching the water power, and other advantages of this section of country:

SITE OF THE DES MOINES RAPIDS.

Length of rapids - - - - - - 11½ miles.
Entire fall in this distance - - - - - 25.27 feet.

The site or position deemed most suitable for the attainment and display of an efficient water power is at a point six miles below the head of the rapids.

The fall from the head of the rapids to this point is - - - 8.25 feet.
The range from extreme low to extreme high water, at the head of the rapids, is - - - - - - 5.50 feet.
The range from extreme low to extreme high water, at the foot of the rapids - - - - - - 20 feet.
The range from extreme low to extreme high water, at a point six miles below the head of the rapids, is - - - 5.50 feet.

The river at the head of the rapids spreads to the width of four-fifths of a mile, and embraces a small island immediately at the commencement of the rapids, about 300 yards wide, between which and the Iowa shore is the main navigable channel of the river, about one-quarter of a mile wide; and between the same and the Illinois shore is a broad shoal slough, half a mile wide.

At the foot of the island commences a broad bar, composed of rock, gravel, and sand, which extends obliquely downwards, approaching the Illinois shore, through a distance of about two miles, to the head of a series of three small islands, or rocky bars, lying parallel to the Illinois shore, and at the distance of 300 yards from the shore.

The low-water depth of the bar first mentioned varies from two to four feet, and occasionally to six feet.

The depth in the channel between the small islands and the Illinois shore varies from four to eight feet. This depth continues downwards on the Illinois side, near the shore, for two miles and a quarter, through which distance a bench or berm 50 to 400 feet wide, and 3 to 14 feet above low water, occurs at the base of the hills along the margin of the river. The bar again presents itself extending downwards along the shore for several miles, in rear of which the bench above mentioned continues for a distance of about a mile, and its broadest part embraces a width of 600 feet; affording the most eligible and convenient locality for displaying the water power presented on this part of the river.

At the lower extremity of this position, the bench of land terminates, the hills coming at this point precipitously to the margin of the river.

The method deemed most appropriate for creating the water power is as follows:

Let a dam, or jettee of rock work, be extended from the lower end of the island first mentioned, to the head of the uppermost of the small islands near the Illinois shore; the top of the dam being raised throughout to the level of low-water surface at the head of the rapids. From this point the dam should be continued downwards, on the small islands, and across the channels between them, to the foot of the lowermost island; the summit of this part of the dam rising to the level of the highest freshet at the head of the rapids, or five feet and a half above the crest of the dam first mentioned.

From the foot of the lowermost of the small islands, a dam should be run obliquely downwards from the island to the Illinois shore, the height and level of which to be equal to those of the dam upon the islands. From the dam last described, a canal or race should be found on the bench between the margin of the Mississippi and the river hills, running parallel with the shore; the canal serving also as a forebay, from which the water power may be displayed at any point through a distance of three miles.

The method above proposed will, no doubt, ensure an efficient head and fall of at least eight feet, during all stages of the waters, which may be rendered available, under all circumstances, by the use of percussion or reaction wheels.

The dams and race contemplated embrace an aggregate length of about six and a half miles.

The cost of their construction may be assumed at an average of $12,000 per mile, making the aggregate cost of providing for a water power $78,000.

The ascent from the bank of the river, or bench of land proposed as the site for the erection of the workshops and display of the water power, to the level of the table lands immediately in the rear, and upon which the dwelling-houses, &c., could be advantageously displayed, may be effected at a gentle inclination by pursuing either or both of two ravines which intersect the river hills in the immediate vicinity of this locality. The passes alluded to are those formed by Middleton's and Calkin's runs, the former near the upper and the latter near the lower end of the site.

A tract of any desirable extent, covering the localities and water privileges above contemplated, may no doubt be purchased at an expense not exceeding $10 per acre.

The uplands in this vicinity are generally covered with a scattering growth of post, white, and red oak, while the bottom lands and valleys afford a plentiful supply of white oaks, black walnut, ash, cotton wood, elm, sugar tree, maple, wild cherry, hickory, &c. The soil of the uplands as well as that of the bottoms is exceedingly fertile, producing corn, wheat, rye, oats, and other agricultural products in great abundance and perfection.

Good building stone, both of sandstone and limestone, abounds in the vicinity of the rapids.

Abundant supplies of timber may be obtained from the upper Mississippi and Des Moines rivers.

Stone coal is said to abound on both sides of the Mississippi, several localities of which have also been discovered on the Des Moines river.

At the head of the rapids, on the Illinois side, is situated Nauvoo; the city of the Mormons; and immediately opposite, on the Iowa shore, is the town of Mount Rose, late the site of Fort Des Moines.

At the foot of the rapids, on the Iowa shore, is the town of Keokuck; and four miles below, on the Illinois side, stands the flourishing town of Warsaw, near the late site of Fort Edwards, opposite the mouth of the Des Moines river.

From the nature of the country in the vicinity of the point at which the water power would be displayed, and the workshops and other buildings erected, both shores of the river and the islands within being rocky bound, and the land to the rear and on each side being very high, with its soil based on limestone rock, it is to be presumed that the location would be as healthy

as most places on the banks of this or any other river in the Western country.

The Des Moines rapids of the Mississippi are 200 miles above St. Louis, or 400 miles from the confluence of the Ohio with the Mississippi river.

The navigation to the foot of these rapids is suspended for two months and more by ice in the winter season; and it is moreover frequently interrupted by low water at other seasons of the year, for boats drawing more than two and a half feet water.

The board, in giving their views in relation to this position as a site for an armory, deem it not inappropriate to express the opinion that the river wall, and other improvements contemplated as a means of creating a water power in the left or southern pass, would have the effect also to swell the water in the right or main channel of the river, and thus materially to improve the navigation through the whole extent of the rapids.

SITE OF ROCK ISLAND.

This beautiful island, situated in the centre of the Mississippi at the foot of Rock Island falls, and between the flourishing towns of Stephenson, on the Illinois, and Davenport, on the Iowa shores, derives its name from the fact of its resting upon a bed of rocks, consisting of limestone in horizontal strata. Its length is about two miles and seven-eighths, and its greatest breadth four-fifths of a mile. It contains about 800 hundred acres of excellent land, still the property of the United States. The surface of the island is generally waving, with a broad ravine passing centrally, and nearly longitudinally, through two-thirds its extent.

With the exception of a few acres cleared at the head and foot of the island, (the latter point late the site of Fort Armstrong, and now used by the United States as a depot for arms,) and a large garden with other improvements, occupied by George Davenport, Esq., the island is covered with a dense growth of heavy timber.

The island is bounded for the most part by precipitous cliffs or abruptly sloping rocky hills, its surface rising ten to twenty feet above the reach of the highest freshets.

The width of the channel on the south side of the island varies from 150 to 300 yards, while that on the north side, which is the main channel of the river, has a width varying from 420 to 700 yards. A dam 600 feet long has been erected across the south channel 300 yards below the head of the island, which affords a low-water head and fall of about four and a half feet, the surface of the water of the dam being nearly seven feet higher than the low-water surface at the foot of the rapids. In connexion with this dam, a saw mill has recently been constructed on its southern extremity, in which a very efficient and forcible water power has been produced, and rendered operative on the principle of the percussion wheel. With the existing arrangements at this mill site, however, any machinery must unavoidably be liable to interruptions by backwater, and may be rendered completely inoperative whenever the range at the foot of the rapids exceeds seven feet above low water. It is equally obvious that the head and fall of water at this place is not susceptible of any enlargement or other modification, by which to prevent interruptions during stages of the water more elevated than that above designated, without resorting to other means or other improvements than those confined to the south channel of the river.

It has been deemed important, if not essential, that the power proper for propelling the machinery of an armory, whether water or steam power, should be constant, and, if possible, entirely exempt from all interruptions. Such a power may be obtained at the site now under consideration in the following manner:

It has already been stated that the entire head and fall at the island, or the aggregate descent from the surface water of the dam to the low-water surface at the foot of the rapids, is nearly seven feet. To this fall it is proposed to add the descent from the head of Campbell's island to the head of Rock island, which is six and a half feet more, making the aggregate fall from the head of Campbell's island to the foot of Rock island thirteen and a half feet.

The method of uniting these two falls, and bringing them into conjoint operation on Rock island, consists in the erection of a river wall or dam, extending upwards from the head of Rock island, parallel, or nearly so, to the Illinois shore, till it reaches the foot of Campbell's island; the distance between the two islands, and consequently the extent of the wall, being three miles and three-quarters. The height of the wall should be such that its summit may be elevated at least two feet higher than the low-water surface at the head of Campbell's island, in order to secure a head and fall at least three feet greater than the extreme range at the foot of the rapids, which is supposed to be twelve feet above extreme low water at that point.

In addition to the wall, a dam will be required across the south channel, at Rock island; the appropriate locality for which is at a point about midway of the island, where the rapids in that channel have their lowermost termination. The length of the dam will be about 300 feet, and its height above extreme low water 15 to 16 feet.

The water power thus created may be conveyed from a point a little above the dam, through a deep-cut race leading across a ridge on the south side of the island 25 to 30 feet high, and 150 yards wide, and terminating in another race or canal found centrally and lengthwise of the island; from which last, the power may be conducted and displayed through races leading to either or both sides of the island, near its lower extremity.

The following items, taken from the minutes of the survey executed by Mr. Oglevie for the use of the board, will explain more clearly the extent and declivity of that part of Rock Island rapids, of which we have been treating:

Distance from the head of Campbell's island downward to the foot of Rock island	8½ miles.
Aggregate fall in this distance	12.96 feet.
Extreme range from lowest to highest water at head of Campbell's island	5 feet.
Extreme range from lowest to highest water at foot of Rock island	12 feet.
Length of Campbell's island	1½ mile.
Fall from head to foot of Campbell's island	2½ feet.
Distance from foot of Campbell's island to head of Rock island	3¾ miles.
Fall in this distance	3½ feet.
Length of Rock island	2⅞ miles.
Fall from head to foot of Rock island	6.96 feet.

The cost of providing for a water power in the manner above contemplated, and of remunerating the proprietors of the present dam and mill for

the damage that will be done to their improvements, may be stated as follows:

River wall 3¾ miles or 20,000 feet long, 8 to 15 feet high, at $10 per foot - - - - - - - -	$200,000
Dam, 300 feet long and 16 feet high, at $20 per foot - -	6,000
Canals, races, forebays, &c. on Rock island, 3,000 lineal yards, at $12 per yard, the depth varying from 11 to 25 feet -	36,000
Damage to proprietors of dam and mill, as valued by themselves, covering the purchase of the entire site and privileges	40,000
Amounting to - -	282,000

Building materials of all kinds are to be had in abundance upon Rock island and in its vicinity.

Sawed timber, consisting of white and black oak, black walnut, yellow poplar, ash, and cherry tree, is prepared in this neighborhood, and afforded at prices varying from $12 to $20 per thousand board measure. Pine timber is procured from the Wisconsin, Black, and St. Croix rivers, and can be afforded at about the same rates.

The woodlands of this part of the country occupy about one-sixth of the entire surface, the remaining five-sixths being prairies. The growth of the woodland is generally scattering, and consists of white, red, black, and bur oak, black and white walnut, yellow poplar, wild cherry, sugar tree, maple, linden, red and white hickory, yellow birch, dog wood, &c.

The soil is generally rich, and in places where it has been cultivated gives evidence of exceeding fruitfulness. Corn, wheat, rye, oats, flax, hemp, tobacco, culinary vegetables of all kinds, and a variety of fruit, are produced in great abundance and perfection.

Bituminous or stone coal is abundant in this neighborhood. It is generally found in the river hills, at different elevations from five to 30 or 40 feet above their bases, and in veins from two to four and a half or five feet thick.

Lead is obtained in abundance from the mines of the upper Mississippi and Wisconsin rivers; and iron ore is said to abound in many parts of the country.

Articles of subsistence of all kinds for man and beast are abundant, and they are very cheap, especially those that are produced in the neighborhood.

This site when occupied by troops was considered one of the healthiest positions in the Western country, as may be seen by reference to the medical reports on file in the Surgeon General's office at the city of Washington.

Rock Island rapids are 160 miles above the Des Moines rapids of the Mississippi.

The navigation of the upper Mississippi is subject to annual obstructions by ice during the period of about three months, from the 1st of December to the 1st of March. On the breaking up of the ice, especially if it be thick and strong, jams of this solid material are formed at narrow passes of the river, particularly at the heads of the islands, by which the river is divided into two or more narrow channels; and this constitutes a further interruption to the navigation of the river. Under such circumstances, also, those parts of the river situated above the jams are liable to sudden

and excessive floods, which inundate the bottom lands to agreat depth and extent.

In a dry season the river is liable to obstructions from sand bars, so that a boat drawing more than two or two and a half feet of water cannot pass the shoalest places, even in the deepest channel, without impinging the bars. Extreme low water seldom continues more than a few weeks, and sometimes only a few days at a time. At a medium stage of water, the river is navigable, for boats of the largest classes, from the mouth of the Missouri to the foot of Des Moines rapids; from the head of these rapids to Rock island; and from the head of Rock Island rapids to Fort Snelling, at the mouth of St. Peter's river.

For further information in relation to this site, see documents Nos. 1, 2, and 3, in the Appendix.

SITE AT LOWER RAPIDS OF ROCK RIVER.

The site to which the attention of the board was directed in this vicinity is on the north side of Rock river, three miles above its mouth; this last opening into the Mississippi four or five miles below Rock Island falls. The claims of this position rest upon the water power supposed to be available at this point, the magnitude and efficiency of which may be inferred from the following statements derived from the minutes of a survey made by Mr. Oglevie for the use of the board:

Length of rapids from head of Carr's island to foot of Vandruff's island, 1.65 miles.

Fall from head to foot of rapids, 10.2 feet.

Extreme range from highest to lowest water surface at the foot of the rapids, (the channel below being gorged with ice,) 15 feet.

Ordinary range as above, (the channel below being gorged with ice,) 11 feet.

Extreme range at foot of rapids, (the river below being clear of ice,) 9 feet.

Ordinary range from high to low water, at the head of the rapids, 3.26 feet.

Corresponding ordinary range at the foot of the rapids, 6.37 feet.

Distance from foot of rapids to mouth of Rock river, 3 miles.

From the foregoing statements, it is obvious that the entire fall at this site will be cancelled, and the water power neutralized, whenever the range at the foot of the rapids amounts to 15 feet, or even to 13½ feet; consequently, on such occasions, all operations depending upon water power must cease.

With occasional interruptions of the character above intimated, which would be likely to continue but for a short time, the water power at this place may be regarded as abundant, and efficient in a very high degree. The ordinary effective fall, in high-water stages, may be kept at six to seven feet, by the following arrangement:

The channel separating Vandruff's island from the northern shore of the river varies in width from 400 to 600 feet; has a rocky bed and a depth of 2½ to 3½ feet of water, with a rapid current during low water. This channel may be entirely stopped by a dam erected at a point about midway of the island, and uniting the island to the northern shore. The waste or surplus water, instead of being precipitated over the dam, may be carried off by the channel on the other side of the island, which is capacious, having a width varying from 300 to 500 yards.

In order more effectually to secure the high-water range at the head of the rapids, it will be advisable to construct also a dam across a narrow

channel situated between Vandruff's and Carr's islands, and communicating the northern with the southern channels of the river.

By this means, the entire descent from the head to the foot of the rapids, together with the high-water range at the head, may be rendered operative as a fall at a point on the northern shore, at some convenient distance below the dam first mentioned, and within the limits of the site now under consideration.

The quantity of water which the river affords in its lowest stage (as ascertained by admeasurement) is said to be 168,000 cubic feet per minute. With this quantity of water, and a fall of 10 feet, which may be readily secured for at least 11 months in the year, the effective power would be equivalent to that of more than 2,000 horses, or sufficient to drive more than 200 run of stones.

The works required for the creation and display of such a water power could be constructed at comparatively a trifling expense. The cost of the two dams need not exceed $12,000, while that of a race for conveying the water from the pool above the dam to a position about one-third of a mile below, most convenient for the display of the power, together with the expense of constructing forebays, &c., may be estimated at an equal sum, making the whole amount required for these purposes only $24,000.

The country in the vicinity of this site may be described thus:

On the north side of the rapids a high ridge of land or bluff comes in upon the river, sinking near the foot of the fall into an inclined plane from 200 to 500 yards wide, extending to the water. Immediatly to the south is Vandruff's island and some smaller isles—all subject to be partially and sometimes altogether overflowed.

A little further to the south and to the east lies a great extent of bottom land, indented with ponds and intersected by sluices—the whole subject to occasional overflow, with the ponds holding water throughout the year; and to the west, or below the fall, are low grounds, sluices, &c., extending to the Mississippi. The inclined plane on the north side of the river is the only position on which buildings could be displayed to any advantage. This tract of land, lately occupied by the Fox Indians and their celebrated chief Black Hawk, and whereon stood their principal town, is now the site of Rock Island city; the ground of which having been divided into lots, and sold to companies and to individuals, it was of course impracticable for the board to ascertain the terms on which a locality for an armory could be obtained.

From the low grounds, sluices, &c., contiguous to this position, the atmosphere cannot but be more humid than is desirable around a manufactory of arms; and the wide range of bottom land, &c., lying to the windward, during the summer season, would necessarily render the location very unhealthy.

A canal, with a dam and lock of 6½ feet lift, has been projected at this place, for the purpose of aiding boats in their passage over the rapids. The site of the dam is at a point about 200 yards above that designated in a former part of this article, and that of the canal is on the north side of Vandruff's island, extending downward about 450 yards below the dam. The excavation of the canal and the construction of the guard lock have already been commenced, at the expense of the State of Illinois.

The agricultural, mineral, and other products, and the facilities for procuring them at this site, are very similar to those enjoyed at Rock island and its vicinity.

Cost of building materials, provisions, &c., at the Des Moines rapids, Rock Island rapids, and lower rapids of Rock river.

Dry rubble wall, per perch	$1 75.
Mortar walls, per perch	$2 25.
Dressed stone work, per perch	$3 to $3 50.
Bricks, per thousand	$4.
Brick masonry complete, per perch	$8.
Lime, per bushel	10 to 12½ cts.
Hard wood lumber, per thousand, sawed	$8 to $10.
Pine wood lumber, per thousand, sawed	$10 to $12 50.
Stone coal, per bushel	8 to 10 cts.
Wrought iron, per pound	6 to 8 cts.
Corn, per bushel	15 to 18 cts.
Wheat, per bushel	50 to 62½ cts.
Beans, per bushel	37½ to 50 cts.
Potatoes, per bushel	20 cts.
Pork, per pound	2½ cts.
Beef, per pound	3 cts.
Lard, per pound	6¼ cts.
Butter, per pound	10 to 12 cts.
Tallow, per pound	8 to 10 cts.
Hemp, per pound	5 to 6 cts.
Wages of common laborers, per month, and found	$10 to $12.
Wages of carpenters, per day, including board	$1 50.
Wages of masons, per day, including board	$2.

For further particulars, see document No. 1, already cited.

SITE AT THE UPPER RAPIDS OF ROCK RIVER.

Distance from the mouth of the river to upper rapids, by water, seventy-five miles.

Aggregate fall in this distance, sixty feet.

Length of rapids, one and a fourth mile.

Aggregate fall of water, eight and one-fourth feet.

Width of river at rapids, two hundred and sixty-five to five hundred and thirty yards.

Extreme range, except when obstructed by jams of ice, five feet.

Measured width, midway of rapids, thirteen hundred feet.

The quantity of water passing these rapids cannot be less than 150,000 cubic feet per minute; that at the lower rapids being 168,000 cubic feet, as before stated. This inference may be safely drawn from the fact, that a large quantity of the water must be taken off, by evaporation, from the broad surface presented by the river through a distance of seventy-two miles, from the upper to the lower rapids, while but three small streams, the Elkhorn, Little Rock, and Green river, contribute to the supply of water in the main stream between the two rapids.

A canal, with a lock and dam, has been constructed at this place at the expense of the State of Illinois. Materials for the construction of locks and other masonry are found in this vicinity.

No coal, iron, or lead ore, has yet been found within a considerable distance of this point.

The water power at these rapids belongs to the State. The lands on

both sides of the river, with the exception of a few tracts, belong to the United States. A town, called "Rapids city," has been commenced on the south side of the river; and another called Sterlingville, directly opposite, on the north side.

Tracts of valuable timber are occasionally to be met with in the valleys of the streams, while the uplands are generally prairies.

The distance, by land, from Rock island to the upper rapids of Rock river, is about fifty-six miles.

This position presents some advantages on the score of health, fertility of soil, evenness of surface, &c.; yet, as the site is seventy miles up a river, requiring expensive improvements to render it permanently navigable, and, withal, possesses but a doubtful water power in very high freshets, or during engorgements of the stream by ice below, the board deem it unnecessary to go into an estimate of the expense likely to be incurred in the establishment of an armory at this place.

See document No. 1.

SITE AT PERU, ON THE ILLINOIS RIVER.

The water power contemplated in this vicinity, is that to be afforded by the Illinois and Michigan canal, which has its southern termination at La Salle, immediately above Peru.

The entire length of this canal, from Peru to Chicago, is ninety-six miles. Its summit level, which extends from Chicago to Lockport —— miles, is supplied with water from Lake Michigan.

The lockage water from the summit level, and the water power employed from the same level in operating machinery at Lockport, together with the low-water tribute afforded by the Des Plains river, are relied on for the supply of the canal between Lockport and Marseilles, at which commences a lower reach or level, supplied mainly by Fox river. From this level the canal passes downward by four locks and three successive levels, all depending for their supply of water mainly upon the lockage water derived from the Fox river level. At Ottawa, in the vicinity of the level last mentioned, it is the purpose of the State to withdraw from the canal (viz: from the Fox river level) all the water that can be spared, for the purpose of operating machinery at this point; consequently, there will remain but very little water for the supply of the lower levels, except what may be drawn from the Fox river level as lockage water, all of which will be required for the supply of the locks below. Hence, we may infer that any dependence upon a water power, for any considerable mechanical operations, to be derived from the canal at Peru, is altogether fallacious. Moreover, the range from extreme low to extreme high water, at Peru, is variously estimated, some say that it is twenty, others twenty-four, and others again twenty-six feet. We were credibly informed by one of the canal engineers, who had paid particular attention to the subject, that its ordinary range might be stated at twenty feet, and that an extreme range, especially when the river below happened to be gorged with ice, which is not unfrequently the case, is twenty-four to twenty-six feet. In either of these events, the water power at the levels above the first and second locks, both of which are situated near the southerly terminus of the canal, will be nearly or quite neutralized during the continuance of extreme high water.

The board being satisfied that a water power adapted to the purposes of

an armory could not be derived from the canal, directed their inquiries to a natural waterfall a few miles above Peru, called the Vermilion rapids, and obtained the following information concerning the same:

Mr. Woodworth, late an engineer in the service of the State, kindly furnished the following results from surveys executed under his special direction:

Length of Vermilion rapids, five miles.

Aggregate fall in this distance, seven feet and two-thirds.

Extreme range at foot of rapids, twenty feet.

Extreme range at head of rapids, thirteen feet.

Hence the water power at Vermilion rapids, during extreme high water, will be entirely neutralized.

Again: agreeably to intelligence from the same gentleman, the aggregate fall from Ottowa to Peru (the distance by land being 16, and by water between 18 and 20 miles) is 19 feet; accordingly, when the extreme range at Peru is 20 feet, the efficient water power of the river, throughout that entire distance, will be completely neutralized during extreme high water.

In reference to the canal above mentioned, it may be further observed, that its transverse dimensions are as follows, viz:

Width at surface water, 60 feet.

Width at bottom, 40 feet.

Depth of water, 6 feet.

Estimated cost of entire canal, 96 miles, about $8,000,000.

Already expended, between three and four millions; required to complete the canal, between four and five millions.

Having been thus fully convinced that the requisite uninterrupted water power could not be obtained, either at Peru or any other point between that place and Ottowa, the board proceeded, on the 21st of November, to Ottowa, for the purpose of examining a site at which a water power derived from Fox river might be available.

For further particulars, see documents Nos. 4 and 5.

SITE AT OTTOWA, ON THE ILLINOIS RIVER.

The water power at this place must be derived almost exclusively from Fox river, which enters the Illinois, immediately above the town of Ottowa.

The Fox river level, which has an extent of about ten miles, reaches from a point about three miles below Ottowa, to Marseilles, which is about seven miles above, on the line of the canal.

The level must also be supplied by water from Fox river, which is to be conveyed through a feeder about five miles long, commencing at the head of the lower rapids of Fox river, and terminating in the ten-mile reach before mentioned, opposite the town of Ottowa.

The transverse section of the feeder is as follows:

Width of water surface, twenty-two feet.

Width at bottom, ten feet.

Depth of water in feeder, four feet.

Minimum quantity of water discharged from Fox river, said to have been determined by admeasurement, 37,300 cubic feet per minute.

Of this quantity, one-fourth is owned by Messrs. Green & Stadden, who have mills now in operation near the head of the feeder. Another equal quantity (viz: one-fourth) is in the right of the State, and is to be ap-

plied not only for the supply of the Fox river level, but for operating machinery on a large scale at the town of Ottawa. The remaining two-fourths of the water of Fox river belongs to a company in New York, who are possessed of the land on the east side of Fox river adjacent to the rapids.

Messrs. Green & Stadden offer their privilege, together with all their improvements in mills, &c., and 160 acres of land, including the dam, feeder, &c., for $150,000.

The quantity of water required in the Fox river level, on account of leakage, absorption, and evaporation, will amount to at least 1,000 cubic feet per minute.

The quantity owned by the State, being one-fourth of the river, will amount, in the dryest season, to 9,325 cubic feet per minute.

	Feet.
The aggregate descent from the surface of the Fox river level to the low-water surface of the Illinois and Ottawa - - -	37
Range from extreme high to extreme low water at Ottawa -	13
Aggregate descent in extreme high water from surface of canal to surface of river - - - - - - -	24

The quantity of water (with this fall of 24 feet) required to furnish a power equivalent to that of 200 horses, is 5,866⅔ cubic feet per minute.

Hence a power equivalent to that of 200 horses being required for the purposes of an armory, and this power being furnished by water from the Fox river feeder, there will remain, for operating machinery at Ottawa, 3,458⅓ cubic feet per minute.

By extinguishing the claim of the New York company, or even that of Messrs. Green & Stadden, to their portion of the water privileges, that of the former being attainable at a fair price, the amount of water power at this point will be amply sufficient for all the purposes under consideration.

The site here contemplated commences about a mile below the town of Ottawa, and extends downward a mile or more on the Illinois river, embracing the entire area situated between the Illinois and Michigan canal, and the Illinois river. The contents of the area, and other particulars respecting this place, are expected in a communication and drawings from E. B. Talcott, Esq., civil engineer in the State service of Illinois, agreeably to overtures kindly made by that gentleman to the board.

The site occupies a portion of a beautiful plain, of a slightly waving aspect, extending from the mouth of Fox river downward several miles. It is elevated considerably above the reach of the highest freshets, is considered comparatively healthy, and possesses a productive soil.

Beneath its surface, at various inconsiderable depths, are beds of limestone in horizontal strata, accompanied in many places by bituminous coal and carboniferous slate resting upon the limestone.

See document No. 1.

SITE AT MARSEILLES, ON THE ILLINOIS RIVER.

This locality is situated at or near the foot of the Grand rapids of Illinois river, about seven miles above the mouth of Fox river.

Length of Grand rapids about 900 yards.

Natural fall of Grand rapids, in low water, ten feet.

Dam at head of rapids (head of water) 5.6 feet.

The dam, together with a large flour mill three stories high, with six run

of stones, also a saw mill connected with the same, are the property of an association of gentlemen called the Marseilles Manufacturing Company.

The agent of this company offers to sell their water privilege, which embraces the entire water power of the Illinois at these rapids, for the sum of $125,000, together with such additional compensation as may be awarded by suitable referees for the mills now erected thereat, which are to be valued at a rate not exceeding their actual worth or cost, independently of the water power; or he is willing to sell a portion of the water power and privilege, reserving for the company only a sufficiency of the water to operate the mills now erected, for the sum of $100,000.

He moreover offers 130 acres of land within three-quarters of a mile below the mill, and situated between the canal and the river, for $25 per acre. It is believed that other tracts, sufficient to cover the entire area required for an armory, may be obtained on fair terms in the vicinity of the tracts before mentioned.

The low-water supply of the Illinois at these rapids is probably about double that afforded by Fox river. The charter of the Marseilles Manufacturing Company secures to them the privilege of erecting a dam seven feet high at the head of the rapids, instead of five and a half, its present height. Hence, the aggregate head and fall in low water will amount to seventeen feet.

A dam of the height just mentioned will back the water of the river nearly or quite to the mouth of the Kankakee, a distance of 15 or 20 miles.

Extreme range at foot of rapids, about thirteen feet.

Hence the pitch at the dam in extreme water will be four feet.

Elevation of Fox river level, (which commences at Marseilles,) above the low-water surface of the Illinois, at the foot of the Grand rapids, nineteen feet and fifty-eight hundredths.

Elevation of Fox river level above the crest of a dam seven feet high, at the head of the Grand rapids, two feet and fifty-eight hundredths.

Aggregate natural fall of Illinois river from head of Grand rapids to Ottawa, twenty-seven feet, and forty-two hundredths.

The site most appropriate for an armory at this place is a portion of an undulatory plain, situated below the village of Marseilles, and between the canal and the Illinois river. An area of about 320 acres may probably be obtained at a rate not exceeding that before mentioned.

This ground may be enlarged at pleasure by procuring an equal or greater number of acres of land on the south side of the river, directly opposite to the former, at a price considerably less than $25 per acre.

These two portions of ground may readily be connected by a bridge about 400 yards long, across the river, at or near the foot of the rapids.

The water may be conveyed from the dam, at the head of the rapids, in a race leading downward on the north side of the river, about three-quarters of a mile, supplying a range of factories or workshops, situated at and below the foot of the rapids, and between the race and the margin of the river.

The site on the north side of the river is underlaid with calcareous sandstone, which is every where found a few feet below the surface of the ground.

The ground on both sides of the river is elevated considerably above the reach of the highest freshets. On the south bank, in particular, a beautiful

plain presents itself, upon which all the necessary buildings could be displayed to great advantage, and with every prospect of health.

Limestone of an excellent quality, and in abundance, is to be found in numerous localities in this section of the country.

The masonry of the Illinois and Michigan canal has been constructed of stone of this sort, and exhibits an appearance highly recommendatory, not only of the material but also of the workmanship. The limestone contains a considerable portion of silex, but slakes well after calcination, and, with nearly equal proportions of sand and hydrate of lime, forms a good mortar.

Hydraulic lime has been found in abundance. The sandstone of this part of the country is generally friable, and unfit for masonry. Sandstone of a reddish complexion (feruginous sandstone) has been found on the south side of the river, opposite Peru, which is said to be well adapted to the purposes of building. Brick clay of a good quality is abundant. The bottom lands of the valley of the Illinois river, and of the Vermilion, Fox, and other streams in this vicinity, are generally underlaid with sandstone in horizontal strata, at depths varying from one to twelve feet below the surface.

The uplands contain beds of compact clay, and occasionally stone, at a depth of a few feet below the surface. Fire clay of a good quality is said to be abundant. Bur, red, white, and post oak, white ash, black walnut, sugar tree, maple, black locust, white walnut, and hickory, are the principal growth of the country. Of these, several varieties of the oak, the sugar tree, maple, black and white walnut, are sawed into lumber, and sold at the rate of about twenty dollars per thousand, board measure.

The pine timber used in this country is brought from a great distance, and costs about $30 per thousand.

Stone coal of a good quality has been discovered in numerous localities in almost every part of the country drained by the Illinois, from the mouth of Kankakee down to the Mississippi river. It is found in beds or veins varying in thickness from 1 to 5, and occasionally to 8 feet.

The strata that have been laid open are generally situated above the water table of the principal streams in the vicinity. Their depth below the upland surface varies from 50 to 150 feet.

These veins are generally surmounted by bituminous shale and carboniferous limestone. In several instances, however, within the valleys of the streams, they have been found near the surface of the ground covered by a stratum of soil only.

The coal generally contains more or less sulphur, which prevails in many instances to an injurious extent.

From a cursory view of the country between Rock island and Peru, it appears that the proportion of prairie to woodland is about as seven to one; not more than one-eighth of the entire surface being covered with a growth of timber.

The soil appears remarkably rich, and wherever it has been cultivated gives evidence of exceeding fertility.

Peru is situated at the head of navigation on the Illinois river, and is about — miles above its mouth, or — miles from St. Louis.

The navigation of the Illinois river is, as a general rule, suspended by ice for a period of three months in the year, viz: from the 1st of December to the 1st of March. During a dry season, it has a low-water depth of about two feet on the bars, and, of course, is then navigable only for boats of the lightest draught.

As this river, however, is a sluggish stream from Peru to its mouth, (its bed having only the minimum declivity requisite to the production of a current,) the obstacles last mentioned will, no doubt, in some degree be remedied upon the completion of the canal, by the introduction of a copious supply of water from Lake Michigan.

The bed of the Illinois river, from Peru to its mouth on the Mississippi, is remarkably straight; and on its deep and broad valleys evidences are every where presented authorizing the conclusion that Lake Michigan and other lakes above the falls of Niagara once discharged their waters in this direction towards the Gulf of Mexico.

Cost of building and building materials and agricultural products, &c., in this district of country.

Dressed stone, per perch	$6 to $10	00
Rubble work	$2 to	3 00
Lime, per bushel		12½
Bricks, per thousand		4 00
Brick masonry complete, per thousand		12 00
Wages of bricklayers, per day		2 00
Wages of stonecutters, per day		2 25
Wages of attendants on masons, per month	$12 to	15 00
Wages of brickmakers, per month		40 00
Sawed timber, per thousand, board measure		20 00
Sawed pine timber, per thousand		30 00
Common shingles, per thousand		4 00
Wages of common farm hands, per month		10 00
Wages of mechanics, per month		26 00
Board of workmen in general, per week		1 50
Price of oxen, per yoke		40 00
Price of a good work horse	$40 to	60 00
Wrought iron, per pound 4 to 6 cents; castings, per pound	5 to	07
Corn, per bushel		20
Wheat, per bushel		50
Oats, per bushel		16
Beans, per bushel		75
Potatoes, per bushel		20
Onions, per bushel		60
Turnips, per bushel		12½
Hay, per ton	$2 to	3 00
Pork, per pound		02
Beef, per pound		03
Mutton, per pound		05
Butter, per pound		12½
Lard, per pound		06
Chickens, per dozen		1 00
Eggs, per dozen		08
Transportation from St. Louis to Peru, per 100 pounds,	12½ to	50
Transportation from New Orleans to Peru, do.	62½ to	1 00
Land transportation from Chicago to Peru, do.		1 50
Probable cost of transportation from Chicago to Peru by canal, when completed, per 100 pounds		25

See document No. 1.

SITE NEAR ALTON, ILLINOIS.

Alton is situated on the Mississippi, 11 miles below the mouth of Illinois river, 7 miles above the mouth of Missouri river, and 25 miles distant from St. Louis.

The localities examined by the board were the following:

1. A position on the river bluffs, about two miles above lower Alton. The ground is elevated about 150 feet above the Mississippi river, and is accessible by three favorable passes, leading from the margin of the river up to the table lands at the summit of the hills. Of these passes, one leads from Smeltzer's ferry, one and a half miles above Alton, in a ravine rising at the rate of about three degrees to the surface of the uplands, which it reaches in a distance of one half mile; another from the mouth of Mason's run, two miles above Alton, to the same surface, and by a similar distance and acclivity; and a third, from the mouth of Freestone run, three miles above Alton, by a larger, more circuitous, and less abrupt route, to the same level of ground.

The shore of the Mississippi at these several passes is rocky bound, and presents convenient and easy landings at all stages of the water.

This site occupies a portion of the space between the two runs last mentioned. The ground is somewhat rolling, but contains an area of some forty or fifty acres unbroken by hills or ravines, and tolerably well adapted to the proper arrangement of the necessary buildings of an armory. On all sides without the area designated, however, the surface is more uneven, and in places broken by deep ravines.

2. A position accessible by a more gentle and extended acclivity may be had at or near the most southerly source of Smeltzer's creek, something more than a mile from Smeltzer's ferry landing, above Alton.

This site presents a more level and extensive area, and is more commodious in all respects for an armory, except that its distance from the river is greater than that of the point before described. It lies on the track of the contemplated railroad leading from Alton to Springfield, the seat of Government of the State of Illinois, which road has already been partially constructed. A vein of good coal has been opened within a mile of the place, and indications of its existence in the immediate vicinity are abundant. Three hundred and twenty acres of land, constituting a portion o this site, can be obtained at the rate of ten dollars per acre, and there is no doubt that the quantity can be enlarged to any desirable extent by additional purchases at the same price.

The considerations that entitle the last to a preference over the first site designated are the more favorable aspect of the ground, and a more gradual ascent from the river to the summit of the hill. In all other respects, they may be regarded as possessing equal advantages.

Both positions are probably as healthy as any others within the State of Illinois, and command unlimited resources with respect to supplies of all kinds.

The supplies of bituminous coal in almost every part of Illinois are inexhaustible. The veins of coal that have been opened in the neighborhood of Alton vary in thickness from three to six feet, and the locations of it in the vicinity of that place are numerous.

Timber suitable to the purposes of building is comparatively scarce, owing to the predominancy of prairies over woodlands in this section of

the country. Supplies, however, may be obtained with much convenience by water conveyance from the extensive timber regions of the upper Mississippi and Illinois rivers.

Building stone of a good quality, consisting of limestone and sandstone, are found in great abundance, especially in the bluffs of the rivers and creeks. The soil is well adapted to the formation of bricks, and lime of a good quality can be furnished at a moderate expense.

Articles of subsistence, forage, &c., can be procured in the greatest abundance, and at the lowest prices.

The proprietors of the site first designated have offered two hundred acres of the ground as a donation to the United States, on the condition that the armory be established thereon; and they also propose to sell four hundred acres more of the same tract at the rate of ten dollars per acre.

For further particulars in relation to this place, see documents Nos. 6 and 7, in the Appendix.

SITE IN THE VICINITY OF BELLVILLE, ILLINOIS.

Bellville is situated on a small stream, tributary to Kaskaskias or Ocoa river, called Richland creek, by the branches of which the neighboring country is much divided and broken.

Its distance from St. Louis, in a direction nearly east-southeast, is, by the road usually travelled, about fifteen miles, and from the nearest point on the Mississippi, by a direct line, between nine and ten miles; and is distant from the Mississippi bluffs by the first route seven, and by that last mentioned six miles. Between the bluffs and the Mississippi river lies the rich, flat, fertile tract, known as the American bottom, varying in width from three to five or six miles, which must be traversed by any route leading from the river to Bellville.

The country in the vicinity of and surrounding Bellville, like most other tracts in the State of Illinois, consists of a soil exceedingly rich, producing all the necessaries of life, both for man and beast, in the greatest abundance and perfection.

The immense coal field of Illinois has been perforated at several points, and veins of good coal, from three to seven feet thick, have been discovered. The diggings for coal have invariably been made within the ravines of the principal streams, and the mineral has generally been found on a level with the low-water table of the streams in their vicinity. Thus situated, the mines are subject to be flooded when ever the streams are much swollen by freshets.

Iron ore is said to abound within a distance of fourteen miles from Bellville, but its qualities appear never to have been tested.

The timber growth of the country, especially on the uplands, is scattering and defective. It consists principally of oak, hickory, walnut, and poplar.

Sawed lumber of oak and walnut is afforded at $17, of poplar at $20, and of pine at $20 to $30 per thousand, board measure.

Limestone and standstone suitable for building purposes, also good brick clay, lime, &c., are sufficiently abundant; but the quarries of the former are imbedded, in most instances, a great depth below the surface of the ground.

The site recommended by the committee of the citizens of Bellville is at

the distance of half a mile southwestward of the town. The ground around is much broken by ravines; but a spot of a gently waving aspect, sufficiently large for the accommodation of the necessary buildings of an armory, may be had on a rising ground at the point designated, the whole of which is probably underlaid with coal at the depth of forty or fifty feet below the surface.

Several other sites of a more favorable appearance, and quite as eligible in other respects, are to be found in either direction from Bellville, within a distance of three or four miles from the town, and especially between Bellville and the Mississippi bluffs, six or seven miles westward of the town. In the immediate vicinity of the bluffs, and near the point at which the contemplated railroad from St. Louis to Bellville is to reach this summit, a very level site of the requisite extent is presented at the distance of about seven and a half miles from St. Louis, or about three miles from the nearest point on the Mississippi river.

On a portion of this distance (viz: from a point of the Mississippi opposite to St. Louis to the foot of the bluffs, about six miles and a half) a railroad has already been constructed for the purpose of conveying coal from the Illinois coal mines to St. Louis. This road, however, is at present out of repair, and unfit for use.

The coal mines just mentioned are in the Mississippi bluffs, on the east side of the American bottom; their locality in the bluffs being elevated some twenty or thirty feet above the surface of the bottom land at their bases. The coal vein is from four to six or seven feet thick, and has been opened at intervals through a distance of seven or eight miles. Its extent northward and southward is probably commensurate with that of the American bottom.

The mines on the branches of Wood river, near Alton, and those on Muddy river, near the Grand Tower, are, in all likelihood, portions of the same vein.

Coal can be afforded any where in the vicinity of Bellville at five or six cents per bushel.

The requisite quantity of land for the accommodation of an armory may no doubt be had at either of the sites above designated, at rates varying from ten to twenty dollars per acre.

See documents Nos. 8 and 9.

SITE NEAR ST. LOUIS, MISSOURI.

This position recommended by the mayor and committee of the city council, acting in behalf of the citizens of St. Louis, is a point of land on the west side of the Mississippi river, about seven miles below St. Louis, situated immediately above the mouth of the river Des Perres, and extending upward about one mile to the village of Carondelet.

The site presents a very favorable aspect, the ground rising very gently from the shores both of the Mississippi and of the Des Perres river, the margins of which are respectively thirty feet above low-water mark, to a summit midway between these two streams, elevated about forty feet above the lowest water of the river.

The range of the Mississippi from the lowest to the highest water is supposed to have been thirty-three feet in the highest freshet of which we have any account. This freshet occurred in the year 1785, since which

period the range has in no instance recollected exceeded thirty feet. Of course, a small portion of the site under consideration, near the margins of the two rivers, would be liable to inundations in the event of an excessive freshet like that 1785.

The shores of the Mississippi and Des Perres at this point are rocky-bound, that of the former presenting convenient landings for steamboats in all stages of the water, while the channel of the Des Perres, running over a portion of the rocky substratum by which the site is underlaid, is inaccessible to steamboats at all times.

The site is of a triangular form, and embraces a portion of the commons of Carondelet, which are held by the citizens of that town in their corporate capacity.

The board were given to understand that a tract of at least five hundred acres of the ground most suitable for the purposes of an armory may be obtained at a fair price, and perhaps by way of gratuity, from the authorities of the town, in the event of the place being selected and used as a site for the armory.

It was also intimated that a communication might be expected from the authorities of the town, setting forth the boundaries and contents of the tract they would be willing to appropriate as a site for the armory, and the terms on which they would be disposed to transfer the lands to the United States.

The United States garrison, (Jefferson barracks,) with a tract of 1,705 acres of land attached thereto, is situated four miles below; and the United States arsenal, occupying about forty acres of ground, is located about an equal distance above the site under consideration.

Building stone of an excellent quality (limestone, in horizontal strata, varying in thickness from a few inches to two or three feet) may be obtained in the greatest abundance at the margin of the river, at almost every point between the river Des Perres and the arsenal.

Timber, consisting of boards, planks, scantling, &c., and other building materials, may be obtained at this site on the following terms, viz:

Sawed lumber, consisting of oak, ash, maple, black walnut, poplar, yellow pine, &c., per thousand, board measure	$12 00	to	$18 00
Sawed lumber, consisting of white pine, variously assorted, per thousand	15 00	to	30 00
Shingles, per thousand	3 00	to	5 00
Bricks, per thousand	4 00	to	5 00
Lime, per bushel	12½	to	15

A portion of the State of Missouri, bounded on the north by the Missouri river, on the south and southeast by the Mississippi, and on the southwest by a line running from the mouth of the Des Perres, northwardly, to the Charbonaire coal mines, on the Missouri, the whole embracing between six and eight hundred square miles, is analogous, in the general appearance and mineral products of the country, to the uplands of Illinois, and may be regarded as a carboniferous region. The localities in this district at which coal has been discovered are numerous, especially in the hills bounding the valley of the Des Perres river. The veins of the coal vary in thickness from three to four feet, and are situated at the depth of thirty to forty or fifty feet below the surface of the uplands. This coal ignites freely, but after combustion leaves much cinder, owing most probably to the sulphur and

iron it contains. The prices at which this coal is furnished at St. Louis and Carondelet vary, like those of the coal from Illinois, from eight to twelve and a half cents per bushel; the coal from Illinois, however, is invariably preferred.

The iron brought to the St. Louis market is obtained principally from the iron works on the Ohio, Cumberland, and Tennessee rivers. Supplies of wrought iron are obtained also in considerable quantities from Massie's works, at the head of Maramec river, and from Perry's works, near Potosi, in the State of Missouri. The ore from which the iron made at the former of these works is extracted is said to be of a character and consisteney like those of the ore of the Iron mountain, both of which are esteemed of a good quality for the manufacture of malleable iron, but not well adapted to castings.

Lead in vast quantities is brought to St. Louis, from the lead mines on the upper Mississippi, Wisconsin, &c.

The soil of this part of the State of Missouri is very productive, yielding in great abundance the various articles of subsistence, forage, &c.

The agricultural products brought to the St. Louis markets, especially those that constitute the daily supplies of the inhabitants, are mostly derived from the State of Illinois; the soil of that shore being still more prolific, and withal more generally cultivated, than the country on the Missouri side of the Mississippi, in the vicinity of St. Louis.

Products of this kind command somewhat higher prices at St. Louis than at Alton, owing to the incomparably larger demand for them at the latter place. In the wholesale way, however, provisions of all kinds bear prices at St. Louis but little in advance of those at Alton.

The shore of the Mississippi, adjacent to the proposed site, as was said before, is remarkably favorable for landings at all stages of the river, from the mouth of the Des Perres to the upper extremity of the position at Carondelet. A tabular bar of solid rock (limestone, in horizontal strata) presents itself at an elevation suitable for landings in low water, while in advance of this bar the channel is deep and free from obstructions. From the exterior margin of this table, a sloped pavement, rising at a suitable inclination to the summit of the highest freshets, may be formed of the materials in the immediate vicinity, and serve for landings during the more elevated stages of the river.

The tract of land proposed to be conveyed to the United States is a beauful piece of ground, well adapted to all the purposes of an armory, the machinery of which is to be propelled by steam power. Upon the plain at the summit of the site, the buildings can be displayed to great advantage, and at any convenient distance from the water; and as the rivers which bound two sides of this tract have rocky shores, and the country for miles to the rear and around is very high, this position may be considered as healthy as any other near the banks of the Mississippi.

It may not be improper in this place to offer a few remarks in reference to the character and condition of the Mississippi, between the mouths of the Ohio and Missouri rivers, the navigation of which may be regarded as more difficult and dangerous at this time than that of any other portion of this noble stream.

It is about three years since the business of extracting and removing snags and other obstructions from this part of the river was suspended, for want of an appropriation of funds for that purpose by the General Govern-

ment. In consequence, snags, planters, sunken logs, &c., have been constantly accumulating in the present main channels, till they have become in many places almost impassable during the lower stages of the river. In some instances new channels appear to have been cut across sand bars that contained numerous imbedded logs and trees, which now remain at the sides and bottoms of the channels, opposing the most formidable obstructions to the passage of steamboats. In other instances the banks have been undermined, and the trees standing upon them precipitated into the river, where they have become snags, planters, and sawyers, in the new channel that has been formed beneath the site they formerly occupied. So greatly have obstructions of this character been multiplied, that steamboats have been wrecked upon them in almost every part of the river between St. Louis and the Grand Chain, 155 miles below; and in one place, particularly, within the distance of two miles, three wrecks of this kind present themselves, the boats having been lost within the past year.

So great has been the actual loss of steamboats on this part of the river within the last two years, and so hazardous is the navigation to all future adventurers, that the munificence of the Government seems to be imperiously called for. Property vastly greater in value than the amount required to remedy the evil has already been sacrificed, and still greater losses must necessarily ensue, unless measures are taken to remove the obstructions in this portion of the river.

This part of the Mississippi seldom freezes over, but the vast quantities of floating ice conveyed upon its surface during the winter months renders the navigation difficult, dangerous, and sometimes impracticable. In very cold weather, the river has been frozen entirely across in several places, with ice strong enough to bear a loaded team.

A succession of cold weather, continued for many days, chills the water to such a degree that floating ice has often been conveyed downward to Memphis, sometimes to the mouth of the Arkansas river, and even occasionally to Vicksburg; but the river has probably never been frozen over below the mouth of the Ohio.

From the mouth of the Ohio upward to that of the Missouri, and even of Illinois river, the Mississippi is navigable, for boats drawing 4½ to 5 feet, in all stages of the water.

For further information, see documents Nos. 10, 11, and 12.

SITE AT MARAMEC RIVER.

The headwaters of this stream interlock with those of the Gasconade—the former opening into the Mississippi 20 miles below St. Louis, and the latter entering the Missouri 100 miles above its mouth. The Maramec has its origin in the hilly and elevated region called the Ozark mountains; its principal source being a copious fountain denominated the Big spring, in the vicinity of which are Massie's iron works, which are worked by means of a water power derived exclusively from the spring. From this source the river pursues a very serpentine course to its mouth, receiving in its progress numerous tributaries, of which the most considerable are the East fork, the Courtois, and Big rivers.

The distance by water from the Big spring to the mouth of the Maramec is 178 miles, while the distance on a direct line between these two points does not exceed 80 miles. The aggregate fall from the spring to the mouth of the river is 382 feet, the fall in the first half mile being 30 feet,

and on the remaining distance varying from three feet to less than one-fourth of a foot per mile. The quantity of water afforded by the river at its lowest stage is ample at all points from the spring downward, being 5,600 cubic feet per minute immediately below the spring, 8,200 cubic feet below the mouth of the East fork, 57,200 cubic feet at the Virginia mines, and 112,000 cubic feet per minute below the mouth of Big river.

The Maramec is said to be navigable for keel boats drawing 2½ feet water to the Virginia lead mines, 120 miles from its mouth, in all stages of the water, and probably for steamers of the smallest classes for 5 or 6 months in the year.

The range from the lowest to the highest water varies from 15 feet, which is the extreme range near the head spring, to 30 or 35 feet, which is the elevation attained by the highest freshets, from the mouth of the Big river downward to the Mississippi.

The waterfall most considerable and most available for manufacturing operations, and at the same time nearest to the Mississippi, is at a place called Devil's island, 60 miles above the mouth of the river, where the fall in a distance of 4½ miles is 12 feet. This fall may probably be increased by the erection of a dam (to the destruction of the navigation of the river above this point, of course) 12 feet high, which will raise the head and fall of the water to 24 feet; the whole of which, however, will be neutralized during periods of very high freshets, the range on such occasions being from 30 to 35 feet.

From the head of the spring downward to the mouth of Big river, the Maramec flows through a deep narrow valley, or ravine, varying in width from 100 to 300 yards, the country on both sides of the valley being elevated, hilly, and broken. Below the mouth of Big river the valley gradually widens till we arrive at the Mississippi, in the neighborhood of which it spreads to the width of 2 or 3 miles.

The woodland growth of the country on the Maramec comprises the most valuable varieties of the oak, black and white ash, all the varieties of hickory, sugar tree, white walnut, poplar, wild cherry, yellow birch, white and curly maple, white and red elm, &c. Yellow pine abounds on the head branches of the river, and large supplies of this article are annually brought down the river, and conveyed thence to markets on the Mississippi.

The soil of the valleys is generally rich and productive, while that of the uplands is often meager, and seldom deserves an estimation higher than that of third-rate land. The products of agriculture consist of corn, wheat, oats, buckwheat, tobacco, hemp, flax, potatoes, apples, wild plums, crab apples, &c.

No stone coal has yet been discovered in this part of the country, nor is it likely ever to be found here; supplies of this article can be obtained only by transportation up the river. Iron ore of an excellent quality is said to abound in various parts of the country. Lead is found in abundance at the Virginia mines, and it no doubt exists at numerous other localities near the river. Ores of zinc are said to have been found at a point on the river about 100 miles from its mouth.

The board searched in vain for a site convenient for an armory near the confluence of the Maramec and Mississippi rivers. An extensive tract of bottom land occurs near this point, most of which is liable to be inundated during a very high freshet. The hills by which this tract is bounded are considerably remote from the river, and at the same time present

no level area sufficiently extensive for the buildings of an armory. No sufficient water power can be produced at or near the mouth of the river, except at the expense of a dam 12 feet high and a canal 30 or 40 miles long, through which to bring the necessary supply of water from a point 30 or 40 miles up the river.

We shall conclude this article by introducing a variety of tabular statements relative to the distances, waterfall, minimum supply of water, ranges, &c., at different points on the Maramec river, computed from information kindly imparted to the board by W. K. Singleton, Esq., civil engineer.

Table of distances.

Localities.	Distance from mouth of river, in miles.	Aggregate distance from mouth of river, in miles.	Minimum supply of water in cubic feet, per minute.	Fall, in feet, per mile.	Aggregate fall, in feet.	Extreme range, in feet.
Head spring -	0	0	5,600			
Mouth of East fork -	0.5	0.5	8,200	60	30	15
Virginia mines -	64.5	65	57,200	–	–	25
Devil's island -	52	117	–	2.8	327.5	30
Mouth of Big river -	4.5	121.5	–	2.6	12	30
Mouth of Maramec -	56.5	178	112,000	0.22	12.5	30 to 35
Total - -	178	–	–	–	382	

See document No. 13.

OF THE GASCONADE RIVER.

This stream has its sources southwestwardly of those of the Maramec, in the same mountain region that gives rise to the latter river. It runs northwardly, and falls into the Missouri at a point 100 miles above its mouth, as was before remarked.

Agreeably to information obtained by the board from the officers of the General Land Office, at St. Louis, and other authentic sources, this stream is less prolific in water power than the Maramec, while the points at which inconsiderable falls occur are far more remote and difficult of access by water conveyance than similar points on the Maramec river.

This river is said to be navigable for small steamboats, during high water, through a distance of 30 or 40 miles only. Rapids or waterfalls, affording the requisite water power for mills, &c., present themselves at the distance of 120 miles from its mouth, where lumber is prepared in considerable quantities, and rafted down to the markets on the lower part of the Missouri and at several points on the Mississippi.

The lumber consists principally of yellow pine, sawed into boards, scantling, &c.; and abundant supplies of this kind of timber are said to exist on the upper portions of this stream and its tributaries.

The board, at first, contemplated visiting the Gasconade and upper Maramec rivers; but having been assured by the officers of the land office and other persons who had examined and surveyed the country, that no water power with other necessary advantages could be found on the Gasconade

or the Maramec, they afterwards deemed it unnecessary to make a reconnoissance of that section of the country.

The board having examined the several positions pointed out to them in the vicinity of St. Louis, and made a reconnoissance of the country on the Maramec, near its confluence with the Mississippi river; and having also obtained all the information practicable in relation to the water power facilities of navigation, &c., on the upper Maramec, and on the Gasconade river, proceeded down the Mississippi towards the mouth of the Ohio, taking, on their route, a cursory view of the shore generally, and entering into a particular examination of the Iron mountain, the Pilot knob, and the country in the vicinity of St. Genevieve, St. Mary's landing, and Platt's landing, and also the grounds around Cape Girardeau—all in the State of Missouri.

See document No. 10.

OF THE IRON MOUNTAIN AND PILOT KNOB.

The Iron mountain is an isolated knob, having an elevation of about 350 feet, and a circumference of three miles, as measured round its base. It presents three distinct summits, connected together by narrow ridges less elevated than the summits by 60 to 80 feet. Its entire surface is thickly covered by fragments of iron ore, varying in size from that of a hickory nut to masses containing many tons.

The ore is apparently very rich, and free from oxidation, of a dark green or blackish complexion, and when fractured presents a distinctly feruginous structure, with a lustre similar to that of steel or iron recently fractured. On analysis, it is said to yield 75 to 80 per cent. of pure iron.

It is supposed to be well adapted to the manufacture of bar iron and steel, but not so suitable for castings.

The only tests to which it has been known to be subjected are sundry trials in common smiths' forges, the results of which are, that it has been refined without much difficulty, and wrought into implements of various kinds, such as hatchets, knives, horse shoes, &c. The entire mountain is apparently composed of this mineral, which is every where presented on the surface, unconnected with other rocks, though in most places it is accompanied with a scanty soil, sufficient for the support of a scattering growth of trees, bushes, and weeds.

The Pilot knob is situated at the distance of five miles southeastwardly of the Iron mountain, is similarly isolated, but has an elevation and circumference considerably greater than that of its compeer. The Pilot knob also presents a vast abundance of iron ore, but of a quality inferior to that of the Iron mountain, the per centage of iron contained in it being generally limited to 40 or 50 to the hundred. Moreover, the rocks of the knob afford a far greater variety than those of the mountain. Among the former, porphyritic sandstone, red granite, feldspar, &c., are found in connexion with the ore, while the rocks of the Iron mountain are almost exclusively iron ore of the kind denominated peroxide of iron.

These two remarkable eminences are surrounded on all sides by a wilderness of hills and ridges 600 to 700 feet high, the whole constituting a portion of the mountain range called the Ozark mountains.

The most northerly sources of the St. Francis river have their origin in this vicinity; and Big river, a copious tributary of the Maramec, rises but a few miles to the northwest of the Iron mountain.

The principal difficulty in the way of realizing immediate benefits from

working the ore of either of these mountains is their remoteness from a constant water power sufficient to maintain the requisite blasts for smelting.

No such power is to be had within a distance of more than 20 miles from either mountain, and the roads of the country are at present too rough, if not impracticable, for the convenient transportation of the ore to a site where the requisite power may be obtained. The streams above mentioned all fail in dry weather, so that no dependence can be placed in their ability to afford the power required. At the distance of something more than 20 miles northeastwardly from the Iron mountain, and in the vicinity of Potosi, it is supposed that such a power may be obtained at a site on Big river, which is nearer than any other position suitable for this purpose.

The woodlands, which embrace all the varieties of timber and trees common to the country on Maramec river, afford the greatest abundance of materials suitable to the production of charcoal.

The soil of the country is generally poor, the best of it yielding only moderate crops of corn, wheat, oats, potatoes, &c.

The mineral products hitherto developed consist almost exclusively of iron ore and marble—a fine quarry of the latter having been found in a ridge about three miles to the southward of the Iron mountain.

Indications of lead, zinc, and copper, are occasionally presented. As a means of facilitating the conveyance of ore from the Iron mountain to a place where it may be worked to advantage, the construction of a good road leading from the mountain to some point on the Mississippi has been contemplated.

For this purpose, two routes, of nearly equal distances, have been proposed, viz: one leading from the mountain by the most direct and favorable ground to St. Genevieve, and the other leading towards St. Mary's landing, 13 miles below St. Genevieve—the distance on either route being about 45 miles.

The relative merits of the two routes can be determined only by an instrumental survey of the contiguous country.

On both routes extensive tracts of level ground are presented, the soil of which is for the most part poor, and, in places, quite sandy and sterile. Several deep ravines must be passed, which may readily be surmounted by high bridges. In view of the general features of the country, no reasonable doubt can exist as to the practicability of constructing a road, adapted to the easy conveyance of heavy burdens, on either route, at an expense comparatively moderate.

The board have been credibly informed that castings made of iron extracted from the Iron mountain ore are more dense and heavy in the proportion of 38 to 37 than any other castings; that castings, bar iron, and steel, manufactured from the same, are far less liable to oxidation than those from any other ores; and that bar iron made from the mountain ore is equally as malleable, ductile, and tenacious, as the best of the iron used at the Eastern armories. These positions, if they have been by a proper and thorough course of experiments established, show conclusively that the Iron mountain ore is better adapted to the manufacture of cannon balls, small arms, and ordnance, than any other heretofore used for that purpose.

The exhaustless resources in iron which the Iron mountain manifestly presents would seem to indicate the propriety of adopting measures, under the sanction and the patronage of the General Government, having in

view the full development of the qualities of the ore, with the eventual object of having it employed in the fabrication of small arms and of cannon for the navy and army of the United States.

SITE NEAR ST. GENEVIEVE, MISSOURI.

The locality deemed most favorable for a site for the armory in the vicinity of St. Genevieve is a position on the tabular tract of upland immediately in rear of the river bluffs, which are here separated from the Mississippi by an extensive tract of level bottom land, varying from half a mile to two miles in width. It is distant from the town half a mile: from St. Genevieve landing, one mile and a half; and from the nearest point on the margin of the Mississippi, about three-quarters of a mile. Its elevation above the bottom land is 50 to 75 feet, or from 75 to 125 feet above the surface of the river.

The ground is slightly waving, or rather rounded, in such a manner that the more elevated parts of the tract rise by gentle slopes to the height of 20 or 25 feet above its more level and depressed portions. The land embraced by the site may be regarded as second-rate, and is the property of several individuals. It may be purchased, at a rate not exceeding $15 or $20 per acre, in sufficient quantity for the purposes of an armory.

In the vicinity of this position is a remarkable spring, affording a constant supply of water, sufficient, with a fall of 20 feet, to drive three run of millstones, or to furnish a power equivalent to that of 30 horses.

The fall at command, with a suitable dam and race, is said to be 26 feet. The land, including this water privilege, may probably be obtained at the same rate as that before mentioned.

The entire tract here contemplated embraces 800 or 1,000 acres, and covers an extensive area of uplands, together with the river bluffs, for a distance of more than a mile, and a narrow strip of land at the base of the bluffs, on the last of which the engine-houses and machine shops may be erected, while the other buildings of the armory, gardens, &c., may be located upon the high grounds in rear of the bluffs.

Building stone of a good quality, consisting of limestone in horizontal strata, may be had in abundance within or near the site. Oolite or roe stone of a beautiful character, and easily wrought, may be obtained in abundance within a mile and a half of the place. Good brick clay abounds in the neighborhood, and lime can be furnished at a very moderate expense.

The remoteness of the position from a convenient and permanent natural landing may be regarded as an objection to this locality. This defect, however, may be remedied by a road about three-quarters of a mile long, leading directly from the site to a point near the present mouth of Gabourie creek, where the bottom land near the shore of the river is underlaid with an extensive bed of limestone, rising a little above the extreme low-water surface of the river. Upon this bed, as a permanent foundation, a wharf of stone work may be reared to any convenient height, and serve as a landing for all stages of the water.

The cost of the road, (which should be raised to the elevation of the highest freshets, and covered with a substantial macadam pavement,) together with that of the wharf, including the excavations required for its foundations, will probably amount to $30,000.

The power contemplated to be used in the armory at this place is that

of steam, for the production of which stone coal must be obtained from Illinois.

The nearest locality at which this mineral has been discovered is distant fourteen miles from St. Genevieve, in the river hills back of the American bottom, where it is said to be found in veins from four to six or seven feet in thickness. Its present price, delivered at St. Genevieve, is ten to fifteen cents per bushel; it may no doubt be furnished in large quantities, per contract, at eight or nine cents per bushel.

All the varieties of lumber that are furnished at the St. Louis market may be obtained here with equal facility and at the same expense. Provisions of all kinds may also be purchased at St. Genevieve on the most favorable terms.

The distance from St. Genevieve to St. Louis is 65 miles, and to Cairo, at the mouth of the Ohio, is 135 miles.

The Mississippi, at St. Genevieve, has occasionally been frozen entirely across; but the chief obstruction presented here by ice consists in the vast bodies of floating ice which come down from the upper Mississippi and Missouri rivers.

The site at St. Genevieve is said to be healthy, but its proximity to the extensive flats which intervene between it and the Mississippi river, and also to the broad American bottom on the opposite side of the river, seem to indicate that malarial disease must prevail to some extent during the sickly season of the year.

See documents Nos. 14 and 15.

SITE NEAR ST. MARY'S AND PRATT'S LANDINGS.

This locality is on the bank of the Mississippi, immediately above the mouth of St. Loras creek, and at the distance by land of thirteen, or by water sixteen, miles below St. Genevieve.

The site contemplated at this place may be thus defined: It has an extent on the Mississippi, from the mouth of St. Loras creek upward, of half a mile; it thence extends backward from the river, in the form of a rectangular parallelogram, a mile or more, embracing a tract of rolling land of considerable extent, through which the creek above mentioned has its course. A portion of the parallelogram contiguous to the river, and extending about one hundred and fifty yards backward from it, is cleared and under improvement; the residue is woodland, supporting a fine growth of oak, hickory, ash, sugar tree, maple, walnut, poplar, &c. On reaching the woodland, the site may be enlarged at pleasure, by additions to the sides of the parallelogram, till its contents amount to eight hundred or one thousand acres.

The board made particular inquiry as to the price at which the site might be purchased, but could get no definite answer. The probability is, that it may be obtained at the same rate per acre as that at St. Genevieve, viz: fifteen to twenty dollars per acre.

The engine-houses, machine shops, &c., might be located on the cleared ground near the river, which is elevated above the reach of the highest freshets, while the dwellings and other buildings of an armory might be arranged on the woodland tract in the rear, which is elevated sixty to eighty feet above the surface of the ground in front.

St. Loras creek is an inconsiderable stream, affording a constant supply of water, sufficient probably to drive one run of stones, provided a fall of ten or twelve feet could be obtained. Its efficiency in this way, however,

is neutralized by back water from the Mississippi during the freshets of that river.

A dam and mill were erected on this stream, at the distance of one hundred and fifty yards from its mouth, where it has a rocky bed and a fall of five or six feet; but both of these structures have been undermined and swept away by freshets.

The stream can be considered of but little use to an armory, except on account of its ability to yield an abundant supply of water for the necessary steam engines, and for other purposes of irrigation.

The power contemplated to be used at this point is that of steam, generated by the use of stone coal as a fuel. The facilities for obtaining the coal here are similar to those presented at St. Genevieve, the localities from which it must be obtained being the same.

Building materials of all kinds are abundant and convenient, and may be had on terms no less favorable than at other points on the Mississippi already noticed. The same is true, also, with respect to provisions of all kinds—abundant supplies of which may be had on favorable terms.

The landings in this vicinity are deemed more convenient and favorable than at St. Genevieve, while their contiguity to the ground to be occupied gives this a decided advantage over the other position.

This locality is probably quite as healthy as any other position on the Mississippi, from St. Louis downward. There are no flat or marshy grounds in its vicinity nearer than the American bottom on the east side of the Mississippi.

See document No. 16.

SITE NEAR CAPE GIRARDEAU.

The position deemed most suitable for an armory in the neighborhood of Cape Girardeau is a point upon the river hills, about a mile below the town. Its surface is divided by a broad ravine, running parallel to the river hills, and descending into the valley of a small stream at the upper end of the site, (thus affording a gentle declivity for a road leading from the summit of the highlands to the valley of the river,) and thence to a position on the shore of the river suitable for a landing. At and near the head of the ravine the surface becomes more even, and of sufficient extent for the accommodation of the buildings of an armory.

The distance from the landing to the ground to be occupied by the buildings will be half a mile, and a road of that extent, more than half of which must be elevated upon an embankment rising above the reach of the highest freshets, will be required in order to afford an easy passage between the landing and the site. Such a road will cost about $5,000, and a wharf at the landing, adapted to the loading and unloading of boats in all stages of the water, will probably cost an equal sum.

The site is elevated about 100 feet above a low and marshy strip of bottom land, four or five hundred yards wide, situated between the hills and the river. The hill sides present a ramp of gentle and nearly uniform acclivity, rising at an angle of 20 to 30 degrees.

The landing above proposed is said to be accessible to boats of the deepest draught, in all stages of the water. The shore is rocky bound at this place, being but a short distance below a cape of high land based upon rock, and situated a little below the town of Cape Girardeau.

The ground is partially cleared and under improvement. Its soil is quite rich and productive. The board were informed, by one of its proprietors, that a tract of 500 to 800 acres of ground, including the site, may be purchased at the rate of $25 per acre.

The power relied on at this locality is that of steam generated by the use of stone coal, there being no stream in this vicinity affording the requisite water power. Fuel of this sort, and of a very superior quality, may be obtained from the coal mines on Big Muddy river, by water transportation downward through a distance of about 65 miles. Its cost, delivered at Cape Girardeau, in a wholesale way, or by contract for large supplies, will be about eight cents per bushel.

Big Muddy river is navigable for keel boats about five months in each year, from its mouth to the coal mines, a distance of 40 miles. The coal veins opened on this stream are said to vary in thickness from four to eight feet, and there is no doubt that inexhaustible supplies exist in this vicinity. The coal appears to be quite free from pyrites and other impurities, ignites freely, burns with a bright flame, leaves no other residuum but light impalpable ashes, and is believed to be equal to the best bituminous coal found in the United States.

Between three and six miles below Cape Girardeau is a tract of bottom land called "the swamp," about three miles wide, and extending westwardly and southwestwardly till it meets and becomes incorporated with the great swamp through which the St. Francis river has its devious course and intricate windings. A little below "the swamp" the highlands approach the Mississippi on both sides of the river, and four or five miles below the same swamp the remarkable rocky bar called the Grand Chain stretches entirely across the bed of the river. These circumstances indicate, with some degree of probability, if not certainty, that the Mississippi once wended its way through this region of morasses, from Cape Girardeau, by way of the valley of St. Francis river, to its present bed at the mouth of that river, having pursued its course through a channel many miles to the westward of its present channel, for a distance of more than 300 miles.

Easy access by land from the Mississippi to the country westward of the St. Francis river, throughout this entire range, is rendered impracticable, without the construction of expensive roads and bridges, leading across the extensive morass above mentioned. This consideration may be regarded as an objection to the establishment of an armory on the western bank of the Mississippi, at any point from Cape Girardeau downward to the mouth of the St. Francis.

Building materials, provisions of all kinds, and raw materials for manufacturing purposes, may be supplied at Cape Girardeau at the ordinary rates of other markets on the Mississippi.

The distance between Cape Girardeau and St. Louis is estimated at 120 miles, and between the Cape and Cairo 80 miles.

Prices of articles of subsistence, materials, &c., delivered at St. Louis, St. Genevieve, St. Mary's, Platt's Landing, Cape Girardeau, &c.

Bituminous or stone coal, per bushel - - -	8 to 12 cts.
Pig iron, per ton of 2,268 pounds, average - -	$28.
Blooms, per ton, gross - - - - -	$55 to $60.

Common bar iron, per ton, nett	$100.
Assorted bar iron, per ton, nett	$120.
Boiler iron, per ton, nett	$160.
Sheet iron, for chimneys, stove pipes, &c., per pound	9 cts.
Cut spikes, per pound	7 cts.
Cut nails 8d., 10d., and 12d., per pound	7 cts.
Cut nails, 4d. and 6d., per pound	8 cts.
Castings, per pound	3 to 5 cts.
Charcoal, per bushel	3 to 5 cts.
Lead, per pound	4 cts.
Hard-wood lumber, consisting of oak, ash, black walnut, maple, wild cherry, &c., also poplar, cotton wood, &c., sawed into boards, plank, scantling, &c., per thousand, board measure	$12 50 to $15.
Yellow and white pine, sawed as above, per thousand, board measure	$18 to $30.
Shingles, per thousand	$3 to $5.
Corn, per bushel	20 to 25 cts.
Wheat, per bushel	56 to 85 cts.
Oats, per bushel	20 to 25 cts.
Beans, per bushel	75 cts.
Rye, per bushel	37½ to 50 cts.
Potatoes, per bushel	20 to 25 cts.
Pork, per pound	2 to 3 cts.
Beef, per pound	3 to 4 cts.
Butter, per pound	12½ cts.
Lard, per pound	6¼ cts.
Chickens, per dozen	$1.
Eggs, per dozen	10 to 12½ cts.
Hay, per ton	$7 to $10.

See document No. 19.

SITE AT CAIRO.

Cairo, situated on the point of land immediately above the confluence of the Ohio with the Mississippi river, is the common centre of an extensive range of inland navigation, embracing an aggregate distance of more than 10,000 miles; and, from its geographical position, would seem to be the proper place of depot for the trade and commerce of the vast region drained by the Mississippi.

Unfortunately for this locality, however, it is made up of an extensive bed of alluvious deposites, and is liable to encroachments upon its borders by the resistless currents of the Mississippi and Ohio rivers, which, during the prevalence of high water, undermine and abrade the banks that are unprotected by a rocky substratum. Moreover, the site is so low that almost the whole of its surface is liable to inundations, to greater or less depths, whenever an excessive freshet occurs.

An efficient association of enterprising gentlemen, denominated the "Cairo City and Canal Company," have undertaken to reclaim and improve this place by the formation of heavy embankments or levees, to prevent overflows, and by the erection of warehouses, stores, dwellings, mills, a foundry, furnaces, machine shops, and a floating dry dock, for the ac-

commodation of mercantile and other business operations, and of the persons employed in the same.

A levee three and half miles long, twenty feet wide on its summit, and rising, as is supposed by its projectors, at least eighteen inches above the highest freshets ever known, has been partially constructed, and nearly completed on the westerly or Mississippi border of the position. The distance of its southerly extremity from the Mississippi, at the confluence of this river with the Ohio, is about three hundred yards. From this point, which is on the immediate bank of the Ohio, the levee passes upwards at distances of fifty to three hundred yards from the margin of the river, and is to terminate at an elevated ridge of the bottom, supposed to be above the reach of the highest freshets.

The levee on the Ohio or easterly side of the site has the same width of summit, passes upward near the margin of the Ohio about two miles, and is to terminate at a rising ground of about the same elevation as that of the ridge at the head of the Mississippi embankment. The height of both of these embankments above their bases varies from three to sixteen feet. That on the Ohio, for about half its length, remains unfinished, while that on the Mississippi side is nearly completed.

The town site proper, as surveyed and laid off by the company, is said to contain 3,884 acres; in addition to which, the company are possessed of 5,848 acres more—amounting, in the aggregate, to 9,732 acres of land; the whole of which is bottom land, possessed of a soil exceedingly rich, and covered with a dense and heavy growth of cotton wood, sycamore, and occasional thickets of cypress.

The amount actually expended in the purchase of land, and in making improvements thereon, could not be definitely ascertained The estimated amount required to complete the improvements contemplated by the company, and to cancel their liabilities, is said to be about one million of dollars.

However confident the company may be in the successful issue of their enterprise, doubts may be entertained as to the sufficiency of their works to withstand the impetuous floods that sometimes occur in these mighty rivers. It is true that the levees, in their present new and unfinished state, have effectually resisted the percolations, washings, and abrasions of one annual freshet in each river, in which the water rose to an elevation several feet higher than the surface of the ground in their rear; but their ability to withstand such freshets as occurred in the years 1785, 1828, and 1832, when the high-water surface attained an elevation eight or ten feet higher than that of ordinary high freshets, remains to be tested.

The bottom lands owned by the company constitute but a small proportion of the flat lands in this vicinity.

These flats extend upward on the Ohio river about twelve miles, and on the Mississippi at least an equal distance, embracing an area of about forty thousand acres. This extensive tract is altogether alluvial, and, with the exception of here and there an isolated ridge or swell, rising a little above the reach of the highest freshets, is subject to overflows. It is in places swampy, and is covered with a dense growth of trees, bushes, vines, and weeds, which are successively springing up and decaying upon the surface.

An extensive body of bottom land, called the "Tywassatic bottom," also lies on the westerly side of the Mississippi, directly opposite to Cairo; and a

similar tract, of great extent, covered with a dense growth of cotton wood, willows, &c., presents itself on the Kentucky side of the Ohio, and immediately on the bank of the river. Surrounded by these fruitful sources of damps and of miasmata, the inhabitants of Cairo cannot fail to be injuriously affected by them, and the place cannot, under existing circumstances, be otherwise than unhealthy. But when the country shall have been cleared, the swamps and bottom lands drained and cultivated, and the atmosphere around made dry or rarefied by the fires and smoke of the workshops and of the dwellings of a numerous population, Cairo may then boast of as much health as her sister towns on the Western waters.

No particular locality could be designated as a site for the armory, either within the limits of the city or upon the adjacent grounds owned by the company; but no doubts are entertained that any portion of the whole tract that may be deemed most suitable for this purpose, exclusive of that occupied by the buildings and other improvements, may readily be obtained on liberal terms.

The Mississippi is navigable from the Gulf of Mexico to this place, for steamboats of 400 tons burden, during all stages of the water. Its navigation below this point is sometimes rendered difficult by floating ice, with which the river is occasionally gorged at narrow passes below; and its entire surface for a greater or less distance may be closed, for a short time, in a manner to prevent entirely the passage of steamboats. Above this point, the Mississippi is occasionally frozen entirely across, and remains closed for several days in very cold weather.

The temperature of the Ohio being considerably raised by large supplies of warmer water from the south, received though the channels of the copious Tennessee and Cumberland rivers, that river is seldom or never known to be closed by ice between its mouth and that of the Tennessee; while the water of the Ohio, thus partially warmed, contributes to dissolve the ice brought down by the Mississippi, and to prevent the latter from being frozen over below the confluence of these two rivers.

The only power available at this place for the uses of an armory is that of steam, the means of producing which may be derived from any or all of the coal fields of the great West, most if not all of which lie upon the waters of the Mississippi and Ohio above this point.

Coal from Pittsburg and Wheeling may be had at twelve and a half cents per bushel; from the mines on Big Muddy river, in Illinois, Tradewater river, and Hawesville, in Kentucky, and various other localities in these two States, it may be had for eight to ten cents per bushel.

Hard-wood lumber of all kinds, sawed into boards, planks, scantling, &c., may be obtained at the rate of $12 50 per thousand feet, board measure.

Yellow pine, poplar, cypress, cedar, cotton wood, &c., sawed as above, may be obtained at $12 to $15 per thousand, board measure.

White pine, from Olean, sawed as above, at $15 to $20 per thousand.

Price of cypress shingles, delivered at Cairo, $2 50 to $3 per thousand.

Roofing slate, furnished and laid, per square of one hundred square feet, $12.

Building stone, per perch, delivered, $1 50 to $2 50.

Lime, per barrel, 62½ cents.

Bricks, per thousand, $5.

Wages of stone masons, per day, including board, $1 50 to $1 75.

Wages of stonecutters, per day, including board, $1 75 to $2.

Wages of brick masons, per day, including board, $1 75.
Wages of attendants on masons, per day, including board, 87½ cents
Wages of carpenters, per day, including board, $1 50.
Wages of blacksmiths, per day, including board, $1 50.
Wages of common laborers, per month, exclusive of board, $10.
Price of pig iron, per ton, gross, delivered at Cairo, $22 to $25.
Price of common bar iron, per ton, nett, $70 to $100.
Price of assorted bar iron, per ton, nett, $120.
Price of boiler iron, chimney iron, &c., per ton, nett, $120.
Price of cut spikes, nails, &c., per pound, 4½ to 6 cents.
Price of castings, per pound, 3 to 5 cents.
Price of common castings, made at Cairo, per pound, 3 cents.

The pig metal most valued at this place is that made at the Shawneetown furnace. The most approved boiler iron is that manufactured at the Cumberland iron works. The iron made on the Tennessee river is said to be of a texture and consistency equal to those of the Cumberland, but not so well refined, and in all respects less highly wrought.

Provisions of all kinds may be obtained at Cairo on terms quite as favorable as at any other point above, either on the Mississippi or Ohio rivers.

For further information in relation to this place, see documents Nos. 20, 21, and 22.

Distances from Cairo to remarkable points on the Western waters accessible to steamboats.

POINTS ON THE MISSISSIPPI RIVER.

	Miles.
Mouth of Mississippi river	1,150
New Orleans, Louisiana	1,038
Mouth of Red river, Louisiana	806
Vicksburg, Mississippi	623
Mouth of Yazoo river, Mississippi	610
Mouth of Arkansas river	406
Mouth of White river	384
Helena	314
Mouth of St. Francis river, Arkansas	302
Memphis, Tennessee	230
Cape Girardeau, Missouri	80
Mouth of Big Muddy river, Illinois	106
Grand Tower	111
St. Mary's and Pratt's landings, Missouri	150
St. Genevieve, Missouri	165
Mouth of River Des Perres, Missouri	193
St. Louis, Missouri	200
Alton, Illinois	225
Quincy, Illinois	360
Des Moines rapids	404
Rock island, in Mississippi river	550
Galena, Illinois	606
Prairie-du-Chien	692
Mouth of St. Peter's river, Wisconsin	940

POINTS ON THE OHIO RIVER.

	Miles.
Caledonia, Illinois	15
Paducah, Kentucky, mouth of Tennessee river	46
Smithland, Kentucky, mouth of Cumberland river	60
Mouth of Tradewater river, Kentucky	105
Shawneetown, Illinois	133
Mouth of Wabash river	146
Mouth of Green river, Kentucky	209
Hawesville, Kentucky	273
Louisville, Kentucky	400
Mouth of Kentucky river	496
Mouth of Big Miami, North bend, Ohio	527
Cincinnati, Ohio; Newport, Kentucky	539
Maysville, Kentucky	602
Portsmouth, mouth of Scioto river, Ohio	656
Gallipolis, mouth of Kenawha river	743
Marietta, Ohio, mouth of Muskingum river	828
Wheeling, Virginia	908
Beavertown, mouth of Big Beaver river	976
Pittsburg, head of Ohio river	1,008

POINTS ON THE MISSOURI RIVER.

Mouth of Gasconade river	317
Mouth of Osage river	348
Jefferson City, capital of Missouri	357
Franklin, Boonsville, Missouri	406
Mouth of Grand river, Missouri	459
Fort Osage, Missouri	545
Fort Leavenworth, Missouri	601
Mouth of river Platte	892
Council Bluffs	937
Grand Tour	1,343
Mandan village, Fort Mandan	1,761
Mouth of Yellowstone river	2,020

POINTS ON THE ARKANSAS RIVER.

Post of Arkansas	446
Pine bluffs	542
Little Rock, capital of Arkansas	692
Fort Smith, mouth of Potean river	921
Fort Gibson, on Neosho river, 2½ miles above its mouth	1,015

POINTS ON RED RIVER.

Mouth of Black river, (Washita)	845
Alexandria	956
Head of bayou Bon Dieu, near Natchitoches	1,056
Foot of Old raft, mouth of Loggy bayou	1,140
Shreveport	1,240
Head of Old raft near Phelps's landing	1,290
Fort Towson, supposed to be 310 miles above head of raft	1,600

POINTS ON THE BLACK AND WASHITA RIVERS.

	Miles.
Harrisonburg, Louisiana	920
Monroe	1,018
Ecore Fabre, or Beau's bluff, Arkansas	1,118

POINTS ON THE ILLINOIS RIVER.

Beardstown	300
Peoria, at the foot of Lake Peoria	380
Peru, at the head of river navigation	460

POINTS ON ROCK RIVER.

Upper rapids, Rapids City, Sterlingville	622
Dixon	635
Mouth of Peckatonica, head of navigation	795

POINT ON THE WISCONSIN RIVER, WISCONSIN TERRITORY.

Fort Winnebago, Wisconsin portage	844

POINT ON DES MOINES RIVER, IOWA TERRITORY.

Head of high-water navigation	500

POINT ON IOWA RIVER, IOWA TERRITORY.

Iowa City	518

POINT ON OSAGE RIVER, MISSOURI.

Warsaw, near the head of navigation	548

POINTS ON WHITE RIVER, ARKANSAS.

Mouth of Big Black river	614
Batesville	647

POINTS ON ATCHAFALAYA AND TECHE RIVERS, LOUISIANA.

Franklin, Attakapas	989
St. Martinsville, Attakapas	1,058

POINT ON BAYOU BŒUF, VIA COURTABLEAU AND ATCHAFALAYA.

Washington, Louisiana	1,004

POINTS ON THE YAZOO RIVER, MISSISSIPPI.

Mouth of the Yalobusha river	830
Pittsburg, State of Mississippi	896

POINTS ON THE TENNESSEE RIVER.

	Miles.
Brownsport, Tennessee	200
Savannah	257
Waterloo, Colbert's shoals, Alabama	282
Florence, Tuscumbia, Alabama	332
Decatur, via Tuscumbia and Decatur railroad	377
Decatur's landing, Alabama	408
Gunter's landing, Alabama	433
Suck, Tennessee, base of Waldron's and Racoon mountains	526
Chattanooga, Ross landing	541
Knoxville, Tennessee, on Holston river	726

POINTS ON THE CUMBERLAND RIVER.

Eddyville, Kentucky	105
Cumberland iron works, seven miles above Dover	165
Mouth of Harpeth river	220
Nashville, Tennessee	260
Carthage, mouth of Cany fork	410
Burkesville, Kentucky, head of navigation	660

POINTS ON THE WABASH RIVER.

Mount Carmel, Illinois	252
Vincennes, Indiana	284
Terre Haute, Indiana	368
Lafayette, Indiana	492

POINT ON KENTUCKY RIVER.

Frankfort, capital of Kentucky	552

The foregoing list has been compiled from the most approved authorities, and agreeably to information obtained from the most experienced navigators of the Western waters. The aggregate extent of the navigation contemplated in the list, and through which steamboats have been known to pass, is upwards of 10,557 miles. The navigable distances on other streams of the West not enumerated in this list, for want of accurate information on the subject, would undoubtedly increase the extent to between 11,000 and 12,000 miles.

Among the navigable streams not mentioned, are the Allegany, the Monongahela, the Kenawha, the Big Sandy, the Muskingum, the Green river, &c., all tributary to the Ohio; the St. Peter's, the St. Croix, the Chippewa, and the Black river, tributary to the upper Mississippi; the Yellowstone, and numerous other tributaries of the Missouri; the Maramec, Kaskaskias, Big Muddy, Big Hatchie, and numerous other streams of minor importance connected with the lower Mississippi—all of which are navigable for steamboats to greater or less distances.

The following summary will exhibit the extent of steamboat navigation on each of the rivers enumerated in the list:

	Miles.
Mississippi river	2,090
Missouri river	2,200
Ohio river	1,008
Arkansas river	631
Red river	794
Washita river	382
Atchafalaya and Teche rivers	145
Atchafalaya and Courtableau and Bœuf bayous	91
Illinois river	220
Rock river	248
Wisconsin river	156
Des Moines river	100
Iowa river	60
White river	263
Yazoo river	286
Osage river	200
Tennessee and Holston rivers	680
Cumberland river	600
Wabash river	347
Kentucky river	56
Grand total	10,557

From the statements contained in this list are derived the following deductions:

	Miles.
The aggregate extent of steamboat navigation on the Mississippi river and its tributaries entering below Cairo is	3,742
The aggregate extent of steamboat navigation on the Mississippi river and its tributaries above Cairo is	4,124
The aggregate extent of steamboat navigation on the Ohio river and its tributaries above Cairo is	2,691
Grand total, as before	10,557

Agreeably to the best information that could be obtained in reference to the draught of boats adapted to the navigation of several of these rivers, or the depth of water on their shoalest bars, in extreme low water, the following statements are believed to be approximately correct:

The Mississippi, from its mouth to Cairo, affords a minimum depth or clearance of only six feet; thence to the mouth of Missouri or to Alton, of four and a half to five feet; and thence to the mouth of St. Peter's, the Des Moines and Rock Island rapids excepted, of two to two and a half feet.

The Missouri affords a depth of three feet, from its mouth to that of Grand river; thence to Council Bluffs, of two and a half feet; and thence upward, of one and a half to two feet, in the lowest stage of water.

The Ohio has a low-water depth of three feet, from its mouth to Paducah; thence to Louisville, of sixteen to eighteen inches; thence to Cincinnati, of two to two and a half feet; and afterwards to Wheeling and to Pittsburg, of one to one and a half feet.

The Arkansas river, from its mouth to the port of Arkansas, three feet;

thence to Little Rock two feet; and thence to the mouth of Neosho, one to one and a half feet.

Red river, from its mouth to Alexandria, three feet; from head of rapids at Alexandria to head of raft, three to four feet; and thence to mouth of Keamishy, fifteen to eighteen inches.

Illinois, from its mouth to Peru, 18 to 20 inches. Rock river, from its mouth to Dixon, 15 to 18 inches. Wisconsin river, from its mouth to Fort Winnebago, 12 to 15 inches.

Tennessee river, from its mouth to Waterloo, two to two and a half feet; and from head of Muscle shoals to Suck, one and a half to two feet. Cumberland river, from its mouth to Horseford, (35 miles,) three feet; and thence to Nashville of ten to twelve inches only in extreme low water.

The number of steamboats, now employed on the Western waters, is about 540. Of these, at least 250 are plying continually up and down the rivers, each running perhaps 120 miles per day.

Hence, the aggregate distance navigated daily on the Western waters may be estimated at 30,000 miles or more.

SITE AT CALEDONIA.

On ascending the Ohio, the first upland, rising above the reach of the highest freshets, (with the exception of two or three mounds,) that presents itself on the bank of the river, is the tract of land, on the Illinois shore, twelve miles above Cairo, formerly laid out as a town, and called "America."

The surface of the ground here rises gradually from the margin of the river in front, and on the lower or west side from the extensive alluvial bottom described under the preceding head as constituting the tongue of land running between the Ohio and Mississippi rivers.

This town site is now shut out from low-water navigation by a spacious sand bar, extending from a point three-fourths of a mile below to a point two and a half miles above the position; the width of the bar being several hundred yards, and its length three miles and more in extent. But for this obstruction to the landing at this point on the river, America would become the emporium of the trade and commerce of the neighboring country, inasmuch as it occupies the high grounds nearest the confluence of the Ohio and Mississippi, and is entirely exempt from the overflows and abrasions of those rivers.

Three miles above America, or fifteen miles above the mouth of the Ohio, and on the same shore, is the town of Caledonia, situated on a bluff bank of the river, from forty to seventy feet above the ordinary surface of the water, or from twenty to fifty feet above the highest freshets.

This town contains, as yet, only five or six houses, several stores, and a post office. The river banks here are exposed to the undermining influence of the Ohio, the current of which in high water sets strongly against them. The injurious effects of this abrasion have been recently exemplified in a striking manner by an avalanche or slide of the earth, in which a tract of between two and three acres was precipitated, and partially thrown into the river.

This occurrence was owing to the absence of a rocky substratum for the support and protection of the bank, no beds of rock having been discovered in the banks of the Ohio from its mouth to a point a half mile above this

place. From Caledonia to the Grand Chain, two and a half miles above, the main channel of the Ohio is near the Illinois side; throughout this distance a sufficient depth of water is presented for the landing of steamboats in all stages of the river. Above Caledonia, however, the river hills rise to the height of from one hundred to one hundred and fifty feet; and the surface of the country presents a very uneven and broken appearance, the ground being much divided by deep ravines, &c.

The position deemed most favorable for an armory in this vicinity is at the lower end of the town site, covering a portion of the same, where an area of about one hundred acres, of an irregular shape and of a slightly undulating surface, is presented. About eighty acres of this tract, adjacent to the river, are cleared, and under improvement; in connexion with which is a spacious tract, heavily timbered with ash, oak, poplar, hickory, walnut, &c. Of this tract, together with the cleared land above mentioned, five hundred to eight hundred acres may probably be obtained at a rate not exceeding $25 per acre.

The site is divided by a small ravine, through which the water is backed from the river in high freshets, and passes into a small creek, or run, called Marshall's bayou; the last entering the river about two miles below Caledonia, at the upper end of the town of America. Any upland site lower down the river is rendered inaccessible to boats of burden by reason of the extensive sand bar before mentioned.

The landing at the upper end of this site is sufficiently deep and bold in all stages of the river, and the communication between it and the ground to be occupied may be rendered easy and convenient by the construction of a road two or three hundred yards long.

The power contemplated at this site is that of steam; for the generation of which, stone coal of course can be obtained at the several localities mentioned in treating of Cairo, and at the same expense.

Building stone, lumber, and provisions of all kinds may be obtained at this place on terms quite as favorable as at Cairo.

With respect to the healthfulness of this position, it may be observed that here, as at most new places on the banks of the lower Ohio, malarial disease must prevail to a considerable extent until the country is cleared and the land cultivated.

In consequence of the absence of the proprietors of the land, the board failed to ascertain the exact price at which a site may be purchased at Caledonia.

SITE NEAR SMITHLAND.

Smithland is situated on the Kentucky side of the Ohio, at or immediately below the mouth of Cumberland river, sixty miles above Cairo, forty-five miles above Caledonia, and fourteen miles above Paducah, at the mouth of Tennessee river. The site proposed for the armory in this neighborhood is that point of land situated between the Ohio and Cumberland rivers, immediately above their junction, extending upward on the former about one mile, and on the latter three-fourths of a mile.

A tract of twelve hundred acres of land embracing the site is owned by Messrs. Dallam & Watts, of Salem, Livingston county, Kentucky, who will sell to the United States eight hundred acres of the same, with all their improvements thereon, at thirty dollars per acre, in the event of the place

being selected for the armory; reserving to themselves the right of establishing and maintaining a ferry across the Cumberland river, together with a suitable ferry landing on the northeasterly side of said river, about three-quarters of a mile above its mouth, and on the lower side of a deep ravine or slough uniting with the river at that place.

Out of the tract offered for sale as above, must be excepted five town lots, of one-third acre each, owned by individuals as proprietors of a town formerly located on the tract, who, it is supposed, will be willing to dispose of their lots at a fair rate. These proprietors being absent, no definite price can be affixed to their lots.

About one-half of the site has a plane or gently rolling surface, elevated a few feet above the reach of the highest freshets ever known; a very large proportion of the residue is low and flat, being made up of bottom lands bordering upon the Ohio river, and subject to inundation during the ordinary high freshets in this part of the river. A portion of the tract extends to the river hills, and embraces the highest land point situated between the valleys of the Ohio and Cumberland rivers. Between this tract and the Ohio bottom, is a swampy flat, liable to overflows even in a moderate freshet.

About eighty acres of the land, including the town lots before mentioned, are cleared and under improvements. The residue supports a heavy growth of timber, consisting of white, red, post, Spanish and bur oak, ash, black walnut, hickory, elm, sweet gum, &c.

Building stone (limestone and sandstone) abounds in this neighborhood, but is characterized by no peculiar excellence. Brick clay of a good quality is abundant. Firestone (a coarse sandstone) has been discovered on the westerly side of the Cumberland, one mile and a half from its mouth; and on trial has been found well adapted to the construction of hearth stones for furnaces.

Bituminous coal, believed to be of superior quality, is found in great abundance on the Tradewater river, which enters the Ohio, from Kentucky, forty-five miles above Smithland. This stream is said to be navigable for steamboats that navigate the Ohio, through a distance of six miles from its mouth. The coal beds are presented within one mile and a half of the Ohio, and extend upward indefinitely. The coal veins are said to vary in thickness from three to five feet.

Stone coal is also found on Saline creek, near its mouth, ten miles above the mouth of Tradewater and fifty-five miles above Smithland. There are numerous other localities, both in Illinois and Kentucky, from which coal may be obtained for use on this part of the river. The prices at which this article may be delivered at the site under consideration, vary from eight to twelve and a half cents per bushel; coal from Pittsburg having been occasionally furnished at the same.

There being no means of obtaining any considerable water power in this neighborhood, steam power, generated by stone coal, must be relied on for driving the machinery of an armory at this place.

Iron ore, apparently of a good quality, abounds, within the distance of a few miles from the site, on both sides of the Cumberland river. The entire region between the Cumberland and Tennessee rivers, extending upward on the former to Harpeth river, and on the latter to the Muscle shoals, may be regarded as one continued iron field. Numerous iron works have already been constructed in various parts of this region of country; and the supplies

in the forms of pig metal, blooms, bar iron of all sorts, boiler iron, sheet iron, cut nails, &c., produced thereat, are widely spread throughout the valley of the Mississippi, and constitute, probably, about one-fourth of the entire quantity consumed in the Western country.

The most considerable iron works hitherto put into operation in this part of the country are those of Messrs. Wood, Stacker, & Co., called the "Cumberland iron works," and situated on the westerly side of the Cumberland, about one hundred miles above Smithland. The wrought iron manufactured at these works is no doubt of an excellent quality. Specimens of it have been subjected to trials of the most severe and conclusive character, made with the utmost care and precision, by a scientific committee of the Franklin Institute, at Philadelphia; and, according to these experiments, the quality of the iron made at these works has been found to be, as relates to its ductility, malleability, and tenacity, superior to that of any other made in the United States, and equal to the best iron imported from abroad. The quantity of iron manufactured annually at these works is as follows, viz:

	Tons.
Of pig iron and castings - - - - - -	9,500
Of wrought iron in bars, round iron, boiler iron, sheet iron, spikes, nails, &c., maximum quantity - - - - -	2,500
Minimum quantity - - - - - -	1,800
Average quantity - - - - - -	2,150

The coal used in the forges and furnaces connected with the rolling mill is obtained from the spurs of the Cumberland mountain, at a cost of 20 cents per bushel; and is said to be better adapted to these uses than that obtained from any other locality, by reason of its producing a more speedy and more intense heat.

Cumberland island, in the Ohio, is situated immediately opposite to this site. The noted bar at the head of this island, which was formerly an impediment to the low-water navigation of this river, may now be passed on the Kentucky side of the island; a wing dam of stone having been constructed a few years since, which, by interrupting the passage of the water on the right side, in a very low stage, throws the current into the left channel of the river.

Between the mouth of the Cumberland and that of Tennessee river, 14 miles below, however, there are two or three broad sand bars, upon which the depth of water, in a very low stage, is said to be not more than from 16 to 18 or 20 inches in the deepest channel—the Ohio being there fordable entirely across its stream. The extreme range on this part of the river is said to be 45 feet; perhaps a little more. Lumber, building materials, and provisions of all kinds, may be procured at this place on terms as favorable as at Cairo or any other point on the Western waters.

The proprietors of the land promised to furnish the board with a plat of the ground, defining the boundaries of the whole tract, and designating the limits of the pieces to be reserved, but the map has not been received. Until the figure and extent of the ground, and the relative proportion of high and low land proposed to be sold to the United States, are ascertained, the immediate locality for the buildings cannot be determined; nor can a definite opinion, touching the probable healthfulness of the site, be expressed.

See documents Nos. 23, 24, and 25.

SITE AT THE NARROWS OF HARPETH RIVER, TENNESSEE.

This position was examined by the commissioners appointed to select a site for a Western armory in 1823, and subsequently by Captain J. L. Smith, appointed for the same service in 1827. The reports of these officers, in relation to the advantages of this place, appear to be sufficiently comprehensive and accurate in their details, according in all respects with the information obtained by the present board.

For a description of this interesting locality, reference is respectfully had to the very able reports of the former commissioners, from which many of the following particulars have been extracted:

The "Narrows are situated on Harpeth river, twenty-two and a half miles above its mouth." This name is applied to the neck of a detour or bend of the river, between five and six miles in circuit, and containing about 1,000 acres. At and near the gorge or neck of the bend is an elevated ridge, bounded by high cliffs of limestone, and rising from fifty to more than two hundred feet above the reach of the highest freshets. The width across the gorge, for a distance of about three hundred yards, is only about one hundred and eighty feet; the neck through this distance being bounded on both sides by rocky precipices, facing the river valley.

Through this neck two tunnels, each sixteen feet wide and seven feet between the floor and roof, have been perforated, for the purpose of creating a water power at this place. The descent of the river, or its perpendicular fall, in extreme low water, from the heads to the outlets of the tunnels, is sixteen feet, which is the natural fall of the river in its passage round the bend.

At the time when the officers alluded to visited this locality, one of the tunnels only (that furthest from the bend) had been opened. This tunnel was completed in 1818, at a cost of $8,000. The other, or new tunnel, which heads at the distance of one hundred yards further down the bend, was completed in 1835, at a cost of $6,000.

The range of the river, from the lowest to the highest surface water, both at the heads and at the outlets of the tunnels, is said to be only about twenty feet; but, agreeably to the reports above referred to, may with greater safety be stated at twenty-five feet, especially at a point immediately below the Narrows.

The method of creating a water power at this place, adequate to the uses of an armory, as proposed by the commissioners of 1823, is as follows:

A canal or race, to receive the water from the first tunnel, was proposed, to extend downward along the margin of the river two thousand one hundred and thirty-six feet, by means of excavations in the river banks, and the erection of river walls through that distance, rising thirty-one feet above the level of low-water surface. The point at which the power was to be displayed is on the lower portion of that distance, where a recess is presented, between the river hills and the margin of the river, sufficiently spacious for the accommodation of the buildings of an armory, and above the reach of the highest freshet. This recess was the site then contemplated for the armory. The cost of the canal, river walls, forebays, tail races, and other works necessary to the creation and maintenance of the desired water power, was estimated at $142,606.

A different method was suggested by the same commissioners, and afterwards recommended by the commission of 1827, which is as follows:

A tunnel eight hundred and sixty feet long, heading a considerable distance above the tunnel of 1818, discharging its water at the site above mentioned, and affording a water power of the same character as was before proposed to be opened. The cost of the new tunnel, forebays, walls, &c., requisite to the creation of a water power on this plan, was estimated at about $68,295—somewhat less than half the amount required for the creation of a water power on the plan first proposed.

Of the two projects, the latter is undoubtedly entitled to the preference, on many accounts. It is believed that this method, however, is susceptible of improvements in the following manner:

In connexion with the proposed tunnel, and at a suitable distance below its head, a dam ten feet high, reaching entirely across the channel of the river and the narrow strips of alluvion on its two margins, should be erected and firmly united to the rocks at the bottom and sides of the channel. From the pool thus formed above the dam, the requisite supply of water may be drained through the tunnels, at a greater elevation, and with an extent of tunnel somewhat less than it could be without a dam, while at the same time the water may be discharged at an equally increased elevation above the surface of the river below the Narrows. By this means the machine shops through which the power is displayed may readily be elevated above the reach of the highest freshets that occur at the foot of the Narrows, and the low-water head and fall increased from sixteen to twenty-six feet.

The cost of the dam, which will rise on an average about 11 feet above the bed of the river, and have an extent of about 120 yards, may be estimated at $2,500.

In order to protect the works below the tunnel against the influence of freshets at its head, it will be necessary to construct at its outlet a flood bay of substantial mason work, at least 12 feet square in the clear, and rising to the level of the highest freshet at the head of the tunnel. This bay should be furnished with suitable gates, through which the water may be admitted into the head race, and forebays connected with the machine shops, the walls of which (viz: of the head race and forebays) should also rise at least five feet above the low-water surface at the head of the tunnel, for the purpose of securing a head of five or six feet, in extreme high water, which is supposed to attain an elevation of 25 feet above the lowest stage, immediately below the Narrows.

This head may be rendered operative by means of reaction wheels, which can ply to advantage with the head or fall corresponding to this or any other stage of the water. Such a flood or guard bay, with its gates, &c., (its height being thirty feet from the bottom of the tunnel,) would probably cost about $2,000.

Accordingly, the cost of creating a water power at this site, as reported by the commission of 1827, including tunnel, &c., being - $68,295
The cost of a dam, as above proposed - - - 2,500
The cost of a flood or guard bay - - - - 2,000

The present estimated cost of creating a water power will be 72,795

Agreeably to the plan proposed by the commission of 1827, in the event of a freshet rising higher than sixteen or seventeen feet above low

water at the site, the water power would be neutralized during the continuance of the freshet above that height.

But, agreeably to the improvements above contemplated, the head and fall being ten feet greater than that produced by the former plan, and an additional head of five or six feet being also provided for by means of a flood bay, &c., a water power sufficient for driving the machinery of an armory would be maintained during all stages of the water.

At and near the outlet of the proposed tunnel is situated the covelike recess before mentioned, embracing an area of rolling land sufficiently large for the accommodation of the buildings of an armory, and elevated from fifteen to twenty feet above the reach of the highest freshets. In case of a demand for a greater extent of ground, an additional area of about 250 acres on the opposite side of the river, somewhat more elevated, and equally as favorable in other respects for the location of the dwelling-houses, may be obtained, and united to the contemplated site of the machine shops, by means of a bridge 100 yards long, across the river.

At the time this site was visited by the former commissioners, there existed a reservation made by the Legislature of Tennessee, of a tract of land embracing the site and all the country within five miles of the same, for the use of the General Government, in the event of the Western armory being located at the Narrows. This reservation, however, has been cancelled since that time, and the tract embracing the Narrows has become the property of individuals.

Willam Montgomery Bell, Esq., is the proprietor of about 10,000 acres in this vicinity, which include nearly the whole of the bend, and a large tract of land both above and below the bend, together with the Narrows and the improvements thereat. This gentleman offers to sell to the United States 1,000 acres, embracing the site, together with the privilege of creating and using the requisite water power, at the rate of $10 per acre; reserving the improvements already made by him for the creation and employment of a water power.

With regard to the quantity of water afforded by the Harpeth river at this place in extreme low water, nothing definite has hitherto been determined. The water was probably too high to admit of the solution of this problem, when the site was examined by the former commissioners; and at the time when the present board visited it, the river was eight or ten feet above its low-water surface. No doubts are entertained, however, as to the sufficiency of the water for the creation of the requisite water power in the dryest season, especially if the new arrangement herein suggested should be adopted.

Harpeth river is said to be navigable for keel boats drawing two or three feet water, from the Narrows to its mouth, (22½ miles,) during a period of two to four months in each year. It may no doubt be rendered navigable for steamboats of an equal draught, during the same periods, by clearing its channel of logs and its banks of impending trees. The low-water descent in this distance may be assumed to be two feet per mile; consequently, the aggregate descent from the Narrows to the Cumberland river will be 43 feet.

The extreme range of the Cumberland at the mouth of the Harpeth being assumed at 50 feet, which is probably less than the height attained by the highest freshet, it follows that a 50-foot rise of the former during a low stage of the latter will occasion at least seven feet depth of back

water at a point immediately below the Narrows; while the water of the Harpeth, at a point immediately above the Narrows, would remain unaffected by such a rise. At the point last mentioned, the low-water surface would be elevated 59 feet above that at the mouth of the river; consequently, a 50-foot rise of the Cumberland would have but very little, if any, influence in checking or backing the water at this point.

The improvements at and near the Narrows consist of the two tunnels above mentioned, a forge at which there are manufactured 1,000 tons of hammered iron annually, a saw mill, a grist mill, several dwelling-houses, plantations, &c. Several furnaces and a few forges are also in operation within a few miles of the site. The country, for many miles around, abounds in iron ore of a superior quality. "A ton of iron from the works of Colonel Napier, in this vicinity, was sent to Springfield, and on trial found to be equal in quality to any that is found in commerce."

The surrounding country presents an aspect exceedingly broken and diversified, by ridges, ravines, valleys, hills, &c. The hills are generally very abrupt, and in places precipitous, rising from 100 to 300 feet above their bases. The ridges and intervening valleys are remarkably serpentine in their courses, and oppose serious obstacles in the way of direct roads leading from one point to another. The soil upon the high grounds is generally meager, and in places quite unfit for cultivation, but for the most part well timbered. The valleys, especially those of the principal streams, generally possess a rich soil, and sustain a heavy woodland growth.

The timber growth consists principally of red, black, chestnut, white Spanish, pin, and bur oak, hickory, ash, maple, sugar tree, red and white beech, black and white walnut, chestnut, poplar, hackberry, red birch, wild cherry, sycamore, black and sweet gum, red elm, linden, cedar, yellow pine, dog wood, iron wood, &c.

The agricultural products consist of corn, wheat, rye, oats, Irish and sweet potatoes, turnips, beans, peas, apples, peaches, pears, quinces, plums, cherries, gooseberries, currants, raspberries, strawberries, millet, clover, timothy, herdsgrass, Egyptian grass, hemp, flax, &c.

Building stone of a good quality, and other building materials, are abundant and convenient. Hydraulic lime may no doubt be found in the neighborhood.

The distance from Harpeth Narrows to Nashville is 22 miles; and from the same place to the nearest point on the Cumberland river, which is at the mouth of Sam's creek, the distance is said to be only eight miles, by a route well adapted to the construction of a good road, with grades of easy ascent.

No localities of stone coal have as yet been discovered in this part of the country, nor are there any geological indications to be met with, from which its existence in this quarter can reasonably be inferred. Supplies of this article must be obtained either from the coal mines at and near the sources of the Cumberland, or from those on the Ohio and its tributaries, at a cost of not less than 20 cents per bushel.

In view of the abundant supplies of timber that may be obtained from the woodlands on Harpeth river, and of the frequency of mill sites afforded by this stream, no doubt can be entertained that any amount of lumber can be furnished in this vicinity on the most moderate terms.

With regard to the healthfulness of this position, appearances seem to justify the conclusion that but few points in the Western country are, on this score, entitled to higher consideration.

SITE NEAR NASHVILLE.

The choice of a site in the vicinity of Nashville, at the instance of a committee appointed by the citizens of that city to confer with the board on the subject, was made contingent on the construction of a dam proposed to be built across the Cumberland river, about two and a half miles above the city, for the purpose of creating a water power for manufacturing operations. In accordance with this understanding, positions were examined on both sides of the river, at and near the extremities of the proposed dam. On the left shore, at this place, is presented an extensive alluvial plain, extending upward from a bluff bank three-quarters of a mile above the city, to the mouth of Brown's creek. This site was deemed objectionable on account of its proximity to the city, the great amount of expense that must be incurred in the purchase of the requisite quantity of land, and more especially its liability in many places to overflows during the prevalence of the higher freshets in the river.

A position on the right shore, directly opposite that just considered, was deemed more favorable on every account. With the exception of a narrow strip of low ground, near the margin of the river, the surface is more elevated on this side, being the termination of a low ridge which rises very gradually from the river shore, passes obliquely downward, receding from the river in that direction, and uniting with the slopes of the river hills opposite to and for a considerable distance below the site intended for the dam. Upon this ridge, which becomes broader and more elevated as it recedes from the river, is the site most suitable for the buildings of an armory, while the machine shops connected with the same must be erected near the margin of the river, and directly below the end of the contemplated dam.

A number of gentlemen in Nashville have recently applied to the State Legislature for a charter authorizing them to construct a dam across the river at the place above designated, of a height or elevation above low water not exceeding 25 feet. The charter has not yet been granted, but is expected to be obtained at some future period.

The highest freshet ever known at Nashville is said to have attained an elevation of 52 feet above extreme low water. During such a freshet, it is obvious that the water power at the dam must be effectually neutralized, in so far as relates to its agency upon machinery adapted to the action of a head and fall of only 25 feet. The same will of course be true, also, of all freshets rising above the crest of the dam. Hence an uninterrupted water power cannot be obtained at this site. The periods, however, during which freshets of 20 or 25 feet rise prevail seldom continue longer than 10 to 15 days, and the occurrence of such freshets is seldom oftener than once or twice in a year. Other freshets of less elevation will of course diminish the efficient head and fall in degrees proportionate to their respective elevations. Accordingly, in order to make the water power available to the full extent of the head and fall during the prevalence of the minor freshets of the river, a resort must be had to the use of reaction wheels.

With regard to the magnitude and sufficiency of the water power, except when interrupted by freshets, there can be no doubt of its adequacy, not only to the purposes of an armory, but to those also of the contemplated mechanical operations for which the dam is intended.

The position of the machine shops, as above proposed, must unavoida-

bly be subjected to the inconvenience of being flooded whenever a rise of more than 30 or 40 feet occurs in the river. Any other position, exempt from this inconvenience, that could be selected for the workshops, would require expenditures to an incalculable amount, in the construction of races, forebays, guard walls, &c.

The proprietor of a large tract of land, including most of the site under consideration, has proposed to sell to the United States 700 acres for 100,000 dollars, on condition of the establishment of the armory at this place. Any additional grounds that may be required for this purpose may no doubt be obtained at a similar rate. About 400 acres of the tract first mentioned is cleared and under improvement, and, being bottom land, much of it is subject to inundations; the residue (viz: 300 acres) is mostly upland, and sustains a valuable growth of timber.

Nashville is situated on the southerly or left bank of Cumberland river, about 200 miles above its mouth. Throughout this distance the river is navigable for steamboats of the largest class during ordinary high freshets, which usually prevail during an aggregate period of four to six months in each year, and for steamboats of light draught during eight or nine months in each year. In 1839 no steamboats could navigate this river between Nashville and its mouth from the last of June to an advanced date in the following October, while in 1841 its navigation continued uninterrupted during almost the whole year. In extreme low water, numerous shoals occur on this part of the river, at which the depth in the deepest channel does not exceed 12 to 15 inches. From Nashville upward, the Cumberland is navigable for steamboats, in ordinary high water, to Burkesville, Kentucky, 600 miles above its mouth, or 400 miles above Nashville.

The bars of the Cumberland river, that give occasion to its numerous shoals, are generally composed of rock, affording substantial foundations for dams, &c. The bar at the site contemplated for the dam above Nashville is of this character. The descent of the water, in its passage across this bar, amounts probably to two or three feet.

Most of the stone coal used at Nashville is procured from the spurs of Cumberland mountain, near the head of navigation on Cumberland river, at a cost of about twenty cents per bushel. Supplies of this article to a considerable amount may also be brought from the coal mines of Pittsburg, Wheeling, and other points on the Ohio river, at a cost of twenty or twenty-five cents per bushel.

An extensive rolling mill is now in operation at this place, at which large quantities of bar, boiler, sheet, and nail iron are manufactured of blooms obtained from forges in this part of the country. The iron thus wrought is offered in market at prices varying from five to eight cents per pound.

Building materials of all kinds are to be had in abundance at Nashville, but at prices, so far as relates to sawed lumber in particular, somewhat in advance of those at which the same description of materials may be had on the Ohio river and at Cairo.

Provisions of all kinds also are abundant and cheap, with the exception of beef, pork, lard, &c., which command higher prices here than on the Ohio and Mississippi rivers.

There are no less than five macadam turnpikes radiating from this point, viz: one northeastwardly, to Gallatin; another eastwardly, to Lebanon; a third southeastwardly, to Murfreesborough; a fourth southwestwardly, to Franklin; and the fifth westwardly, toward Memphis.

See documents Nos. 26, 27, 28, and 29.

SITE AT THE FALLS OF THE CANEY FORK OF CUMBERLAND RIVER.

The Caney fork enters the Cumberland at a point near the town of Carthage, one hundred and fifty miles above Nashville. It is said to be navigable for keel boats of one hundred to one hundred and forty tons burden during seven or eight months in the year, affording a low-water depth equal to that of the Cumberland between Nashville and its mouth. It is supposed that it may be rendered navigable for small steamboats of a similar draught, during the same periods, by the removal of trees, &c., overhanging the channel. In extreme low water, its greatest depth in the shoalest parts of its main channel is only one foot. From the head of navigation to the foot of the main falls, the distance, following the course of the stream, is about five miles. In this distance, the aggregate descent is estimated at between twenty and thirty feet, which will of course ever prevent the passage of boats of burden further up the river.

The country in the vicinity of the river, especially near the falls, is very elevated, rising from one hundred and fifty to two hundred and fifty feet above the surface of the water, and in many places is much divided and diversified by ravines, valleys, sinks, &c.

No site of easy access from the shores of the river, of an aspect even and uniform, and in extent sufficient for the accommodation of the buildings of an armory, is to be found in this neighborhood. Any position that might be selected for this purpose must unavoidably be elevated at least one hundred feet above any appropriate site for the accommodation of machine shops or the display of the water power.

The site deemed most practicable for the purposes under consideration, although very objectionable on account of its elevation and the unevenness of its surface, is a peninsula situated between the Caney fork and Collins river, (just below the confluence of the two streams,) containing five hundred acres of ground, partially cleared and under improvement, which the proprietor will sell for a sum not exceeding $3,000, together with the water privileges connected with the same. The position that must be occupied by the machine shops is the declivity of the river hill, on the left side of Caney fork, contiguous to the neck of the peninsula, which rises from a precipitous basement of solid rock twenty to thirty feet high, by a slope of twenty to thirty degrees, to the summit of the neck, about two hundred and fifty feet above the surface of the stream last mentioned, but not more than one hundred and fifty feet above that of Collins river. From this position a road may be formed upon the hill side, rising at an angle of four degrees, and reaching the summit of the site in a distance of about six hundred yards.

The main consideration that gives this locality claims to attention is the extensive and magnificent water power which may here be created by the use of these two streams. In the distance of less than two hundred yards, adjacent to the proposed site of the machine shops, the river embraces two cascades of more than twenty feet each, and has an aggregate fall, in low water, of more than fifty feet. Owing to the narrowness of the channel, or rather chasm, below, which appears too limited to afford a free passage for the water in a high freshet, the current becomes checked at the foot of these falls, and back water accumulates to the depth of twenty feet, thereby neutralizing a portion of the fall, but leaving still an efficient descent of about thirty feet.

In order to command the power afforded by the falls, and for the pur-

pose of supporting the machine shops through which this power is to be displayed, extensive walls of great height and strength will be required. The walls may rest upon the bed of the river and a tabular bar of about the same level, both of which are composed of solid rock, and must rise to the height of between thirty and forty feet from their foundation.

The power requisite for the purposes in view may be more readily and more economically obtained, however, in the following manner:

The distance through the neck or isthmus of the peninsula above mentioned, beginning at the surface of low water in Collins river, and passing horizontally through the neck to the valley of Caney fork, is only about one hundred and twenty yards. On this line a tunnel of suitable transverse dimensions may be opened, through which to convey the waters of Collins river to a position near that proposed for the machine shops, which by this arrangement may have a more elevated location and be made more commodious in all respects. In this position the foundations of the shops may be laid at or above the tops of the river cliffs, which rise perpendicularly about thirty feet above the bed of the river; thus obviating the necessity of heavy and expensive walls for the support of these structures.

The fall afforded by this arrangement will amount to about eighty feet, clear of back water in the highest stage of the river; and, by the erection of a dam, ten feet high, across Collins river, below the head of the tunnel, may be increased to ninety feet. There is, however, a difficulty in the way of carrying this plan into effect, which is deserving of particular notice. The head of the proposed tunnel is near the extremity of a bend or detour of Collins river, near the gorge of which there is said to be a subterraneous channel, through which a part of the water of the river is conveyed from its bed at a point above the site of the contemplated dam, and restored to the main river again at a point below the same.

This being the case, it will be proper to prevent such a waste of the water by stopping up the subterraneous channel at its head.

The quantity of water afforded by the Caney fork above the mouth of Collins river, in a very low stage, is said to be at least 15,000 cubic feet per minute. That afforded by Collins river, in a similar stage, is supposed to be fully equal to that of Caney fork, making the aggregate quantity of both combined at least 30,000 cubic feet per minute, in the dryest season.

The building stone in this vicinity consists principally of limestone in horizontal strata. That found in the bed of the river and at the bases of the hills abounds in flinty concretions, which render it difficult to dress. Stone of the same character, but of a superior quality, is found in more elevated situations, and is far better adapted to the purposes of building.

The timber growth embraces all the varieties common to the country on Harpeth river, and lumber of all kinds may be furnished on terms quite as favorable.

The soil is generally indifferent, and a few spots only deserve a higher estimation than that of second-rate land. Its products, however, are of sufficient variety and abundance to supply the exigencies of a far more numerous population than that which at present inhabits this part of the country.

Bituminous coal abounds in the Cumberland mountain and its spurs, and has been found within a distance of eight or ten miles from this place. Its cost, delivered in this neighborhood, owing to the unevenness of the country and the present unimproved state of the roads over which it has to be

conveyed, is twenty cents per bushel; under more favorable circumstances, however, it could no doubt be afforded at fifteen cents or less per bushel.

Iron ore of a good quality is said to abound in many places. A furnace for smelting this mineral, and a forge at which bar iron is manufactured from the pig, are in operation within a few miles of the site.

This locality was examined by the armory commissioners of 1823, who duly appreciated the importance of its water privileges, but regarded it as objectionable on account of the inequalities of surface on the grounds around, the abruptness and height of the river hills, and its remoteness from uninterrupted navigation.

See documents Nos. 30, 31, 32, 33, 34, and 35.

SITE AT STONE FORT, TENNESSEE.

The remarkable antiquity denominated "the Stone fort" contains an area of 37½ acres, and occupies an elevated portion of a peninsula situated between two considerable tributaries of Duck river, called the Barren and Bark Camp forks. This area presents a rolling aspect, and is surrounded almost entirely by parapets of earth and stones, taken from the surface and rudely thrown together, in a manner to form embankments, rising at present from three to eight or ten feet above their bases. On the banks or bluffs of the Barren fork the parapet is intermitted for a few yards, and on the Bark Camp fork a similar interruption occurs on a distance of about 300 yards. The probable reason for these intermissions was, that, as the bluffs here presented high perpendicular and insurmountable cliffs, no artificial defences were required. At the gorge of the peninsula, where the distance across the neck from one fork to the other does not exceed one hundred and fifty yards, are the gateways or sally-ports of the fort, more strongly fortified by parapets and mounds of greater heights than any other part of the work. At this point the elevation of the enclosed area above the surface of the two streams does not probably exceed thirty-five or forty feet, while at the lower and broader part, which has a width of about 400 yards, its elevation is about 120 feet; the difference in these respective elevations being occasioned principally by the great descent of the two streams, in their passage from the upper to the lower extremity of the fort.

The site contemplated for the armory embraces the entire peninsula, together with a contiguous tract extending upward between the forks to the Nashville road, and another tract on the northerly side of the Barren fork, opposite to those above mentioned—the whole embracing 1,000 acres. The ground here specified, together with the water privileges connected with the same, may probably be purchased of its proprietor, Colonel Hynds, of Nashville, on reasonable terms. The position deemed most suitable for the buildings of an armory, exclusive of machine shops, is the area included within the walls of the fort.

The aggregate fall of water at this place, which consists of a series of cascades and intervening rapids in both of the streams, amounts to between forty and fifty feet, clear of back water, in a distance of about half a mile. The quantity of water supplied by either of the forks in the dryest season appears never to have been ascertained; but, with the fall above mentioned, it is believed to be amply sufficient for all the purposes of an armory, so far as relates to a motive power. The quantity afforded by

the Barren fork is supposed to be nearly double that furnished by the Bark Camp fork.

The method deemed most appropriate for the creation of a water power, embracing the forces of both streams, is as follows:

A dam fifteen feet high may be constructed across the Bark Camp fork, a little above its uppermost cascade, and near the site of a dam of six feet height, already built to supply a water power for a mill now in operation a little below. From the pool thus formed, a canal or race must be opened across the neck of the peninsula, through which the water of the Bark Camp fork may be conveyed into the channel of the Barren fork. Another dam of an elevation somewhat less may be reared across the stream last mentioned, a little above its uppermost cascade—thus forming a pool to be supplied by both forks, and affording a head and fall of about sixty feet. From the pool last mentioned a race may lead downward, on the northerly or right side of the Barren fork, one hundred and fifty or two hundred yards, to a position suitable for the erection of machine shops and for the display of the water power.

The locality under consideration is embraced within the limits of the extensive region known by the name of the Barrens, the soil of which, except in the valleys, no where surpasses that of second-rate land, and in many places is quite unproductive. The best crops of corn and wheat seldom exceed thirty bushels per acre of the former, and eighteen of the latter. The country generally appears to be better adapted to grazing than to the purposes of agriculture.

The timber growth of the Barrens consists of post, white, black, Spanish, red, and pin oaks, yellow poplar, chestnut, hickory, maple, dog wood, &c.; while, in the valleys of the principal streams, black walnut, white and blue ash, wild cherry, sugar tree, red beach, linden, hackberry, honey and black locust, mulberry, &c., are found in greater or less abundance.

The rocks nearest to the surface of the ground are generally hard sandstone, of no particular value as a building material. Limestone, better adapted to this use, is found at various localities, but not generally diffused through this region. This rock abounds near the confluence of the Barren and Bark Camp forks.

Iron ore of a good quality is abundant in this part of the country. Stone coal may be obtained from the Cumberland mountain, at the distance of twelve or fourteen miles from the site, at an expense of from fifteen to twenty cents per bushel.

This locality is situated at the head of Duck river, (which is formed by the confluence of the two streams above mentioned,) about twenty miles by land above Shelbyville, and fifty-five miles above Columbia. This river is said to be navigable for keel boats during a small portion of the year, from its mouth to the place last mentioned; but its navigation is represented as difficult, owing to the rapidity of the current, and its numerous shoals and other obstructions. The nearest point accessible by steamboat navigation is on the Tennessee river, near Jasper, forty-eight miles southeastwardly from the site. In this direction, however, any line of communication must cross the Cumberland mountain, which rises eight or nine hundred feet above the table of the Barrens, and twelve to fourteen hundred feet above the valley of the Tennessee. In the opposite or northwestwardly direction, the nearest point to navigation is at Nashville, sixty-five miles distant.

The distance from the site southwestwardly to Triana, on the Tennessee river, below Huntsville, is seventy-five miles.

The commissioners of 1823 visited this place; and although they believed the water power sufficient for an armory in all seasons, and regarded the surface of the country as favorable for the location of such an establishment, yet they deemed its remoteness from navigation, and the difficulties of obtaining the necessary supplies of materials, provisions, &c., to the full extent required, as highly objectionable.

See documents Nos. 30, 31, 32, 33, and 34, already cited.

SITE NEAR PADUCAH, KENTUCKY.

Paducah occupies a position on the south bank of the Ohio river, and on the margin of a vast plain, elevated from six to fifteen or twenty feet above the reach of the highest freshets, and extending backward from the river, in every direction, to an indefinite distance. Two or three miles from town the plain unites, and becomes coincident with the Barrens of western Kentucky and Tennessee, and embraces by far the largest portion of the country situated between the Tennessee and Mississippi rivers.

The surface of the plain, for several miles above, below, and back of the town, is slightly undulating, and is here and there traversed by ravines and watercourses of a moderate depth; the most considerable of which are the valley of Clark's river, which enters the Tennessee four miles above Paducah; that of Island creek, entering the Ohio about one mile above; and that of Perkins's creek, entering the same about four and a half miles below the town.

Directly below the mouth proper of the Tennessee river is an island, a little more than one mile long and four or five hundred yards wide, the channel between which and the Kentucky or Paducah shore is 420 yards wide; and between the head of the island and the point of land immediately above the junction of the Ohio and Tennessee rivers the width of the slough or channel is 770 yards. Whenever a freshet occurs in the Tennessee during a low stage of the Ohio, the water of the former discharges itself partly above and partly below the island. But when a freshet prevails in the Ohio, the Tennessee being at a low stage, the discharge of the latter is confined to the channel between the island and Paducah shore, through which probably a portion of the water of the Ohio passes, the current at the head of the island being reversed.

The distance from the town, upward, to the point between the Ohio and Tennessee, is a little more than two miles. This point or narrow tongue of land, for a distance of about a mile upward, on both rivers, where it attains a width of about 200 yards, is subject to inundation during the higher freshets. This is also true of the island below, which is somewhat more elevated.

A strip of bottom land, between the margin of the river and the plain of the town, extending from a point on the shore midway of the town, where it has a width of 50 yards, downward 4½ miles to the mouth of Perkins's creek, where it has a width of 500 to 600 yards, is also subject to inundation whenever the island is overflowed. With these exceptions, together with the valleys of Island and Perkins's creeks above mentioned, and a few small ravines at and near their outlets, the country in the neighborhood of

Paducah, on the south side of the Ohio, is entirely exempt from overflows in the highest freshets.

The highest freshet in the Ohio river, of which we could get any account, occurred in 1828, at the extreme rise of which the surface attained an elevation of between 45 and 46 feet above extreme low-water mark. At the height of this freshet, the water backed upward in the valleys of Island and Perkins's creek, and through a ravine about a mile of the town, 25 to 30 yards wide, uniting these two valleys so as completely to insulate the town site and the adjacent grounds. The depth of the overflow, however, at the summit between the two creeks, was only about six inches, and in other parts of the ravine did not exceed 18 inches or two feet. Its duration, at this height, was for a short time only.

The distance from Paducah to the mouth of the Ohio is 45 miles, through which the river is navigable, for boats drawing three feet, in the lowest stage of the river. The navigation on this part of the Ohio is never obstructed by ice, except when brought down in large quantities from above. The temperature of the water from the Tennessee, as before observed, is such as to prevent the Ohio from being frozen over below the junction of these two streams.

The Tennessee is also navigable at all times for about 40 miles from its mouth for any boats that can pass the mouth of the Ohio to this place, and for boats of 2½ feet draught to the Big bend, 240 miles from its mouth, even in the lowest stage known by the oldest navigators of this river. During a period of 22 years, two or three weeks only have occured during which boats of the draught just mentioned could not ascend even to Waterloo, 270 miles above Paducah.

The soil of this plain and barrens, before mentioned, is generally rich, and well adapted to the culture of corn, rye, oats, hemp, flax, potatoes, turnips, apples, pears, peaches, &c.

The natural growth is somewhat scattering, but embraces a great variety of timber trees, consisting of post, red, and white oak, yellow poplar, black and sweet gum, shellbark hickory, &c. The valleys, besides several of the varieties above mentioned, afford, in addition to the same, a dense growth of bur oak, black walnut, catalpa, red elm, white ash, hackberry, cotton wood, sycamore, cypress, &c.

The cost of necessary provisions, lumber, &c., delivered at Paducah, is as follows, viz:

Corn, per bushel	20 to 25 cts.
Flour, per barrel	$4 to $6.
Beans, per bushel	37½ to 50 cts.
Oats, per bushel	20 cts.
Potatoes, per bushel	25 to 37 cts.
Turnips, per bushel	12½ to 25 cts.
Pork, per pound	2 to 2½ cts.
Beef, per pound	2 to 3 cts.
Lard, per pound	5 to 6 cts.
Tallow, per pound	8 cts.
Butter, per pound	10 to 12½ cts.
Chickens, per dozen	75 cts. to $1.
Eggs, per dozen	6 to 8 cts.
Bacon, per pound	5 to 6 cts.
Salt, per bushel (or 50 pounds)	50 cts.
Hay, per ton	$10.

Groceries of all kinds are obtained, at retail prices, but little in advance of those at New Orleans.

Sawed lumber, in boards, planks, and scantling, of the following varieties, viz:

Oak, elm, gum, cotton wood, beech, chestnut, poplar, black walnut, yellow pine, cypress, &c., per thousand, board measure	$10.
White ash, cherry, and cedar, per thousand, board measure	$12 50.
White pine, from the Allegany river, per thousand, board measure	$12 to $30.
Cypress shingles, per thousand	$2 to $2 50.
Building stone, consisting of sandstone, per perch	$1.
Building stone, consisting of limestone, per perch	$1 50.
Bricks, per thousand, from the kiln	$4 50.
Bricks, per thousand, laid, including all expenses	$9.
Lime, per barrel, unslaked	50 to 75 cts.
Lime, per bushel	17 to 25 cts.

Hydraulic lime may be procured at various points on and near the Ohio river, above Paducah, at a cost probably not exceeding 25 cents per bushel.

Sandstone suitable for building purposes is found in abundance in the bluffs of the Tennessee, about six miles above Paducah.

Limestone may be obtained from the river hills, on the south side of the Ohio, at the distance of 10 miles above Paducah, and at sundry other localities in that neighborhood.

Bituminous coal may be obtained from the numerous coal mines on the Ohio, heretofore noticed, at a cost of 8 to 10 cents per bushel.

Iron ore, resembling that found on the Cumberland, in all its characters, abounds on both sides of the Tennessee river, from near its mouth to the Muscle shoals, 300 miles above, and probably to a much greater extent.

Iron from this region can be furnished on terms quite as favorable as that on Cumberland river.

The position deemed most suitable for the armory in this vicinity is a portion of the extensive plain already described, situated immediately above the mouth of Island creek, and extending from this point upward about a mile to the mouth proper of Tennessee river. Bold and commodious landings are presented along the whole of this shore, from Paducah upward to the mouth of the Tennessee, through a distance of two or three miles.

Throughout this distance the plain presents itself immediately at the margin of the river, where it rises six or eight feet above the reach of the highest freshet, and is bounded by bluff banks more than 50 feet above extreme low water.

A tract of land of 4,160 acres, with a mile or more front on the river, and embracing the site above proposed, is the property of G. Woolfolk, Esq., of Paducah, who offers to sell the whole, as a site for the armory, at $3 per acre, or 1,000 acres of the same nearest to the margin of the river at $10 per acre.

The best locality for the workshops, dwelling-houses, &c., seems to be on the bank of the river, in the centre of Woolfolk's tract, immediately opposite to the pass between the island and the point above the confluence of the Tennessee with the Ohio river, and one mile and a half distant from Paducah.

It is a bluff bank, with a deep landing in front, and the position opens beautifully both upon the Ohio and Tennessee rivers.

The elevation of the ground, as was said before, is 7 or 8 feet above the highest freshets; and its surface, although remarkably level, is, nevertheless, susceptible of easy and effectual drainage in every direction. Steam, generated by the use of bituminous coal or other fuel, is the only agent that can be employed at this locality for propelling the machinery of an armory.

From the topography of the country around, this position may be regarded as comparatively healthy. The only bottom land in the immediate vicinity is the Illinois bank of the Ohio, the island betwen the two shores, and the point at or near the confluence of the Tennessee with the Ohio river.

As these several pieces of low land, which are subject to inundation, and from which noxious vapors or miasmata may occasionally arise, lie however, to the northeast, north, and northwest or leeward side, while the country to the southeast, south, and southwest (the course of the prevailing winds during the summer or sickly season of the year) is for miles back and round dry, and with but an indifferent soil, the conclusion must be that the proposed site for the armory will be as free from disease as any other point on the lower Ohio.

See documents Nos. 36 and 37.

As it was impracticable to ascertain accurately the water power on any of the rivers during the spring freshet, particularly on the streams of doubtful water power, and the presence of one of its members (Lieutenant Colonel Long) being required before a court of justice in the State of Georgia, the president of the board, with the approbation of the Secretary of War, adjourned the board, to meet again at Paducah on the 1st of May proximo.

TH. LAWSON, *Surgeon General.*

INDEX

TO THE PRINCIPAL POSITIONS EXAMINED.

B.

Report of Surgeon General Thomas Lawson, one of the commissioners appointed "to select a suitable site for a national armory on the Western waters."

The board, as will be seen from the report of their proceedings already given, have examined, with the exception of two or three places that were manifestly too much out of position, every site recommended to them by Legislatures of States, the authorities of cities, organized companies, and by distinguished individuals. They have consequently extended their reconnoissance to sections of country, and examined places, where they could not reasonably expect to find the necessary advantages for an armory.

The words of the act of Congress appropriating money to defray the expenses of the reconnoissance, however, seemed to recognise the whole country washed by the Western waters as within the legitimate range of the examination, and the instructions from the Department of War, under which the board immediately acted, confined their operations to no other geographical limits than those indicated by the act of Congress. Again, the citizens of many sections of country and of particular places, although they did not expect to present advantages sufficient to induce the location of the armory among them, still, as their district offered great advantages for manufacturing purposes, or possessed mineral and other resources, they believed themselves entitled to respectful consideration from the Government, and accordingly claimed that the resources of the country be officially inquired into and reported upon, and by authority published. While, then, the board, having in view alone the public good, set out with a determination to locate the amory at that point which should seem to them to present the greatest amount of advantages, present and prospective, they nevertheless in cheerful acquiescence with the public wish and public expectation, gave their attention to remote positions, and reported, for general information, the resources of each section of country submitted to their examination.

Before recapitulating the remarks upon the various places examined or entering upon the discussion of the relative advantages of the several most prominent positions for the armory, it may not be amiss to set forth the general principles by which I have been governed in arriving at the conclusions about to be expressed.

It is assumed that the armory should be located, if possible, on the highway through the Western country—that is, on the banks of the Ohio or Mississippi rivers; and that, all other things being equal, the site should be as near the geographical centre (having in view also the future as well as the present centre of population) of the Western country as practicable. These positions being admitted, I go further, and say that the geographical centre of the Western country lies between the mouth of Cumberland river on the Ohio, and the mouth of Missouri river on the Mississippi; and that ere very long the centre of population will be found to be within the same line of country. Should, then, a position be found in that section of country possessing all the advantages required, or sufficient requisites for an armory, (whether the motive power to be employed be steam or water power,) that point, it is contended, should be the location of the Western armory. With these preliminary observations, I shall proceed to recount the

most important facts, and give an expression of opinion, touching the relative advantages of the various positions that have come under the examination of the board.

The Des Moines rapids of the Mississippi, the first point embraced in our report, will afford all the water power required, and the water can be concentrated and controlled at an expense (the improvement to navigation on the falls by the artificial works being also taken into consideration) comparatively reasonable; but the immediate site for the armory, or the point at which the water power would have to be displayed, is about the centre of the falls, and with, of course, bad landings. Besides, these rapids are two hundred miles out of position, having the navigation below suspended two or three months every year by ice, with interrupted navigation every season by low water.

The site at the Rock Island rapids of the Mississippi, the next in order on our report, is a beautiful place, in the centre of a very fertile country; and the rapids can, by artificial means, be made to afford the requisite amount of water power for an armory. The erection of a sea or river wall, high dam, &c., to create the power, or to raise the fall of water above the maximum rise in the river at this point, however, will be attended with a vast outlay in the first instance, with the prospect of subsequent expenditures to sustain the works against the pressure of water, floating ice, and timber from above.

The lower rapids of Rock river, which are three miles distant from its mouth, and this last a few miles below Rock island, can be made to furnish all necessary water power; but, with some other minor disadvantages, a location there is objectionable on the score of health. The place, from the nature of the country around, cannot be otherwise than unhealthy.

These two last positions are still further removed from the centre of the West, being 150 miles above the Des Moines rapids, or 350 from St. Louis, and with a longer suspension of navigation annually by ice and by low water. An armory located at either of those places, too, might not be, with the present sparse population intervening, altogether secure from an assault from the Indian tribes, if stimulated to action and led on by foreign emissaries.

The objections, on the score of difficult navigation, to the position near the mouth of the river, is still more applicable to the site at the upper rapids of Rock river; and, as the place is in other respects of little importance, I shall not give it further attention.

Of the several sites examined on the Illinois river, that at Ottawa, near the mouth of Fox river, and another at Marseilles, eleven miles above, are the only two that deserve to be mentioned in this place. At both of those points, water power sufficient for all the purposes of an armory can be obtained. The last of these positions, however, is decidedly to be preferred, and for the reason that the power is taken from the river itself, with the entire control of both shores to any desirable extent, while the power at Ottawa is to be derived from a canal, with all the inconvenience of an entangling alliance with a State institution or a canal company, including, probably, nay certain, suspension of the work by the breaking of dams, the annual drawing off of water to clear out the canal, &c.

The same objections, on account of interrupted navigation and suspended navigation, by low water in the summer, and by ice in the winter season, may be advanced, and, it is believed, with stronger reasons against these

two positions than against those on the upper Mississipi. Again, these points are within eighty-five miles of Lake Michigan, with a plain country, very sparsely populated between; the amount of population immediately around, and on the shores of the Illinois below, being also very inconsiderable. A large manufactory and store-house of arms thus exposed might, in the event of hostilities, invite an attack from Canada; and it might not be altogether secure from destruction by a combined force of British and Indians, organized in advance, and immediately put forth on the declaration of war. It would, at any rate, be considered by ourselves a probable point of attack; and military propriety would require that we should keep a large military force in position, to defend the armory and prevent this section of country from becoming the theatre of war.

The next place examined was Alton, Illinois. This position has the advantage of good navigation, good landings, and an abundant country around, with coal mines in the vicinity to create steam as a motive power for the machinery of an armory; but the immediate sites proprosed are too much broken by gullies and ravines, are somewhat removed from the bank of the river, and are more difficult of access than is desirable.

Bellville, Illinois. This place can boast of coal mines in its immediate vicinity, with a good country around. It is too distant from the Mississippi, however; with the American bottom interposing, so as to render the route to the river, after a heavy rain, or during the spring freshets, almost impracticable.

The site near St. Louis, Missouri, is a beautiful point of land, having the rocky bound river Des Perres on the right, the low plain of Carondelet on its left, a bold rocky front on the Mississippi, presenting good landings and good natural wharves throughout its extent, and with the ground rising gradually from the river to a high plain to the rear. This place is near the geographical centre of the Western country, and has the advantage of broad-water navigation throughout the year, with the exception, perhaps, of two or three days' interruption by floating ice from the rivers above. Stone for the purposes of building, &c., of excellent quality and to any amount, can be got on the spot; and stone coal, to any necessary extent of supply, may be obtained in the immediate vicinity of the place on the same shore. An extensive mine of rich coal has lately been found on the Missouri river or one of its tributaries, and the exhaustless coal mines of Illinois are also immediately at command. In addition to these advantages, the position under consideration is in the vicinity of a fertile region of country, with an excellent market at hand for every thing foreign and domestic to sustain an armory.

The water power on the Maramec river cannot be made available except at an enormous expense; nor can any point on the Mississippi, or near it, suitable for the display of the power be found, with other advantages requisite for an armory.

St. Genevieve and St. Mary's landing, though near that great source of wealth, the lower lead mines of Missouri and the Iron mountain, and not very distant from stone coal, possess fewer local advantages than the position near St. Louis, and of course cannot be placed in competition with it as the location for the armory.

There is no point on either side of the Mississippi, near the Grand Tower, affording a sufficient extent of ground, or possessing other essential requisites for an armory.

Cape Girardeau presents no spot in its vicinity more desirable than those on the same shore already described. Besides, it is too near the interminable swamps of the St. Francis river, which not only interfere with the facilities of communication, and retard the progress of improvement through the country, but must occasionally send forth noxious vapors for miles around.

Memphis, the lowest point on the Mississippi that was examined by the board, is represented as possessing advantages for an armory, whether steam or water power is to be employed in driving the machinery; and its claims to the location of the armory are strongly urged by the Legislature of Tennessee, the authorities of the place, and by several individuals of distinction. It is on the central line of communication, (a great portion of the way by railroad,) between the city of Washington and the southern and southwestern frontier, and it might be made the most expeditious as well as the most certain mail route, in the winter season, to the Western and Northwestern frontier of our country.

Memphis is the grand mart, or place of export, for a very extensive region of fertile country to the rear and on either side, with no inconsiderable degree of support from the Arkansas Territory on the opposite shore. It possesses the great advantage of permanent navigation, and for boats of the very largest class. The power, however, for driving the machinery of an armory, whether it be steam or water power, will have to be obtained at a very heavy expense, attended, perhaps, with occasional interruptions in the supply of water, or of the material for creating the steam power. It is very questionable whether water power created by high dams, and running through a canal or race 25 miles in length to the point of display, as in the present instance, will remain permanent, or be exempt from frequent interruptions. The cost of this power, too, it is to be feared, will not be the original outlay for the erection of the works *only;* but the expense, annually, for repairs of the canal, dams, &c., will be considerable, accompanied with other losses incident to a suspension of business at the armory. Also, as the nearest points at which stone coal can be got are, first, the mines on Big Muddy river, which empties into the Mississippi 105 miles above the mouth of the Ohio, and, secondly, the mines at and near the mouth of Tradewater river, 105 miles up the Ohio, (both about 335 miles distant from Memphis,) the supplies of this article must be attended with considerable expense, compared with the price of it at other places, and not altogether without hazard of interruption or failure in the supply. The difficulty and the expense, then, of obtaining both water and steam power at Memphis, compared with the facilities of commanding the one or the other power at some other points, constrain me (notwithstanding its advantages for other purposes) to withhold my recommendation in favor of this place as the site for the Western armory.

Fulton, the place examined next above Memphis, boasts of no water privileges; and as it is nearly as distant from the sources of steam power as Memphis, without some of the advantages of the latter place, it may be set down also as not the site for the Western armory.

Cairo, on the Illinois shore of the Ohio and near the confluence of that river with the Mississippi, although situated in the very centre of the Western waters and the Western world, and, consequently, possessing all the advantages of free navigation throughout the year, is manifestly an unsuitable place for an armory. The point, or a portion of it, is under

water almost every year; and it is always in danger of irruptions from the Ohio or the Mississippi river. The country for many miles around being bottom lands, marshes, &c., the position must necessarily be sickly.

America and Caledonia, of Illinois, the two places on the first high land from the mouth of the Ohio, embraced in our report, are both objectionable; the first for the reason that it is, for all business purposes, shut out from the river a great portion of the year by an extensive sand bar; and the second because it is deficient in landing places, and, withal, the bluff is constantly subject to the encroachments of the river. Again, there is not a sufficient extent of plain land, exclusive of town lots, for the purposes of an armory.

Metropolis, Illinois, the next place above that was examined, is situated on a handsome bluff, with good landing places, &c.; but the best portion of the ground is occupied by fifty or sixty houses, and the remainder divided and perhaps sold out in lots. This position, at any rate, is not so desirable for the purposes of an armory as the site of Massac, a mile and a half above.

Massac is a beautiful place, situated on a high bluff about thirty-eight miles above the mouth of the Ohio and ten miles below Paducah, at the mouth of the Tennessee river. This bluff, including the site of the nominal town of Massac, presents a beautiful front, about a mile in extent on the river, with several good landings, and a sound shore. From the river there is an uninterrupted plain, running a mile and more back, presenting a beautiful piece of ground upon which to display the dwelling-houses, workshops, &c., with land enough for gardens, pasture grounds, &c., required for a permanent establishment. The iron required for the manufacture of arms can be obtained with great facility and at the lowest possible rate, from the iron works on the upper Ohio, the Cumberland, and the Tennessee rivers. The coal necessary to create steam for driving machinery at this place can be procured from the mines of Tradewater river, or the bluff of the Ohio a few miles above, and on the Saline river opposite, on the Illinois shore—all about seventy miles above Massac; also, from the mines at the mouth of Green river, those near the town of Owensburg, and from the mines of the Hawesville Company, higher up the river. The whole plain, called Massac, is a very eligible position for an armory; and, as there is but one dwelling-house on the town plat, it is to be presumed that the whole ground can be purchased at something like the common price of land. Exclusive of the town site, there would not be front enough on the river; besides, the best landings are within the limits of the town, and without the control of the whole ground, the place is not desirable.

The position examined near Paducah, Kentucky, is, as has been before stated, a beautiful plain at the immediate confluence of the Tennessee with the Ohio river, opening upon both rivers through a wide gap between the point of confluence and a long narrow island below. The ground is above all freshets, and has bold water and good landings along the whole shore; the point of land, too, between the two rivers and the island below, constituting, together, barriers to the force of certain winds, and thereby forming a very safe harbor here for steamers, barges, and flat boats, or permanent fixtures at the wharves. This place is in a district of country affording subsistence stores and other essential articles in abundance, and at the lowest market prices. It is in position, also, to receive coal, iron, and other materials required for an armory, from the Ohio, the Cumberland, the

Tennessee, and other rivers, above; and from the Mississippi, below—all at the cheapest possible rate. This site may be considered the more desirable, inasmuch as it has attached to it a continuous body of good land, two or three thousand acres in extent, the whole at the command of the Government and at a price per thousand acres not exceeding the charge for the one hundred acres at most other places.

Brownsport and Carrollville, the two lowest positions on the Tennessee river that were examined, present no advantages other than that of being in the vicinity of iron ore. The country around is sparsely populated—indeed, seems to be almost in a state of nature; besides, there is not a plain on the river near this place, above the annual freshets, extensive enough for the location of the workshops and storehouses. There is certainly no plain always above high water upon which to display both the workshops and dwelling houses required for an armory.

The positions near Florence, Alabama, that were examined by the board are, first, the shores of Cypress creek, which empties into Tennessee river, a mile or two below the town; secondly, the shores of Shoal creek, opening into the Muscle shoals of the Tennessee, thirteen miles above the town. Cypress creek will afford all the water required, and at a reasonable cost. It presents a fine fall of water a few miles from its mouth, with a beautiful inclined plane in position and above all freshets, upon which to display all the buildings, &c., appertaining to an armory. The surrounding country, too, is well populated, and will furnish the necessary subsistence in great abundance, and at a cheap rate. The only objection to this place is that it is two hundred and seventy-five miles up the Tennessee river, and with Colbert's shoals intervening to obstruct, and even to suspend navigation every year.

Shoal creek also presents water power in abundance; but it is less easily to be concentrated and controlled, and withal has a portion of the Muscle shoals, as well as Colbert's shoals of Tennessee, intervening between it and permanent navigation.

The Grand Suck of Tennessee river is still further out of position, and presents fewer advantages, in other respects, than the places below near Florence.

The banks of the Holston, at the head of Tennessee river, being manifestly too far out of the way, were not examined by the board.

The point of land at the confluence of the Ohio and Cumberland rivers presents in the centre ground a very handsome plain extending near to the shore of the Cumberland; but on the Ohio river side the bottom is very wide, and between it and the high plain there is a swampy flat—both subject to overflows during freshets, the latter even in ordinary rises of the river. The great proportion of bottom land on this tract is objectionable, not only on the score of health, but it would also leave the place without landings on the Ohio in high water, and interfere with the communication with the river during the low stage of the river. Again, the position is encumbered with town lots on the extreme point of the land, a State road running through the tract, and with a reservation of ground with ferry privileges on the Tennessee river side.

At the narrows of Harpeth river, permanent water power to any desirable extent, with the necessary land, including a good site for the location of the buildings attached thereto, can be got—the whole at an expense of from $80,000 to $90,000. Harpeth river, below the narrows to its

mouth on Cumberland, a distance of twenty-two and a half miles, is navigable but two or three months in the year for barges even; and the road from the narrows to Nashville, twenty-two miles in extent, and the route, to the nearest point on the Cumberland, nine miles distant, are over a country full of hills, ridges, gullies, and valleys. The difficulty of communicating with the Cumberland river, and the fact that the navigation of the last river is obstructed several months in almost every year, constitute an objection to this place as the site for an armory.

There is no natural water power at the point recommended to the board near Nashville, and any power that could be created by artificial means would be neutralized every year by the spring freshets and other great rises in the river. To erect a dam across the Cumberland river, high enough to raise the water and keep it permanently above the freshets or swells of the river below, would be attended with incalculable expense, and of course would be, comparatively speaking, impracticable. A dam to this extent might have the effect to deluge the land above, and it certainly would be in danger of a breach every year. There is a great difference between a dam of ordinary height, to concentrate and control water power, and placing a high barrier across a river by which to make water power. As, then, permanent water power cannot be obtained at Nashville, and there are no coal mines in the vicinity to furnish the material for steam power to drive the machinery, that place cannot be considered as a proper location for an armory.

The falls of the Caney fork of the Cumberland river present two magnificent cascades, little inferior in appearance to the falls of Niagara; and the water power is immense. The bluffs of the river here, however, are so high and precipitous that it would be difficult to erect the necessary buildings and machinery at the point where the power is to be displayed. The principal objection to this place, however, is its being on an unnavigable river, emptying into another of difficult navigation during a part of every year.

The site of the old Stone fort, in Tennessee, at the point between the two principal tributaries to Duck river, is a beautiful place, with water power in abundance at hand. The objection to this place, and it is an insuperable one, is its remoteness from navigation; Nashville on the one side, sixty-five miles distant, and Triana, on the Tennessee, seventy-five miles removed, being the nearest points at which steamboat navigation could be reached. Duck river is at no time navigable for steamboats, and but a short time in the year to be navigated up to this point even by barges.

The falls of the Cumberland river being five or six hundred miles above Nashville, in a mountainous and almost impracticable country, and withal beyond the reach of navigation, was not examined by the board.

The country around Caseyville, on the Kentucky shore of the Ohio, was looked at by the board; but no eligible site near the river presented itself. The best ground is covered by the town of Caseyville, and a portion of that is every year inundated. This place, however, is in the centre of a coal region; and from the mines of the Tradewater and Saline rivers, in its vicinity, and from the banks of the Ohio, just above, can the coal be furnished with great facility and at little cost to any point on the Ohio below.

There is no permanent water power at the rapids of the Wabash, near Mount Carmel; and there is very little power during any part of the year, the fall being but ten or twelve feet in a distance of six miles. Nor can

any power be created here by artificial means that would not every year be neutralized by the swells in the river. Again, there is no site at the falls, or for some distance below, suitable for the location of the buildings; and at any point favorable for the display of the water power the land, it is believed, would be inundated every year. Moreover, the navigation from the falls to the mouth of this river, through a distance of ninety miles and more, is suspended a month or two every year by ice, and three or four months by low water.

The position near Evansville, Illinois, recommended to the board, is a handsome bluff, a mile or two below the town. The necessary amount of land, with a good plain upon which to display the buildings, can be obtained at a reasonable price. The landing at this bluff is pretty good, and a great portion of the shore free from the encroachments of the current. Coal, for the purpose of creating steam as a motive power, can be got very conveniently from the mouth of Green river, the mines near Owensburg, and those at Hawesville, on the opposite shore. The navigation here is occasionally interrupted by ice, and there are three very bad bars between this place and the mouth of Tennessee river; these two circumstances rendering this last less desirable than the positions near Paducah and Massac, below.

The slackwater navigation on the Green river will be of incalculable benefit to an extensive region of country bordering on that river and its tributaries, and may eventually be a source of revenue to the State of Kentucky. If the dams and locks are kept in order there will be water enough throughout the year for steamboat navigation up to Bowling Green, a distance of 175 miles from the Ohio river. Considerable water power may be obtained at the several dams for mills and ordinary manufacturing purposes for the greater portion of the year, but permanent water power cannot be secured at either of these points. The power will be multiplied by the spring freshets of every year, and occasionally the water will sweep over dams, locks, land, and all. The fact that the water power will be neutralized every year by the swells in the river, and the buildings be in danger of being swept away by the flood, is decisive against the location of the armory at either of the locks and dams on Green river.

The place recommended to the board five miles below New Albany, Indiana, is by no means a desirable site; there is not front enough on the river, and the ground in other respects is objectionable. This position has in its immediate vicinity very fine building stone; timber of every kind is also convenient; and the country adjacent is very productive, affording all articles of subsistence at reasonable rates. The power contemplated to be employed here is steam power; but, as the site is 100 miles and more above the coal mines of Hawesville and other places lower down the river, and very far removed from the coal region of the upper Ohio, the fuel cannot be got so readily or so cheaply perhaps as at the points below.

The Ohio river at the falls near Louisville will afford a column of water for manufacturing purposes on both sides of the river, but it is questionable whether permanent water power can be obtained on either side of the rapids. The fall of water through the whole extent of the rapids does not exceed twenty-four feet, while the freshets in the river rise to sixty or sixty-two feet below the falls, or within two feet of the swell above the rapids and the pitch of the water together; it would seem to be difficult therefore to raise the water by artificial means sufficiently high to surmount the

swell of the river below the falls. The site on the Kentucky shore recommended by the authorities of Louisville is the plain immediately opposite and below the lower end of the canal. It is proposed to pierce the canal just above the dry dock and first lock, and by a race to conduct the water around and display it into the river just below the outlet of the canal. Should there not already be water enough in the canal for the purposes of an armory, as well as for navigation, it can be, by artificial means, easily introduced; and with the view of increasing the column of water, and of course raising the level in the canal as high as possible, it is proposed to run a wall from the mouth of the canal obliquely across the shoal at the head of the falls and of the canal, and thus draw into the Kentucky shore a much larger column of water. With all the means of art, however, it is doubtful whether a sufficient head of water can be secured to operate a reaction wheel *even* throughout the year. The plain which is offered to the Government is a beautiful site, but it is on the highway between Louisville and the towns of Portland and Shippingsport, and there must necessarily be a thoroughfare through the premises. This is a decided objection to the place. The inconvenience of having an armory within the limits of a town has been already experienced, and prudence would dictate the propriety of locating a new establishment of the kind upon ground completely under the control of the Government. Again, this position is at the immediate point of arrival and departure of a great number of steamboats; it is also the place at which a number of the boats are moored during the low stage of water, or suspension of navigation by ice—both circumstances concurring to render the site less desirable. The wharves and other fixtures in front of the armory would interfere with the passing of the boats into and out of the canal, the accommodations for the boats, whether temporarily moored or laid up for the season, would unavoidably be abridged; and the operations of the armory would on the other hand, be frequently interrupted or incommoded by the shipping. The indiscriminate intermingling of the operatives in the armory with the boatmen, too, would be attended with inconvenience to all parties; and disorder and collision might ensue to the injury of private as well as the public interest.

The water power on the Indiana side of the falls cannot be displayed to advantage immediately below the rapids, or between that point and New Albany, for the reason that there is no good landing place within the distance; and, besides, there is a bar or very shoal place above the town. The water here, to be rendered available, would have to be taken from the head of the rapids and conducted by a canal to the rear and around Albany, and displayed into the river somewhere below the town. As the canal, however, (the country through which it would have to pass being rocky and very broken, with a stream or two and bottoms intervening,) would be incalculably expensive, I am free to say that the proposition should not be for a moment entertained.

Madison, Indiana, itself, nor its immediate environs present a plain on the river sufficiently extensive for the location of an armory; but there is a very handsome bluff two or three miles below the tower upon which the buildings could be displayed to great advantage. This place is in the vicinity of very good building stone; and timber for building and for all other purposes can be brought very conveniently from the interior of the country upon a railroad already in operation. The country is very abund-

ant, and provisions of every kind very cheap; and the place may have daily intercourse with the great commercial cities of Cincinnati and Louisville. But there is no water power here, nor coal convenient with which to generate steam as a motive power for the machinery of an armory.

At the lock and dam on the Kentucky river, just below the town of Frankfort, a great deal of water power for manufacturing purposes can be obtained on either side of the stream. On both banks of the river immediately below the dam, there are eligible situations for the erection of manufactories, store houses, and other buildings. The plain on the left shore, however, would be preferred for an armory, for the reason that, while it is entirely above the floods of the river, it is not so high or precipitous as to render the communication with the river difficult or laborious; besides, the canal or race can be cut at much less expense on this than on the other side of the river. On the right bank, a high and precipitous rocky bluff comes in upon the river, so that a deep cut for the race would have to be made through solid rock for some distance to the point of operation, or display of the water power. This place is in the centre of a very beautiful and fertile region, and, with the slack-water navigation above, may anticipate, ere long, great resources from a long line of country not yet explored. The lock and dam at Frankfort will afford water power a great part of the year, perhaps a very great portion of the year; but the power at one period or other of the year will be neutralized, and the very fact that the operations of an armory may be suspended for 24 hours, *even* in opposition to our will, militates against the place at which such a result is to be apprehended.

Licking river, Kentucky, affords no water power just now. The two locks and dams near the mouth of the river, the only improvements commenced I believe, are incomplete; and it is very questionable whether they will ever be finished. But were they to be completed, and the other improvements carried out as originally contemplated, there is not the least probability that water power to the extent required for an armory could be obtained at either lock and dam of the river.

At Cincinnati there is an immense amount of water power derived from the Miami canal. Nearly all the power, however, is already taken up for the use of factories, mills, &c.; and there is not a spot of ground, in the city or its immediate vicinity, at which the armory could be located. The place recommended by the authorities of the city is on the track of the Whitewater canal at the North bend of the Ohio, 15 miles below; the water to be employed at the point where the canal, coming in upon the Ohio, turns and runs parallel with it towards Cincinnati. The immediate site proposed for the armory is a part of the tract of land now occupied by the venerable relict of the late President of the United States. The ground consists of an inclined plane, or rather two planes—the one always above the freshets in the Ohio, the other being high bottom land occasionally overflowed. This place is in the centre of the finest portion of the Western country, and near one of the best markets in the United States. Here machinists of every kind, and laborers can be got at any moment; and, as all articles of subsistence are very cheap, the price of labor will no doubt always be reasonable. The Whitewater canal, however, from which the power for driving the machinery of the armory is to be derived, is incomplete; and it is more than doubtful whether, when completed, it will furnish, uninterruptedly, a sufficient quantity of water to supply an

armory, in addition to that required for the purposes of navigation. Again, the idea of a permanent national establishment being dependent on a navigation canal for the power with which to carry on its operations is so much at variance with the dictates of common prudence and the lights of experience, that I am at a loss to conceive how such a project could ever have been entertained. The water may become deficient by the failure of the feeder, by the evaporation and unavoidable leakage of a long line of canal, and by breaches in the canal or destruction of the locks; and once a year, too, the water must be drawn off to clean out the canal. One or the other of these circumstances would occur in every year to interrupt the regular operations of an armory; and should a breach be made in the canal, or other serious injury be sustained, the Government, being more immediately interested, (for the operations of the armory could not be suspended for a day without detriment to the public service,) would have to advance money to repair the damages, if it did not have to assume altogether the expense of the work. In addition to these unavoidable accidents, other difficulties may very readily be conceived. It would not do for the Government to be dependent on the whim and caprice of a company for water-power, or to be subjected to the consequences of mismanagement or negligence on the part of any other agents than those under its own control.

Hamilton, a town in the State of Ohio, situated 23 miles north of Cincinnati, immediately on the Big Miami river, and with the Miami canal running in its rear, is very strenuously recommended as the site for the Western armory.

An association of very respectable and enterprising gentlemen, called the Hamilton and Rossville Hydraulic Company, have, at great labor and expense, excavated grounds, erected dams, and made other improvements, so as to bring the water of the Miami into the old bed of the river, and there secure it for hydraulic purposes. The basin or pool thus created, will cover, I believe, 75 acres of ground, and will in many places have 15 or 20 feet of water always present. As the water to supply this basin comes from a long length of river below the level which feeds the navigation canal, there is but little doubt that the pool will always contain water enough to give out an immeasurable quantity of water power for manufacturing purposes. The works connected with this water power can be made, at little expense, to communicate with the Miami navigation canal, either at the basin of it within the town of Hamilton, or on the main line tending towards Cincinnati.

The company offer to the Government the choice of points at which to use their water, and pledge themselves to secure as much land in position as is required—the whole at a reasonable price. The Government having the choice of position and first claim to the water from this immense pool, there can be (barring accidents) no want of water; and if the surface level of the basin is as high above the freshets of the river as is reported by the engineers of the work, there will always be head of water sufficient to drive the machinery of an armory. But, after all, this is not a place for a permanent national establishment. It is a common reservoir, from which every body can take water who wishes it and can pay for it; whereas the Government requires all the water privileges, and wants, for manifest reasons, entire control of the ground in the vicinity of its works. There is seldom a concert of action between the Government and individuals in any joint stock concern. There cannot be, as a general rule, any actual participation in risks and in misfortunes, or an entire union of interests between the Gov-

ernment and an incorporated company, or with individuals. This would be an entangling alliance with another independent power, and, in the event of misfortune, the Government might have (sooner or later) to rue the connexion.

Carrollton, a town situated in a bend of the Great Miami, with the Miami canal passing through it, and the river sweeping around it, presents water power both at the locks of the canal in front of the town, and from the river itself in the rear; this last power, to be taken from the head of a fall, increased by a dam across the river above, and conducted by a large race, already cut through the point of land, and employed on the bank of the river just below the town, and where the river and canal approximate each other. The land in the bend, between the canal and the river, both table and bottom land, amounts to several hundred acres, with a broad and handsome front on the canal. Besides the dwelling-house and other buildings of the principal proprietors of the land and water privileges, (the Messrs. Pease,) there are several other tenements of inconsiderable value to be purchased in order to secure the control of the whole of the ground between the canal and the river. As the Messrs. Pease offer the land and the water privileges from the river, together with their improvements at a reasonable price, there is not a doubt but that the two or three other improvements could be, through their agency, purchased also on reasonable terms. With the water privileges in front from the canal, backed by water power from the river itself behind, an armory located here could not, without some catastrophe, have its operations entirely suspended for the want of water. There is a manufacturing establishment, a mill and a distillery here, the operatives in which, it is represented, are healthy; but it is very questionable whether a location in the bend of a river, with a navigation canal immediately in front, a hydraulic canal or large race running through the ground, and the river around skirted by low bottom land subject to overflows, can be considered favorable to health. This place has a ready communication, by a turnpike road and by the canal, with Cincinnati; still it is fifty-three miles from the Ohio river, and therefore out of position.

Dayton, situated at the junction of the Great Miami, Stillwater, and Mad rivers, is a beautiful town. Being in the centre of the Miami valley, one of the richest portions of the State of Ohio, and with great manufacturing as well as agricultural capabilities and advantages, it is increasing daily in wealth and refinement, and in population. At this place there is an immense amount of water power, but the best power and the most desirable positions are already occupied by manufacturing establishments, mills, &c. The power proposed to be given for the purposes of an armory is to be taken from Mad river, which has already (besides furnishing water to the canal for the purposes of navigation) to supply water to twenty-five or more factories, mills, &c. Many of those establishments, to be sure, employ the same water, but others have to throw off their water, not to be used again. I am not sufficiently conversant with matters of this kind, and we were not furnished with sufficient data upon which to form a correct judgment on the subject; but admitting that the little Mad river could supply all the additional water power that is expected, the cost of a dam to swell the stream, a long canal partly raised to keep up the proper level to the "table of land east of the city," and the waste race to conduct the water from the point of display on the centre of the plain to the river, would be too great to justify the location of an armory

at this point. In addition to these objections, Dayton is sixty-three miles from the Ohio river, and of course too distant from the highway through the Western country.

At Bradford's landing, or ship yard, just below the old mouth of Scioto river, there is no water power; and as the plain adjacent to it (or a portion of the ground) is occasionally inundated, it is not a suitable site for an armory, with steam as a motive power for the machinery.

On the Ohio canal, a few miles above its mouth, and three miles by land from Portsmouth, there is water power; but it is believed not to be well adapted to or sufficient for the purposes of an armory. There is no ground, either, immediately adjacent to the power suitable for the location of the buildings; and the place, judging from the immense body of marsh and bottom land subject to frequent overflows lying between it and the Scioto river, cannot be otherwise than sickly. Some of the gentlemen of Portsmouth suggested that the water might be conducted from this level by a hydraulic canal, and displayed at a point on the Ohio a mile or two above Portsmouth. This work, however, would be very expensive; and when completed might not, and most probably would not, furnish throughout the year the necessary supply of water for an armory.

Muskingum river, at Zanesville, Ohio, presents a considerable amount of water power, and might give out more; but all the power just now available has already been taken up, and there is no ground within the city or in its immediate vicinage that could be appropriated to the use of an armory. The water power and the ground which were examined and reported upon by a former board of commissioners are no longer at the command of the Government; the power has been appropriated to the use of factories, mills, &c., and the ground is occupied by a flourishing village.

At Pierce's mill, or the lock and draw, eleven miles above the town, there is also water power. The dam here, however, owing to the want of a good rocky foundation, is always liable to be carried away; besides, there is no ground at hand very eligible for the location of the buildings of an armory.

At Duncan's falls again, near Taylorsville, ten miles below Zanesville, there is a beautiful cascade and a very fine water power. The river here presents a wide and bold stream, and has a fine rocky bed upon which to rear a permanent dam to any reasonable height. Water power sufficient for an armory can be got on either side of the river; the power on the left shore free from all encumbrances, the water privileges on the other side being somewhat incommoded by the short navigation canal leading from the head to the foot of these rapids. As all the water on both sides of the river, however, (except the lockage water of the canal) can, with the ground immediately connected with it, be obtained at a very reasonable price, the control of the whole water power should be, for manifest reasons, secured to the Government. On the left bank of the river, in particular, the ground is admirably well adapted to the location of the buildings generally of an armory; and a tract of land five or six hundred acres in extent, always above the highest freshets, and embracing all the water privileges on that shore, with a very fine mill and other buildings immediately available, and that will always be of use to the establishment, is now at the command of the Government. This place presents as fair a prospect for health as most situations on water courses; and the surrounding country abounds in all the products of agriculture, &c. As relates to the water power, and the localities immediately around, I consider it one of the best sites for an armory (with water as a motive power) in the Western coun-

try. There are manifest objections to this place, however, as well as to all others where uninterrupted water is to be found. This position is sixty miles up a slack-water navigation river, with three or four locks and dams intervening between it and the Ohio river; the dams, for the want of a good rocky base, being subject to breaches, and the navigation liable to interruptions therefrom. This position is also very far east, and with too many obstructions to navigation westward of it on the Ohio, to admit of its being selected as the best site for the Western armory.

In the vicinity of Wheeling, Virginia, on both sides of the Ohio, there are several places suitable for the location of the buildings of an armory, with good landings in front, and with coal mines in the rear, or adjacent to the ground. Stone and other materials for building are also very convenient, and the surrounding country abounds in all the articles of subsistence, &c. There are objections to this place, however, and among them is the fact that it is within two hundred and twenty miles of the armory already established at Harper's Ferry. But the principal objection to locating the armory in the vicinity of Wheeling (and it is with me an insuperable one) is, that it is six or seven hundred miles removed from the centre of the Western country, and with navigation suspended during the winter by ice, and interrupted through the summer by low water in every year.

There is a large amount of water power on Big Beaver creek; but all the power, almost, is already taken up for several miles along the creek, and the ground occupied by 5 or 6 towns. About 6 or 7 miles above the mouth of the stream, however, there is still good water power available, viz: at Patterson's and at Adams's dams. Of these two places, the latter, being more free from the encumbrances of other establishments, and, of course, more under control, is to be preferred. At this point the water is abundant and the power permanent, and the ground adjacent always above high-water mark. The plain on which the workshops, &c., would have to be erected is not so extensive as might be desired; still it will suffice, and it is in other respects well adapted to the display of the buildings generally of an armory. There is fine building stone on the ground, with all other building materials very convenient; and every article of subsistence stores can be commanded at the lowest prices. As there is canal-boat navigation only between this point and the Ohio river, there would have to be a transhipment of every thing from this place destined to the lower country. This, with the circumstances already presented against positions far east, constitute a decided objection to the location of the armory on the banks of Big Beaver creek.

The board examined the banks of the Allegany and Monongahela rivers several miles above Pittsburg. On the Monongahela, between the first and second lock and dam on the river, we found two or three sites suitable for the location of all the buildings of an armory, viz: Braddock's fields 11 miles, and Scotch bottom six miles above, and on the same shore with the town; and McClure's place, six or seven miles distant; and on the opposite side of the river. At each of those places the landing is good, and the ground is above all freshets. Coal, of the finest quality for furnaces, and to any amount, is very convenient, and at a low price. Building stone and timber, of every kind, can also be got on very reasonable terms. Pittsburg is situated in one of the most fertile sections of the Western country, and the market here for all the substantials of life is little if at all inferior to any in the United States. At this place, also, the Juniata iron, and other iron of Pennsylvania, can be obtained to any amount required, and

at the very cheapest rate; and here, too, mechanics and machinists of every kind, and skilful in their art, can always be obtained, and on the most reasonable terms.

All these advantages, and other circumstances, perhaps, may be advanced in favor of Pittsburg; still, I cannot bring myself to believe that the armory should be located in that section of country. I am constrained therefore to say that Pittsburg is not the proper location for the Western armory, and for the reason that it is at the extreme eastern end of the Western country, and with many hundred miles of difficult navigation to the Southwestern, Western, and Northwestern frontiers of our country, the points at which our military operations for years to come are most likely to be carried on, and where, of course, the arms to be manufactured will be most required.

From the foreging statement of facts, (and it is but an abstract from the detailed report of the board,) it will be perceived that of all the points that have been examined by the board, but four present permanent natural water power, easily and cheaply to be commanded, viz: Cypress creek, near Florence, Alabama, the Narrows of Harpeth river, near Nashville, Tennessee, Duncan's falls, on Muskingum river, near Zanesville, Ohio, and Adams's dam, on Big Beaver creek, near the towns of Beaver, Brighton, &c., Pennsylvania. These, then, may be considered as the best positions where water power is to be employed, and those from which a selection will have to be made, if water power is adopted as the motive power of the armory.

Of the places examined with the view to the employment of steam power to drive the machinery, there are many that possess the necessary advantages for an armory, but of those there are three, (viz: the point of land on the Mississippi between the village of Carondelet and the river Des Perres, and near St. Louis, Missouri, the site of the town of Massac, on the Ohio river, ten miles below Paducah, and the position at the confluence of the Tennessee with the Ohio river near Paducah, Kentucky,) that are, for reasons already advanced, most to be preferred.

To the four places designated as the best for water power, there are undeniable objections. Neither of them is accessible at all seasons of the year by steamboats; and they are each within the waters and the limits of a single State, and would on that account, if none other, be objected to by the other Western States generally. Should it be determined, however, that water power is indispensable, or is to be preferred on the score of economy, and I am confined in my selection to one of these four places, I must give my opinion in favor of the site near Florence, Alabama, and for the following reasons.

As the Tennessee river runs for several hundred miles through a southern region, the water is always warm enough not only to remain fluid itself, but also to keep the Ohio open to the Mississippi, and of course there is no suspension of navigation by ice to the low country. Again: there is but one impediment to uninterrupted navigation by steamboats of a moderate size to this point, and that is at Colbert's shoals of Tennessee river, which obstruction can be overcome at the expense of fifteen or twenty thousand dollars, and should be removed if for no other purpose but for the benefit of navigation alone. The navigation to the other three positions, on the other hand, is suspended almost every year by ice, and interrupted by low water; and these obstacles cannot be removed or overcome.

To decide upon the relative capabilities and other advantages of the

three sites most preferred for steam-power operations is still more difficult. They are all near the centre of the Western country, and are on the highways of that country, with broad-water navigation throughout the year. The land at each point presents handsomely upon the river, with good landing places, and a firm shore ; and the medical topography of the country around is favorable to health.

Paducah and Massac, being below the mouths of the Cumberland and Tennessee rivers, can be supplied with iron from the numerous iron-works on those rivers, as well as from the upper Ohio, at a low cost for transportation ; and coal from the Tradewater and Saline rivers, and from the mines on the banks of the Ohio, just above, can be brought down in flats or barges, and of course at the lowest rate of transportation.

The site near St. Louis is not so convenient to the iron works on the Ohio, Cumberland, and Tennessee rivers; but it is near the Iron mountain, and other inexhaustible sources of iron in Missouri, with the wrought material of Massie's and Perry's works immediately at command ; and coal, the transportation of which is the heaviest item of expense, is much more convenient at this than at the other places with which it is compared. Independent of the coal fields immediately to the rear and around this position, there are the exhaustless coal mines of Illinois directly across the river in front. With the newly developed sources of coal on the Missouri and Osage rivers, added to the coal beds adjacent and on the opposite shore, the supply of this mineral will not only be uninterrupted, and to any amount required, but it must also be brought down to the very lowest price that the Government or other liberal purchaser could reasonably desire.

As these three places are all suitable sites for an armory, and possess nearly equal advantages, I feel some diffidence in giving a decision upon their relative claims to the favorable consideration of the Government ; more especially as my opinion will be adverse to the interests, and perhaps to the feelings of the people of the greater number of the Western States.

Having no predilections or private feelings of my own to gratify, however, I can with the less reluctance meet the question, and shall proceed to the discharge of my duty.

Under a full sense, then, of the obligations imposed upon me, and the responsibility I am about to incur, I cast my vote in favor of the site on the Mississippi, near St. Louis, and for the following reasons:

This position, while it possesses the same capabilities, &c., with Paducah and Massac, has the advantage of being situated in a section of country better known than that on the lower Ohio, and to which the current of emigration is now setting, and will continue to flow for years to come. It is moreover in the vicinity of a large and still growing city, with foundries, &c., already established to attract to it machinists and mechanics of every kind, and where skilful artists can always be obtained at a moment's warning. Again : this position has on one side an extensive arsenal, where the arms, as soon as fabricated can be deposited and secured; and on the other, a body of troops always ready to defend the public property against intrusion and violence from without, or to protect the public interest from the effects of any wild commotion among the operatives themselves within the armory.

Having designated, according to the best of my judgment, the place most suitable for an armory with water power to drive the machinery, and the point most to be preferred in the event of steam being adopted as the motive power of the machinery, the only question that remains to be de-

termined is, whether water power is indispensable, or so much less expensive as to claim a preference over steam power, even under the most favorable circumstances of position. Although every effort was made to gain all the lights upon the subject of which it was susceptible, no accurate information could be obtained touching the relative expense of the two powers.

As a general rule, lands with water privileges attached thereto are infinitely higher in price than ground *simply*, however desirable the position; and if to the cost of the land and water privileges you have to add the expense of a high dam, long canal or race, waste ways, &c., the original outlay, it is believed, will be much greater at places with water power to drive the machinery, than where steam is to be employed. And when we take into consideration, also, the constant expense of repairing breaches in the canal, broken dams and gates, wheels, and other machinery, together with the suspension of business by one or the other of these accidents, it may readily be conceived that the current expenses of the water works will equal those of steam power operations in the vicinity of coal mines. Admitting, however, that the land with the water privileges are to be purchased at a low price, and are so favorably situated as to require but little artificial work to concentrate and control the power and secure its permanency, it is still doubtful whether the water power out of position, as it must necessarily be, (for water power and a good navigable stream are as incompatible as any two things in nature,) will be less expensive than steam power exactly in position—that is situated in the centre of coal mines, and with access to and from the place every day in the year.

Without, then, pretending to know the relative expense of steam and water power operations, for I have had no experience myself in these matters, and I could find no person in the Western country or elsewhere who could, or at least would, enlighten me on the subject, I feel myself free to say, that if the coal for generating steam power can be obtained at five, six, or even seven cents per bushel, it will be more advantageous to the Government to adopt steam rather than water power in the operations of an armory.

Among the advantages of steam power is, that you can place the workshops, as well as the other buildings, just where you please; while, with water as an agent, you must locate the shops at that point, and that point only, at which the water or its power is to be displayed. Also, wherever water power is employed, the atmosphere is always humid, and alike injurious to health and destructive to metallic substances, particularly to fire arms and other implements of war; whereas the heat from numerous furnaces and fireplaces invariably rarefies and modifies the air around, and thereby renders the damp atmosphere of low grounds and water courses less pernicious to human life.

Upon a review of the whole ground of observation, and after mature deliberation upon all the circumstances connected with the subject of our investigations, I am clearly of opinion that steam is to be preferred to water power in a manufactory of arms; and that the point of land on the Mississippi, between the village of Carondelet and the mouth of Des Perres river, near St. Louis, Missouri, presents the greatest number of advantages for the location of the Western armory.

All which is respectfully submitted.

TH. LAWSON,
Surgeon General U. S. Army.