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GRADUATE COLLEGE

WATER USE IN HOTELS AND MOTELS IN OKLAHOMA

1963 - 1964

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

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DOCTOR OF PHILOSOPHY

BY

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Norman, Oklahoma

1967

WATER USE IN HOTELS AND MOTELS IN OKLAHOMA

1963 - 1964

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WATER USE IN THE HOTELS AND MOTELS IN OKLAHOMA 1963-1965

CHAPTER I

INTRODUCTION

Water is a paradox. It is fixed in quantity, yet limitless in use. Like the air we breathe, it is used over and over again. It has long been regarded as a "free" commodity. But its time, place, and form utility often make it a scarce and expensive good. The world-wide supply of water is limitless, but many localities have insufficient quantities to sustain life. Many have an abundance of water, but have a requirement for a small proportion of the available supply. Great quantities of water originate in a given area, but are lost to that area. In many places in the world it severely limits economic progress; in others, it makes development possible. It is the most abundant commodity on the face of the earth. Erich Zimmermann has called it the keystone of the resource structure of the world.[1] Oklahomans are using an estimated 960 million gallons of water per day for all uses

[1]Erich W. Zimmermann, World Resources and Industries (New York: Harper and Brothers, 1933), p. 572.

except electric power generation. This is about 420 gallons per capita per day.[2]

During recent decades, service industries have grown at a rapid pace. An important segment of these service industries is represented by hotels and motels. The increase in leisure time suggests an increasing importance of this industry to the economic development of the state and the nation. The Bureau of the Census indicated there were 968 hotels, motels and tourist courts in Oklahoma in 1963.[3] Their total retail sales have been estimated at $38.4 million dollars.[4] Their contribution to personal income in Oklahoma is $13 million.[5]

Purpose and Scope

Tourism is a growing industry in Oklahoma. Hotels and motels are an outward manifestation of that industry. Water use among all Oklahoma industries is important to its future.

The purpose of this study is two fold: 1) To examine

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[2]K. A. MacKichan and J. C. Kammerer, Estimated Use of Water in the U. S., 1960, Geological Survey Circular 456, U. S. Department of Interior, Washington, D. C., 1961, p. 4.

[3]U. S. Bureau of the Census, 1963 Census of Business, Selected Services Oklahoma BC 63 (A) S38, Advance Report, U. S. Government Printing Office, Washington, D. C., 1966, p. 2.

[4]Bureau of Business Research, The Oklahoma Business Review, College of Business Administration, University of Oklahoma, Vols. 31 and 32.

[5]Department of Commerce, Survey of Current Business, August, 1964, Table 47, line 22.

water use in hotels and motels in Oklahoma in order to reveal water use patterns. 2) To discover the determinants of the patterns. This purpose will be accomplished by measuring water use in these broad areas: 1) Annual water use by geographical location, source of supply, and seasonal variation. 2) Percentage distribution of water use related to the percentage of establishments by their total number, size, and daily rental rate. 3) Daily water use per occupied room related to the several characteristics of the establishments. 4) Annual water use by functional services provided by hotels and motels.

The study encompasses a census of hotels and motels in all Oklahoma cities and towns having a population of 5,000 and over. Six smaller towns are also included in the study. In addition it includes 13 state owned and operated resorts lodges and other activities having lodging facilities.

As background material, a brief discussion of the demand for water, world-wide, nation-wide and in the State of Oklahoma will be presented. Emphasis will be placed on the demand for water in Oklahoma. A brief historical sketch of hotels and motels will be presented, with emphasis on their growth in Oklahoma. Once the broad background of history and water demand has been established, the characteristics of hotels and motels in Oklahoma will be developed. The main feature of the study will be the relationships that exist among these characteristics and water use.

Procedure

Preliminary Investigation. A review of the literature in the area of water, water supply and demand revealed a great deal of information on a broad level. Considerable engineering data with respect to planning and associated water use rates was also found relating to the hotel and motel industry.[6] These are planning factors based on water use on a per resident or per bed basis. Their primary purpose is to provide the engineer with the basis for determining the size of the water supply and piping. They are based on a condition of minimum pressure available with allowances for system friction, elevation and rates of flow required for satisfactory operation at a high probability of simultaneous use. The conditions of this study go beyond these aspects. It is intended to develop actual use data in relationship to the characteristics of the hotel and motel industry.

An early decision was reached to gather original data direct from the source. Two direct sources were indicated. First were the hotel and motel owners and operators who could

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[6] Examples are: U. S. Department of Health, Education and Welfare, Public Health Service, Report of Public Health Service Technical Committee on Plumbing Standards, U. S. Government Printing Office, Washington, 25, D. C., 1963 and U. S. Department of Health, Education and Welfare, Public Health Service, Manual of Individual Water Supply Systems, U. S. Government Printing Office, Washington, 25, D. C., 1962.

Frank Borsenik, Literature of the Lodging Market, Bureau of Business and Economic Research, Michigan State University, East Lansing, Michigan, 1966, lists 413 publications relating to hotels and motels in U. S. None of them is concerned with water.

provide information such as size, location, seasonality of operation, room occupancy rate, room price level, numbers of employees, kinds of patronage, age of the establishment, services provided, and source of the water supply. The second source of information was the municipal water departments furnishing the water.

In order to determine the number of hotels and motels in Oklahoma to become a part of the study, the telephone directory library of the Southwestern Bell Telephone Company in Oklahoma City was consulted. The definition of hotels and motels used in this study is that of the Bureau of the Census and the Standard Industrial Classification Manual.[7] It includes, as a major grouping, commercial establishments engaged in furnishing lodging, or lodging and meals, on a fee basis: (1) year-round hotels; (2) seasonal hotels; and (3) tourist courts and motels. An examination of the classified section of telephone directories from 50 cities and towns in Oklahoma

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[7]U. S. Bureau of the Census, U. S. Census of Business, 1954, Vol. VI, Selected Services Trades - Area Statistics, Missouri-Wyoming-Alaska and Hawaii, U. S. Government Printing Office, Washington, D. C., 1961, p. 3, defines hotels and motels: Hotels: (SIC 701, except 7013) Establishments known as hotels, engaged in providing lodging, or lodging and meals, to the general public. Included are hotels operated by membership organizations but open to the public, and apartment hotels which provide accommodations for transients. Excluded are rooming and boarding houses, private residences commonly known as tourist homes, and apartment or residential hotels which provide no accommodations for transients. Motels (and tourist courts) (SIC 7013) Establishments known as motels, tourist courts, tourist camps or motor courts primarily engaged in providing accommodations in furnished cabins or similar structures. Excluded from the Census are tourist homes (private residences furnishing lodging to motorists).

with a population of 5,000 and greater revealed about 850 motels and hotels.[8]

Some duplication between listings as hotels and motels was noted. An effort was made to separate the listings, but later field investigation revealed a relatively large number of rooming houses, trailer courts, nursing homes and small apartment houses had shown listing as hotels or motels. The number of establishments determined from the classified listing in the telephone directories was therefore revised during the enumeration phase.

The pace of construction of the interstate highway system during the approximately one year since publication of the available telephone directories had resulted in abandonment of some establishments in the smaller communities. Also, new ones had been built. A final count of establishments in the selected cities and towns at the conclusion of the field investigations was 898. This total included 13 state-owned and operated resort lodges. The 1963 Census of Business (Advance Report) indicated a total of 968 establishments in Oklahoma.[9]

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[8]There are 52 cities in Oklahoma in the 1960 Census of Population having a population of 5,000 and greater. Two of these, Guymon and Frederick, are not served by Southwestern Bell Telephone Co. Letters to Chambers of Commerce were used in these two cities.

[9]U. S. Bureau of the Census, 1963 Census of Business, Selected Services Oklahoma BC 63(A) 838, Advance Report, U. S. Government Printing Office, Washington, D. C., 1966, p. 2.

Discussions were held with several independent motel operators. The purpose of these discussions was to determine the feasibility of the project. Some operators showed lack of interest. Others evidenced interest in the project and made several suggestions which facilitated the gathering of the data.

Developing the Questionnaire. After conversations with several operators who indicated the project was feasible, development of the questionnaire began. The questionnaire consisted of two parts. Part I was intended to seek data on hotel and motel characteristics from owners and operators. Part II was intended to determine water consumption data from municipal water services. Part I was examined by the same operators who had assisted in its development. As a result of a round-table discussion, minor changes were made. The first revision was then presented to the membership of the Oklahoma City Hotel and Motel Owners Association at a regularly scheduled noon luncheon. Operators of 33 Oklahoma City establishments were present. Their concern with the questionnaire was that competitive information would be revealed. They were particularly concerned with a question that asked them to reveal their seasonal occupancy rate. This discussion resulted in the decision to delete any reference to name or location of any establishment other than its location in a particular city.

The questionnaire was then subjected to a 110 hotel and motel trial. This trial was conducted in 9 cities and towns in

Oklahoma. The interviewers were students of the University of Oklahoma who had attended two one-hour sessions in the questionnaire technique to be employed. The student interviewers had been selected on the basis of their home towns. They were students from the smaller towns who were well known or whose families were well known in the community. Each was furnished with a letter of introduction and a set of written instructions. (See Appendices A and B.) The results of the trial run were encouraging. An overall response of 89 per cent was achieved. However, only a 59 per cent response to the occupancy rate question was obtained. Accordingly, it was reworded. It was also relocated in the questionnaire so as to be the last question. In addition, a supplemental questionnaire (Appendix C) was developed in the event the operator elected not to answer that particular question. The supplemental questionnaire was worded identically with the particular question on the overall questionnaire but was isolated from all other questions so that no identification was readily apparent. Part I of the questionnaire in its final form is shown in Appendix D.

Part II of the questionnaire (Appendix D, Part II) was designed to secure water consumption data for each establishment. It was developed after examining water department records in Oklahoma City and Tulsa.

Data Collection. During the period December 19, 1964, to January 4, 1965, 52 cities and towns in Oklahoma were visited by interviewers. A 56 per cent response to Part I of the questionnaire was achieved. A 98 per cent

response to the Water Department questionnaire (Part II) was achieved. Subsequent follow-up (February 1 to March 15) added 6 more cities and resulted in an overall questionnaire response of 87.2 per cent (Table 1). A 100 per cent response was achieved in 30 cities and towns (Table 2). One city registered only a 36.2 per cent response. This low response was because of the scattered nature of the establishments.

TABLE 1

QUESTIONNAIRE RESPONSE, HOTEL AND MOTEL CHARACTERISTICS IN SELECTED CITIES AND TOWNS IN OKLAHOMA, SEPTEMBER 1964 - February 1965

City	Number of Establishments	Number of Establishments Responding	Percentage Response
Ada	10	10	100.0
Altus	15	11	73.3
Alva	9	6	66.7
Antlers	4	4	100.0
Anadarko	4	4	100.0
Ardmore	17	13	76.5
Bartlesville	16	14	87.5
Bethany	2	2	100.0
Blackwell	7	7	100.0
Chickasha	12	9	75.0
Claremore	19	10	52.6
Clinton	11	11	100.0
Cushing	8	5	62.5
Del City	1	1	100.0
Duncan	18	18	100.0
Durant	21	16	76.2
Edmond	1	1	100.0
Elk City	15	11	73.3

Continued on next page.

TABLE 1 (continued)

City	Number of Establishments	Number of Establishments Responding	Percentage Response
El Reno	12	12	100.0
Enid	26	16	61.5
Frederick	4	4	100.0
Guthrie	5	4	80.0
Guymon	16	13	81.3
Henryetta	9	8	88.9
Hobart	3	3	100.0
Holdenville	3	3	100.0
Hugo	10	9	90.0
Lawton	31	29	93.5
McAlester	22	19	86.4
Madill	10	10	100.0
Marlow	3	3	100.0
Miami	18	12	66.7
Midwest City	4	4	100.0
Moore	2	2	100.0
Muskogee	33	28	84.8
Norman	7	6	85.7
Oklahoma City	183	176	96.1
Okmulgee	12	7	58.3
Owasso	1	1	100.0
Pauls Valley	4	4	100.0
Pawhuska	7	7	100.0
Perry	6	5	83.3
Ponca City	22	15	68.2
Poteau	3	3	100.0
Prague	2	2	100.0
Pryor	6	6	100.0
Sand Springs	5	5	100.0
Sapulpa	6	6	100.0
Seminole	9	9	100.0
Shawnee	11	10	90.9
Stigler	5	5	100.9

Continued on next page.

TABLE 1 (continued)

City	Number of Establishments	Number of Establishments Responding	Percentage Response
Stillwater	12	8	66.7
Tahlequah	22	16	72.7
Tulsa	122	120	98.4
Vinita	19	7	36.2
Wewoka	6	6	100.0
Woodward	13	13	100.0
Yukon	1	1	100.0
State Lodges	13	13	100.0
Total	898	783	87.2

Source: Number of Establishments: local telephone directories for 1964 with adjustments made during interviews. Number of Establishments responding: questionnaire response.

TABLE 2

DISTRIBUTION OF CITIES RESPONDING TO THE QUESTIONNAIRE BY PER CENT OF ESTABLISHMENTS RESPONDING

Per Cent of Establishments Responding	Number of Cities
100	30
90 - 99	5
80 - 89	8
70 - 79	6
60 - 69	6
50 - 59	2
40 - 49	0
30 - 39	1
less than 30	0
Total	58

Source: Questionnaire response.

The city is located near one of Oklahoma's large recreation lakes. The 36.2 per cent response represented 100 per cent of the establishments in the immediate vicinity of the city. The remainder were located in remote areas. Most of the nonrespondents were contacted by mail rather than in person. They failed to respond to one mail follow-up. Tulsa and Oklahoma City response was 98.4 and 96.1 per cent, respectively. Forty-three (74.1 per cent) cities registered a response of 80 per cent or more. These 43 cities account for 610 establishments (77.9 per cent of the number of respondents).

The high percentage of response is attributable, in part, to the cooperation of the Oklahoma City Chamber of Commerce. One week before interviewers arrived in each of the cities and towns, the Chamber of Commerce, through its Water Development Foundation of Oklahoma, Inc., dispatched a letter to the president of each Chamber of Commerce in the cities involved. (Appendix E.) This letter outlined the purpose of the project, and requested that each local Chamber provide the interviewer with a list of hotels and motels, together with the name of the manager. It suggested that each manager be notified of the purpose of the interview and asked the owner and operator to cooperate.

The high percentage of response is also attributable to the cooperation of the Oklahoma Association of Hotel and Motel Owners and Operators. The author appeared as a speaker at their annual convention in November 1964. Here, he had the

opportunity of outlining the purpose, scope and extent of the project. He pledged that no establishment would be identified by name or in any other manner. In addition, he kept the executive board of the organization apprised of the project's progress. An interim report was presented at the May 1965 meeting of the Oklahoma City Chapter.

Concurrently with the development of the questionnaire, the feasibility of cooperation of the municipal water departments was explored. A meeting was arranged with the Oklahoma City City Manager and the Director of Water and Sewer Services, Oklahoma City Water Department. At this meeting the purpose of the project was outlined. A definitive statement of the scope and extent of assistance desired was furnished. As a result of this meeting, the Director of Water and Sewer Services, Oklahoma City Water Department, dispatched a letter to his counterparts in each of the cities and towns to be visited by interviewers. (Appendix F.) This letter, like the letter from the Chamber of Commerce, outlined the purpose and solicited the cooperation of each Superintendent.

Questionnaire Response. A high percentage of response (87.2 per cent) was achieved in the questionnaire. The assistance of the local Chambers of Commerce, the Oklahoma City Water Department and the Owners Association has already been noted. Another factor has also been mentioned: the use of students who were well known in the

community. In several instances these interviewers came from families highly placed in the political structure of the community. One student's father was mayor of the town; another student's father was the water commissioner; several had relatives in positions of responsibility in the local water departments. Other students had families who were highly respected in the business community. Three came from families who operated motels. One family operated three motels in one city. Five students were well known in their own right in the community. They had been outstanding high school athletes.

Some respondents did not supply an answer to all questions. The response to each question in the questionnaire is presented as a numerical value and as a per cent of the respondents in Table 3. As a per cent of the respondents, the values range from 68.6 per cent for the response to occupancy rate in the summer to a high of 100.0 per cent for several "preliminary" questions. If each question is given an equal weight, a weighted arithmetic average of the percentage response is 86.4.

Respondents were asked if the response came from records or from an estimate made by the operator. Question number 14, the amount of water used per season, was one such question. Responses totaled 759 out of 783 for this question. Affirmative replies came from 695 (93.9 per cent of those responding). (Table 4.) Only 64 replied in the negative. Some 24 respondents did not answer this question. The majority of the affirmative replies occurred because the source of

TABLE 3

QUESTIONNAIRE RESPONSE BY NUMBER OF RESPONDENTS TO EACH QUESTION AND AS A PER CENT OF THE RESPONDENTS

Question	Number of Respondents	Response as a Per Cent of Total Number of Respondents
1. Is your establishment a hotel or motel?	783	100.0
2. Is your establishment located	783	100.0
a. in or near the business district	(407)	
b. at or near the edge of town	(335)	
c. in a rural location	(41)	
3. Please indicate the name of the city in which or near which your establishment is located.	783	100.0
4. And the name of the county.	783	100.0
5. Do you remain open at least 50 weeks each year?	779	99.5
6. How many rooms or units are there in your establishment?	674	88.6

Continued on next page.

TABLE 3 (continued)

Question	Number of Respondents	Response as a Per Cent of Total Number of Respondents
7. What is the daily rental price of your most popular single room during the:		
Fall	651	83.1
Winter	651	83.1
Spring	652	83.3
Summer	652	83.3
8. a. How many full-time employees, other than members of your family, do you have in the hotel or motel proper during the:		
Fall	644	82.2
Winter	642	82.0
Spring	645	82.4
Summer	652	82.5
b. *How many full-time employees, other than members of your family, do you have in your restaurant during the :		
Fall	112	
Winter	110	
Spring	114	
Summer	114	

Continued on next page.

TABLE 3 (continued)

Question	Number of Respondents	Response as a Per Cent of Total Number of Respondents
9. Are most of your patrons permanent or transient?	651	83.1
10. How old, in years, is your establishment?	688**	77.1
11. What percentage of your total annual water supply comes from these sources:	783	100.0
Municipal		
Private		
12. What percentage of your total annual water usage is used in the following activities:		
Rooms	664	84.8
Restaurant	653	83.4
Service Station	660	84.3
Swimming Pool	670	85.6
Care of Grounds	667	85.2
Heating and Air Conditioning	648	82.8
13. What is the total volume of water in thousands of gallons used in your establishment for all purposes during the:		
Fall	769	98.2
Winter	767	97.0
Spring	769	98.2
Summer	772	98.6

Continued on next page.

TABLE 3 (continued)

Question	Number of Respondents	Response as a Per Cent of Total Number of Respondents
14. Are these above amounts taken from records:	759	96.9
15. a. On the average, what percentage of your rooms or units are occupied during the:		
Fall	540	69.0
Winter	537	68.6
Spring	539	68.8
Summer	546	69.7
Year-round	618	78.9
b. Are the above percentages computed from:		
your records	170	21.7
A "best guess"	440	56.2
All questions		86.4***

Source: Questionnaire response

*The questionnaire required an answer only from those having a restaurant. Therefore, no percentages are computed. See question 12.

**The questionnaire did not provide for a "don't know" response. Many operators knew only during the length of time they had been the operators.

***Percentage computed by weighting each question response equally.

TABLE 4

RESPONSE TO QUESTION 14:
DID THE RESPONSE TO QUESTION 13 WITH RESPECT TO THE THOUSANDS OF GALLONS PER SEASON USED IN EACH ESTABLISHMENT COME FROM RECORDS?

Response	Number of Responses	Percentage of Total Response to the Question
From records	695	93.9
Estimate	64	6.1
Total	759	100.0

Source: Computed from questionnaire response.

Note: 24 failed to respond to this question.

the data was the municipal water department records. Only 17 respondents having a private source of water were able to take their water use data from records. Thirteen of these were the state-owned and operated lodges.

Question number 15.a, which asked for information concerning the seasonal and year-round occupancy rate, also inquired as to the source of the response. The basic question, "on the average, what percentage of your rooms or units are occupied during the fall, winter, spring and summer" produced the poorest response. Response was about 69 per cent. Less reluctance was encountered in the response to the year-round rate. Its response was 78.9 per cent. (Table 3.) Question 15.b asked if these responses were from records or were they

a "best guess." Responses totaled 610. (Table 5.) Replies taken from records accounted for 170 (27.9 per cent of the total responses). "Best guess" replies were supplied by 440. This was 72.1 per cent of all responses to the question. An effort was made to evaluate each response to this question. If, in the opinion of the interviewer, the respondent gave some studied thought to his reply, it was coded "A studied response." There were 211 of these (34.6 per cent). If, in the opinion of the interviewer, the respondent gave the impression of a less reliable answer, it was coded "Off-hand." There were 162 of these (26.6 per cent). If in doubt, the interviewers were instructed to attempt no evaluation. There were 67 of these (10.9 per cent).

Data Collation. Two separate questionnaires for each establishment resulted from the procedure outlined above. Questionnaires were matched by establishment. The data were then transferred to data processing cards. The cards were verified against the original source. Machine tabulations followed.

Summary

A census of hotels and motels in Oklahoma cities having a population of 5,000 and over has been conducted. In addition, a census has been taken in 6 towns having a population of less than 5,000 and among the state owned lodging facilities. Of the 898 establishments estimated to have been in existence in these communities during the fall and winter of

TABLE 5

RESPONSE TO QUESTION 15.b
ARE THE PERCENTAGES WITH RESPECT TO SEASONAL AND
YEAR-ROUND OCCUPANCY RATES TAKEN FROM
RECORDS OR ARE THEY A "BEST GUESS"

Response and Evaluation	Number of Responses	Percentage of Total Response to the Question
From records	170	27.9
"Best Guess"	440	72.1
A "studied" response	(211)	(34.6)
An "Off hand" response	(162)	(26.6)
Unevaluated response	(67)	(10.9)
Total	610	100.0

Source: Computed from questionnaire response.

Note: 173 did not respond to the question.

1964-1965, 793 responded to the questionnaire. This is a response of 87.2 per cent. Some operators were unable or unwilling to supply answers to all questions. If each question is given equal weight, 86.4 per cent of all questions was answered.

CHAPTER II

THE DEMAND FOR WATER IN OKLAHOMA

A peculiar characteristic of water supply is that it is fixed in quantity but virtually inexhaustible. The fixed quantity is cycled over and over by the forces of nature in the evaporation and condensation process of the hydrologic cycle. The demand for water also has a peculiar characteristic: after being put to whatever use intended by one user, it may be returned to the source to be used by a subsequent user. The demand for water is, therefore, classified according to its immediate effect on the total supply. Among the classifications in use are withdrawal and nonwithdrawal, either of which may be consumptive or nonconsumptive. Withdrawal occurs when water is removed from its ground storage, lake, or stream. Most water use falls in this classification. Examples are municipal, domestic, industrial, and irrigation. Nonwithdrawal does not require removal of the water from its course or storage place. Examples are navigation, recreation, waste disposal, conservation of fish and wildlife. Withdrawal uses are further classified into consumptive and nonconsumptive. Consumptive use includes the quantity of water incorporated in a productive process. Consumption implies ultimate discharge

of the water into the evaporative or transpirative process of the hydrologic cycle. Consumption may take place in nonwithdrawal uses through direct evaporation of water ways, fisheries, and the surface of recreational lakes. Water withdrawn for consumptive use disappears temporarily from the total supply. At some later date and at some other location, it may re-enter the world's supply. For the immediate time, however, it represents demand similar to the consumption of any depletable resource. Nonconsumptive use is returned directly to the source of withdrawal. It is often changed by the addition of heat or pollutants. As opposed to consumptive use, it does not deplete the total supply by an appreciable amount.[1] However, from the supply side, sufficient water is required to meet the withdrawal demand at any given time and place.

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[1]These definitions are taken from K. A. MacKichan and J. C. Kammerer, Estimated Use of Water in the United States, 1960 (Washington, D. C.: U. S. Department of the Interior, Geological Survey Circular 456, 196), p. 39. Similar definitions appear in Milliman, Jerome W., "Commonality, the Price System and the Use of Water Supplies," The Southern Economic Journal, Vol. 22, No. 4, April 1956, p. 426 ff. and in "The Economics of Water Resource Use," American Economic Review Papers and Proceedings, May 1962, p. 450 ff. The American Water Works Association Task Force on Definition and Terminology also uses these definitions.

Ackerman and Lof, op. cit., pp. 47-48 deviate somewhat from these definitions: The word "use" is defined as "employment." The categories then become (1) withdrawal uses with subheadings of disappearing withdrawals and returnable withdrawals; (2) flow uses which involve no withdrawals; this is similar to non-consumptive withdrawals; (3) on-site use is a further refinement of non-consumptive withdrawals.

Hans H. Landsberg, Leonard L. Fischman and Joseph L. Fisher, Resources in America's Future, Resources for the Future, Inc. (Baltimore: Johns Hopkins Press, 1963) and Water Resources Activities in the United States, Committee Print No. 32; Water Supply and Demand (Washington, D.C.: August 1960), use similar terminology.

Terminology used in this study will be withdrawal and consumption. Withdrawal will denote the total water taken by an activity. Consumption will indicate the water evaporated in the process and not returned directly to the source. It will deplete the immediate level of water supply.

The National Demand

Total U. S. water withdrawal, exclusive of that used to generate electric power, was estimated at 270 billion gallons per day in 1960. (Table 6.) This is about 1,500 gallons per day per capita. Self-supplied water was withdrawn at the rate of 140 billion gallons per day (51.9 per cent). Water withdrawn for irrigation purposes totaled about 110 billion gallons per day (40.7 per cent). Municipal users withdrew about 20.6 billion gallons per day (7.6 per cent). This included water withdrawal for industrial, domestic, and agricultural purposes supplied by publicly-owned water sources. Rural users took 3.6 billion gallons per day (1.3 per cent).

Surface sources provided 82.6 per cent of total withdrawal at about 200 billion gallons per day. Irrigation and rural domestic withdrawal was taken largely from ground water. Self-supplied water and municipal water were taken mainly from surface sources.

About 136 million urban residents were served by public or private water systems in the U. S. in 1960. Their daily per capita withdrawal of water was about 151 gallons. This per capita figure included all uses. It is estimated that

TABLE 6

ESTIMATED U. S. WATER WITHDRAWAL AND CONSUMPTION IN MILLIONS OF GALLONS PER DAY BY SOURCE AND USE CATEGORY, 1960

	Withdrawals (Millions of Gallons Per Day)	Consumption (Millions of Gallons Per Day)	Sources of Total Withdrawals (Millions of Gallons Per Day)	
			Ground Water	Surface Water
Self-supplied industrial	140,000[a]	3,200	7,300	131,000
Irrigation	110,000	51,000	53,000	30,000
Municipal industrial and domestic	20,600	3,470	6,300	14,200
Rural domestic	3,600	2,800	2,800	850
All uses except[b] water power	270,000	61,000	47,000	200,000

Source: K. A. MacKichan and J. C. Kammerer, Estimated Use of Water in the U. S., 1960, Geological Survey Circular 456, U. S. Department of Interior, Washington, D. C., 1961.

[a]Includes 71 million gallons per day of sewage.

[b]Details will not add to totals because of 23 billion gallons per day loss in transmission and because of rounding.

industry required about 31 per cent of the total. Agricultural usage from municipal systems was negligible.[2]

Rural residents in 1960 totaled about 48 million people. Those living in homes with running water had an estimated daily per capita use of about 60 gallons; those without running water withdrew an estimated 10 gallons per day. About 36 million rural residents had running water.[3]

The greatest quantity of consumption occurred in irrigation. It accounted for about five-sixths of all consumption. About 94 million acre-feet per year was used in irrigating 39 million acres of land. Nearly 52 per cent of this amount came from ground water. Almost 93 per cent of this withdrawal occurred in the seventeen western states. About 60 per cent of the water used in these states is consumed by evaporation or transpiration. This is more than 25 times the consumption in industry and about four times the amount of domestic consumption.[4]

Industrial consumption is estimated at about one-twentieth of total consumption. The remainder is returned to its source. However, the character of the water returned to its source is often changed by pollutants added to it during

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[2]MacKichan and Kammerer, op. cit., p. 4.

[3]Ibid.

[4]U. S. Department of Agriculture, Water, The Yearbook of Agriculture, U. S. Government Printing Office: Washington, D. C., p. 223.

the industrial process. About 94 per cent of industrial water employment is for cooling. Most water used for cooling is unaffected by the process, aside from a temporary increase in temperature. Nearly all manufacturing processes require withdrawal of water many times the weight of the finished product. It has been estimated that the approximately one ton of steel in each automobile requires about 285 tons of water in the manufacturing process. Other automobile components use about 115 additional tons of water.[5] In addition, each gallon of gasoline the automobile burns has required another 25 gallons of water in its production. It was estimated in 1950 that, among large manufacturers, 54 per cent of water withdrawn was used for cooling, 32 per cent for processing, 9 per cent for boiler feed, 6 per cent for sanitation and cleaning, and 4 per cent for miscellaneous uses.[6] Small factories, however, used about 23 per cent for cooling, 36 per cent for processing, 12 per cent for boiler feed and 26 per cent for sanitation.[7]

Water Demand in Oklahoma

Total water withdrawal in Oklahoma in 1960, excluding

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[5]P. Weir, "Public Water Supply in the Future," Journal of the American Water Works Association, Vol. 48, 1956, p. 755.

[6]Edward A. Ackerman and George O. G. Lof, Technology in American Water Development (Baltimore: Johns Hopkins Press, Resources for the Future, Inc., 1959), p. 53.

[7]H. E. Jordan, "The Increasing Use of Water by Industry," Water, The Yearbook of Agriculture, 1955 (Washington, D. C.: U. S. Government Printing Office, 1956), p. 654.

electric power generation has been estimated at about 960 million gallons per day. (Table 7.) This is about 420 gallons per capita per day. Surface source demand was about 620 million gallons per day; 340 million gallons per day were taken from ground water sources. All use categories, except irrigation, took the larger portion of their requirements from surface sources. Industrial demand from self-supplied sources totaled 420 million gallons per day. Ground sources provided 75 million gallons per day. Of the total industrial withdrawal, about 180 million gallons per day was estimated to be high in saline content. About 46 million gallons per day of this saline water came from ground sources: 134 million gallons per day from surface sources. Irrigation, the second largest use category, withdrew 270 million gallons per day. Slightly more than two-thirds, 190 million gallons per day, came from ground sources. The other one-third, 84 million gallons per day, came from the surface supply. Municipal demand for water accounted for about 210 million gallons per day. About three-fourths, or 150 million gallons per day, was withdrawn from surface sources while 56 million gallons per day came from the ground. Rural users required, during 1960, about 59 million gallons per day. They took about 20 million gallons per day from ground sources and 39 million gallons per day from surface sources.

Industrial, self-supplied demand for water in Oklahoma amounted to 43.8 per cent of the total estimated demand. (Table 8.) On a nationwide basis, this use category has been

TABLE 7

ESTIMATED OKLAHOMA WATER WITHDRAWAL AND CONSUMPTION, BY SOURCE AND USE CATEGORY, 1960

Use Category	Withdrawal (Millions of Gallons per Day[a])	Consumption (Millions of Gallons per Day)	Source	
			Ground Water (Millions of Gallons per Day)	Surface Water (Millions of Gallons per Day)
Industrial self-supplied	420[b]	29	75	377
Irrigation	270	190[c]	190	84
Municipal	210	72	56	150
Rural	59	57	20	39
All uses except electric power generation	960	350	340	620

Source: K. A. MacKichan and J. C. Kemmerer, Estimated Use of Water in the U. S., 1960, Geological Survey Circular 456, U. S. Department of the Interior, Washington, 1961.

[a]Details will not add to totals because of rounding.

[b]180 mgd estimated to be saline, 46 mgd from ground water and 134 mgd from surface water.

[c]Does not include conveyance loss of 16 mgd.

TABLE 8

PERCENTAGE DISTRIBUTION OF TOTAL ESTIMATED DAILY WATER WITHDRAWAL IN OKLAHOMA AND THE U. S., BY USE CATEGORY, 1960

Use Category	Oklahoma (Per Cent)	United States (Per Cent)
Industrial, self-supplied	43.8	51.9
Irrigation	28.1	40.7
Municipal	21.9	7.6
Rural	6.1	1.3
Total	100.0	100.0

Source: Computed from data in Tables 6 and 7.

Note: Components do not add to 100.0 because of rounding and losses in transmission.

estimated at 51.9 per cent. Irrigation represented the second largest water requirement in Oklahoma. It took 28.1 per cent of the total water demand. Nationally, irrigation withdrew 40.7 per cent of the total. Users of municipally supplied water accounted for 21.9 per cent of the total in the state; 7.6 per cent in the nation. In Oklahoma, 6.1 per cent of the total withdrawal was accounted for by rural residents. Rural residents accounted for only 1.3 per cent of the nation-wide demand.

The percentage distribution of estimated state-wide water withdrawals by source among the use categories (Table 9) shows irrigation drew most heavily on ground water stores. Some 70.4 per cent of total water used for irrigation came from this source. The demand for water by rural users represented the second largest relative user of ground stores, but they took only 35.4 per cent of their total demand from ground sources. Municipal water came largely from surface sources. Similarly, industrial users who provided their own sources of water supply took 82.1 per cent of their total requirements from the surface. Ground sources provided 35.4 per cent of the total water demand in Oklahoma; surface sources, 64.6 per cent. This compares to the nation-wide demand of only 17.4 per cent from ground sources; 82.6 from the surface.

Consumption demand in Oklahoma amounted to 37.5 per cent of total demand. Consumption demand in Oklahoma during

TABLE 9

PERCENTAGE DISTRIBUTION OF ESTIMATED WATER WITHDRAWAL IN OKLAHOMA, BY SOURCE AND USE CATEGORY, 1960

Use Category	Total Withdrawal (Per Cent)	Ground Water as a Per Cent of the Total	Surface Water as a Per Cent of the Total
Irrigation	100.0	70.4	29.6
Rural	100.0	35.4	64.6
Municipal	100.0	26.7	73.3
Industrial, self-supplied	100.0	17.9	82.1
All uses, except electric power generation	100.0	35.4	64.6

Source: Computed from data in Table 7.

1960 was estimated at 350 million gallons per day. This converts to 152 gallons per capita per day. If total withdrawal is used as a measure of demand, Oklahoma's daily per capita demand is about 420 gallons.

Municipal Demand

Potable water supply in Oklahoma is largely the concern of publicly owned water systems. These municipal systems supplied 62.9 per cent of Oklahoma's 1960 population. Municipal system withdrawal includes water used domestically, industrially, publicly, and commercially. It excludes rural utilization not drawing water from the municipal supply. It also excludes industrial water use employing self-supplied water.

Among cities in Oklahoma with a population of 2,000 and over, total municipal pumpage was almost 57.5 billion gallons during fiscal year 1963.[8] This is about 160 million gallons per day; 141 gallons per capita per day. It ranges from a low of 60 gallons per capita per day in Owasso to 290 gallons per capita per day in Elk City.[9] Owasso is a "bedroom" community near Tulsa. Its population in 1960 was 2,032. Elk City is located in the western part of the state in Roger Mills County. Its population in 1960 was 8,196. The large

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[8]Pat Choate, Water Usage in Oklahoma Municipalities, unpublished manuscript, the University of Oklahoma, 1964, p. 11.

[9]Ibid., computed from Tables 10-13, pp. 21-24.

per capita use of water in Elk City is due in large part to a large dairy processing plant.

The bulk of municipal water sales is made to residential users in Oklahoma. Tulsa, an exception to this, has a wide range of industries with emphasis on petroleum refining. Several cities--Bethany, Claremore, Guthrie, Miami and Wewoka--have recorded 90 per cent of their water sales to residential subscribers. Norman lists 98 per cent of all sales for residents. Bethany, Claremore and Guthrie are "bedroom" communities near Tulsa or Oklahoma City. The main industry in Norman is the University of Oklahoma. On the contrary, Bartlesville, Clinton, Durant, Okmulgee and Sapulpa have reported residential sales of about 60 per cent of the total. These cities have substantial local industry.[10]

Summary

The demand for water has a peculiar quality: after being put to a particular use, it may be returned to the source to be employed by a subsequent user. Water demand has therefore been classified according to its effect on the total supply. Withdrawal uses extract water from a source of supply. Nonwithdrawal use does not remove the water from the source. Further, water withdrawals are subdivided into consumptive and nonconsumptive withdrawal. Consumptive

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[10]Choate, op. cit., pp. 60-63.

withdrawal employs water in some productive process and discharges the water into the atmosphere. It depletes the immediate supply. Nonconsumptive withdrawal returns the water to its source after employment. The characteristics of the water may be changed by the addition of heat temporarily or undesirable pollutants.

Total withdrawal in the United States has been estimated at about 270 billion gallons per day. In Oklahoma daily withdrawal has been estimated at 960 million gallons per day. Nationwide this is about 1,500 gallons per capita per day. In Oklahoma the daily per capita withdrawal demand is about 420 gallons. Per capita consumption demand is estimated at 152 gallons per day. Nationwide more than 80 per cent of total withdrawal comes from surface sources. Surface sources in Oklahoma supply about 65 per cent of the total demand.

On a percentage basis the nationwide withdrawal from self-supplied sources is 51.9; in Oklahoma it is 43.8. Irrigation accounts for 40.7 per cent of total national withdrawal and 28.1 per cent in Oklahoma. Municipal systems throughout the nation withdraw 7.6 per cent of the total. In Oklahoma municipal withdrawals amount to 21.9 per cent. Nationwide, rural users withdraw 1.3 per cent of the total. Oklahoma's rural users withdraw 6.1 per cent.

Municipal withdrawal in Oklahoma reaches about 62.9 per cent of Oklahoma's population; about 75.5 per cent

throughout the nation. Among Oklahoma cities having a population of 2,000 and more, the daily municipal withdrawal has been estimated at about 160 million gallons per day. The daily per capita withdrawal for this segment of the population is about 141 gallons.

CHAPTER III

HISTORICAL BACKGROUND OF HOTELS AND MOTELS IN OKLAHOMA

Hotels in some form are as ancient as travel. Historians believe the first inns in which regular fees were charged were established in Lydia in about 600 B.C.[1] Many Biblical references to lodging exist but the most famous of all Biblical inns is the one in Bethlehem and its adjacent manger. Many accounts of hotel life are found in early Greek and Roman literature.[2] As the Roman empire spread westward, this part of its culture accompanied it.

Early Hotels

Hotels in a more recent setting have their beginnings in the late medieval period and early Renaissance. Travel during the Dark Ages almost ceased. There was, consequently, no need for overnight stopping places. As western Europe was secured from roaming bandits, commercial travelers increased.

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[1]Jefferson Williamson, The American Hotel (New York: Alfred A. Knopf, 1930), p. 239.

[2]See W. C. Firebaugh, Inns of Greece and Rome, Chicago University Press, 1923, Chapter IV, pp. 37-52.

Their stopping places were often a manor house or a monastery. Those of lesser means sought shelter with a householder.

Guildsmen provided accommodations for traveling brother craftsmen. The suppression of the monasteries in England gave rise to an increase in the number of inns on the British Isles. Some of today's English inns probably had their beginning as a monastery. The New Inn, in Gloucester, is probably one of these. It was built about 1430.[3]

British inns were located along the main Roman roads but probably did not exist before the Middle Ages. These medieval inns appeared first in larger towns where the traveler was expected to supply his own fuel, food and bedding. The rise of the nation states brought post roads, post riders and regular means of transportation. Accommodations for official couriers and private travelers were soon established along these official routes.

The development of the hotel system in England is closely related to the increase in travel. The increase in travel, in turn, stemmed from the increase in security afforded the traveler. Early English inns were constructed with a view toward security. They often resembled fortresses on a small scale. The White Hart, at Chipping Norton, is still preserved in almost its original fortress-like form.

The influence of travel on the hotel industry in

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[3]Thomas Burke, The English Inn (London: Longmans Green and Co., 1930), p. 33.

western Europe is related to the development of the stage coach. By the 1650's a public stage coach system had appeared. It lasted until the mid-1800's, when it was replaced by the railroad. The staging activities of the coach lines were conducted at conveniently located inns. A plaque in the Royal Inn in Cheltenham, England, proclaims it served 23 coach arrivals and departures daily.[4]

The Hotel in America

The first hotels in America were seaport inns and converted farm houses along the cross-country stage coach routes.[5] As the frontier pushed westward, each town had an establishment labeled hotel. It was often crude, providing the barest of conveniences for its patrons. Its prime function was often contained in an adjacent livery stable. Here care was provided for the horses which furnished the motive power for the coach. Comforts and accommodations for the human passengers were often secondary to facilities for the horses.

The advent of the railroad changed this aspect of the hotel industry. Railroad servicing facilities were associated with the larger cities and towns. The size of the hotel often represented the size of the railroading function in that city or town.[6] The comfort of the customer became

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[4]Ibid., pp. 32-62.

[5]Elise Lathrop, Early American Inns and Taverns (New York: Tudor Publishing Co., 1935), p. 25.

[6]Jefferson Williamson, The American Hotel (New York: Alfred A. Knopf, 1930), pp. 38-72.

paramount. A characteristic still prevailed, however, in that the hotel was often located immediately adjacent to the transportation facility, a railway depot. Observation in almost any city or town in the United States still shows the vestiges of this relationship between rail transportation and the hotel industry. As commerce among the cities and towns increased, the traveling salesman became an important aspect of the marketing function. He called on several clients, often in the downtown location. Hotels, therefore, gravitated to the center of commerce in each city and town. The hotel near the railroad center degenerated in quality of service and accommodation. The up-town hotel became the center of social and economic activity. The commercial traveler also demanded more services. The hotel industry responded and often surpassed the luxury associated with European hotels. The post World War I period saw a great increase in hotel construction. The economic collapse in 1929 resulted in bankruptcy for large numbers of these establishments.

American travel habits were responsible for another upheaval in the hotel industry. More and more tourists were taking to the highways in their private automobiles. The congestion in the larger cities caused many motorists to avoid the hotels. A new kind of accommodation for the traveling public appeared. Initially, these were little more than camp grounds, often provided at municipal expense. The traveling motorist carried his own tent and camping equipment. Upon

arriving at a temporary destination, he pitched his tent, prepared his evening meal, and spent the night under canvas. He struck camp the next morning and proceeded on his way. Conveniences were sometimes added in the way of washing facilities. The tourist camp gave way to tourist cottages. The cottage was often a crude shelter and the tourist provided his own bedding. Midway between World War I and World War II a new service and a new word became available to the traveling public. It was "motel." The motel offered the convenience of being located immediately adjacent to well-traveled highways, together with many of the services previously associated with the hotel. Much tourist trade was accommodated in this new kind of establishment. The commercial traveler, however, continued to patronize the downtown hotel.

A significant, though abortive, development in the motel industry occurred in the mid-1930's. A petroleum company established several two-story, multi-function tourist attractions in the Southwest. These were similar to today's large motels. They offered the tourist lodging, meals, entertainment and service for his automobile. They did not last long. This was a time of depression and the traveling public was unwilling or unable to pay the price for the added service they offered.[7]

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[7]This commentary was supplied by Mr. Howard D. Woodard, formerly associate with the Mid-Continent Petroleum Company in Tulsa. He was a consulting attorney for Sunray D-X Oil Co. and others in Tulsa, until his death in September, 1965.

World War II brought disruptions to the travel patterns of the average American. Many American servicemen stationed at military posts found a motel in the vicinity was often the only spot where they could locate their families temporarily. Many motels broadened their accommodations to include kitchenettes. Hotels often provided apartment-hotel accommodations.

The end of World War II saw another change in American travel methods. The rapid growth of the turnpike system, often skirting the edges of the large cities and towns, encouraged the construction of large numbers of motels, motor hotels, inns and lodges. The services provided by these establishments often rivaled those of their downtown counterparts, the hotels. The tourist made increasing use of these establishments. Of some significance was a change in the habits of the commercial traveler. He began to make greater use of the outlying motel, inn, or lodge. Motel operators catered to this new traveling public. They provided entertainment facilities, conference rooms, and other inducements, including special commercial rates. The increase in air travel is having an impact on the hotel and motel industry. Many large cities having airports capable of handling today's jet traffic are seeing the development of some kind of lodging establishment immediately adjacent to the airport. Airports have often been located without regard to highway systems. In fact, they have been located in areas remote from the downtown center of the town which they serve. The commercial traveler is now moving his seat of

operation from the downtown hotel and from the super highway motel to the airport motel. An essential feature of the airport motel, motor hotel, lodge or inn, is its facilities for business meetings.

The first census of hotels in the United States was made in 1930.[8] Its scope was limited to establishments having 25 or more guest rooms each. In 1933 the Census of Business included all hotels and motels, regardless of size. Currently, the Census defines a hotel as "an establishment engaged in providing lodging, or lodging and meals, to the general public. Included are hotels operated by membership organizations, but open to the public, and apartment hotels which provide accommodations for transients. Excluded from the Census are rooming and boarding houses, private residences commonly known as tourist homes, and apartment or residential hotels which provide no accommodations for transients." It defines a motel as an establishment "primarily engaged in providing accommodations in furnished cabins or similar structures. Excluded from the Census are tourist homes (private residences furnishing lodging to motorists)."[9]

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[8]Tourist courts and tourist camps were first included in the scope of American business for 1933. They were also covered by the Census of Business for 1935. Hotels were first included in the scope of the Census of Distribution for 1929, limited, however, to those having 25 rooms or more. Hotels (without size limitations) were included in the Census of American Business for 1933 and the Census of Business in 1935.

[9]U. S. Bureau of the Census, U. S. Census of Business, 1958, Vol. VI, Selected Services, Trades, Part 2, U. S. Government Printing Office, Washington, D. C., 1961, p. 3.

The number of hotels in the United States has fluctuated during the past three decades. (Table 10.) In 1963 they numbered 22,692, or 6,770 fewer than in 1933. On the other hand, the number of motels in the United States has shown a steady increase. The number almost doubled between 1939 and 1948 and there was another big rush of motel building during the period 1954 to 1958. In 1963 there were 41,584 motels in the United States.

Hotels and Motels in Oklahoma

The number of hotels and motels in Oklahoma has followed generally the national pattern during the past three decades. However, motel construction in Oklahoma has lagged behind the national rate by almost a half. The number of hotels declined from 734 in 1933 to 561 in 1958. (Table 11.) During that period the number of motels increased from 154 to 570. There was a sharp decline in the number of hotels between 1958 and 1963 and a moderate increase in the number of motels.

In 1935 the Census enumerated 216 tourist camps in Oklahoma and 247 livery stables. As late as 1939 only half the motels in Oklahoma offered cabins or shelter of any kind to their patrons. When the auto replaced the horse as a means of transportation, it caused a revolution in the motel industry in Oklahoma as well as nationally.

At the present time there are 3 Standard Metropolitan Statistical Areas (SMSA) in Oklahoma. They are Oklahoma City,

TABLE 10

NUMBER OF HOTELS AND MOTELS IN THE UNITED STATES AND POSSESSIONS, CENSUS YEARS, 1933 - 1963

Year	Number of Hotels	Number of Motels[a]	Total
1933[b]	29,462	5,846	35,308
1939	27,980	13,521	41,501
1948	29,650	25,919	55,569
1954	24,778	29,432	54,210
1958	29,203	41,332	70,535
1963	22,692	41,584	64,276

Source: Data for 1933 from U.S. Bureau of the Census, Census of American Business, 1933, Services, Amusements and Hotels, Vol. I and II, Washington: 1935. Data for 1939 from U.S. Bureau of the Census, Sixteenth Census of the U.S., 1940, Census of Business, Vol. III, Service Establishments, 1939, Washington: 1942. Data for 1948 from U.S. Bureau of the Census, U.S. Census of Business, 1948, Vol. VI, Service Trade, General Statistics, U.S. Government Printing Office, Washington 25, D.C.: 1952. Data for 1954 from U.S. Bureau of the Census, U.S. Census of Business, 1954, Vol. VI, Selected Services - Trades - Area Statistics, Part 2, U.S. Government Printing Office, Washington, D.C.: 1956. Data for 1958 from U.S. Bureau of the Census, U.S. Census of Business, 1958, Vol. VI, Selected Services, Trades, Part 2, U.S. Government Printing Office, Washington, D.C., 1961. Data for 1963 from U.S. Bureau of the Census, Census of Business, 1963, Selected Services, Oklahoma, BC63-SA38, U.S. Government Printing Office, Washington, D.C., 1965.

[a]Census Reports 1933 to 1948 referred to these establishments as Tourist Courts.

[b]1933 data included all hotels but did not include "tourist camps operated as adjuncts to filling stations."

TABLE 11

NUMBER OF HOTELS AND MOTELS IN OKLAHOMA,
1933 to 1963

Year	Number of Hotels	Number of Motels[a]	Total
1933[b]	734	154	888
1935	-	216	-
1939	673	214	887
1948	607	411	1,008
1954	498	458	956
1958	561	570	1,031
1963	386	582	968

Source: Data for 1933 from U.S. Bureau of the Census of American Business, 1933, Services, Amusements and Hotels, Vol. I and II, Washington, 1935. Data for 1935 from U.S. Department of Commerce, Bureau of Census, Census of Business, Vol. II, Washington, 1939, and from 1939 Summary (see below). Data for 1939 from U.S. Bureau of the Census, Sixteenth Census of the U.S., 1949, Census of Business, Vol. III, Service Establishments, 1939, Washington, 1942. Data for 1948 from U.S. Bureau of the Census, U.S. Census of Business, 1948, Vol. VI, Service Trade, General Statistics, U.S. Government Printing Office, Washington 25, D.C.: 1952. Data for 1954 from U.S. Bureau of the Census, U.S. Census of Business, 1954, Vol. VI, Selected Services - Trades - Area Statistics, Part 2, U.S. Government Printing Office, Washington 25, D.C., 1956. Data for 1958 from U.S. Bureau of the Census, U.S. Census of Business, 1958, Vol. VI, Selected Services, Trades, Business, 1958, Vol. VI, Part 2, U.S. Government Printing Office, Washington 25, D.C., 1961. Data for 1963 from U.S. Bureau of the Census, Census of Business, 1963, Selected Services, Oklahoma, BC63-SA38, U.S. Government Printing Office, Washington, 25, D.C., 1965.

Notes: [a]Census Reports 1933 to 1948 referred to these establishments as Tourist Courts.

[b]1933 data included all hotels but did not include "tourist camps operated as adjuncts to filling stations."

Tulsa, and Lawton. As might be expected, the number of hotels and motels in Oklahoma is concentrated to a considerable extent in these three areas. In 1963, there were 350 hotels and motels in these three areas, somewhat more than a third of the total number of hotels and motels in the state. In the Tulsa SMSA there are more than twice as many hotels as motels but in the other two SMSA's the number of motels is greater than the number of hotels. (Table 12.)

Retail sales in hotels and motels in Oklahoma from September 1963 to September 1964 was about $38.8 million. This was about 1.1 per cent of total retail sales in the state; about 10.5 per cent of retail sales in services.[10] At $13 million, their contribution to Oklahoma's personal income in 1963 was about 0.3 per cent.[11]

Summary

Historically, hotels and motels have been closely related to travel. The mode of travel has influenced both their function and location. Nationally, the number of hotels in the nation has declined. The number of motels has increased. In 1963, motels exceeded hotels by a factor of about 1.8. The increase in motels has been sufficient to offset the loss in hotels. In Oklahoma hotels have declined; motels have increased.

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[10] Oklahoma Business Bulletin, Bureau of Business Research, The University of Oklahoma, Norman, Oklahoma, Vols. 31 and 32.

[11] Survey of Current Business, Department of Commerce, August 1963, Vol. 44, No. 8, Table 47, p. 13.

TABLE 12

NUMBER OF HOTELS AND MOTELS IN STANDARD METROPOLITAN STATISTICAL AREAS IN OKLAHOMA, CENSUS YEARS, 1939 to 1963

Year and Type of Establishment	Standard Metropolitan Statistical Areas[a]			Total
	Oklahoma City	Tulsa	Lawton[b]	
1939[c]				
Hotels	136	72	-[d]	208
Motels	-	-	-	-
Total	-	-	-	-
1948				
Hotels	107	77	-	184
Motels	58	35	-	93
Total	165	112	-	277
1954				
Hotels	83	88	-	171
Motels	57	50	-	107
Total	140	138	-	278
1958				
Hotels	117	149	-	266
Motels	94	34	-	128
Total	211	183	-	394
1963				
Hotels	80	98	7	202
Motels	94	47	17	148
Total	174	145	24	350

Sources: Data for 1939 from U.S. Bureau of the Census, Sixteenth Census of the U.S., 1940, Census of Business, Vol. III, Service Establishments, Hotels, Tourist Courts and Tourist Camps, 1939. U.S. Government Printing Office, Washington, D.C., 1942. Data for 1948 from U.S. Bureau of the Census, U.S. Census of Business, 1948, Vol. VII,

(Continued on next page)

TABLE 12 (Continued)

Service Trade - Area Statistics, U. S. Government Printing Office, Washington, D.C., 1951. Data for 1954 from U.S. Bureau of the Census. U.S. Census of Business, 1954, Vol. VI, Selected Service Trades - Area Statistics, Part 2, Missouri-Wyoming and Alaska and Hawaii, U.S. Government Printing Office, Washington, D.C., 1956. Data for 1958 from U.S. Bureau of the Census, U.S. Census of Business, 1958, Vol. VI, Selected Service Trades - Area Statistics, Part 2, Missouri, Wyoming, Alaska and Hawaii, U.S. Government Printing Office, Washington, D.C., 1961. Data for 1963 from U.S. Bureau of the Census, Census of Business, 1963, Selected Services Oklahoma BC63-SA38, U.S. Government Printing Office, Washington, D.C., 1965.

Notes: [a]1939 data is for cities rather than for Standard Metropolitan Statistical Areas.

[b]Lawton area designated as a Standard Metropolitan Statistical Area in 1963.

[c]1939 data for motels not available.

Terminology for hotels remained constant. "Motels" is an all-inclusive term for tourist courts, camps, and motor hotels.

[d]--indicates data not available.

Terminology for hotels is constant. Motels is an all-inclusive term for tourist courts, camps, and motor hotels.

In 1958, their numbers were about equal. About a third of them were concentrated in the SMSA's in 1963. The pace of motel construction in Oklahoma has been about half the national rate. Retail sales accounted for about 1 per cent of total sales; 10.5 per cent of sales among statewide services.

CHAPTER IV

CHARACTERISTICS OF HOTELS AND MOTELS IN OKLAHOMA

In this chapter there is a discussion of the major characteristics of hotels and motels in Oklahoma. They include location with respect to the central business district, the kind of clientele served, the type of service offered, age, size, number of employees, daily rental rate, occupancy rate, and seasonality.

Location

Most hotels in Oklahoma are located in or near the central business district. (Table 13.) Nearly 95 per cent of the responding hotels are so located. No hotels reported a rural location. Motels, on the other hand, are located mainly at or near the edge of town. About 1 out of 3 are found in this location. Thirteen of the 41 motels located in rural areas are the state owned resort lodges. Over a third of the total establishments are located in Tulsa and Oklahoma City.

Clientele

Hotel patronage is almost evenly divided between per-

TABLE 13

DISTRIBUTION OF HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO QUESTIONNAIRE, BY LOCATION WITH RESPECT TO THE CENTRAL BUSINESS DISTRICT, 1963-1964

Location	Hotels		Motels		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
In or near the central business district	296	94.9	111	23.6	407	52.0
At or near the edge of town	15	5.1	319	67.7	335	42.8
In a rural location	0	0.0	41	8.7	41	5.2
Total	312	100.0	471	100.0	783	100.0

Source: Questionnaire.

Note: All respondents answered the question, "Is your establishment located in or near the central business district, at or near the edge of town, or in a rural location?"

manent and transient guests. (Table 14.) Some 53 per cent cater mainly to permanent guests. About 47 per cent have mainly transient traffic. Motel patronage is largely transient. Over 90 per cent of the motels indicated most of their clientele was transient. An increasing amount of commercial clientele was reported by motel owners.

Type of Service

Most hotels in Oklahoma limit their services to lodging. About 1 out of 10 has a restaurant. Only 3 hotels out of more than 300 have a service station and only 4 of the total have a swimming pool. (Table 15.) Services in addition to lodging are more frequent among motels. About 1 out of 6 motels has a restaurant, and 1 out of 5 has a swimming pool. Only 11 respondent motels have a service station attached to them.

Age

Oklahoma's hotels are relatively old. (Table 16.) More than three-fourths of the reporting hotels are at least 30 years old. Only 1 hotel reported an age of 1 year or less. The average age among hotels is 33.1 years. A different age pattern emerges among motels. Less than 8 per cent of them are 30 years old and over. On the other hand, more than 40 per cent are less than 10 years old. Another 40 per cent are in the 10 to 19 year age bracket. The average age of motels is 12.6 years.

TABLE 14

DISTRIBUTION OF HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, BY TYPE OF CLIENTELE, 1963-1964

Type of Clientele	Hotels		Motels		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Transient	116	46.6	377	93.8	493	75.7
Permanent	135	53.4	25	6.2	158	24.2
Total	249	100.0	402	100.0	651	100.0

Source: Questionnaire.

Note: 63 hotels and 69 motels did not answer the question, "Are most of your patrons permanent or transient?"

TABLE 15

DISTRIBUTION OF HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, BY TYPE OF SERVICE, 1963-1964

Service	Respondents		With Service		Without Service	
	Hotels	Motels	Hotels	Motels	Hotels	Motels
Lodging	312	471	312	471	0	0
Restaurant	256	397	35	79	221	318
Service Station	268	392	3	11	265	381
Swimming Pool	268	402	4	95	264	307

Source: Questionnaire.

TABLE 16

DISTRIBUTION OF HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, BY AGE OF ESTABLISHMENT, 1963-1964

	Hotels		Motels		Total	
Age in Years	Number	Per Cent	Number	Per Cent	Number	Per Cent
1 year or less	1	0.5	17	4.4	18	3.0
2 - 4	2	0.9	61	15.7	63	10.4
5 - 9	5	2.3	90	23.2	95	15.6
10 - 19	17	7.7	142	36.6	159	26.2
20 - 29	23	10.5	48	12.4	71	11.7
30 and over	172	78.2	30	7.7	202	33.2
Total	220	100.0*	388	100.0*	608	100.0*

Source: Questionnaire.

Note: 92 hotels and 83 motels did not answer the question, "How old, in years, is your establishment?"

*Totals will not add to 100.0 because of rounding

Size

Most hotels and motels in Oklahoma are relatively small. (Table 17.) Over 60 per cent of the hotels included in the survey have less than 40 guest rooms. Over a third of them are in the 20 to 39 room class. Only 3 reported having more than 400 guest rooms. The arithmetic mean size among hotels is 48.7 rooms. The median size is 33 rooms. Motels, on the average, are slightly smaller than hotels. Almost 80 per cent have less than 40 units. Almost half have fewer than 10 units. At the other extreme, there is only 1 motel with more than 400 units. Six have 200 or more. The motel mean size is 33.1 units. The median size is 21 units.

Employment

The pattern of employment is similar in both hotels and motels. Almost three-fourths of both hotels and motels employ less than 4 full-time employees. (Table 18.) Slightly more than a fourth of them reported having no full time employees. At the opposite extreme only 7 of 252 hotels and 8 of 386 motels have 50 or more employees. The average number of employees per hotel is 5.6; the median number is 3. The motel average is 4.9 employees. The median is 2.

Daily Rental Rate

The rental rate structure is different in hotels and motels. (Table 19.) Hotel rates for the most popular single

TABLE 17

DISTRIBUTION OF HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, BY NUMBER OF ROOMS OR UNITS, 1963-1964

Number of Rooms or Units	Hotels		Motels		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Less than 10	6	2.3	43	10.5	49	7.3
10 - 19	61	23.1	153	37.3	214	31.8
20 - 39	95	36.0	129	31.5	224	33.2
40 - 79	72	27.3	49	12.0	121	18.0
80 - 99	6	2.3	15	3.7	21	3.1
100 - 199	15	5.7	15	3.7	30	4.5
200 - 399	6	2.3	5	1.2	11	1.6
400 and more	3	1.1	1	0.2	4	0.6
Total	264	100.0*	410	100.0*	674	100.0*

Source: Questionnaire.

Note: 48 hotels and 61 motels did not answer the question, "How many rooms, or units, are there in your establishment?"
Totals do not add to 100.0 because of rounding.

TABLE 18

DISTRIBUTION OF HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO QUESTIONNAIRE, BY NUMBER OF YEAR-ROUND EMPLOYEES, 1963-1964

Number of Employees	Hotels		Motels		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
0	71	28.2	109	28.2	180	28.2
1 - 3	117	46.4	179	46.4	296	46.4
4 - 9	35	13.9	51	13.2	86	13.5
10 - 19	12	4.8	20	5.2	32	5.0
20 - 49	10	4.0	19	4.9	29	4.5
50 and over	7	2.8	8	2.1	15	2.4
Total	252	100.0*	386	100.0*	638	100.0*

Source: Questionnaire.

Note: An average of 60 hotels and 85 motels did not answer the question, "How many full-time employees, other than members of your family, do you have in the hotel or motel proper during the fall, winter, spring and summer?" Questionnaire did not ask for year-round data. Distribution of establishments is a weighted arithmetic mean computed from establishments reporting in all four seasons.

*Totals may not add to 100.0 because of rounding.

TABLE 19

DISTRIBUTION OF HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO QUESTIONNAIRE, BY DAILY RENTAL RATE OF MOST POPULAR SINGLE ROOM, 1963-1964

Daily Rental Rate	Hotels		Motels		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
$1.00 - 1.99	80	31.2	3	0.7	83	12.7
$2.00 - 4.99	134	52.3	87	21.8	221	33.7
$5.00 - 9.99	37	14.5	290	72.7	327	49.9
$10.00 - 15.99	5	2.0	17	4.3	22	3.4
$16.00 and over	0	0.0	2	0.5	2	0.3
Total	256	100.0	399	100.0	655	100.0

Source: Questionnaire.

Note: Questionnaire did not ask for a year-round rental rate. Distribution of establishments is a weighted arithmetic mean of the seasonal data. An average of 56 hotels and 72 motels did not respond to the question, "What is the daily rental price of your most popular room, or unit, on a single basis during the fall, winter, spring, and summer?"

Totals do not add to 100.0 because of rounding.

room are concentrated in the $2.00 to $4.99 per day class.[1] Over half the reporting hotels are in this bracket. Nearly a third of them fall in the $1.00 to $1.99 per day group. The average rate for all hotels is $3.09. Motel rates are higher. Nearly three-fourths of them have a daily rate from $5.00 to $9.99 for their most popular single unit. About a fifth of them have a daily rate from $2.00 to $4.99. The average rental rate among motels is more than twice the hotel average rate. It is $6.81.

Occupancy Rate

About a fifth of the hotels reported a year round occupancy rate from 70 to 79 per cent. (Table 20.) At the extremes of the distribution, about an eighth of them have an occupancy rate of 90 per cent and more. These were often the lower priced, less desirable houses. Another eighth reported an occupancy rate of less than 30 per cent. Their year round average occupancy rate is 67.9 per cent. Nearly a third of the motels reported a year round occupancy rate of 70 to 79 per cent. Only about a tenth of the motels have a year round

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[1]Single rates are reported for the sake of ease of comparison. A sampling of operators (Members of the Oklahoma City Hotel and Motel Owners and Operators Association) indicated that year-round multiple occupancy occurs in hotels about half the time; in motels about three-fourths of the time. Seasonally, there is little difference among hotels. In motels the summer season has more than 90 per cent multiple occupancy. The year-round average is about 1.6 persons per hotel room; about 1.8 in motels. The motel summer average, however, is about 2.3 persons per room.

TABLE 20

DISTRIBUTION OF HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO QUESTIONNAIRE BY YEAR-ROUND OCCUPANCY RATE, 1963-1964

Occupancy Rate (Per Cent)	Hotels		Motels		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
90% and over	35	13.5	34	9.5	69	11.2
80 - 89	24	9.3	64	17.8	88	14.2
70 - 79	53	20.5	111	30.9	164	26.5
60 - 69	35	13.5	53	14.8	88	14.2
50 - 59	38	14.7	45	12.5	83	13.4
40 - 49	18	6.9	26	7.2	44	7.1
30 - 39	24	9.3	19	5.3	43	7.0
Less than 30	32	12.4	7	2.0	39	6.3
Total	259	100.0	359	100.0	618	100.0

Source: Computed from questionnaire.

Note: 53 hotels and 112 motels did not respond to the question, "On the average, what per cent of your rooms are occupied the year round?"
Totals do not add to 100.0 because of rounding.

occupancy rate of 90 per cent and more. Most of these were the newer establishments located on the newly constructed interstate highway system, especially in and around Tulsa and Oklahoma City. A very small fraction of the total number of motels had an occupancy rate of less than 30 per cent. The average year round motel occupancy rate was 68.5 per cent.

Seasonality

Seasonality is not an important factor among hotels and motels in Oklahoma. Only 27 of 779 respondents indicated they operate less than 50 weeks out of the year. Daily rental rates change only slightly with the seasons.[2] Employment changes even less. The occupancy rate among hotels is also stable. (Table 21.) The highest hotel occupancy rate occurs in the winter at 68.5 per cent. The lowest hotel occupancy rate was reported in the summer at 67.9 per cent. The annual difference between the winter rate and the summer rate is only 1.1 percentage points. Motel seasonal changes in the occupancy rate differ, both in magnitude and order, from the hotel observations. The highest motel occupancy rate is in the summer; the lowest in the winter. The summer rate is 80.3 per

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[2]This observation is based on the questionnaire response. Conversation with the operators on this point could be paraphrased: "I wouldn't think of deviating from the published rental rates, but some do. The hour of the night, how many units are occupied, and the appearance of the potential occupant often have more to do with the price than the season of the year. A local event that attracts an abnormally large clientele also will probably induce some operators to increase their rates."

TABLE 21

MEAN OCCUPANCY RATE OF HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, BY SEASON, 1963-1964

Season	Occupancy Rate (Per Cent)		
	Hotels	Motels	Total
Fall	67.8	62.5	64.7
Winter	68.3	55.7	60.7
Spring	67.5	68.7	67.7
Summer	67.2	80.3	75.2
Year-round	67.9	68.5	67.3

Source: Questionnaire.

Note: Seasonal details will not check with year-round rates because different establishments were reporting at different seasons.

cent, although many of the newer motels have a summer occupancy rate of 100 per cent. The winter rate is 55.7 per cent.

Summary

Most Oklahoma hotels are located in or near the central business district and cater primarily to permanent clientele. They provide lodging, but only a few have a restaurant, a swimming pool, or a service station. They operate the year round and have a year-round occupancy rate of about 68 per cent. The occupancy rate is only slightly seasonal. The rental rate and employment also varies only slightly with the seasons. Hotels average about 33 years of age, with a median size of 33 rooms and 5 to 6 full-time staff. Daily rental rates for their most popular single room ranges from $3 to $5.

Most Oklahoma motels are located at or near the edge of town and cater primarily to transient traffic. Their median size is 21 units, but most of them do not have a swimming pool, a service station, or a restaurant. They are more likely to have these added services than a hotel. Motels average about 12 to 13 years old. They operate with a year round occupancy rate of about 68 per cent. Their seasonal occupancy rate varies more than hotels, however, It ranges from a summer high of about 80 per cent to a winter low of

some 56 per cent. Neither motel rental rates nor employment show marked seasonal changes. On the average they have only 2 to 3 full-time employees. The daily motel rental rate is more than twice the hotel rate at about $7.

CHAPTER V

ANNUAL WATER WITHDRAWAL IN HOTELS AND MOTELS IN OKLAHOMA

About 285 billion gallons of fresh water were withdrawn in Oklahoma during 1960 for all purposes, except the generation of electric power.[1] Hotels and motels included in this study withdrew 841 million gallons from September 1963 to September 1964, This is about 0.3 per cent of the 1960 state withdrawal, or less than one day's statewide use. Hotels took 402 million gallons; motels 439 million. About 498 million gallons were used by establishments located in or near central business districts. Some 318 million gallons were used by establishments located at or near the edge of the cities; 25 million gallons by rural establishments.

Total Withdrawal

Geographical Location. The 841 million gallons of total hotel and motel water withdrawal during the reporting

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[1]Computed from K. A. MacKichan and J. C. Kammerer, Estimated Use of Water in the U. S., 1960, Geological Survey Circular 456, U. S. Department of the Interior, Washington, 1961, Table 1, p. 13; Table 5, p. 16; Table 7, p. 18; Table 15, p. 24.

year in Oklahoma ranged from 149,000 gallons in Prague to 228 million gallons in Oklahoma City. (Table 22.) In Tulsa it was 176 million gallons. Withdrawals in Oklahoma City and Tulsa accounted for almost half the total in the state. No other city exceeded 50 million gallons. Lawton, at 49.5 million gallons, followed Tulsa. Other leading cities were Enid (28 million gallons) and Muskogee (23 million gallons). The 13 state-owned and operated resort lodges reported a total withdrawal of about 6 million gallons during the year. This was about the same as the withdrawal reported by hotels and motels in Claremore. By way of comparison, the average daily withdrawal for all purposes from the Tulsa municipal water system is about 50 million gallons. Peak daily withdrawal was registered in Tulsa in July 1966 at 95.7 million gallons.[2]

Source. Municipal sources provided 774 million of the 841 million gallon total withdrawn by hotels and motels in Oklahoma. Total annual withdrawal in the state from municipal sources has been estimated at 77 billion gallons.[3] Hotel and motel withdrawal was about 1.1 per cent of this amount. Withdrawal by hotels and motels in all cities except Bethany, Chickasha, and Madill came mostly from municipal sources.

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[2] Tulsa Daily World, Tulsa, Oklahoma, July 19, 1966, p. 15.

[3] MacKichan and Kammerer; loc. cit.

TABLE 22

ANNUAL WATER WITHDRAWAL BY HOTELS AND MOTELS IN OKLAHOMA, RESPONDING TO THE QUESTIONNAIRE, BY CITY AND SOURCE, 1963-1964*

City	SOURCE		
	Municipal	Private	Total
	(Thousands of Gallons Per Year)		
Ada	14,685	-	14,685
Altus	12,316	-	12,316
Alva	3,728	-	3,728
Anadarko	1,877	-	1,877
Antlers	1,388	-	1,388
Ardmore	13,532	4,455	17,987
Bartlesville	18,336	-	18,336
Bethany	-	591	591
Blackwell	3,561	-	3,561
Chickasha	2,000	2,620	4,620
Claremore	6,224	-	6,224
Clinton	11,085	-	11,085
Cushing	2,770	35	2,805
Del City	2,183	-	2,183
Duncan	11,502	-	11,502
Durant	6,363	640	7,003
Edmond	1,175	-	1,175
Elk City	8,927	-	8,927
El Reno	6,529	-	6,529
Enid	27,641	-	27,641
Frederick	952	-	952
Guthrie	5,217	-	5,217
Guymon	12,469	-	12,469
Henryetta	3,461	-	3,461
Hobart	2,527	810	3,337
Holdenville	648	-	648
Hugo	5,740	-	5,740
Lawton	48,609	925	49,534
Madill	1,422	4,138	5,560
Marlow	1,664	-	1,664

Continued on next page.

TABLE 22 (Continued)

City	SOURCE Municipal (Thousands of Gallons Per Year)	Private	Total
McAlester	18,081	-	18,081
Miami	17,188	-	17,188
Midwest City	6,071	69	6,140
Moore	325	42	367
Muskogee	21,492	1,603	23,095
Norman	16,615	-	16,615
Oklahoma City	195,543	32,823	228,366
Okmulgee	4,043	348	4,391
Owasso	512	-	512
Pauls Valley	888	-	888
Pawhuska	3,159	152	3,311
Perry	8,917	8,059	16,976
Ponca City	12,844	89	12,933
Poteau	2,825	-	2,825
Prague	149	-	149
Pryor	3,885	-	3,885
Sand Springs	741	-	741
Sapulpa	1,700	-	1,700
Seminole	2,566	-	2,566
Shawnee	10,184	135	10,319
Stigler	1,753	-	1,753
Stillwater	6,215	-	6,215
Tahlequah	5,079	2,119	7,198
Tulsa	173,902	1,895	175,797
Vinita	4,785	-	4,785
Wewoka	3,131	346	3,477
Woodward	11,302	181	11,483
Yukon	502	-	502
State Lodges**	592	5,535	6,127
TOTAL	773,520	67,610	841,130

Source: Municipal sources taken directly from water department records of the appropriate city. Private sources estimated by the water user.

Notes: *The Year of Record runs from September 1963 to August 1964. **These are not elsewhere classified by location.

Total annual withdrawal in the state from private sources has been estimated at 208 billion gallons.[4] Hotel and motel withdrawal, at about 68 million gallons, was only about .03 of 1 per cent of this total. The largest total private withdrawal of any city occurred in Oklahoma City (33 million gallons). Two large hotels in Oklahoma City get part of their water from private wells. Several large motels on the interstate highway system serving Oklahoma City also have private water supplies. Bethany's hotels and motels were supplied entirely by private sources. Private and municipal sources furnished about equal parts in Perry.

Seasonal Variation. The volume of water used at hotels and motels was low during the winter, increased during the spring, reached a peak in the summer, and tapered off in the fall. (Table 23.) There was less seasonal variation in hotel water use than motel use. The increase in water use by hotels between winter and summer was about a third, while the increase by motels was almost a half.

Percentage Distribution

A small number of hotels in the upper water withdrawal bracket account for the majority of total water withdrawal. Only 9 per cent of the hotels withdraw as much as 3.6 million gallons per year, but they take almost 60 per cent of the total

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[4] Ibid.

TABLE 23

WATER WITHDRAWAL BY HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, BY SEASON, 1963-1964

Season	Hotels	Motels	Total
		(Thousands of Gallons)	
Fall	106,090	109,499	215,589
Winter	88,411	82,191	170,602
Spring	92,747	96,952	189,699
Summer	115,015	150,225	265,240
Total	402,263	438,867	841,130

Source: Computed from questionnaire response and from water department records.

amount by hotels. (Table 24.) On the other hand, a large number of hotels take a very small amount of water. More than half the hotels require less than 400,000 gallons per year. These account for only 8 per cent of the hotel total withdrawal.

Water withdrawal is not so concentrated among motels. Some 5 per cent of the hotels are in the 3.6 million annual gallon withdrawal bracket. They take about 29 per cent of the motel total. At the other extreme of the distribution about 40 per cent of the motels withdraw less than 400,000 gallons annually. They take only about 8 per cent of the total annual motel water requirement.

Size. A large share of total hotel withdrawal occurs among larger hotels. (Table 25.) Only about 1 per cent of the hotels have 400 or more rooms but these few hotels use almost a fourth of the total hotel water. Only 10 per cent of the hotels have as many as 100 rooms. They use more than 60 per cent of the hotel water. At the low end of the size scale, about a fourth of the hotels have less than 20 rooms. They use only 4 per cent of hotel water.

Withdrawal is also concentrated in a few large motels. About 5 per cent of the motels have 100 or more units. These motels use nearly 25 per cent of total motel withdrawal. Over a third of the motels have from 10-19 units, but they take only about a sixth of total motel water.

Rental Rate. Most hotel water is withdrawn in the relatively small number of hotels charging the higher rates.

TABLE 24

PERCENTAGE DISTRIBUTION OF ANNUAL WATER WITHDRAWAL BY HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, 1963 - 1964

Annual Water Withdrawal (Thousands of Gallons)	Hotels		Motels		Total	
	Per Cent of:		Per Cent of:		Per Cent of:	
	Establish-ments	With-drawal	Establish-ments	With-drawal	Establish-ments	With-drawal
Less than 400	51.1	8.0	39.8	8.3	44.4	8.2
400 - 799	21.4	9.9	27.3	17.0	24.9	13.6
800 - 1,199	7.1	5.6	12.3	12.8	10.2	9.4
1,200 - 1,599	4.9	5.3	6.8	10.1	6.0	7.8
1,600 - 1,999	1.9	2.7	3.5	6.7	2.9	4.8
2,000 - 2,399	1.6	2.4	2.0	4.5	1.8	3.5
2,400 - 2,799	1.3	2.9	1.8	4.9	1.6	4.0
2,800 - 3,199	0.6	1.7	0.9	2.7	0.8	2.2
3,200 - 3,599	1.0	1.7	1.1	3.7	1.0	2.7
3,600 and over	9.1	59.9	4.6	29.2	6.4	43.8
Total*	100.0	100.0	100.0	100.0	100.0	100.0

Source: Computed from data in questionnaire.
*Note: Components may not add to totals because of rounding.

TABLE 25

PERCENTAGE DISTRIBUTION OF ESTABLISHMENTS AND ANNUAL WATER WITHDRAWAL IN OKLAHOMA HOTELS AND MOTELS RESPONDING TO THE QUESTIONNAIRE, BY SIZE, 1963-1964

Number of Rooms or Units	Hotels		Motels	
	Per Cent of:		Per Cent of:	
	Establish-ments	With-drawal	Establish-ments	With-drawal
Less than 10	2.3	0.2	10.5	2.4
10 - 19	23.1	3.8	37.3	16.3
20 - 39	36.0	12.1	31.5	23.6
40 - 79	27.3	20.1	12.0	22.6
80 - 99	2.3	2.5	3.7	11.4
100 - 199	5.7	19.2	3.7	17.5
200 - 399	2.3	18.5	1.2	3.9
400 and more	1.1	23.8	0.2	2.4
Total*	100.0	100.0	100.0	100.0

Source: Computed from data in questionnaire.

*Note: Totals do not add to 100.0 because of rounding.

Only about 15 per cent of the hotels are in the $5.00 to $9.99 rental rate bracket, but they take over half the annual hotel water requirement. (Table 26.) Over half the hotels have a daily single rate of $2.00 to $5.00, but they take only one-fourth of the hotel water. A fairly large percentage of hotels, (32 per cent), are in the less than $2.00 rental rate bracket, but they withdraw only about 8 per cent of the total hotel water.

Motels have a different withdrawal pattern. Most motels, just under three-fourths, charge from $5.00 to $9.99, and they use just over three-fourths of the motel water.

Summary

Hotels and motels in Oklahoma responding to the questionnaire withdrew about 841 million gallons from September 1963 to September 1964. This was about 0.3 per cent of the 1960 estimated withdrawal throughout the state. Hotel withdrawal was 402 million gallons; motel withdrawal was 439 million gallons. About half the hotel and motel withdrawal occurs in Tulsa and Oklahoma City. Municipal sources provide over 90 per cent of the total. There is more seasonal variation among motels than hotels. Hotel water withdrawal is concentrated in the few establishments having large annual requirements; in the few large hotels and in the few

TABLE 26

PERCENTAGE DISTRIBUTION OF ESTABLISHMENTS AND ANNUAL WATER WITHDRAWAL BY HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, BY DAILY RENTAL RATE OF THE MOST POPULAR SINGLE GUEST ROOM OR UNIT, 1963-1964

Daily Rental Rate (Dollars)	Hotels		Motels	
	Per Cent of:		Per Cent of:	
	Establish-ments	With-drawal	Establish-ments	With-drawal
$ 1.00 - 1.99	31.2	8.4	0.7	0.5
$ 2.00 - 4.99	52.3	26.1	21.8	11.2
$ 5.00 - 9.99	14.5	51.3	72.7	78.5
$10.00 - 15.99	2.0	14.2	4.3	9.6
$16.00 and over	0.0	0.0	0.5	0.1
Total	100.0	100.0	100.0	100.0

Source: Computed from data in questionnaire.

Note: Totals do not add to 100.0 because of rounding.

charging the higher daily single rental rates. Motel water withdrawal is also concentrated in the few establishments having large annual requirements, but not to the same degree as among hotels.

CHAPTER VI

DAILY WATER WITHDRAWAL AND THE OCCUPANCY RATE IN HOTELS AND MOTELS IN OKLAHOMA

Water withdrawal in the previous chapter has been related to several major characteristics of hotels and motels in Oklahoma. One of the characteristics not examined was the occupancy rate. The occupancy rate and its water use relationships to the other characteristics will be discussed in this chapter. The data will be reduced to average daily water withdrawal per occupied room.[1]

Kind of Establishment

For all establishments and without regard to characteristic, about 50 per cent more water is withdrawn in a

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[1]Values in this chapter have been computed from questionnaire response. Within each characteristic, the sum of the product of individual establishment rooms or units times the occupancy rate has been divided by the sum of water withdrawals per day for those establishments providing answers to the appropriate questions. Hence, a slight variation will be noted in footings in the tables. Footings in Table 29 do not agree with the averages in Tables 27 and 28. The lack of agreement will be noted in all other tables in this chapter except Table 30. A different group of establishments forms the basis for each table because of the lack of uniformity in response to basic questions such as size, employment, occupancy rate, etc.

day per average occupied motel room than per hotel room.[2] (Table 27.) Hotels take just over 97 gallons per occupied room daily. Motel withdrawal is about 147 gallons per day.

Relative Location

Hotels located at or near the edge of town have a greater average daily water use rate per occupied room than in any other relative location (Table 28). It is nearly 140 gallons per day. These hotels frequently offer limited kitchen facilities for permanent guests. This coupled with their small number tends to increase their average withdrawal. Those in or near the central business district withdraw an average of only 95 gallons daily per room. There are no rural hotels.

Motel withdrawal is opposite. The largest daily withdrawal per occupied room among motels occurs in or near the central business district. It is about 166 gallons per day. Both rural motels and those located at or near the edge of town have nearly equal withdrawal at about 140 gallons per day per room each.

Clientele

Opposite withdrawal patterns also prevail among hotels and motels with respect to clientele. (Table 29.) Daily use

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[2]These data do not imply this quantity of water is used in the room. The occupied room is the common denominator. The following chapter will refine the data in this respect.

TABLE 27

MEAN DAILY WITHDRAWAL IN GALLONS PER DAY PER OCCUPIED QUEST ROOM OR UNIT BY HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, SEPTEMBER 1963 TO SEPTEMBER 1964

Establishment	Gallons per Day
Hotels	97.4
Motels	146.5
All Establishments	126.9

Source: Computed from Questionnaire response.

TABLE 28

MEAN DAILY WATER WITHDRAWAL IN GALLONS PER DAY PER OCCUPIED GUEST ROOM OR UNIT BY HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, BY LOCATION WITH RESPECT TO THE CENTRAL BUSINESS DISTRICT, 1963-1964

Location	Hotels (Gallons Per Day)	Motels (Gallons Per Day)	Both (Gallons Per Day)
In or near the Central Business District	95.2	165.6	114.4
At or near the Edge of Town	139.1	140.5	140.4
In a Rural Location	0.0	141.4	141.4
All Locations	97.4	146.5	126.9

Source: Computed from questionnaire response.

TABLE 29

MEAN DAILY WATER WITHDRAWAL IN GALLONS PER DAY PER OCCUPIED GUEST ROOM OR UNIT BY HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, BY CLIENTELE, 1963-1964

Type of Clientele	Hotels (Gallons Per Day)	Motels (Gallons Per Day)	Both (Gallons Per Day)
Permanent	89.8	188.3	106.0
Transient	100.5	145.1	134.6
Combined Clientele	94.7	147.7	127.8

Source: Computed from questionnaire response.

per occupied room is greater among hotels catering primarily to transient patrons. The difference is slight. Those with mainly transient patrons use about 100 gallons per day; permanent about 90.

In contrast, motels with mainly permanent patrons use more water daily per occupied room than those with transient patrons. The daily use rate is higher in motels than hotels for both types of clients. About 188 gallons per day are used by permanent motel patrons per room; about 145 by transient clients.

Source of Supply

Both hotels and motels with a municipal water supply have a greater daily withdrawal per occupied room than those with a private source. (Table 30.) Hotel withdrawal is less than motel, regardless of source. Hotels take about 98 gallons per day per occupied room from municipal sources; about 37 gallons per day from private sources.

Motel daily withdrawal per occupied room from municipal sources is 159 gallons; from private sources, 46.

Size

The daily withdrawal pattern by size of the establishment is not well defined. It tends to increase irregularly with an increase in size in both hotels and motels. (Table 31.) The smallest hotels have a greater daily withdrawal per occupied room than all but those having 80 or more

TABLE 30

MEAN DAILY WATER WITHDRAWAL IN GALLONS PER DAY PER OCCUPIED GUEST ROOM OR UNIT BY HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, BY SOURCE OF WATER SUPPLY, 1963-1964

Source of Water Supply	Hotels (Gallons Per Day)	Motels (Gallons Per Day)	Both (Gallons Per Day)
Municipal water supply	98.4	159.3	133.5
Private water supply	36.5	45.6	43.2
All sources	97.4	146.5	126.9

Source: Computed from questionnaire response.

TABLE 31

MEAN DAILY WATER WITHDRAWAL PER OCCUPIED GUEST ROOM OR UNIT BY HOTELS AND MOTELS IN OKLAHOMA, BY SIZE OF ESTABLISHMENT IN NUMBER OF GUEST ROOMS OR UNITS, 1963-1964

Number of Rooms or Units	Hotels (Gallons Per Day)	Motels (Gallons Per Day)	Both (Gallons Per Day)
Less than 10	110.9	105.8	106.4
10 - 19	79.0	159.0	131.9
20 - 39	78.6	120.0	102.4
40 - 79	100.8	145.7	119.0
80 - 99	189.2	154.1	169.8
100 - 199	131.7	155.0	142.9
200 and over	157.7	167.0	161.4
All sizes	93.7	139.4	121.5

Source: Computed from questionnaire response.

rooms. The 80-99 room size group has the greatest daily use. The mid-range sizes that have the least water use make up over half the total hotels. Many of these are also among the older hotels with very few water use facilities.

The motel withdrawal pattern is less erratic than the hotel pattern, but it too, is not well defined. The low withdrawal rate is recorded among the smallest size motels at about 106 gallons per day per occupied room. The high rate is noted at the largest. It is 167 gallons. However, the 20 to 39 unit motel requires less water per room per day than any but the smallest size group.

Daily Rental Rate

A different use pattern by rental rate is evident in the two types of establishments. In neither type, however, is the pattern well defined. (Table 32.) In hotels there is an initial rise in water use as rents rise. This is followed by a decline as rents continue to rise. Hotel water use reaches its maximum daily value in the $5.00 to $9.00 rent bracket. It is 169 gallons per day. The minimum is 69 gallons per day in the lowest rent bracket.

Motel use is more irregular than in hotels and even less well defined. It fluctuates from rent bracket to rent bracket. The minimum occurs at the $1.00 to $1.99 price. It is 76 gallons per day. The maximum use occurs in the $10.00 to $15.99 rent level. It is 187 gallons per day per room.

TABLE 32

MEAN DAILY WATER WITHDRAWAL PER OCCUPIED GUEST ROOM OR UNIT BY HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, BY THE DAILY RENTAL RATE OF THE MOST POPULAR SINGLE ROOM OR UNIT, 1963-1964

Daily rental rate (In Dollars)	Hotels (Gallons Per Day)	Motels (Gallons Per Day)	Both (Gallons Per Day)
1.00 - 1.99	68.9	75.5	69.1
2.00 - 4.99	92.8	153.4	134.2
5.00 - 9.99	168.8	126.7	139.3
10.00 - 15.99	71.6	186.6	180.5
16.00 and over	0.0	170.0	170.0
All rates	95.8	148.5	127.9

Source: Computed from questionnaire.

Employment

The trend of daily withdrawal per occupied room as a function of the number of employees is different in hotels and motels. The pattern is diffused in both. (Table 33.) The hotel withdrawal increases irregularly with an increase in the number of employees. The range is from 70 gallons per day in hotels with 4 to 9 employees to 209 gallons per day in establishments with 20 to 49 employees.

The motel withdrawal trend is slightly downward as employment increases. The range is from 162 gallons per day per occupied room in motels with no full-time employees to 140 gallons per day per occupied room in establishments with 50 plus employees. In the lower ranges of employment, motel withdrawal is more than hotel use. In the upper ranges it is less.

Age

Daily withdrawal per day per occupied room, by age, declines among hotels and rises in motels with an increase in age. In each instance, there is no well defined pattern. (Table 34.) The hotel distribution is irregular with the lowest daily withdrawal in the 10 to 19 year old group. The greatest is in the 2 to 4 year group. The range is from 83 to 136 gallons per day.

There is greater irregularity among motels. The greatest withdrawal occurs in the 20 to 29 year age bracket.

TABLE 33

MEAN DAILY WATER WITHDRAWAL PER OCCUPIED GUEST ROOM OR UNIT BY HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, BY NUMBER OF EMPLOYEES, 1963-1964

Number of Employees	Hotels (Gallons Per Day)	Motels (Gallons Per Day)	Both (Gallons Per Day)
0	88.6	161.6	132.8
1 - 3	81.8	144.7	119.8
4 - 9	70.6	161.8	124.7
10 - 19	129.3	138.7	130.4
20 - 49	209.2	153.3	162.7
50 and over	175.0	139.6	156.6
All establishments	92.3	151.7	128.2

Source: Computed from questionnaire response.

TABLE 34

MEAN DAILY WATER WITHDRAWAL PER OCCUPIED GUEST ROOM OR UNIT BY HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, BY AGE OF THE ESTABLISHMENT IN YEARS, 1963-1964

Age in Years	Hotels (Gallons Per Day)	Motels (Gallons Per Day)	Both (Gallons Per Day)
1 or less	88.9	153.3	149.7
2 - 4	136.1	131.2	131.4
5 - 9	101.6	125.9	124.6
10 - 19	83.1	132.7	127.4
20 - 29	109.0	219.6	183.8
30 and over	98.6	214.8	115.9
All ages	98.8	148.9	130.7

Sources: Computed from questionnaire response.

The least is in the 5 to 9 year group. The range is from 126 to 220 gallons per day per occupied room.

Seasonality

The annual seasonal withdrawal pattern showed the greatest withdrawal in the summer, followed by the fall, spring and winter. It is also evident on a daily basis per occupied room for hotels. (Table 35.) The summer high is 114 gallons per day per occupied room. The fall is 104 gallons; the spring 91; the winter 86.

Motel withdrawal is slightly different. Summer ranks in first place at 175 gallons per day. The fall is next at 164 gallons, but the winter and spring have changed places. Motels, despite their low winter seasonal occupancy rate, and their low monthly withdrawal during the winter, have a slightly higher daily withdrawal per occupied room during the winter than in the spring. The winter rate is 158 gallons per day per occupied room. During the spring it is 133 gallons.

Summary

Average daily water use per occupied room, without regard to characteristics, is about 50 per cent more in motels than in hotels. Hotel use is about 97 gallons per day. In motels it is 147.

Daily withdrawal among hotels is greater at the edge of town than in any other relative location; greater for

TABLE 35

MEAN DAILY WATER WITHDRAWAL PER DAY PER OCCUPIED GUEST ROOM OR UNIT BY HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, BY SEASON, 1963-1964

Season	Hotels (Gallons Per Day)	Motels (Gallons Per Day)	Both (Gallons Per Day)
Fall	104.1	163.7	139.8
Winter	86.1	137.9	117.3
Spring	91.4	133.2	116.6
Summer	114.0	174.9	150.8
Year-Round	97.6	145.4	125.6

Note: Details will not prove out to year-round entries because of different establishments reporting in each season.

Source: Computed from questionnaire response.

transient guests than for permanent; greater from municipal than from private sources. It is also greater during the summer than in any other season.

Daily withdrawal by motels, unlike hotels, is greater in or near the central business district than at the edge of town; greater among permanent clientele than transient. Like hotels it is greater from municipal sources than private. Summer is also the season of greatest daily withdrawal among motels.

These data are inclusive of all water withdrawn without regard to the manner in which it is used. A pattern of withdrawal by characteristic is not clearly defined. It is impossible to isolate a single characteristic. Each characteristic operates to influence water withdrawal. It in turn, is influenced by other factors. Moreover, other factors outside the range of these characteristics are also at work. For example, size and number of employees is related, but a large number of employees may result from a greater number of services, as well as size. Two establishments of the same size, in units or rooms, may have widely differing numbers of employees.

Within these limitations, both hotels and motels have a similar withdrawal pattern with respect to size. Average daily withdrawal per occupied room increases with size. Their pattern is opposite by employment and age. Motel withdrawal decreases with an increase in employment; hotel withdrawal

increases. With respect to age, motel water use increases with an increase in age; hotels decrease. The pattern with respect to rental rate is very irregular. Motel withdrawal tends to increase slightly with an increase in rental rates.

One of the outside influences that obscures the pattern is the extent of services offered other than lodging. In the following chapter, we will consider withdrawal and consumption by the several functional services provided by hotels and motels. The universal function, lodging, will be the basis for comparison.

CHAPTER VII

WATER WITHDRAWAL AND FUNCTIONAL SERVICES IN HOTELS AND MOTELS IN OKLAHOMA

Water withdrawal relationships between occupied rooms and major characteristics of hotels and motels in Oklahoma have been discussed in the previous chapter. The withdrawal pattern has not been clearly defined. The pattern has been clouded by other influences often buried in the broad characteristics. One of these influences is the services other than lodging offered by the house. These functional services and their relationships to water withdrawal will be presented in this chapter. These services, other than lodging, are restaurant, swimming pool, and service station. In addition, two other water use categories will be treated. They are heating and air conditioning, and care of the ground. Although these services occur in conjunction with lodging, there is often a lack of direct correlation. For example, a hotel restaurant may cater to a different clientele than the lodging service. A similar situation prevails in the service station. Swimming pools, heating and air conditioning systems, and care of the grounds are also not directly related to lodging. They probably influence patronage, but water

withdrawal in these activities is not a function to the number of lodging patrons.

The Functional Services

The primary function provided by hotels and motels is lodging. All 783 of the establishments replying to the questionnaire provide this function. Another functional service is a restaurant. Restaurants included in the study are an integral part of each establishment. Some 114 restaurants have been identified in the responding establishments. Of this number, 79 are associated with motels and 35 with hotels.

A swimming pool is provided by 99 of the establishments responding to the questionnaire. Motels operate 95 of these. Only 4 are in hotels. A service station was identified in association with 14 establishments. Motels account for 11 of these, while 3 are a service offered by hotels. Heating and air conditioning in some combination would be expected in all establishments. However, only these establishments that reported a heating and/or air conditioning system that requires water for its use are tabulated. There are 80 hotels and 94 motels in this category. Establishments reporting water expenditure for care of the grounds total 86; 67 motels and 19 hotels.

Annual Water Withdrawal by Functional Service

Lodging accounts for the majority of water withdrawal. Annual water withdrawal for the lodging function among the

reporting establishments is 547 million gallons of a reported total of 746 million gallons.[1] (Table 36.) Motels take the most at 278 million gallons per year; hotels take 269 million gallons. As a percentage of their withdrawal by type of establishment, however, hotels take a larger share for lodging than motels; 75.7 per cent as compared to 71.2 per cent. The second largest annual withdrawal in either type of establishment is taken by the restaurant function. In hotels, this is 51 million gallons per year. In motels it is 38 million gallons. The percentage distribution is 14.5 per cent of hotel withdrawal and 9.7 per cent of motel use. The widest difference by establishment category occurs in the swimming pool function. Motels require 30.9 million gallons per year for this function; hotels 3.9 million gallons. On a percentage basis this is 7.9 per cent of motel requirements and 1.1 per cent of the hotel total. Service stations withdraw about 4.7 million gallons during the year. Motel service stations use 3.2 million gallons; hotel service stations, 1.6 million gallons. This is 0.8 per cent in motels and 0.4 per cent in hotels. Water use in heating and air conditioning in hotels exceeds motel use 2.5 times. Hotels withdraw 24.9 million gallons per year for this function while motels take but 9.7

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[1] Computations were based on the response to the question, "What percentage of your total annual water usage was used in the following activities: Rooms and room maintenance, restaurant, swimming pool, service station, care of the grounds, heating and air conditioning." The overall response was about 85 per cent. Therefore, the control total of 841.1 million gallons was not reached.

TABLE 36

ANNUAL WATER WITHDRAWAL IN THOUSANDS OF GALLONS AND AS A PER CENT OF THE TOTAL OF HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, BY FUNCTIONAL SERVICE, 1963-1964

Functional Service	Hotels		Motels		Total	
	thousands of gallons	per cent	thousands of gallons	per cent	thousands of gallons	per cent
Lodging	268,956	75.7	278,413	71.2	547,369	73.4
Restaurant	51,468	14.5	38,047	9.7	89,515	12.0
Swimming Pool	3,978	1.1	30,930	7.9	34,908	4.7
Service Station	1,563	0.4	3,167	0.8	4,730	0.6
Heating and Air-Conditioning	24,899	7.0	9,698	2.5	34,596	4.6
Care of Grounds	4,333	1.2	30,774	7.9	35,107	4.7
Total*	355,198	100.0	391,030	100.0	746,228	100.0

Source: Computed from questionnaire response and municipal water records.

*Totals will not agree with previously indicated totals because of incomplete questionnaire response. See Table 3, Chapter I.

Totals may not add to 100.0 because of rounding.

million gallons. On a percentage basis, this is 7.0 per cent of hotel use as compared with 2.5 per cent for motels. A wide difference in annual withdrawal also occurs in the care of grounds. Motels take 30.8 million gallons per year for this purpose. Hotels take only 4.3 million gallons per year.

In the following sub-sections each of these functional services will be examined in more detail, in the order of lodging, restaurant, swimming pool, service station, heating and air conditioning, and care of the grounds.

Lodging. Total annual motel withdrawal in the lodging function only exceeds hotel by about 9 million gallons. Hotels, however, use a greater share of their total withdrawal in the lodging function than motels. On the basis of monthly withdrawal per establishment in the lodging function only, motels exceed hotels by about 50 per cent. (Table 37.) Hotels withdraw an average of 87.2 thousand gallons per month; motels 57 thousand gallons. The fact that hotels, on the average, are larger than motels helps explain this wider spread. If the lodging data are reduced to daily withdrawal per occupied room, the factor of size is removed. This value for hotels is 80.7 gallons per day per occupied room. For motels it is 100.2 gallons. The daily withdrawal range, per occupied room for the lodging function only, is smaller than for all functions. Moreover, the pattern is more stable and more clearly defined than when the data includes withdrawal for the several other functional services. Withdrawal among

TABLE 37

WATER WITHDRAWAL USED IN THE LODGING FUNCTION BY HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, SEPTEMBER 1963 TO SEPTEMBER 1964

Type of Establishment	Number Providing Lodging	Annual Withdrawal (Thousands of Gallons)	Average Monthly Withdrawal (Thousands of Gallons Per Establishment)	Average Daily Withdrawal Per Occupied Room (Gallons)
Hotel	257	268,956	87.2	80.7
Motel	407	278,413	57.0	100.0
Total	664	547,369	68.7[a]	93.7[a]

Source: Computed from questionnaire response. 664 establishments responded to question basic to computation.

[a]Weighted arithmetic mean.

hotels decreases with an increase in age; increases slightly with an increase in size, employment and occupancy rate. It rises as rents rise from $1.00 to $2.00, but then levels off. The withdrawal pattern among motels rises with an increase in age and size. It shows very little employment influence. Like hotels, an increase in motel rent from $1.00 to $2.00 is accompanied with a rise in water use, but it too, then levels off. The occupancy rate has very little effect on motel withdrawal in the lower levels of occupancy. However, at 80 per cent occupancy and above there is a sharp rise to the 90 per cent and over occupancy rate level. The greater stability of withdrawal values associated wholly with the lodging function indicates a lesser influence of establishment characteristics than a variety of services. Relative stability of water use in the lodging function is indicated regardless of size, rental rate, employment, or occupancy rate. Daily withdrawal has somewhat lesser stability in two of these characteristics. The characteristics are age among hotels and occupancy rate among motels. Older hotels have a much smaller daily withdrawal rate. They also have limited water use facilities. Many have only one bath room per floor. Motels with higher occupancy rates tend toward greater daily withdrawal. This is because of the greater multiple occupancy in motels, especially during the summer. The range of withdrawal in the lodging function is attributable, therefore, to two main factors: water use facilities and number

of persons per occupancy.

The effect of the multiple occupancy may be removed by applying the average occupancy factors. The average year-round occupancy per room among hotels is 1.6. It is 1.8 in motels. There is very little seasonality among hotels, but the summer value for motels is about 2.3. The application of these year-round factors reduces withdrawal per person to about 50 gallons per day in hotels; to 56 gallons in motels. It is a stable value, not greatly influenced by any of the hotel or motel characteristics.

An important aspect of withdrawal in the lodging function is that it may be closely identified with the registered patronage of the establishment. Other functional services, especially the restaurant and service station, may bear little relationship to the registered clientele.

Restaurants. There are less than half the number of restaurants associated with hotels than motels. However, those associated with hotels use a third more water than those in motels. Their withdrawal is 51.5 million gallons of water during the year. (Table 38.) The restaurants associated with hotels are often large multi-purpose food service organizations. Those associated with motels withdraw 38 million gallons of water during the year. The larger number of restaurants associated with motels are often smaller with less diversified activity. This observation is substantiated by the average monthly withdrawal per establishment. Res-

TABLE 38

WATER WITHDRAWAL BY RESTAURANTS ASSOCIATED WITH HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, SEPTEMBER 1963 TO SEPTEMBER 1964

Type of Establishments	Number Providing Restaurants	Annual Withdrawal (Thousands of Gallons)	Average Monthly Withdrawal (Thousands of Gallons Per Establishment)
Hotel	35	51,468	122.5
Motel	79	38,047	40.1
Total	114	89,515	65.4[a]

Source: Computed from questionnaire response. 653 establishments responded to question basic to computation.

[a]Weighted arithmetic mean.

taurants associated with hotels use, on the average, 122.5 thousand gallons of water per month. Those associated with motels use only one-third this amount, 40.1 thousand gallons per month.

Swimming Pools. There are 95 of the 99 reported pools in motels. (Table 39.) Annual water withdrawal reflects, in part, this condition. Motels require 30.9 million gallons per year. On an average monthly basis per establishment, however, the hotel requirement is 83 thousand gallons compared to 27 thousand gallons for motels. This wide difference may be accounted for by the fact that the hotel swimming pools are usually larger and operate the year-round, while the motel pools are smaller and operate seasonally.

Service Stations. Nearly four times more service stations are associated with motels than hotels. (Table 40.) There are 11 service stations associated with motels, but only 3 hotels reported a service station. The amount of water withdrawn, however, does not reflect a similar ratio. Motel service stations withdraw 3.2 million gallons during the year. Hotel stations require only about half that amount at 1.6 million gallons per year. On an average monthly basis per establishment the hotel service station requires 43,000 gallons. The average motel service station takes but 24,000 gallons per month. The few service stations associated with hotels usually offer a greater range of services than the larger number of smaller establishments associated with motels.

TABLE 39

WATER WITHDRAWAL BY SWIMMING POOLS IN HOTELS AND MOTELS
IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE
SEPTEMBER 1963 to SEPTEMBER 1964

Type of Establishment	Number Providing Swimming Pools	Annual Withdrawal (Thousands of Gallons)	Average Monthly Withdrawal (Thousands of Gallons Per Establishment)
Hotel	4	3,978	83.0
Motel	95	30,930	27.1
Total	99	34,908	29.4[a]

Source: Computed from questionnaire response. 670 establishments responded to question basic to computation.

[a]Weighted arithmetic mean.

TABLE 40

WATER WITHDRAWAL BY SERVICE STATIONS ASSOCIATED WITH HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, SEPTEMBER 1963 TO SEPTEMBER 1964

Type of Establishment	Number Providing Service Stations	Annual Withdrawal (Thousands of Gallons)	Average Monthly Withdrawals (Thousands of Gallons Per Establishment)
Hotel	3	1,563	43.3
Motel	11	3,167	24.0
Total	14	4,370	28.1[a]

Source: Computed from questionnaire response. 653 establishments responded to question basic to computations.

[a]Weighted arithmetic mean.

Heating and Air-Conditioning. The number of hotels and motels using water in their heating and/or air-conditioning system are relatively equal in number - 80 hotels and 94 motels. (Table 41.) Hotel water use, on an annual basis, however, is over twice the motel use. Hotels withdraw 24.9 million gallons per year for this purpose. Motels withdraw but 9.7 million gallons per year. On a monthly basis, hotels average 25.9 thousand gallons, while the motel monthly average is but 8.6 thousand gallons. The fact that most of the hotels are old and many use steam heat accounts for this condition. The larger and often older installations among hotels generally use water-cooled condensers in their air-conditioning systems. Motels are newer and use forced-air furnaces for heat. Their air-conditioning systems often have air-cooled condensers.

Care of Grounds. Most water withdrawal for the care of grounds occurs among motels. Some 67 motels have an annual withdrawal of 30.8 million gallons; an average monthly withdrawal of 38.3 thousand gallons. (Table 42.) The 19 hotels that use water for care of grounds have an annual withdrawal of 4.3 million gallons; 19 thousand gallons per month per establishment.

Consumption

About 15.5 per cent of the total hotel and motel withdrawal in Oklahoma is estimated to be consumed. (Table 43.) This is based on a response of 88 per cent of the 783 establishments included in the survey. They were the hotel

TABLE 41

WATER WITHDRAWAL FOR HEATING AND AIR CONDITIONING IN HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, SEPTEMBER 1963 TO SEPTEMBER 1964

Type of Establishment	Number of Establishments Reporting Water Withdrawal for Heating and Air Conditioning	Annual Withdrawal (Thousands of Gallons)	Average Monthly Withdrawal (Thousands of Gallons Per Establishments
Hotel	80	24,899	25.9
Motel	94	9,698	8.6
Total	174	34,596	16.6[a]

Source: Computed from questionnaire response. 648 establishments responded to question basic to computation.

[a]Weighted arithmetic mean.

TABLE 42

WATER WITHDRAWAL FOR CARE OF GROUNDS BY HOTELS AND MOTELS
IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE
SEPTEMBER 1963 TO SEPTEMBER 1964

Type of Establishment	Number of Establishments reporting Care of Grounds	Annual Water Withdrawal (Thousands of Gallons)	Average Monthly Withdrawal (Thousands of Gallons Per Establishment)
Hotel	19	4,333	19.0
Motel	67	30, 774	38.3
Total	86	35,107	34.0[a]

Source: Computed from questionnaire response. 667 establishments responded to question basic to computation.

[a]Weighted arithmetic mean.

TABLE 43

ESTIMATED CONSUMPTION BY HOTELS AND MOTELS IN OKLAHOMA RESPONDING TO THE QUESTIONNAIRE, BY FUNCTIONAL SERVICE, SEPTEMBER 1963 TO SEPTEMBER 1964

Functional Service	Total Withdrawal (Millions of Gallons)	Estimated Percentage Consumed*	Estimated Consumption (Millions of Gallons)
Lodging	547.4	1.0	5.5
Restaurant	89.5	50.0	44.8
Swimming Pool	34.9	20.0	7.0
Heating and Air Conditioning	34.5	70.0	24.2
Care of Grounds	35.1	90.0	31.6
Service Station	4.7	5.0	0.2
Total	746.2	15.5	116.4

Source: Computed from questionnaire response and evaporation factors.

Note: Components will not add to totals because of rounding.

*Estimates of percentage consumed in each of the functional services was furnished by Mr. A. B. Jewel, Superintendent of Water, Tulsa, Oklahoma.

and motel operators who provided answers to the questions regarding the percentage of total withdrawal used in their several functional areas. Their establishments withdraw some 746 million gallons of the total 841 million gallons measured during the reporting year. This is about 87 per cent of the total withdrawn by all reporting establishments. Thus, about 116 million gallons of the 746 million gallons withdrawn during the reporting year is estimated to be consumed. If the reporting establishments are representative of all establishments, consumption may be estimated at about 122 million gallons during the year.

Very little water used in the lodging function is consumed. It is estimated at about 5.5 million gallons. The largest amount, 45 million gallons, is estimated to have been consumed in food preparation among the 144 restaurants. About 7 million gallons is estimated to have been evaporated from hotel and motel swimming pools during the year. Heating and air conditioning consumption is estimated at about 24 million gallons. Virtually all the withdrawal for care of grounds is consumed. It is estimated at about 32 million gallons. Service stations, the smallest of the withdrawal agents, consume only an estimated 200 thousand gallons during the year.

Summary

The primary function of hotels and motels in Oklahoma is to provide lodging. The existence of functional services,

other than lodging, however, tends to increase both water withdrawal and consumption. They exert a marked influence on consumption. These services appear to influence the patterns of withdrawal and consumption more than the other establishment characteristics, such as size, number of employees, rental rate, location and age. The withdrawal per occupied room, when the influence of other water using activities is removed, falls within much narrower limits than otherwise. When the factor of persons per room is added, withdrawal per room for the lodging function only is very similar in both hotels and motels.

About 75 per cent of all hotel and motel water withdrawal is used in the lodging function. The restaurant function takes about 12 per cent of the total withdrawal followed by swimming pools at 4.7 per cent. The service station requires very little of the total annual withdrawal at 0.6 per cent. Heating and air conditioning and care of the grounds are each about the same, at 4.6 and 4.7 per cent respectively. A larger number of restaurants are in motels than in hotels. However, hotel withdrawal for this service exceeds the motel withdrawal by nearly 1.5 times. Motel swimming pools exceed hotel pools by about 24 to 1. Water withdrawal, however, is at a ratio of about 4 to 1. Motel associated service stations outnumber hotel facilities by about 4 to 1, but the water withdrawal is on a ratio of about 2 to 1. The distribution of establishments requiring water for heating and air conditioning

is about equal. However, water withdrawal by hotels exceeds motel withdrawal for this purpose by about 2.5 times. Care of grounds is largely a water requirement of motels. About 4 times more water was employed by motels for this function than by hotels.

Water consumption is estimated by about 15.5 per cent of the total withdrawal during the reporting year. Total consumption is estimated at about 122 million gallons. The largest amount of consumption occurs in restaurants; the least in service stations.

CHAPTER VIII

SUMMARY AND CONCLUSIONS

Water Supply and Demand

Water has a peculiar quality among natural resources. Its supply is fixed, but inexhaustible. The demand for water also has a peculiar quality. Water withdrawn by one consumer is ultimately returned to the source to be used by another. Its demand is measured by the manner in which it is returned to its source. Water returned to its source immediately after being put to some use is conconsumptive withdrawal. Water that is evaporated in some productive process is labelled consumptive withdrawal. Return to its source is delayed by the amount of time required by the evaporative condensation process of the hydrologic cycle. Consumption is more nearly like the depletion of any other natural resource. However, from the supply side, sufficient water is required to meet the total withdrawal demand at a given time and place.

Hotel and Motel Characteristics

Hotels have declined in number nation-wide. Motels have increased, however, in sufficient numbers to make up for the loss in hotels and to increase the number of total

establishments by some 80 per cent since 1933. Motels exceeded hotels in number for the first time in 1954. The number of hotels has also declined in Oklahoma. The increase in motels has been sufficient to increase the total number of establishments since 1933 by only 10 per cent. Motels exceeded hotels in Oklahoma for the first time in 1958.

A census of hotels and motels in Oklahoma cities and towns having a population of 5,000 and greater has been taken. Some 783 of 898 establishments responded to the questionnaire which was the primary data source for this study. Hotels numbered 312, motels 471.

Most Oklahoma hotels are located in or near the central business district. Their patronage is shared about equally by permanent and transient clientele, although there is a slight favoring by the permanent patron. Few added services are offered by hotels. Only about one in ten has a restaurant. More than three-fourths of the hotels are 30 years of age or older. Some 60 per cent of them have less than 40 guest rooms. Their median size is 33 rooms. About three-fourths of them have less than four full-time employees. The average daily rental rate for the most popular single room is about $3.00. More than 30 per cent of them charge less than $5.00 per day. Their year-round occupancy rate is about 68 per cent. The winter is their best season at 68.5 per cent occupancy. The summer is their poorest at 67.2 per cent. There is also very little seasonal response in employment or rental rates.

Most motels in Oklahoma are located at or near the edge of town. Their clientele is mostly transient. They are, on the average, smaller than hotels. Their median size is about 21 units. They do not provide many extra services, but are more likely to provide them than hotels. Motels, on the average, are younger than hotels. Their average age is about 13 years. Their year-round occupancy rate is about 68 per cent, but their seasonal occupancy rate varies from a winter time low of 56 to a summer high of about 80 per cent. Like hotels, nearly 75 per cent of the motels employ less than four people on a full-time basis. Their average daily rental rate of their most popular single units, at about $7.00, is more than twice the hotel rate. Nearly three-fourths of them charge between $5.00 and $9.00 per day. There is very little seasonal response to rental rates or employment.

Hotels and motels in Oklahoma account for about 1 per cent of total retail sales; about 10 per cent of sales among services; about 0.3 per cent of personal income in the state.

Water Withdrawal

Annual Total Withdrawal. Data for water withdrawn by these establishments have been taken from municipal water department records. Where public water sources were not used, estimates of water use were made by owners or operators. Total water withdrawn by the responding hotels and motels in Oklahoma from September 1963 to September 1964 was 841 million gallons. Hotels require about 402 million gallons of the

yearly total; motels 439 million gallons. Some 40 per cent of the total number of establishments are hotels. They take 48 per cent of the total water during the year. Sixty per cent are motels. They take 52 per cent of the water.

A greater share of water is used by transient patrons than permanent. The summer is the season of greatest withdrawal; winter is the least. Most water is supplied by municipal sources. Most hotel withdrawals are taken by houses located in or near the central business district. Most motel withdrawal is taken by establishments located at or near the edge of town.

Hotels and motels, together, take about 0.3 per cent of the total state withdrawal, 1.1 per cent of total municipal withdrawal, 0.03 per cent of total private withdrawal. They take 0.1 per cent of the statewide water consumption. Hotel and motel consumption in Oklahoma accounted for only about 15 per cent of their total withdrawal. On a nationwide basis, consumption accounts for about 23 per cent of total withdrawal. In Oklahoma, consumption represents 37.5 per cent of total withdrawal.

Percentage Distribution by Characteristic. Water withdrawal is concentrated in a small number of motels. Only 9 per cent of the hotels are in the 3.6 million gallons or more annual withdrawal category. They use 60 per cent of the annual hotel withdrawal. Only one per cent of them have more than 400 rooms, but they use about 25 per cent of hotel water.

About 15 per cent of the hotels charge from $5.00 to $9.00 per day, but they use over half the water.

Some 5 per cent of the motels are in the 3.6 million gallons or more per year bracket. They use nearly 30 per cent of the motel withdrawal. The majority of motels are in the smaller sizes. They also use the majority of water. About three-fourths of the motels fall in the $5.00 to $9.99 rent bracket. They also use about three-fourths of the water.

Daily Withdrawal Per Occupied Room. A clear cut pattern of daily withdrawal per occupied room by characteristic has not been observed. It is diffused by functional services that are not necessarily found as a condition of the broad characteristics. Within these limitations, daily hotel withdrawal per occupied room increases irregularly with size and employment. It increases as rents rise to a mid-range, but declines with further rent increases. It declines with an increase in age. The daily average per occupied hotel room is 97 gallons.

Daily motel withdrawal per occupied room is also obscured but tends to increase irregularly with size and rise with an increase in rental rates and age. It declines with an increase in employment. The daily average per occupied motel unit is 147 gallons.

Functional Services. Hotels provide few functional services. Consequently, a greater percentage of their total water withdrawal is used in the lodging function. Hotels

use more than 75 per cent of their total withdrawal in lodging, 15 per cent in restaurants, 1 per cent in swimming pools, less than a half of one per cent in service stations, 7 per cent in heating and air conditioning and just over 1 per cent in care of grounds. Their average daily use per occupied room for the lodging function alone is 81 gallons. Withdrawal per person in the lodging function is estimated at 50 gallons per day.

Motels use 71 per cent of their total withdrawal in the lodging function, nearly 10 per cent in restaurants, almost 8 per cent in swimming pools, nearly 8 per cent in care of the grounds, about 2.5 per cent in heating and air conditioning and less than 1 per cent in service stations. Their average daily use per occupied room for the lodging function alone is 100 gallons. Estimated motel daily withdrawal per person in the lodging function is 56 gallons.

Consumption. An estimated 122 million gallons of the 841 million gallon withdrawal during the reporting year is consumed in hotels and motels in Oklahoma. This is about 15.5 per cent of their total withdrawal. Some 45 million gallons is consumed in restaurants; 32 million in care of grounds; 24 million in heating and air conditioning; 7 million in swimming pools, and only 200 thousand gallons in service stations. The total hotel and motel consumption is but 0.1 per cent of the state consumption. Because motels offer a wider range of services than hotels, more consumption takes place in motels.

Conclusions

A two-fold purpose for this study was stated in Chapter I. It was to examine water use in hotels and motels in Oklahoma in order to discover water use patterns and to reveal their determinants.

Patterns. Water use patterns fall into four broad areas: Total annual use, total use per occupied room, use per occupied room in the lodging function only, and use per person in the lodging function only. The total annual pattern is will defined. Water use increases with an increase in size of the establishment. The pattern of total use per occupied room is poorly defined. It is diffused by water using functional services other than lodging. These functional services occur in unrelated combinations. Their influence is, therefore, random. Their existence tends to increase both the amount of withdrawal and consumption. However, they tend to increase the percentage of water consumed greater than the percentage of water withdrawn. The pattern of use per person in the lodging function only is clearly defined by virtue of its similarity in spite of widely diverging establishment characteristics. Withdrawal per occupied room in the lodging function alone is, by definition, not affected by other functional services. Variation in withdrawal is not materially affected by size or employment. There is, however, a slight decline in withdrawal among older hotels probably because of limited water use facilities per room in the older hotels. There is

an increase in water use with an increase in occupancy rate. This is more noticeable among motels, mainly during the summer season, where an increase in multiple occupancy attends an increase in occupancy rates. The per person use in the lodging function has a very narrow range of movement, regardless of establishment characteristics. Only in the older hotels is this pattern not readily apparent. Here the withdrawal is less, probably due to the lack of water using facilities in each room.

Determinants. Four main determinants, corresponding to the four patterns, are suggested by the data. On a total basis, size of the establishment is the main determinant of withdrawal. On the basis of total withdrawal per occupied room, the base is provided by the number of patrons, but the wide variations stem from the number and extent of water using facilities outside the lodging function. On the basis of withdrawal per occupied room in the lodging function only, it is water using facilities in each room plus the number of patrons per occupancy. Water use per person per room is a function of water using facilities in each room. The primary determinant of total withdrawal is the number of patrons. The primary determinant of water consumption is the functional services other than lodging.

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Primary Source

The primary source for data relating to water withdrawal in hotels and motels in Oklahoma was a two-part questionnaire. Part I was completed by operators of 783 establishments. It was concerned with industry characteristics. Part II was completed by municipal water departments. It was concerned with monthly water withdrawals of each hotel and motel served by the system. Privately supplied water withdrawals were estimated by the user in Part I of the questionnaire.

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APPENDIX A

BUREAU OF WATER RESOURCES RESEARCH
THE UNIVERSITY OF OKLAHOMA
Norman, Oklahoma
23 November, 1964

TO WHOM IT MAY CONCERN:

This letter will introduce _____, a student at the University of Oklahoma who is assisting the Bureau of Water Resources Research in gathering data essential to a study of water use rates in the Hotel and Motel Industry in Oklahoma.

It is hoped you will be able to provide this student with the information he requests. The information will be kept in strictest confidence. It will be converted to computer data and will be used to develop state-wide totals, averages, and similar statistical measures. No individual organization will be identified and no competitive position will be compromised to any degree.

Your cooperation will be greatly appreciated.

Sincerely,

WALTER A. SMITH
Project Director

APPENDIX B

PROJECT DP 8-65

General Instructions: This is a project of considerable importance. Its importance lies in the key role it plays as a small part of a very broad project. You must approach the project and those you meet in conducting your part of it with this attitude. Many experts believe the future of the entire Southwest rests on our knowledge of a very vital resource, water. This project will add to this knowledge. One of the fastest growing industries in Oklahoma is the Hotel and Motel Industry. It has doubled its contribution to Oklahoma's personal income since 1951; this was $13 million in 1963. The increased lake construction in Oklahoma and the greater leisure time available to its citizens suggests a greater than ever growth rate in the future. People who have devoted their lives to the study of population and the resource base see water as a limiting factor to future growth. This project is part of an inventory of water use rates in Oklahoma's industrial complex. Its contribution to our knowledge will help solve the many problems associated with the vital resource, water.

Special Instructions - Questionnaire Part I: Most of the information for this project will be obtained from a two-part questionnaire. Your individual responsibility is with Part I. You will note each Part I bears the name and address of a Hotel or a Motel. These were taken from telephone directories.

Each Chamber of Commerce has been asked to prepare a list of Hotels and Motels in their cities together with the names of managers. This will be very helpful. It is suggested you call on the Chamber of Commerce to secure this list. Compare the two lists and add or delete questionnaires as required. If the list has not been prepared, do not assume the Part I's are complete. Be alert for new or abandoned establishments, for establishments that we have shown as Hotels or Motels that are, in fact, rooming houses, apartments, tourist rooms, nursing homes, or trailer parks. The definition we will use to determine whether an establishment is a Hotel or a Motel is the same as used by the Bureau of the Census. It is attached.

Upon arriving at a Hotel or Motel ask to speak with the person whose name appears on the Chamber of Commerce list. Presumably he has already been briefed on the project. If he is not available, ask to talk with someone who has some knowledge of the project. Always try to accomplish the questionnaire by talking with someone in authority. Only as a last resort should you attempt to get the information from a desk clerk. This important aspect of interviewing is often a matter of individual judgment.

Present your letter of introduction and your OU ID

Special Instructions - Part I (continued)

card. Explain the purpose of the project. The General Instruction, above, will be helpful. Then begin the interview with as little delay as possible. Most of the questions are self-explanatory, but previous test runs have shown the clarifications below are often necessary.

The numbers below correspond to the numbers of questions on the questionnaire, Part I.

1. Some will wish to be shown as a "Motor Hotel." If so, write "Motor" before "Hotel" and check it.

2. This will often be a matter of judgment. The border line cases will be few. Make a judgment and continue.

3. If in a rural location, show the nearest city.

4. No problems have arisen on this one.

5. No problems.

6. Do include rooms, or units, occupied by the owner-operator, or any members of his staff.

7. We want only a broad average figure. An estimate to the nearest dollar is sufficient.

8. a. This is also an "average" figure for each season. "Full-time employee" is one who works at least a 40-hour week during the appropriate season.

   b. Same as 8.a.

9. This is another judgment answer. Accept his judgment. Some will say 50-50. Accept this answer.

10. Some who are not the original owners will not know. Encourage a reasonable estimate. If definitely unknown, write UNK in the blank.

11. The total should be 100 per cent. Many establishments have private water wells. Hence the water department records will not show their water consumption. If he indicates his primary source is a private well or other private source, go immediately to question 14. It will be unusual to find someone who can give an accurate answer to number 14. Ask him if he can give you the rated capacity of his storage tank; how often he must refill it. His pump will probably be electric, and because of its requirement for

different voltage than normal equipment, it may have a separate meter. Ask him if he will examine his electric bill in making a determination. These questions will usually prompt a reasonably accurate estimate. Do not become a nuisance by pressing him on this one.

12. The total should be 100 per cent. Encourage a reasonable estimate. Be sure the Meter column is checked if any service has a separate water meter. Write the name and address of each meter on the back of the questionnaire so it may be included in Part II.

13. Answer with yes or no.

14. Unless required by the response to number 12, you will get the answer to this one from the Part II.

15. a. We would like a two-digit figure for each season. Some will be reluctant to supply it. Ask for a rough estimate--to the nearest 10 per cent. If they will not give this information, ask them to tell you which season is their best season. Write "Best" in the blank. Then ask them to tell you a percentage decrease from this best season for the others. For instance, if he says the Summer is best and that the Spring is lower by about 15 per cent, write a -15 in the "Spring" blank, etc. Finally, ask him for his year-round rate. Then ask him how this compares with his best season. If he answers, you can now make a reasonable seasonal estimate. Do not become a nuisance. If he is still reluctant, ask him to enter the data on the green supplement. Make sure it bears no identification.

    b. If any part comes from records, the answer is yes. Do not imply it is necessary to compute an answer from the records. If the necessary information is not supplied from records, check the "best guess" space. Indicate your judgment as to degree of reliability of this estimate on a scale of 2 to 4. Guide lines: 2 - studied response; 3 - off-hand response; 4 - no evaluation made.

U.S. Bureau of the Census, U.S. Census of Business, 1954, Vol. VI, Selected Services Trades - Area Statistics, Part 2, Missouri, Wyoming, Alaska and Hawaii, U.S. Government Printing Office, Washington, D.C., 1961, p. 3. defines hotels and motels:

Hotels: (SIC 701, except 7013) Establishments known as hotels, engaged in providing lodging, or lodging and meals, to the general public. Included are hotels operated by membership organizations but open to the public, and apartment hotels which provide accommodations for transients. Excluded are rooming and boarding houses, private residences commonly known as tourist homes and apartment or residential hotels which provide no accommodations for transients.

Motels (and tourist courts): (SIC 7013) Establishments known as motels, tourist courts, tourist camps or motor courts primarily engaged in providing accommodations in furnished cabins or similar structures. Excluded from the Census are tourist homes (private residences furnishing lodging to motorists).

PROJECT DP 8-65

Special Instructions - Part II: Part II must be accomplished in the office of the local water department. Each water department superintendent has been informed of the project (in cities having a population of at least 5,000). If you have completed Part I, it becomes the basis for Part II. If you have been assigned Part II only, it is unlikely you will have access to Part I. In this event, the attached list of hotels and motels will form the basis for your work. Fill out the heading of one Part II form for each establishment.

Call on the Superintendent of Water. Identify yourself with your letter of introduction and your ID card. Explain the project to the local authority as indicated in the General Instructions. Ask for access to the monthly records for the hotels and motels served by his water department. Explain that you wish to record the monthly water consumption in thousand of gallons for each month from September 1963 through August 1964. Show him the Part II (which you have already filled out with the names and addresses of the hotels and motels). He may volunteer to have his staff fill out the forms for you. If this occurs tell him you will return at a time and date to pick them up. If he does not have sufficient staff to accomplish the forms, it will be up to you to do the job. Ask for enough assistance to be sure you can complete it quickly. It is important that you ask for assistance from someone who is familiar with the billing system and the billing dates and the billing units.

There will be some problems: The Part II requires the data be entered in thousands of gallons. The records may not be in thousands of gallons. Convert whatever units are used to thousands of gallons. You may need help on this one.

Another possible problem: Meter reading dates and billing dates may not coincide with the monthly calendar dates. Most cities use the entire month to complete a meter reading cycle. If meter reading dates vary from the calendar dates by more than one week, enter the reading dates after each month.

After the 12 monthly data are entered, total each season.

Label one of the Parts II the Master copy and write the rate structure for that particular city on it. Since it will be the same in each city, there is no need to do it more than once.

At the bottom of the form, enter the date the information was entered. Write your name after the date. Write any unusual problems you had on the back of the Master form.

APPENDIX C

On the average what percentage of your rooms, or units, are occupied during the:

Fall _____%

Winter _____%

Spring _____%

Summer _____%

year 'round _____%

- -

On the average what percentage of your rooms, or units, are occupied during the:

Fall _____%

Winter _____%

Spring _____%

Summer _____%

Year 'round _____%

- -

On the average what percentage of your rooms, or units, are occupied during the:

Fall _____%

Winter _____%

Spring _____%

Summer _____%

Year 'round _____%

- -

On the average what percentage of your rooms, or units, are occupied during the:

Fall _____%

Winter _____%

Spring _____%

Summer _____%

Year 'round %

On the average what percentage of your rooms, or units, are occupied during the:

Fall _____%

Winter _____%

Spring _____%

Summer _____%

year 'round _____%

- -

On the average what percentage of your rooms, or units, are occupied during the:

Fall _____%

Winter _____%

Spring _____%

Summer _____%

Year 'round _____%

- -

On the average what percentage of your rooms, or units, are occupied during the:

Fall _____%

Winter _____%

Spring _____%

Summer _____%

Year 'round _____%

- -

On the average what percentage of your rooms, or units, are occupied during the:

Fall _____%

Winter _____%

Spring _____%

Summer _____%

Year 'round _____%

APPENDIX D

QUESTIONNAIRE

Part I Code No.__

Please answer each of the following questions to the best of your ability. Some answers may require reference to your records. Answers will be kept in the strictest confidence. The use of such data will be limited to computations of state-wide totals, averages and similar measures. No individual establishment will be revealed. Thank you.

1. Is your establishment a hotel?__; Or motel?__; (Check one)

2. Is your establishment located: (Check one of the following)

   a. In or near the Central Business District?___
   b. At or near the edge of town? ___
   c. In a rural location? ___

3. Please indicate the name of the city in which or near which your establishment is located. _____

4. and the name of the County. _____

5. Do you remain open at least 50 weeks each year?

   Yes___ No___

6. How many rooms, or units, are there in your establishment?

   _____ rooms or units.

7. What is the daily rental price of your most popular room or unit on a single basis during the:

   Fall? $_____ Spring? $_____

   Winter? $_____ Summer? $_____

8. a. How many full-time employees, other than members of your family, do you have in the hotel or motel proper during the:

   Fall? _____employees Spring? _____employees

   Winter? _____employees Summer? _____employees

   b. How many full-time employees, other than members of your family, do you have in the restaurant during the:

   Fall? _____employees Spring? _____employees

   Winter? _____employees Summer? _____employees

9. Are most of your patrons permanent?__; Or transient?__

10. How old, in years, is your establishment? ____years

11. What percentage of your water supply comes from these sources?

Municipal Water Supply?	_____%
Private well?	_____%
Other private source?	_____%
	100 %

12. What percentage of your total annual water usage is used in the following activities? (If any activity is served by a separate water meter, please check the Meter column.)

		Meter
Rooms and room maintenance	_____%	_____
Restaurant	_____%	_____
Swimming Pool	_____%	_____
Service Station	_____%	_____
Care of Grounds	_____%	_____
Heating and Air Conditioning	_____%	_____

13. Are the above estimates taken from your records?

Yes_____ No_____

14. What is your estimate of the total volume of water used in your establishment for all purposes during the:

Fall?_____thousands of gallons
Winter?_____thousands of gallons
Spring?_____thousands of gallons
Summer?_____thousands of gallons

15. a. On the average, what percentage of your rooms or units are occupied during the:

Fall (Sept., Oct., Nov.)?	_____%
Winter (Dec., Jan., Feb.)?	_____%
Spring (Mar., Apr., May)?	_____%
Summer (June, July, Aug.)?	_____%
Year 'round	_____%

b. Are the above percentages computed from: (Check one)

Your records? ____
A "best guess"? ____

THANK YOU FOR YOUR COOPERATION

Date_____ Interviewer_____

QUESTIONNAIRE

Part II Code No. ____

Name of Establishment _____

Street Address _____

City _____

Year	Month and Season	Gallons of Water in Thousands	
		Per Month	Per Season
	September		
	October		
	November		
	Fall Total		
	December		
	January		
	February		
	Winter Total		
	March		
	April		
	May		
	Spring Total		
	June		
	July		
	August		
	Summer Total		

Note: Write Rate Schedule on the reverse side of City Master. If reading dates vary more than 7 days from calendar dates, enter the reading date immediately after each month.

APPENDIX E

THE CITY OF OKLAHOMA CITY

Oklahoma City, Okla. November 18, 1964
73102

To Water Department Superintendents:

The Water Research Project in which you were asked to participate several months ago, is being expanded. That project, the Municipal Water Resources Utilization Study, is being used as a point of departure for a water use study of the hotel and motel industry in Oklahoma. A great deal of information is available from the hotel and motel operators; but most of them cannot furnish accurate records of monthly water consumption.

I have been approached by the director of this new project, and recognizing its value in future planning, have agreed to make monthly consumption data available to him. I hope your department will also be able to furnish similar data. I have been assured that no individual establishment will be identified in the final report. The study is designed to develop state-wide totals, averages, and similar statistical measures. No competitive position will be affected in any manner and no individual information will be revealed. On the other hand, we believe the data so developed will be of great value in our future planning.

During the next several weeks, beginning on the 27th of November, an OU student who is working on the project will call you. He will ask that you furnish him with monthly water consumption figures, in thousands of gallons, for each hotel and motel served by your system for the 12-month period beginning last September. He, or she, will have forms on which the data may be recorded by your staff. However, if you are unable to provide the staff for the job, I have also been assured by the project director that the people selected for the information gathering will exercise the utmost care if you can make the records available to them.

We sincerely hope you can assist in this project. At its conclusion, a copy of the final report will be made available to you upon request to the Bureau of Water Resources Research, the University of Oklahoma.

Sincerely,

Frank S. Taylor, Director of
Water and Sewer Services
Oklahoma City Water Department

APPENDIX F

WATER DEVELOPMENT FOUNDATION
OF OKLAHOMA, Inc.
200 Skirvin Tower
Oklahoma City 2, Oklahoma

The Bureau of Water Resources Research at the University of Oklahoma is conducting a research project of water use in the hotel and motel industry in Oklahoma. This combines two important areas: (1) water as a vital resource, and (2) tourism and conventions, surely one of our fast growing industries. We believe this project is worthy of the support of every hotel and motel owner in the State.

Either on the 27th or the 28th of November, or perhaps sometime in December, a team of interviewers will be in your City. They will attempt to interview every hotel and motel operator in your community.

We solicit your assistance in telephoning each hotel and motel manager in advance to inform him of the project and to encourage his cooperation. When the team arrives in your City, it would be most helpful if you could provide the team chief with a list of hotels and motels together with the names of their managers. The project director is Col. Walter A. Smith, Department of Economics, the University of Oklahoma, whom you may contact for added information if needed.

Water is becoming more vital to Oklahoma's future with every passing day. The more we know about it the better we will be able to solve future problems. Your participation in this project will contribute to its success and give valuable insight into the water use pattern of one important segment of our economy.

Sincerely yours,

Guy N. Keith

GNK:bc