AN EVALUATION OF THE EFFECTIVENESS OF THE FEDERAL PRETREATMENT PROGRAM

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CHAPTER I

INTRODUCTION

The thrust of wastewater policy has changed dramatically since the federal government became involved with the issue in the 1960's. The Federal Water Pollution Control Act (WPCA), of 1972 (PL 92-500) was enacted when Congress became concerned about domestic and industrial wastes that fouled lakes and streams.

The 1972 Act was a complex law covering a wide range of water pollution control regulations. One of the important regulations included secondary treatment for all publicly owned treatment works (POTWs) discharging into a navigable waterway. The Environmental Protection Agency (EPA) was directed to establish uniform national standards, regardless of location. The EPA also directed the establishment of best practical technology economically achievable (BPT) standards for industrial categories. To enforce these requirements, PL 92-500 set the framework for the National Pollution Discharge Elimination System (NPDES). NPDES permits are required for every municipal and industrial "direct" discharger (point source) discharging into the nation's waters. Permits are issued for a five-year period by the EPA or states with an approved NPDES program.

PL 92-500 was not sufficient to achieve the WPCA's goal to "restore and maintain the chemical, physical and biological integrity of the Nation's Waters" (Neuman, 1984). This is because many industrial facilities discharge large amounts of pollutants "indirectly" through POTWs, where their wastes are mixed with wastewater from other industrial users, domestic wastes from private residences, and runoff prior to treatment by the POTW and discharged to navigable waters. POTWs generally are not designed to treat heavy metals and other toxic pollutants. Introduction of such pollutants can cause severe problems. Collecting a reliable data base for most substances required years of patient work and millions of dollars. PL 92-500 contains a special section dealing with toxic substances.

EPA was directed to prepare a list of designated toxic substances. A legal action was taken against EPA by the Natural Resources Defense Council (NRDC), the Environmental Defense Fund (EDF), and the Citizens for a Better Environment (CBE) because the EPA was slow in preparing a list of toxic substances. EPA investigators managed to produce standards for only six substances in five years (WPCF, 1981). The NRDC vs. EPA consent decree was issued in June, 1976, and "is perhaps the most significant action ever taken relative to pretreatment" (O'Dette, 1978). Basically, the consent decree requires EPA to promulgate pretreatment standards for classes and categories of industry who discharge pollutants into POTWs. The consent

decree identified a list of 65 pollutant classes. The priority pollutants were developed using these classes under the Clean Water Act (CWA). In partial fulfillment of the consent decree, the EPA identified a list of 129 compounds and elements from the 65 classes. The standards will be developed based upon the degree of effluent reduction attainable through the application of the Best Available Control Technologies (BAT).

The Federal WPCA was amended December 28, 1977 and is known as the CWA of 1977 (PL 95-217). These amendments involve numerous changes to PL 92-500. The basic thrust of the CWA is to provide more emphasis for control of toxic pollutants. This regulation, mandated by the CWA, governs the control of industrial wastes introduced into POTWs. This pretreatment regulation establishes the framework for: 1) application and enforcement of technology-based pretreatment standards (published as General Pretreatment Regulations - 40 CFR Part 403 dated June 26, 1978); 2) economic capabilities of the industries to treat their wastewater; and 3) general prohibitive discharge standards for indirect industrial or non-domestic dischargers. The policy of the EPA is, therefore, to establish uniform effluent limitations for both direct and indirect dischargers.

Another major piece of legislation that impacts both industrial and municipal sewage treatment plants include the Resource Conservation and Recovery Act of 1976 (RCRA)

(PL 94-580). The RCRA provides EPA with the ability to control and regulate all solid wastes, sludges and hazardous byproducts from the 'cradle to the grave'. Two basic objectives of RCRA are:

1) Protection of public health and environment,
2) Conservation of natural resources.

RCRA covers wastes that may be deemed hazardous if they possess certain characteristics or if they have been specifically listed by the EPA to contain one or more of 375 hazardous compounds. Under RCRA, hopefully, priority pollutants will be controlled and illegal dumping of toxics into municipal systems will be eliminated.

Under an exclusion of RCRA, a hazardous waste that is mixed with domestic sewage is no longer considered hazardous by definition. This exclusion, referred to as the Domestic Sewage Exclusion (DSE), means that solid or dissolved material in domestic sewage are exempt from RCRA regulation. POTW sludge is regulated under the jurisdiction of the CWA and it would therefore be redundant to regulate it under RCRA rules and regulations, too.

RCRA and pretreatment regulations also overlap because many of these categorical industries also may be RCRA generators. For example, the largest industrial category subject to pretreatment standards is the metal finishing industry. Plating sludges from the metal finishing industry are a listed hazardous waste under RCRA.

In a February, 1986 publication titled: "Report to Congress on the Discharge of Hazardous Wastes to POTWs" (The Domestic Sewage Study), prepared by the EPA's Office of Water Regulations and Standards and Science Applications International Corporation, the distinctions between RCRA and the pretreatment program under the CWA are explained. The first difference is that they regulate pollutant discharges to different parts of the environment. CWA protects the nation's waters through the regulation of toxic pollutants in wastewater and sludge. RCRA focuses on hazardous wastes in all of the environment, not only in wastewater and sludge, but also in groundwater and in the air.

The second major difference is the types of substances chosen for regulation - toxic pollutants versus hazardous wastes. The third difference between RCRA and pretreatment regulations is in federal responsibilities. Under RCRA the federal government retains a much greater role in Standards development, inspection, and enforcement. States can receive RCRA program approval, but EPA continues to assert an oversight role. No responsibilities are placed at the local level. The pretreatment program, on the other hand, relies heavily on cities to be the principal regulators in standard setting, inspections, and enforcement, making use of POTW expertise on local conditions. EPA and approved states also may exercise review and pretreatment oversight functions, but their involvement is not intended to be as uniformly direct as in the RCRA program.

Therefore, RCRA along with the CWA must be considered in order to enforce a properly run pretreatment program. The purpose of this research was to evaluate the complex Federal Pretreatment Program and present ways that it can be improved. There are five main segments of this paper: 1) Introduction; 2) Literature Review; 3) Materials and Methods; 4) Results; and 5) Discussion and Conclusions.

CHAPTER II

LITERATURE REVIEW

Problems

There has been much debate on the implementation of various aspects of the Pretreatment Program since its inception. There is confusion in understanding this complex law. In a position paper for 1986, the Industrial Waste Committee (IWC) of the Water Pollution Control Federation (WPCF) stated that the pretreatment program is paper heavy and open to various interpretations and is therefore ineffective.

In 1986 the WPCF Journal published an article by the IWC on the pretreatment program. The following year there was a different viewpoint presented by Jay Hair of the National Wildlife Federation (1987). The IWC believes that the recent decision by the US Court of Appeals for the Third Circuit (1986) derailed the pretreatment program by taking out the removal credit regulations at the POTW. Hair of the NWF believes that removing priority pollutants at the source is a more cost-effective environmentally sound approach (Hair, 1987). IWC also believes that national categorical pretreatment standards are unneeded

(WPCF, 1986); instead, enforcement based on water quality standards in the receiving stream are needed (D'Angelo, 1984). Data on stream segments should be developed to determine where to prioritize funds (WPCF, 1986). Mr. Hair states that uniform categorical pretreatment standards are essential to the success of the pretreatment program. Mr. Hair believes that national categorical standards assure a uniform level of pollution control for all indirect industrial users in the same category.

In addition, Mr. Hair thinks that water - based control will return the CWA back to the PRE-1972 era when requiring pollution control only when necessary to protect receiving stream quality.

Finally, the IWC thinks that the pretreatment program should be administered by the local POTW with minimum federal interference. The following steps should be taken for this to be effective:

1. States need to designate the most cost-effective, beneficial use of each segment of a receiving stream within its boundaries. This designated use should be reviewed and updated as necessary every 10 years.

2. Each segment should be monitored and evaluated periodically by the states to determine if it has attained or can attain its designated use.

3. Local pretreatment programs should be administered by the local authority so long as adequate water quality is maintained.

Some controversial issues from the United States General Accounting Office include:

1) The impact of toxics on the treatment plant and environment;

2) The use of technology-based standards, the amount of redundant treatment performed and the equity between different industries.

There is still much to be learned about the effect of toxics on the environment and health, the rate and consistency of removal and effect on processes at the POTW, and the cost associated with those controls.

In 1983, Mr. David Ziaks (Clinton Bogart and Assoc.) stated that studies conducted in several major metropolitan areas, indicate that significant contributors of toxics are from non-industrial users, such as storm runoff, infiltration, and domestic and commercial users. Because the presence of these harmful pollutants may not be reduced at the POTW significantly, it is questionable whether the removal of these toxics at the industries is the correct strategy. However, if the POTW is diligent and continues to search for toxic sources at industries, these toxics may eventually be reduced.

Mr. Gerald Miller (Black and Veatch) believes that stringent requirements by POTW's may cause the accumulation of toxics at the industries where they are not capable of managing the difficult requirements of RCRA regulations. This also may be less desirable for the environment. Instead of one place for the sludge to accumulate (at the POTW) many piles of sludge will now be located throughout the POTW's jurisdiction. This in itself may cause many

illegal dumps of highly concentrated wastes (Wright, etal., 1978).

A WPCF position paper in 1981 said that if POTWs develop their own program the treatment plant could concentrate on the most toxic wastes first. This would base their pretreatment program on local conditions instead of national concerns. This approach would also be more economical and environmentally sound (USGAO, 1982; Stanfield, 1985). Los Angeles, Boise, Chicago, and Rockford developed their own programs while waiting for the EPA to promulgate regulations. This approach focuses on the effluent at the entrance to the municipal sewer system. It does not focus on how the industry meets these limits (Stanfield, 1985). The cities argue that as long as these discharges do not violate their NPDES permit then their programs should not have to be changed. EPA rules, however, states that these cities must change to technology-based standards.

The problem is that the national program is entirely based on technology, not on what levels are safe. "The only way to know if a city system is as good as the national program is if you had water quality standards with numerical criteria for toxic substances so you could judge whether alternative standards do the same job," said Ronald B. Outen of the Environment and Public Works Committee (Stanfield, 1985). The numerical standards for toxics are very few.

According to Gerald Miller, redundant treatment will occur because categorical industries will have to pretreat no matter what amount of discharge, the size of the plant, or detectable effect on the POTW or environment. Also, in the 1981 position paper, the EPA states that because of the mandate from Congress they will choose the protective option of redundant treatment. In 1980, EPA studies indicate that secondary treatment removes more of the priority pollutants than was originally believed (Ziaks and Derucher 1983).

The equity between and within various industries is a major concern. The categorical limits are different because they are technology-based within each industry to remove a certain pollutant. This results in widely different concentrations. A comparison of industry regulations as of December 15, 1981, shows these differences per the USGAO report:

> Proposed textile mill standards require treatment for chromium discharges that are almost eight times more stringent than those for electroplaters.
>
> Proposed standards for zinc and copper in the inorganic chemical industry vary according to the production process, and each is considerably more stringent than the limits for electroplaters.
>
> Proposed standards for the paint and ink formulation industries include a ban on the discharge of pollutants (zero discharge), although many of these pollutants are allowed to be discharged by other industries.

In addition, a large metropolitan POTW states that it is neither environmentally rational or equitable for some

industries to reduce pollutants to lower levels than other industries (USGAO, 1982). Even within industries there is an exception. One, according to the USGAO, is the different limits based on flow. The example is the electroplating industry. There is a 10,000 GPD limit that allows industries that discharge below this level concentrations that are 4 - 9 times higher than electroplaters that discharge more than 10,000 GPD. The National Association of Metal Finishers feels that the 10,000 GPD cutoff would create unfair labor advantages.

The EPA justified the limit because of economic impact on small firms and environmental benefit. The cutoff, does not do justice to EPA's regulation to treat industries within the same category equally. Most municipalities, however, do not make an exception for the flow of the electroplater (USGAO, 1982).

Another problem with the pretreatment program according to Alexandra Wright (Fred C. Hart Assoc. Inc., 1978) is that local treatment plants are afraid that if the states or federal government interfere with the local pretreatment program the POTW will lose their communication link with the local industries. The POTW's are afraid that the indirect industrial user will not communicate with them, as they may have in the past, because of the implications of the Federal Pretreatment Program.

A major problem as reported by Robert O'Dette (Dept. of Health - Tennessee, 1978), is to classify the industries

into their appropriate categories especially if they have more than one categorical process within their plant. Another problem is if the process discharges into a common sewer where a representative sample of the categorical process cannot be taken.

Mr. O'Dette also reports that when the POTW implements concentration limits in their pretreatment program, the limits would discourage good housekeeping, and water conservation. Thus, reduced volume and increased concentration do not occur.

An important factor stated by Gerald Miller is that the local executive director of the POTW is left on his own to moderate the harshness on sanctions for noncompliance (Miller, etal., 1980).

In the 1981 WPCF position paper it was stated that there should be no distinction between limits for new and old sources within the same industry. Nothing in the law states that different limits for new and old sources is the only possible interpretation. The paper continues by stating that a pretreatment standard may be changed because of any one of these interpretations: limits of technology, economics, or limitations on space at the industrial plant.

Requirements

Water pollution is not simply a local problem. One community's weak toxic control program is another community's water pollution.

Experience has taught us that some localities are more willing than others to develop and enforce stringent pollution control on local industries. The desire of Congress to end "shopping" for pollution havens was, in part, responsible for the 1972 Water Pollution Control Act. Minimum uniform federal requirements ultimately enforced by EPA are necessary to prevent localities less committed to environmental protection from attempting to attract industry by promising relaxed pretreatment controls. Several industries and municipalities expressed concern that only nationwide technology-based standards could ensure equality of environmental burden among competing industrial users of POTWs (USEPA, 1978).

All industries in a category or subcategory must treat their wastewater to the same degree of treatment. Regulatory exclusions provided will set different discharge standards for pollutants within the same industry based on the volume of an individual plant's discharge. A volume cutoff has been implemented for the small electroplating industries because of economic hardship the categorical standard may cause. EPA estimates that over 1,000 electroplating firms will qualify for this exclusion. A waste-volume cutoff has not yet been proposed for any other categorical industry (USGAO, 1982).

EPA has had trouble promulgating categorical industrial standards. Since the promulgation date determines the priority in which toxics are controlled, because of

lawsuits and the EPA, some toxics are just now beginning to show reductions. Federal District Court Judge Thomas A. Flannery gave EPA 3.5 years to do most of the work on categorical standards (until December, 1979). He assumed that the period would be long enough for standards to be written and for industrial dischargers to meet the July 1, 1983 deadline for putting the proper effluent controls on-line. But, this date was later revised to July 1, 1984 (WPCF, 1981). Now compliance is required within 3 years of the effective date of the Standard. Theoretically, an industry could be required to comply with its standard before the municipal pretreatment program went into effect. However, this did not take effect in most instances.

EPA has been developing pretreatment standards for existing indirect discharges, industries which discharge indirectly through POTWs, in 24 industrial categories under "best available technology economically achievable" (BAT), which direct dischargers must achieve for toxic pollutants by 1984 under 301(b)(2)(A) and 304(b)(2) (Neuman, 1984). In establishing BAT standards, EPA will take into account such factors as: 1) the cost of achieving these limits; 2) the age of equipment and industrial facilities involved; 3) the process employed; 4) the engineering applications of various types of control techniques; 5) process changes; 6) concentrations of pollutants which interfere with usage of sludge (including disposal); 7) non-water quality

environmental impacts such as water conservation; and 8) any other appropriate factors (O'Dette, 1978).

EPA's pretreatment standards are based on BAT, but the standards set effluent quality limits. They do not require installation of BAT or any other treatment hardware. This gives the industry an option of changing the way it operates to reduce its discharge of pollutants.

Pretreatment requirements undoubtedly means that industries which pay attention to their costs will inevitably attempt to find an easy way to recycle or eliminate those substances that are in their effluent. That may, in the long run, be the most cost effective way for industries to dispose of the pollutants that would otherwise be in their discharge.

Proponents of pretreatment standards based on the technological capabilities of industries emphasized that such standards: 1) provide for maximum progress towards the CWA's basic goal of eliminating the discharge of toxic pollutants into waters of the U.S.; 2) insure greater equality between industrial users and direct dischargers who are already required to comply with technology-based standards; and, 3) will result in greater environmental protection since compliance with technology-based standards is far easier to determine.

According to the EPA, the industry limits are determined strictly on the basis of the performance of available treatment technology and, when employed by different

industries, identical technologies may not produce the same level of pollutants removal because of different industrial processes. EPA further states that the industry standards establish different limitations for different industrial categories in recognition of the variability of raw wastes, the treatment processes available, and the economic health of the industries.

Categorical pretreatment standards are based on treatment technologies, and thus do not reflect the characteristic conditions for any particular POTW. The regulations do not really require a search for problem toxics; they are already established by the NRDC vs. EPA consent decree. There is little local choice available since all industries which are on the Settlement Agreement list are required to pretreat for the sake of meeting a nationally developed pretreatment standard rather than meet a condition necessary to protect the unit operations, sludge handling and disposal, and effluent limitations at the POTW.

There was a concern for heavy metals, BOD (Biochemical Oxygen Demand), TSS (Total Suspended Solids), temperature, pH and flow characteristics before the pretreatment regulations went into effect. A general increase in treatment efficiencies resulting from implementation of PL 92-500 has resulted in more sophisticated wastewater treatment facilities. The need to safeguard these facilities from effects of incompatible pollutants such as heavy metals is more

pronounced, as the advance treatment processes (nitrification) are more sensitive to the presence of toxics.

The dominant metals measured in over 200 POTWs are cadmium, chromium (total), copper, nickel, lead and zinc (Minear, 1980). Removal of toxic pollutants with suspended solids in primary sludge is most prevalent for the heavy metals. A sometimes overlooked mechanism for the removal of metals by biological processes is the uptake of trace quantities of these pollutants as micronutrients.

Industry in the US discharged a total of 14,144 billion gallons of water per year (US Census 1972) of which 56% or 7987 billion gallons per year was untreated. The major portion was discharged to surface waters of various types but 7% or 990 billion gallons/year was discharged to a public sewer (Hannah and Rossman, 1982).

Although industries contribute a relatively small portion of the total flow they account for a substantial portion of the total toxic pollutant load entering POTWs. Each year, 62,000 metric tons of heavy metals are discharged by industries. EPA has estimated that indirect dischargers are responsible for up to 60% of the total toxic metals and contribute 89% of the cyanide, 85% of the cadmium and 83% of the chromium entering POTWs (Neuman, 1984). The most immediate and readily observed impact of industrial pollutants is on the overall operation and efficiency of the POTW.

With full implementation and enforcement of categorical standards there should be a reduction to 3300 metric tons of heavy metals discharged by industries. This should produce a 94% reduction in metal loadings to POTWs (Schauer, 1986).

Table I is presented here to show the harmful effects concerning metals.

TABLE I

POLLUTANT CONCENTRATIONS HARMFUL TO BIOLOGICAL TREATMENT PROCESSES (Bartos, 1979)

	Concentration, mg/l		
Pollutant	Activated sludge	Anaerobic digestion	Nitrification
Ammonia	480	1500	
Arsenic	0.1	1.6	
Borate (Boron)	0.05-100	2	
Cadmium	10-100	0.02	
Calcium	2500		
Chromium (hexavalent)	1-10	50	0.25
Chromium (trivalent)	50	50-500	
Copper	1.0	1.0-10	0.005-0.5
Cyanide	0.1-5	4	0.34
Iron	1000	5	
Lead	0.1		0.5
Manganese	10		
Magnesium		1000	50
Mercury	0.1-5.0	1365	
Nickel	1.0-2.5		0.25
Silver	5		
Sodium		3500	
Sulfate			500
Sulfide		50	
Zinc	0.08-10		0.08-0.5

TABLE I (Continued)

Phenols:	200	
Phenol		4-10
Cresol		4-16
2-4 Dinitrophenol		150

Now the concern is toxic discharges - emitted primarily by industry - that are minuscule but highly poisonous. Two toxic chemicals put Louisville, Kentucky's 100 MGD treatment plant out of operation in 1977. The oily chemicals contaminated equipment and machinery, destroyed the biomass in the activated sludge process and accumulated in the sludge, disrupting digestion. Decontamination has cost about $1,500,000 (Bartos, 1979). Complete documentation of a spill and its consequences should be kept on file for possible legal action at a later date. If the source of a spill is detected early, the discharger can and should be held responsible for cleanup costs. Several steps can be taken to help prevent the entry of hazardous material into municipal collection and treatment systems: 1) flushing spilled material to the municipal sewer system should be prohibited; 2) storage of certain designated pollutants in the POTWs jurisdiction can be prohibited; and 3) mandatory containment for stored hazardous material should be implemented. The most effective preventive

measures are those which permit advanced warnings and provide established procedures for reacting to spills.

Effluent guidelines were and continue to be established for categorical industries. The approach taken by the EPA has been to conduct studies to determine the presence and levels of priority pollutants found in industrial wastewaters.

EPA has expanded from the original list of 65 classes to 126 specific compounds generally referred to as "priority pollutants". The criteria for expanding the list included substances that are: 1) known or suspected carcinogens, mutogens, and/or teratogens; 2) substances present in industrial discharges that are known to have toxic effects on human and aquatic life in sufficiently high concentrations; and, 3) are long-lasting and can concentrate in the food chain (Lacy, 1978).

The priority pollutants now include 46 base/neutral extractable organics, 11 acid extractable organics, 26 pesticides and PCBs, 28 volatile organics, 13 metals, asbestos, and cyanide. The 13 metals plus asbestos and cyanide constitute the inorganic priority pollutants and the remaining 111 compounds constitute the organic priority pollutants.

TABLE II

PRIORITY POLLUTANTS (USEPA 1986)

VOLATILE ORGANIC COMPOUNDS	
acrolein	1,3-dichloropropene
acrylonitrile	ethylbenzene
benzene	methylene chloride
carbontetrachloride	methyl chloride
chlorobenzene	methyl bromide
1,1-dichloroethane	bromoform
1,2-dichloroethane	dichlorobromomethane
1,1,1-trichloroethane	chlorodibromomethane
1,1,2-trichloroethane	tetrachloroethylene
1,1,2-2-tetrachloroethane	toluene
chloroethane	trichloroethylene
2-chloroethylvinyl ether	vinyl chloride
chloroform	1,1-dichloroethylene
1,2-trans-dichloroethylene	1,2-dichloropropane

BASE-NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS	
acenaphthene	nitrobenzene
benzidine	N-nitrosodimethylamine
1,2, 4-trichlorobenzene	N-nitrosodiphenylamine
hexachlorobenzene	N-nitrosodi-n-propylamine
hexachloroethane	butyl benzyl phthalate
bis (2-chloroethyl)ether	di-n-butyl phthalate
2-chloronaphthalene	di-n-octyl phthalate
1,2-dichlorobenzene	diethyl phthalate
1,3-dichlorobenzene	dimethyl phthalate
1,4-dichlorobenzene	benzo (a) anthracene
3,3'-dichlorobenzidine	benzo (a) pyrene
2,4-dinitrotoluene	3,4-benzofluoranthene
2,6-dinitrotoluene	benzo (k) fluoranthene
1,2-diphenylhydrazine	chrysene
fluoranthene	acenaphthylene
4-chlorophenyl phenyl ether	anthracene
4-bromophenyl phenyl ether	benzo (ghi) perylene
bis (2-chloroisopropyl) ether	fluorene
bis (2-chloroethoxy) methane	phenanthrene
hexachlorobutadiene	dibenzo (a,h)anthracene
hexachlorocyclopentadiene	ideno (1,2,3-cd) pyrene
isophorone	pyrene
naphthalene	bis (2-ethylhexyl) phthalate

ACID EXTRACTABLE ORGANIC COMPOUNDS	
2,4,6-trichlorophenol	4-nitrophenol
parachlorometa cresol	2,4-dinitrophenol
2-chlorophenol	4,6-dinitro-o-cresol

TABLE II (Continued)

2-nitrophenol	2,4-dichlorophenol
pentachlorophenol	phenol
2,4-dimethyphenol	
PESTICIDES AND PCB'S	
aldrin	a-BHC
dieldrin	b-BHC
chlordane	q-BHC
4,4'-DDT	w-BHC
4,4'-DDE	PCB-1242
4,4'-DDD	PCB-1254
a-endosulfan	PCB-1221
b-endosulfan	PCB-1232
endosulfan sulfate	PCB-1248
endrin	PCB-1260
endrin aldehyde	PCB-1016
heptachlor	Toxaphene
heptachlor epoxide	2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)
METALS	
Antimony	Mercury
Arsenic	Nickel
Beryllium	Selenium
Cadmium	Silver
Chromium	Thallium
Copper	Zinc
Lead	
MISCELLANEOUS	
Asbestos	Total Cyanides

Until a few years ago, the identification and quantification of the trace concentrations of organics chemicals in wastewater was beyond the capability of the analytical techniques of the time. The ability to detect and

measure these pollutants in the environment has quickly outpaced the understanding of their impact. The toxicity of priority pollutants to various life forms does not correlate to the technology based characteristics of current laboratory instrumentation. Thus, these detection limits represent the current state of the art in analytical methods, but fail to indicate the environmental significance for the lower concentrations of pollutants. Additional research, data collection, and analysis are necessary to fill information gaps on sources and quantities of hazardous waste, their fate and effects in POTW treatment plants and on the environment, and the design of any additional regulatory controls which might be necessary.

Available data suggest that virtually all municipal wastewaters contain most of the inorganic priority pollutant metals and at least some of the organics (Foess and Ericson, 1980). Those organic pollutants found in highest frequency at POTWs are:

benzene (29% of samples)
toluene (29%)
ethylbenzene (17%)
trichloroethane (10%)
chloroform (40%)
methylene chloride (34%)
tetrachloroethylene (10%)
trichloroethylene (10%)
naphthalene (11%)
phthalates (ubiquitous)
phenanthrene/anthracene (11%)
phenol (26%)

When the discharge of priority pollutants is difficult to control at the source, the POTW becomes the only alternative to prevent these compounds from entering the environment. Variable removal efficiencies have been

observed at the POTW for different types of organics (DeWalle, 1980).

Information from 20 cities showed that:

> Half of the "secondary treatment" POTWs significantly reduced priority pollutants, including metals, volatiles, and acid base-neutral pollutants;
>
> Advanced treatment processes reduced priority pollutants slightly better than secondary processes; primary treatment was less effective.

Biological treatment can metabolize several of the organic priority pollutants. If the microbial eco-system is acclimated to wastewater containing these biodegradable priority pollutants, a reduction in concentration of these compounds would be expected. For this to occur, the concentration of the particular priority pollutant would have to be maintained at a relatively consistent and noninhibitory level (Miller and Burch, 1981).

EPA (1980) reported that, for organic priority pollutants observed at concentrations greater than 10 ug/l, the median removal efficiency of 20 treatment plants ranged between 55% and 94%. For metals, the median removal efficiency ranged from 32% to 82%.

Assuming a fully acclimated biological treatment system, EPA estimates that 92% of all pollutants are removed by POTWs from discharges to surface waters. Under this scenario, 14% of all pollutants are air-stripped, 16% are removed to sludge, 62% are biodegraded, while 8% pass-through to receiving waters (Schauer, 1986).

Information independently presented by municipal authorities and industrial waste treatment plant operators supported EPA's findings that well-run biological treatment plant systems did, in fact, control toxic substances to a significant degree. The limited data shows that the removal of the total priority pollutant load was about 48% during primary treatment and 61% during secondary treatment (DeWalle, 1980).

An assessment of the removal of priority pollutants during treatment at any municipal treatment facility fails to give a representative picture of the treatment of their waste stream because treatment plants are usually not designed or operated to reduce priority pollutant levels. Thus, any reduction of priority pollutant concentrations during treatment is generally incidental.

Industries discharge between 45,000 and 52,000 metric tons per year of organic priority pollutants covered under the CWA in the wastewater of POTWs and approximately 20,000 metric tons per year will be discharged assuming implementation of existing and proposed pretreatment standards. With full implementation of the standards, reduction of 47% - 60% are projected and the relative contributions of metal and organic constituents from the residential sector are expected to decrease significantly (Schauer, 1986).

It has been estimated that approximately 5 million tons of municipal sludge are produced each year and with an increase in the number of communities using secondary

treatment this figure is predicted to reach 9 million dry tons by the mid - 1980's. The rising volumes of sludge coupled with increasing energy costs, reduced land availability, and continued public awareness of the potential environmental and health hazards associated with the toxic substances in the sludge, has created a great deal of concern in the scientific community.

Landspreading of municipal sludges is becoming more common in the U.S. Where conditions are favorable, landspreading of combined municipal/industrial sludges is probably the preferred disposal technique. Favorable conditions exist when the soil, the sludge, the vegetative cover, erosion and leaching, and access to the area can all be controlled.

Disposition of POTW sludge at the present time is as follows: 25% on land for human and animal food crops; 25% landfill; 35% incineration; and 15% ocean dumping (Dietz and Dietz, 1978).

Choice of sludge disposal should be a local decision based on the alternates available to a specific location. At the present time, no national standards exist for sludge disposal from POTWs.

As a result of the "Policy Statement on Acceptable Methods for the Utilization or Disposal of Sludges" by the EPA, the following comments are made:

1. POTWs need to collect data on the incompatible pollutant loadings to plants.

2. Determine source of all incompatible pollutants recognizing sources in domestic and commercial discharges, as well as, in stormwater that enters the POTWs.

3. Determine concentrations of incompatible pollutants in waste sludges and their effect on disposal practices.

4. Establish pretreatment regulations consistent with effluent requirements and sludge disposal practices.

5. Utilize the ability of POTWs to serve industrial users but realize that it is easier in most cases to remove pollutants at the industrial source. The concentration of pollutants is high at the industrial source. The sludge volumes resulting from pretreatment will be small.

6. Enforcement and monitoring of industrial effluents to the POTW are as important as the formulation of discharge limits.

7. Industrial waste ordinances provide the POTW with the proper authority to effectively manage industrial wastewater discharges (Dietz and Dietz, 1978).

The problems encountered by POTWs in sludge disposal during the past five years have directed attention to the hazardous pollutants in municipal sludges. Sludge disposal options may be precluded by sludge quality standards for landfilling or land spreading. Landfilling criteria which apply include the standards for RCRA, Extraction Potential (EP) Toxicity Leachability tests as presented in 40 CFR Part 261.24. Wastes exceeding any of the EP toxicity standards must be disposed of as a hazardous waste.

The type and quantity of industrial discharges and the degree to which industrial pretreatment is practiced will directly influence the characteristics of a POTW sludge.

Two general types of industrial chemicals can contaminate POTW sludges: inorganic chemicals such as heavy metals and organics which do not biodegrade during the treatment process. The presence of these industrial pollutants can limit the number and types of sludge disposal options available to the POTW, and thus can substantially increase the cost of sludge handling, utilization and/or disposal facilities. Industrial pretreatment should significantly improve the quality of municipal sewage sludge, allowing less costly disposal methods. Therefore, this should eliminate ocean dumping which was originally banned in 1981 for coastal cities. Savings could run as high as $35 per ton of sludge (The American City and County, 1978).

CHAPTER III

MATERIAL AND METHODS

The Environmental Protection Code of the Federal Regulations (40 CFR), Part 403 - General Pretreatment Regulations for Existing and New Sources of Pollution was reviewed. The original law of June 26, 1978 along with the revisions of January 28, 1981 and June 4, 1986 were studied for changes in the Pretreatment Regulation.

EPA documents were also examined. These included: Federal Guidelines: State and Local Pretreatment Programs, Volumes I, II, and III, January 1977; Municipal Pretreatment Program Guidance Package, September 1980; Pretreatment Resource Reader: A Compendium of Experience and Practical Knowledge for the Establishment of Local Programs, February 1982; Pretreatment Implementation Review Task Force, January 1985; Guidance Manual for Implementing Total Toxic Organics (TTO) Pretreatment Standards, September 1985; Guidance Manual for the Use of Production - Based Pretreatment Standards and the Combined Wastestream Formula, September 1985; and The National Pretreatment Program, July 1986. Two Illinois Environmental Protection Agency documents were also studied. These were the March 1983 and May 1984 Pretreatment Workshop booklets.

Four actual Pretreatment Plans were reviewed. These plans included those for The Greater Peoria Sanitary District in Peoria, Illinois, the Rockford Sanitary District in Rockford, Illinois and the Stillwater and the Okmulgee pretreatment plans in Oklahoma. The four different plans were compared to distinguish how the plans were formulated and were working. If this writer had a personal knowledge of a particular pretreatment plan, the plan was compared to the Federal Pretreatment Program to determine if the local program was meeting the national requirements.

CHAPTER IV

RESULTS

Review of the Pretreatment Program

Pretreatment of industrial wastewaters has become one of the thorniest issues facing a POTW and its industrial users. EPA's general pretreatment rules are long and detailed and extremely complex. An aim of the Federal Pretreatment Program is to begin to reconcile existing pretreatment programs in many cities with the approach called for by the Federal legislation. It is the intent that pretreatment programs be developed which are fair and equitable, cost effective, and successful in reducing industrial discharges through POTWs. Professionals in the environmental engineering field should be able to assist in determining realistic regulations and should insure cooperation between POTWs and the industries they serve.

The objectives of the Pretreatment Program are: (a) to optimize the operation of the sewage treatment plant and appurtenances by preventing the introduction of inhibitory or toxic substances; (b) to protect the environment from possible adverse impacts of effluent and sludge;

(c) to enhance the safety of sewer system personnel (Farmer, etal., 1984).

The initial phase in preparing an industrial pretreatment program should determine what fraction of each toxic pollutant comes from an industrial source and whether industrial pretreatment of that toxic will be effective in reducing the concentration in the sludge to a level where the sludge can be utilized.

Ideally, municipal wastewater treatment plants should have continuous monitoring and surveillance equipment at the influent of the plant to warn of hazardous waste discharges. In actual fact, few do.

One important and costly aspect of the program requirements is the execution of a plant sampling program. A sampling program should be designed to address pretreatment objectives pertinent to operation of the wastewater treatment plant. A treatment plant or industrial plant sampling program involves four tasks: sample collection, sample analysis, sample data tabulation, and evaluation of data results.

Sample the influent to the POTW and determine which priority pollutants are arriving at the plant. Sample the effluent and sludge to determine which pollutants are passing through and which are in the sludge. Then calculate the mass amounts of detected pollutants in pounds per day. Thus a mass balance could be achieved using the concentrations and flows in the influent, effluent, and sludge

(Miller, etal., 1980). Search the literature, especially EPA's development documents, to determine the potential sources of the pollutants detected at the treatment plant.

Sampling should take place at potentially significant industrial dischargers for selected substances. Sampling must be very elaborate, because industry does not operate a fixed process line. It might change daily, weekly, or seasonally. Anyone who takes samples one day a year and thinks they know what is going on is grossly mistaken (The American City and County, 1978).

Samples must be representative of the flow and their analysis impeccable. Big money rests on these analysis, and industry will frequently dispute the results. Random sampling and analysis of industry effluent will have to be performed by either POTW employees or private consultants, depending on who has the necessary equipment and manpower. Sampling is also a highly skilled art. The POTW or consultant has to take many time-composite or proportional-to-flow samples before the person becomes skilled at this task.

Study the analytical results. Compare the mass amounts of each pollutant received at the treatment plant with the mass amount discharged by the industries. Laboratory people must stay abreast of the latest literature and analytical techniques to detect prohibited discharges. The expertise to handle laboratory industrial surveillance must

come from the larger city POTWs, the private consultants, and States (The American City and County, 1978).

Unless specific evidence indicates their presence, most pollutants can be investigated less frequently or only when warranted during a sampling program. Reducing the number of analytical tests performed during sampling would improve a sampling program, as well as reduce costs to industries. It is prudent and expedient to require a reduced list of substances to be monitored by industry, since the cost of analyzing a sample for the entire list of priority pollutants would be prohibitive ($1000-2000) for many industrial concerns. Some marginal industries may not be able to afford the costs of pretreatment and will fold, putting people out of work and reducing the tax base of the very POTWs which have to enforce the regulations.

Historically, effluent limits for pollutants have been based on precedence. Typically, the municipal attorney, or engineer obtained copies of Ordinances from other cities and checked the values listed for individual pollutants. This approach did not take into account local conditions, industrial wastewater amounts and concentrations, treatment plant performance, river or stream water quality, and sludge disposal practices (Farmer, etal., 1984). Establishment of industrial wastewater effluent limits should be based on an assessment of the concentrations in the influent of the POTW, tolerance of influent loadings and unit process configuration at the treatment plant, and to

quantify discharge or disposal characteristics of wastewater, air, and sludge. Local effluent discharge standards should be established to reflect the specific conditions at the particular POTW. The most common type of effluent standards implemented in POTW ordinances are single concentration limits for each specific pollutant. This method is the easiest to enforce when compared to technology based standards (different for different industries).

Acquiring substantial data will help to establish effluent standards. A sound approach backed by a strong data base will help the industries, the public, and the state and federal agencies to accept that particular pretreatment program.

To help develop effluent standards the following effects need to be considered:

Influent

- Effects on Worker Health and Safety
- Effects on POTW Construction Materials
- Compliance with Prohibited Discharge Provisions (40 CFR 403.5)

Biological Treatment

- Effect on Secondary Treatment
- Effect on Biological Nitrification
- Effect on Sedimentation Process

Sludge Treatment

- Effect on Digestion
- Air Emissions (Incineration and from Activated Sludge)

Effluent

- Receiving Water Quality (Aquatic Life, Human Health)

NPDES Discharge Permit Limits

Sludge Disposal

Land Spreading
Landfilling (Stabilized Sludge, Incinerator Ash)
Incineration
Ocean Disposal (Farmer, etal., 1984).

Calculate the most stringent valve. Calculate the load available for industrial dischargers. Convert to concentrations. Leave some room in the calculation for industrial expansion and for a safety factor.

Where a POTW pretreatment program is developed, the POTW will be responsible for enforcement of the national pretreatment standards as well as any local or State standards. Funding to assist POTWs in developing pretreatment programs will be available from EPA through section 201 (construction grants) and section 208 (area wide and state planning grants), which will pay 75% of the cost (USEPA 1978). EPA can withhold other federal funds until the POTW develops a pretreatment program. The pretreatment program can also be interpreted to provide for funding of additional laboratory and safety equipment.

Once the POTW obtains an accepted Pretreatment Program, it establishes the Effluent Guidelines for the industries it services. Also, in many cases local effluent guidelines are considerably more stringent than the corresponding Federal Effluent Limitation Guidelines. The law stipulates that local discharge limitations can not be more lax than the federal regulation.

The EPA and States approved to administer the NPDES program will enforce national pretreatment standards where local governments do not develop a pretreatment program. The federal government plays an important role by providing technical guidance to the states and local authorities and by enforcing the pretreatment program when a state or POTW is not making the required progress. Thirty-seven NPDES States and Territories will be required to administer state pretreatment programs (USEPA, 1978).

Most of the industrial facilities potentially subject to categorical pretreatment standards discharge to approximately 2,500 of the Nation's 23,000 - plus POTWs. While the majority of these 2,500 POTWs have either primary or secondary treatment as many as one-half of the 2,500 may provide treatment at levels greater than secondary treatment (USEPA, 1978). There are only 340 POTWs (1.5%) with flows in excess of 10 MGD (O'Dette, 1978).

There are approximately 568 POTWs that receive industrial wastes and are designed to accept flows of more than 5 MGD and/or have categorical industries within their jurisdiction (The American City and County, 1978). These 568 POTWs account for approximately 87% of the industrial influent to POTWs. Of these 568 POTWs, 367 are in NPDES States (Hall, 1978). NPDES States or EPA will be the responsible enforcement authority for industrial users in the approximately 1900 POTWs not required to develop pretreatment programs (USEPA, 1978).

The nationwide pretreatment program is expected to require compliance with categorical pretreatment standards by up to 20,000 dischargers in 1980 and potentially as many as 38,000 - 55,000 by 1983. Such a major pollution control effort will require substantial dedication of resources as well as public and political support at the municipal, state, and national levels of government (USEPA, 1978).

On February 2, 1977, the EPA proposed a rule (42 FR 6476 - 6502) from the WPCA of 1972 which would establish mechanisms and procedures for enforcing national pretreatment standards controlling the introduction of nondomestic wastes into POTWs. These regulations replace the existing general pretreatment regulation, 40 CFR part 128.

Users of a POTW are required to comply with pretreatment standards promulgated pursuant to Section 307. Sections 307(b) and (c) are the key sections of the CWA in terms of pretreatment. Section 307(b) requires the EPA Administrator to promulgate regulations establishing pretreatment standards for the introduction of pollutants by existing sources into POTWs. Pretreatment standards promulgated under section 307(b) must be established to prevent the discharge of any pollutant which interferes with the POTW (or contaminates its sludge), passes through, or otherwise is "incompatible" with POTWs (USEPA, 1978). Section 307(c) requires that similar standards by established for new sources, and these standards must be complied with upon their promulgation.

Section 307(d) of the CWA makes unlawful for any source to discharge in violation of an applicable pretreatment standard. A new subsection to Section 309 was inserted to provide that violations of pretreatment standards by industrial users should be enforced by the POTW. If within 30 days after notification of a violation the POTW does not commence appropriate enforcement action, EPA or a state with an approved NPDES program may begin an action against the POTW. The violating industrial user is also to be made a party to such action. EPA may also bring criminal actions against industrial users who violate national pretreatment standards, and POTWs who violate their NPDES permits (Hall, 1978). While Federal and State enforcement may compel industry and recalcitrant POTWs to comply with pretreatment requirements, only cooperative local government efforts will result in substantial industrial compliance in light of these resource constraints.

The 1977 amendments modified section 402(b)(8) of the CWA to require local pretreatment programs to enforce national pretreatment standards as a condition of municipal NPDES permits.

EPA promulgated the General Pretreatment Regulations on June 26, 1978 (40 CFR Part 403; 43 FR 27736) and were revised on October 29, 1979 and finalized on January 28, 1981 (Southworth, 1981). On January 28, 1981, the Agency promulgated amendments to the regulations pursuant to a settlement agreement with parties that had challenged the

regulations in Federal court (46 FR 9404). This established the administrative framework for:

> Delegating to state regulatory agencies the present federal responsibility for administering the National Pretreatment Program.
>
> Developing and implementing local pretreatment programs which will protect each POTWs operation and ensures that industries comply with applicable federal standards.
>
> Establishing industrial user responsibilities for the reduction of pollutant loads discharged into municipal sewer systems, and industrial reporting requirements (D'Angelo, 1984).

Also on January 28, 1981, a Presidential freeze on new regulations indefinitely delayed implementation of the latest amendments. On October 13, 1981, EPA published a rule establishing a January 31, 1982 effective date for the general pretreatment amendments. Concurrently, however, EPA proposed a rule suspending the January 31, 1982, effective date and invited comments on whether the effective date should be postponed further. Also in January 1982, EPA suspended several of the more controversial parts of the proposed amendments but allowed other proposed provisions go into effect on January 21, 1982. Included in the provisions is the statement requiring states and the POTWs to have approved pretreatment programs on line by July 1, 1983 (USGAO, 1982).

Of course only a handful of POTWs made this deadline. Most POTWs were hoping for passage of Senator Steven Symms (R-Idaho) amendment which would permit local POTWs to keep the pretreatment programs they devised themselves instead

of switching to the Federal program. Therefore, EPA had a massive enforcement action during 1983-1984 against POTWs who had not submitted their pretreatment program for review.

The Agency has subsequently made several other amendments to the regulations, including revisions to the removal credits provision (40 CFR 403.7) on August 3, 1984 (49 FR 31212). The revised removal credits provision was recently struck down by the US Court of Appeals for the Third Circuit in Natural Resources Defense Council, Inc. v. EPA No. 85-3012 (3d Cir. 1986) (USEPA, 1986).

The Pretreatment Implementation Review Task Force (PIRT), was established by the Administrator of the EPA on February 3, 1984 to develop recommendations on how to improve implementation of the national pretreatment program. In its Final Report to the Administrator (January 30, 1985), PIRT noted that Appendices B, C, and D of the General Pretreatment Regulations of 1978 were out of date and recommended that they be updated. A proposed updated version of Appendix D was published in the Federal Register on May 9, 1985 (50 FR 19664). On June 4, 1986 EPA issued final updated versions of Appendices B and C (USEPA, 1986).

Appendix B lists the toxic pollutants designated pursuant to section 307(a)(1) of the CWA. This list also appears at 40 CFR 401.15. Since Appendix B was first published, EPA has deleted the following pollutants from the from the toxic pollutant list in 40 CFR 401.15:

Dichlorofluoromethane and trichlorofluoromethane, 46 FR 79692 (January 8, 1981), and bis(chloromethyl) ether, 46 FR 10723 (February 4, 1981). Therefore, there are now 126 priority pollutants (USEPA, 1986).

TABLE III

APPENDIX B. 65 TOXIC POLLUTANTS (USEPA, 1986)

Acenaphthene
Acrolein
Acrylonitrile
Aldrin/Dieldrin
Antimony and compounds
Arsenic and compounds
Asbestos
Benzene
Benzidine
Beryllium and compounds
Cadmium and compounds
Carbon tetrachloride
Chlordane (technical mixture and metabolites)
Chlorinated benzenes (other than dichlorobenzenes)
Chlorinated ethanes (including 1,2-dichloroethane, 1,1,1-trichloroethane,and hexachloroethane)
Chloralkyl ethers (Chloroethyl, and mixed ethers)
Chlorinated naphthalene
Chlorinated phenols (other than those listed elsewhere; includes trichlorophenols and chlorinated cresols)
Chloroform
2-chlorophenol
Chromium and compounds
Copper and compounds
Cyanides
DDT and metabolites
Dichlorobenzenes (1,2-, 1,3-, and 1,4-dichlorobenzenes)
Dichlorobenzidine
Dichloroethylenes (1,1- and 1,2-dichloroethylene) 2,4-dichlorophenol
Dichloropropane and dichloropropene 2,4-dimethylphenol
Dinitrotoluene
Diphenylhydrazine
Endosulfan and metabolites

TABLE III (Continued)

Endrin and metabolites
Ethylbenzene
Fluoroanthene
Haloethers (other than those listed elsewhere; includes chlorophenylphenyl ethers, bromophenylphenyl ether, bis(dischloroisopropyl) ether, bis-(chloroethoxy) methane and polychlorinated diphenyl ethers)
Halomethanes (other than those listed elsewhere; includes methylene chloride, methylchloride, methylbromide, bromoform, dichlorobromomethane)
Heptachlor and metabolites
Hexachlorobutadiene
Hexachlorocyclohexane
Hexachlorocyclopentadiene
Isophorone
Lead and compounds
Mercury and compounds
Naphthalene
Nickel and compounds
Nitrophenols (including 2,4-dinitrophenol, dinitrocresol)
Nitrosamines
Pentachlorophenol
Phenol
Phthalate esters
Polychlorinated biphenyls (PCBs)
Polynuclear aromatic hydrocarbons (including benzanthracenes, benzopyrenes, benzofluroranthene, chrysenes, dibenzanthracenes, and indenopyrenes
Selenium and compounds
Silver and compounds
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)
Tetrachloroethylene
Thallium and compounds
Toluene
Toxaphene
Trichloroethylene
Vinyl chloride
Zinc and compounds

Appendix C is a list of the industrial categories for which national categorical pretreatment standards either have been or are planned to be issued. Several changes

have been made to the previous categorization scheme since the list's initial publication (USEPA, 1986).

TABLE IV

APPENDIX C. INDUSTRIAL CATEGORIES SUBJECT TO NATIONAL CATEGORICAL PRETREATMENT STANDARDS (USEPA, 1986)

F - Final Rule	NP - Not Promulgated
Aluminum Forming	Asbestos Manufacturing
Battery Manufacturing	Builder's Paper
Coil Coating I	Carbon Black
Coil Coating (Canmaking)	Cement Manufacturing
Copper Forming	Dairy Products Processing
Electrical and Electronic Components I and II	Feedlots
Electroplating	Ferroalloy Manufacturing
Inorganic Chemicals Interim I and II	Fertilizer Manufacturing
Iron and Steel Manufacturing	Fruits and Vegetables Processing Manufacturing
Leather and Tanning and Finishing	Glass Manufacturing
Metal Finishing	Grain Mills Manufacturing
Metal Molding and Casting (Foundries)	Ink Formulating
Nonferrous Metals Forming	Meat Processing
Nonferrous Metals Manufacturing I and II	Paint Formulating
Organic Chemicals and Plastics and Synthetic Fibers Manufacturing	Paving and Roofing (Tars and Asphalt)
Pesticides	Phosphate Manufacturing
Petroleum Refining	Plastics Molding and Forming
Pharmaceuticals	Rubber Processing
Porcelain Enameling	Seafood Processing
Pulp and Paper	Soaps and Detergents Manufacturing
Steam Electric Power Generation	Sugar Processing
Timber Products Manufacturing	Textile Mills

Two additional categories originally listed in Appendix C do not have pretreatment standards because there are no known existing indirect dischargers within these categories, and, to the Agency's knowledge, none are planned for the future. These are:

Coal Mining (40 CFR part 434)
Ore Mining (40 CFR part 440)

Six other categories have also been removed from the previous list since they have been exempted from national categorical pretreatment standards under provisions of Paragraph 8 of the NRDC - EPA Consent Decree, as modified. These are:

Adhesives and Sealants (40 CFR Part 456)
Auto and Other Laundries (40 CFR part 444)
Explosives (40 CFR part 457)
Gum and Wood Manufacturing (40 CFR part 454)
Photographic Equipment and Supplies (40 CFR part 459)
Printing and Publishing (40 CFR part 463)

Appendix E is included here to show the types of sampling allowed by the Federal Pretreatment Program.

Appendix E - Sampling procedures

I. Composite Method

A. It is recommended that influent and effluent operational data be obtained through 24 - hour flow proportional composite samples. Sampling may be done manually or automatically, and discretely or continuously. If discrete sampling is employed, at least 12 aliquots should be composited. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. All composites should be flow proportional to either the stream flow at the time of collection of the influent aliquot or to the total influent flow since the previous influent aliquot. Volatile pollutant aliquots must be

combined in the laboratory immediately before analysis.

B. Effluent sample collection need not be delayed to compensate for hydraulic detention unless the POTW elects to include detention time compensation or unless the Approval Authority requires detention time compensation. The Approval Authority may require that each effluent sample is taken approximately one detention time later than the corresponding influent sample when failure to do so would result in an unrepresentative portrayal of actual POTW operation. The detention period should be based on a 24 hour average daily flow value. The average daily flow should in turn be based on the average of the daily flows during the same month of the previous year.

II. Grab Method

If composite sampling is not an appropriate technique, grab samples should be taken to obtain influent and effluent operational data. A grab sample is an individual sample collected over a period of time not exceeding 15 minutes. The collection of effluent samples by approximately one detention period except that where the detention period is greater than 24 hours such staggering of the sample collection may not be necessary or appropriate. The detention period should be based on a 24 hour average daily flow value. The average daily flow should in turn be based upon the average of the previous year. Grab sampling should be employed where the pollutants being evaluated are those, such as cyanide and phenol, which may not be held for an extended period because of biological, chemical or physical interaction which take place after sample collection and affect the results (USEPA, 1986).

The EPA has decided to state pretreatment standards in terms of concentration (mg/l) and wherever possible to provide an equivalent mass per unit of production which, at the discretion of State and local authorities, could be used in lieu of the concentration limits (USEPA, 1978).

The following is a general condensation of the Pretreatment regulations (40 CFR Part 403).

403.1 Purpose and Applicability

b) This regulation applies:

1) To pollutants from nondomestic sources covered by Pretreatment Standards which are indirectly discharged into or transported by truck or rail or otherwise introduced into POTWs as defined below in 403.3;

2) To POTWs which receive wastewater from sources subject to National Pretreatment Standards;

3) To States which have or are applying for NPDES programs approved in accordance with section 402 of the Act; and

4) To any new or existing source subject to pretreatment standards (USEPA, 1986)

When industrial pollutants enter POTWs they can create three types of problems as listed in 403.2:

1. Interference. The POTW is doing an inadequate job of treating normal domestic wastes as well as industrial wastes. As a result, the POTW can be prevented from meeting its permit requirements.

2. Sludge Management. Industrial pollutants, particularly metals and other toxic pollutants, can limit the sludge management alternatives available to the POTW and increase the cost to the public of providing adequate sludge management. Sludge contaminated with toxic materials can be rendered unusable as a soil conditioner. Many communities are already faced with serious problems in managing ever-increasing quantities of sludge. In some cases, improper handling of sludges contaminated with metals and other toxic pollutants can result in uptake of theses pollutants by crops in the human food chain or leaching of these pollutants into ground water (currently the source of approximately 50% of the nation's drinking water) as well as surface waters.

3. Pass-through. These toxic pollutants pass-through POTWS in quantities and concentrations that can be harmful to the environment and that would be unacceptable under Federal, State and local regulations dealing with industrial discharges directly to receiving waters. Toxic industrial pollutants which pass-through the POTW can prevent reuse of municipal wastewaters and the productive recycling of organic matter

and nutrients in land treatment systems. The pass-through of toxic industrial pollutants can also prevent the attainment of water quality standards and increase the cost to consumers of treating drinking water.

Interference and inhibition problems generally result in inadequate treatment of normal domestic and industrial wastes that the POTW was originally designed to treat. One of the more common types of interferences occurs in the collection system. Organic materials such as hydrocarbons can be extremely flammable and powerful oxidizing agents such as peroxides and chlorates can liberate potentially explosive gasses (O'Dette, 1978).

Municipal treatment systems are often subject to inhibition or interference due to the natural sensitivity of the biological system. The efficiency of a biological system can be adversely affected by hydraulic, organic and or temperature fluctuations. Slug discharges and high concentrations of certain pollutants are the main cause of this type of problem. More significant are the discharge of substances which are toxic to biological organisms or which adversely affect biological processes.

The following specific prohibited discharges are outlined in 40 CFR 403.5b:

1. Flammable or toxic materials which create a fire or explosion or health hazard in the POTW;

2. Pollutants which will cause corrosive or reactive structural damage to the POTW (pH should not be lower than 5.0)

3. Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW;

4. Any pollutant released at a flow rate or discharge concentration which will cause an upset or inhibition of any treatment process, "slug" and;

5. Heat in amounts which will inhibit biological activity in the POTW, but in no case heat in such quantities that the temperature at the POTW treatment plant exceeds 40 degrees C (104 degrees F) (Farmer, etal., 1984).

These adverse effects will be prohibited by pretreatment regulations to all users of a POTW whether or not the user is subject to other national and/or local pretreatment requirements. The second set of prohibitions will contain numeric limitations based on available technologies and POTW inhibition/interference considerations, and will apply to existing and new sources in specific categorical industries.

When the inhibition/interference and/or sludge disposal problems have been properly considered and abated, there still are many pollutants that are not adequately treated or removed and thus pass-through the POTW.

403.6 specifically addresses the question of coverage by a categorical pretreatment standard. An industrial user may request that the EPA Regional Enforcement Division Director, or the Director of a State NPDES program where applicable, provide written certification that the industrial user does or does not come within a particular categorical regulation.

EPA is modifying 403.6(b) of the Federal Pretreatment Regulations to delete the reference to the July 1, 1984 deadline. That section now states that compliance will be

required within 3 years of the date the Standard is effective unless a shorter compliance time is specified in the appropriate subpart of 40 CFR Chapter I, Subchapter N (USEPA, 1986). The regulation also prohibits the use of dilution or deliberate increasing the amount of process water, as a means of achieving compliance instead of using appropriate treatment 403.6(d).

Section 403.6(e) includes the combined wastestream formula.

e. Combined wastestream formula.

> Where process effluent is mixed prior to treatment with wastewaters other than those generated by the regulated process fixed alternative discharge limits may be derived by the control authority, as defined in 403.12 (a), or by the industrial user with the written concurrence of the control authority. These alternative limits shall be applied to the mixed effluent. When deriving alternative categorical limits, the control authority or industrial user shall calculate both an alternative daily maximum value using the daily maximum value(s) specified in the appropriate categorical pretreatment standards and an alternative consecutive sampling day average value using the monthly average value(s) specified in the appropriate categorical pretreatment standards (USEPA, 1986).

Any POTW that has a design capacity of 5 MGD or more and/or receives industrial pollutants that pass-through or interferes with the operation of the sewage treatment plant subject to federal categorical pretreatment standards is required to develop and enforce an EPA-approvable pretreatment program per 403.8(a).

Also in 403.8 the Regional Administration or state Director may require smaller plants to operate a

pretreatment program "if circumstances warrant". Reasons for such a decision might include the nature or volume of the industrial effluent, or past incidents of process upsets, discharge permit violations, or sludge contamination (The American City and County, 1978).

When a POTW pretreatment program is approved, the POTWs NPDES permit is reissued or modified to incorporate the approved program conditions as enforceable conditions of the permit, section 403.8(e).

The most important section of the pretreatment requirements is 403.8(f) the pretreatment program itself. A POTW pretreatment program must include several important features. First, the POTW must have legal authority authorizing the POTW to implement and enforce all applicable pretreatment standards with respect to industrial users. In some states enabling legislation exists but does not extend beyond the jurisdiction of the city. Therefore, with joint treatment plants in so many cities, the POTW personnel would not be allowed to go into an industrial plant that was not in the city that the treatment plant was located in even though the industrial plant is connected to the POTW by sewers. This is not a very good situation for the POTW to be in (Wright, etal., 1978).

Also a pretreatment program should have an industrial waste ordinance, joint powers agreement, permit license, or other agreement with the user of the POTW to control the introduction of wastes into the municipal system.

This enforcement power must include, among other things, the authority to set and enforce compliance schedules, to require the preparation and filing of self-monitoring reports, to carry out inspections (similar to EPA's authority under section 308 of the Clean Water Act), and to set injunctive relief as well as civil and criminal penalties (or liquidated damages) for noncompliance.

Where evidence of noncompliance is found, the POTW must be able to investigate and accumulate data admissible in court, since law enforcement action against pretreatment violators must be undertaken by contract provisions or by seeking court injunctions.

In addition, a POTW pretreatment program must include authority to identify and locate industrial users which may be subject to its program, identify character and volume of pollutants contributed by each user, notify users of applicable standards and requirements, and receive and analyze monitoring reports. The POTW must also have sufficient funding and personnel to carry out these functions.

If user charges are employed to develop sufficient funding, both domestic and nondomestic users will support pretreatment costs. If surcharges are used, all municipal costs of pretreatment programs will be divided among industrial users at an average cost of about $460 per discharger per year in 1983 (Lacy, 1978).

EPA miscalculated the cost of compliance with part 403 by a factor of 13 with their estimated cost of $460

per year per industry. The City of Chattanooga believes the correct cost is $5980/yr/industry. For this reason, the City feels that the EPA needs to make a very thorough analysis of the environmental benefits versus the cost of adding the national categorical standards to a program which already is likely to cost much more than its proposed price tag. EPA did not attempt to estimate the cost to industry of actual compliance with the National Categorical Standards in part 403. The Pretreatment Program will have a very substantial impact on both municipalities and industries (Wright, etal., 1981).

Procedures are established for submitting the proposed POTW pretreatment program to an appropriate "Approval Authority". In the case of an NPDES state, this is the state Director; otherwise it is the EPA Regional Administrator. Section 403.9 sets forth the requirements for this approval, which are quite detailed and should be carefully consulted by any POTW seeking an approved program. Public participation in the nature of "informal consultation" on the proposed submission must be afforded by the POTW to "interested as well as affected members of the public" (Hall, 1978). Cooperation among industries, POTWs, and other concerned citizens is essential to implement the pretreatment program.

The approval authority must either approve or deny the submission. No state Director may approve the program if, during the evaluation period, the EPA Administrator objects

in writing. Any rejection of the submission at this point, or upon the initial submission prior to the public notice procedure 403.11 (b) must be accompanied with a statement of reasons for the rejection as well as suggested modifications and revisions necessary to bring the submitted program into compliance with applicable requirements 403.9 (f) and 403.11(e). This 403.11 procedure is also applicable for preliminary approved state pretreatment programs and programs for revision of categorical pretreatment standards.

Principal costs to the municipalities will include, first, the development of local programs. These costs will include, among other things, development of legislation, funding, and enforcement and monitoring capability and procedures; a survey of industrial waste; preparation and submission of the program application; the public consultation process required under Section 403.10; and notification to dischargers of applicable pretreatment standards.

A state with an approved pretreatment program may assume responsibility for implementing the POTW pretreatment program requirements instead of requiring the POTW to develop the program 403.10(e).

Once the approval authority has received the submission by the POTW of its proposed pretreatment program, and determines preliminary that it contains the necessary material and information, it begins a public notice and evaluation process (403.11). The approval authority has 90

days to review the submission for compliance with the substantive requirements of the regulation. This period may be extended for up to an additional 90 days depending on the extent of public participation. A hearing may be required if a state or POTW requests, or if there is a "significant public interest in issues relating to whether or not the submission should be approved". The regulation further provides that "instances of doubt should be resolved in favor of holding the hearing" (Hall, 1978).

Typical of most EPA regulatory programs, this one contains carefully tailored reporting requirements for both POTWs and industrial users. Industrial users are required to report average and maximum flows discharged to the POTW in gallons per day. Where standards are not being met, the industry must submit the "shortest schedule which will provide the required additional pretreatment or compliance schedule" (Hall, 1978).

The formulation of a realistic compliance schedule depends on many factors including:

> Size of pretreatment facility (GPD),
> Technology which is acceptable,
> The need for treatability studies,
> Delivery time anticipated for equipment,
> Review of engineering plans with permitting authority,
> Installation and start up of pretreatment equipment
> (Ramirez and D'Alessio, 1984).

The EPA documented that time schedules greater than 33 months are excessive (Ramirez and D'Alessio, 1984). The above number of months assumes no problems are encountered with design, engineering, and installation of

equipment. If more time is needed by the industry, then, a letter to the permitting authority would be in order.

Occasionally, however, delivery of equipment or human error in ordering the wrong equipment can produce excessive delays. Under these circumstances, the enforcing authority may be more lenient. Baseline monitoring reports must be submitted in June and December, unless required more frequently. Baseline Monitoring Reports (BMRs) establish hydraulic wastewater flow from industrial users; it characterizes the end-of-pipe wastewater with reference to seven heavy metals, cyanide, total toxic organics, and the fluctuation of pH during discharge (Ramirez and D'Alessio, 1984).

These reports go to the POTW if it has an approved program, otherwise to the NPDES state Director or the EPA Regional Administrator. Industrial users must also notify the POTW of any "slug loading" of an exceptional volume or strong discharge.

POTWs are also required to file periodic reports regarding development and operation of their programs. Detailed records must be maintained by the POTW and industrial users Section 403.12.

Under section 403.13 EPA notes that in establishing categorical pretreatment standards for existing sources it will take into account "all the information it can collect relevant to pretreatment standards" (Hall, 1978).

Section 403.14 considers confidentiality between the POTW, the EPA and the Industrial User. Section 403.16 provides for an upset condition at the categorical industrial user. That is, an unintentional and temporary noncompliance with categorical pretreatment standards because of factors beyond the control of the industrial user (USEPA, 1986).

The pretreatment program will add substantially to EPA's resource needs, particularly in nonpermit States. This major regulatory program will further drain already scarce technical and financial resources, because of budgetary and economic conditions.

States are also expected to play an important role in the pretreatment program. Many states have insufficient funds to implement new EPA programs without additional money. This situation might result in states either abandoning pretreatment and giving up permit authority, or implementing poorly run, under funded programs which are probably the worst thing that could be done.

Considerable expertise will be needed to successfully develop, implement, and enforce the pretreatment requirements. Given the interdependence of POTWs, States, and EPA in this pretreatment effort, failure at any one level will likely result in 1) unreasonable demands being placed on the other levels and/or 2) an ineffective program (USGAO, 1982).

POTWs will play a crucial role in developing, implementing and enforcing the pretreatment program and ensuring that industrial users (IU's) comply with pretreatment requirements. In the past, POTWs have also experienced difficulty in designing and operating treatment plants and needed technical assistance has not always been available from the States or EPA. Because POTWs obtain grants from the Federal Government to establish pretreatment programs, Federal budget reductions will diminish the POTWs ability to finance the staff and equipment needed to enforce the complex pretreatment regulations.

Once a program is developed, there are a number of ongoing costs associated with operation. These include notices, review of compliance reports, inspecting an monitoring, enforcement, and related administrative expenses.

EPA estimates that it will cost the 568 cities and towns likely to be affected about $17 million over the next five years to set up the pretreatment program, while states will have to spend about $14 million (Lacy, 1978).

Establishment of a local pretreatment program to enforce these standards is the most powerful tool a municipality has to control the quantity of toxics in its wastewater. Only the rigorous enforcement of these limits will control the amount of priority pollutants discharged to the municipal sewers by industrial users.

The success of the pretreatment program then, is likely to be determined by the degree of freedom allowed

the POTW by the EPA from the interpretation of the law and the regulation.

Of the approximately 1460 required POTW pretreatment programs, about 100 have yet to be approved. The EPA anticipates that these remaining programs will be approved (or referred for judicial action) by the end of the current fiscal year (October 1, 1986) (USEPA, 1986).

Survey

There are several ways to run a successful pretreatment program. Resources, however, are an important difference. What resources the pretreatment staff will need to successfully implement the program is based on local requirements. Each city has a different set of industrial users with different characteristics. The pretreatment staff can accomplish the job with the necessary resources.

To acquire the needed resources the industrial users should pay their fair share. The industrial users should pay for that part of their waste that is above the sanitary strength at the POTW. The best way to acquire this money is through some sort of surcharge program.

In the Industrial Waste Pretreatment Primer of 1986 a questionnaire was mailed out and the results of this study were published in the November-December edition. This study will be used extensively in describing the ways different POTWs implement the pretreatment program in their

local jurisdictions. This writer did not produce this survey. Mr. Steve Durchin, a private consulting engineer, from Manchaca, Texas, conducted this survey and tabulated the results.

The largest POTWs who mailed in questionnaires averaged 92 MGD and the three smallest POTWs averaged 1.2 MGD. An Industrial Waste Ordinance (IWO) was in existence for most of these POTWs for an average of 7.5 years and has been enforced for 6.6 years. An average of 1.9 years was given for the existence of a Pretreatment Ordinance (PO) with implementation at 1.6 years.

Seventeen percent of the POTWs operated out of an environmental protection department, 70% were out of a wastewater treatment operation, and 5% were in water departments. Seven percent were staffed by a wastewater laboratory group and 9% were run by the engineers.

Section supervisors averaged 7.7 years in the wastewater field and 3.5 years in pretreatment experience. The inspectors averaged 4.9 years of wastewater experience and 2.5 years in pretreatment. Thirty percent of all POTWs had 2 or more inspectors.

Educational requirements are interesting. Thirty-seven percent require high school, 23% require 2-3 years of college, 3% require a college degree and 27% of those require a degree in science. Ever since the pretreatment program started, requirements have increased, and tasks get more complicated and sophisticated. The pretreatment

program staff has used more qualified people and have upgraded the skills of existing employees with training sessions from the EPA and others.

Some staffs are managed by the treatment plant supervisor or lab chemist or plant operators in some medium and small cities. The medium to large cities like to hire more specialized personnel such as environmental engineers, biologists and chemists.

Twenty percent of the POTWs employ personnel to sample only. These employees should not only collect samples but should be the "eyes and the ears" of the POTW in the field.

Thirty percent of POTWs have pretreatment staff that are manned by laboratory personnel. In some cities the lab is involved in both treatment plant and pretreatment analysis. The author Steve Durchin and this writer believe the best situation is when a section of the lab is directly under the pretreatment supervisor. The priority then is the pretreatment program. This means that these samples will not become the last samples tested as it sometimes is when treatment plant samples are the number one priority.

Responsibilities included 100% checked on sanitary discharges, also 32% checked on storm water discharges, 7% checked on direct dischargers, 5% checked on potable water complaints, and 2% monitored cross connections.

Ninety percent of all POTWs kept track of the electroplaters, metal finishers and circuitboard manufacturers. The average daily discharge of these manufacturers was

10,500 GPD/city. Fifteen percent had semiconductor plants with plastic formulating and pesticides the next most common manufacturer at 5%.

The five largest cities monitored an average of 640 industries. The five smallest averaged 3 per city. Excluding the largest and smallest cities the average number of industries was 55. The three largest POTWs averaged 56 categorical industries while the rest averaged 6 categorical industries.

Forty-five percent of all cities issued permits to over 95% of their categorical industries. Ten percent of all cities have issued zero permits. Seven percent also issued permits to companies that were not quite regulated wastes. Permit issuance is up to the cities. Some POTWs feel that all industries need to be permitted. Others feel that only categorical, surcharge industries with high volumes, and users of toxic chemicals should be permitted.

The author, Mr. Durchin thinks that all regulated waste dischargers should be permitted with a signed permit in the files. That way the manager of a industry knows his company is being regulated. Some cities use simple permits and some issue concentration limits or pound limits for specific pollutants.

Mr. Durchin also feels that if a signed permit from the company is in the files then the POTW can threaten to remove the permit, or cite a discharger for operating without a permit.

These industries are inspected so that a permit can be issued, therefore a fee should be assessed according to Mr. Durchin. The POTW should be able to recover the time involved to inspect these industries. Fifteen percent of the POTWs charged a annual permit fee of $20-$50 and 17% were in the $50-$100 range. Seventeen percent of POTWs charge no fees at all for permits. Two POTWs had a permit fee based on flow with an average of $0.62/1000 GPD. Five percent reported a schedule of fees with 3-4 classes.

Permit application fees of $100 were initiated by 7% of the POTWs. Other fees included $52 for performing site inspections, $66 for using automatic samplers for 24 hours, and 20% said that extra fees were used for sampling and analytical costs.

According to the author these expenditures were encountered by the POTWs for the pretreatment program:

TABLE V

PRETREATMENT SECTION ANNUAL OPERATING BUDGET

TOTAL EXPENDITURES ($) BY PERCENT RESPONDERS			
Under 50,000	- 50%	50,000-100,000	- 23%
100,000-200,000	- 15%	200,000-300,000	- 2.5%
300,000-500,000	- 2.5%	500,000-1,000,000	- 2.5%
Over 1,000,000	- 0%		

This income was generated by the pretreatment program:

TABLE VI

TOTAL SECTION INCOME

(Permit fees, surcharge wastehauler fees, etc.)

($) By PERCENT RESPONDERS

Under 5000	- 15%	5,000-25,000	- 15%
25,000-50,000	- 10%	50,000-100,000	- 7.5%
100,000-200,000	- 15%	200,000-500,000	- 10%
500,000-1,000,000	- 2.5%	Over 1,000,000	- 5%

Improvement in the quality of discharge is the main goal of the pretreatment program. But, the pretreatment program itself cost a great deal of money to run. Collect from the indirect dischargers the load they put on the treatment plant.

The survey has a different definition for regulated industries and permitted industries. A regulated industry is a company with chemical inventories that include a priority pollutant, or a surcharge industry or a pollutant that was limited by ordinance. A permitted industry on the other hand is a company that exceeds a discharge of between 5,000 - 25,000 GPD or a company that has a priority pollutant in its discharge regardless of flow.

Seventy-five percent of all POTWs require a surcharge program in their ordinance and of those 75%, 83% have implemented the program. The average POTWs 5 largest industrial users averaged $2950/month. Twenty companies per city is the average number of companies surcharged. The three smallest cities 5 largest customers averaged $320/month and the three largest cities five largest companies averaged $22,100/month.

Thirty-one percent of POTWs implementing the surcharge program are only sampling categorical and significant industrial users. Only 24% are sampling food establishments. The author and this writer agree that these establishments should be sampled if a surcharge or user charge program is implemented. These food services can add organic loading to the treatment plant.

This part of the survey looks at the type of equipment that is being used for sampling and surveillance purposes. Ninety-five percent of POTWs have purchased sampling equipment. The clear winner is the "ISCO" sampler. The ISCO brand stands for Instrument Specialties Company. If these samplers breakdown there is an 800 number to call so that they can be fixed by the POTW and therefore there is very little downtime. The Greater Peoria Sanitary District (GPSD or Sanitary District), where this writer worked previously, used ISCO 1680 and ISCO 2100 samplers. The other samplers mentioned in the survey included "Sigmamotor" with

19% and "Manning" with 14%. Support for these two samplers was mixed.

Explosive gas meters are used by 62% of the POTWs with "Enmet" used by 32% of the cities. This meter can be calibrated at the factory to whatever setting the POTW would like. The only problem with the Enmets is that the oxygen cell and the batteries wear out quickly. A suggestion is to buy a kit to replace the cells and batteries and to recalibrate the gas meter frequently because a life may depend on it! The other explosive gas meters mentioned were "GasTech" 20%, "MSA" and "Dynamation" 12%.

Thirty percent of respondents do not check flow monitoring, 20% regularly check flows and 50% do so infrequently. Those who monitor check their major IUs, and 46% check city sewers. The "ISCO Model 1870" is used by 46% of the POTWs. This type of flow monitoring equipment seems to be much more accurate than the old "Manning Dipper" which was problematic. The only major problem with the "ISCO" flow monitor is that to set up and calibrate someone has to get into the manhole and measure the wastewater flow. Sometimes this is almost impossible because of the physical conditions of the manhole and obstructions in the flow. "Manning" flow meters in the survey are used by 25% and "Sigma" and "Marsh-McBirney" were used by 8% each.

Forty percent use pH tape and a field pH meter. "Orion", "Corning", "Fisher", and "Great Lakes" are used the most often. Other equipment used included Dissolved

Oxygen Meters, "Scott Air Packs" to enter manholes, and "HACH" metal colormetric field kits used as a screening tool.

The next section is dedicated to how most cities calculate the surcharge formula. According to the author the Generic Formula is:

$\$ = (V)\ (8.34)\ \{\ [a\ (BOD - C)] + [b\ (TSS - C)]\ \}$

where \$ = dollars/month, V = monthly volume in million gallons/month, a = rate factor in \$/lb of BOD, BOD and TSS are in mg/l in the discharge, C = the domestic credit in mg/l, and b = rate factor in \$/lb of TSS.

Generally the POTWs follow this formula but there was varied responses. Volume ran from 80-100% of the water company records. The Greater Peoria Sanitary District used continuous monitoring facility records for the largest users and water meter records for everyone else. From the survey, if water was not going to the sewer, generally the IU had to install credit water meters. This was the same procedure that was used at the GPSD. The domestic waste average concentrations were in the 200-400 range for BOD and TSS. The rate factors for \$/lb ranged widely. The average was \$0.04 - \$0.12 BOD and \$0.04 - 0.11 TSS. The Sanitary District's rates in 1986 were for BOD \$ 0.10/lb, TSS \$0.04/lb, and NH3-N \$1.10/lb.

Some cities also charge for COD, Phosphate and Oil and Grease. Some cities charge based on exceeding a certain limit for individual pollutants like over 400 mg/l BOD and

another higher charge if excedding 1000 mg/l BOD. Also if the discharger exceeds a certain volume some cities charge a higher amount. The Sanitary District charged based on flow, concentration and what sewer lines the industries are connected to.

Only twenty-three percent of POTWs adjust their surcharge rates annually, but 63% have changed their factors at some time. The user fees at the Sanitary District are adjusted yearly based on flow from industrial users, the number of commercial and residential users, operations and maintenance costs, administration overhead and depreciation plus capital outlay for new equipment.

POTWs stated that their surcharge income is 50% more than 5 years ago. That is probably because most of these POTWs did not have much of a surcharge program 5 years ago. Seventy percent of POTWs sample every surcharge customer, and 75% of the POTWs are using an automatic sampler. Fifteen percent use both manual and automatic samplers. Twenty-three percent of the POTWs take grab samples. Twenty percent of the cities are not icing down their samples. This is not a very good practice, especially for BOD's. According to Standard Methods BOD samples must be kept at 4 degrees Celsius or 39 degrees Fahrenheit so that the BODs do not deteriorate.

Twenty-three percent of those cities which take surcharge samples frequently, take an average of 24 samples a year. Thirty percent of the POTWs charge between $7 - $200

for taking surcharge samples. The rest put sampling and analytic costs in surcharge rates and permit fees. Thirteen percent of POTWs will take samples at industry request but will charge for each sample. Most of the other cities will only resample if there is a process charge, pretreatment change or other change which would make their discharge different. Almost all cities average the samples for surcharge costs, but the POTWs that take frequent samples take them on a quarterly basis. Thirteen percent use a running average from past years.

According to the author the annual surcharge income is as follows:

TABLE VII

CITIES ANNUAL SURCHARGE INCOME

Under $5000	- 20%	$5000-$25,000	- 10%
$25,000-$50,000	- 10%	$50,000-$100,000	- 13%
$100,000-$250,000	- 3%	$250,000-$500,000	- 10%
Above $500,000	- 17%		

Eighty-three percent of POTWs are now collecting these fees, while 13% have not collected money yet.

Another interesting fact discovered with this survey is the range for the local limits. Table VIII is presented

here to show the pollutants and the concentration range for each.

TABLE VIII

SURVEYED LOCAL LIMITS BETWEEN DIFFERENT POTWS

Pollutant	Concentration Range mg/l
Total Chromium	<8.6
Cadmium	0.2 - 0.7
Cyanide	1 - 2
TTO	2.13
Animal/Vegetable Oil	100 - 200
Mineral Oil	75 - 200

The next section of the survey deals with the Enforcement part of the pretreatment program. Of the POTWs who use Notice of Violations - 65% use verbal warnings, 22% use simple citations, 20% use formal citations with a copy to the legal department, and 75% use formal letters. Two percent of the POTWs also use "Show - Cause Hearings" where a significant violator is required to appear before a board and explain why the POTW should not enforce legal action against the industry. This should only be done as a last resort when the IU does not cooperate with the POTW.

Compliance schedules also very widely. A compliance schedule should be both flexible and timely for simple and commonplace violations.

Forty-two percent of POTWs have established penalties for collecting fines and 12% have routinely collected these fees. Also 27% have established court procedures to collect fines. Fifty-nine percent of POTWs have set a maximum fine of $500.

Most of the POTWs believe they are getting support from their governing body. Only 10% reported problems with city managers, city councils, mayors and from their legal staff.

Forty-three percent of POTWs required a manhole located at the end of the categorical process, 18% required a primary flow monitoring facility, 20% required a 4 inch sanitary tee, 10% required a unique structure like an 8 inch clean-out or a 2 foot square access compartment, and another 10% wanted a 4 foot concrete pad with a lockable lid.

Sixty-eight percent of POTWs use the "Self Monitoring Reports" (SMR) for compliance and enforcement actions. Some cities use the SMR for an indicator of problems.

Forty-seven percent of cities inspect categorical industries between 2-4 times per year. Forty-seven percent also take between 2-4 samples per year, with 20% taking 6 - 24 samples per year. Some cities do not set a limit for the number of samples but base sampling on the rate of

compliance. This writer thinks this is a good idea. Why put a lot of time and effort into sampling a industry which is in compliance every time sampled. Instead concentrate resources on industries that continue to give the treatment plant problems.

Compliance schedules for major changes within an industry to install pretreatment equipment included:

30-45 days to submit plans - 76% of surveyed POTWs
60-90 days to start construction - 52% of surveyed POTWs
90-180 days to meet limits - 48% of surveyed POTWs

The author states that adequate time is needed for planning, construction, and operation of a new pretreatment facility. During the interim the discharger should still try to do everything possible to keep toxic waste from reaching the sewer.

Seventy-five percent of POTWs plan to publish "significant violators" names in the local paper and 42% have already done so. Twenty-three percent of POTWs are still uneasy about the definition of a "significant violator". The GPSD had a hard time determining what industries would be considered to be "significant violators". The author feels that frequent or serious violators of categorical standards should be considered significant violators. Also non-categorical industries that cause significant problems with the collection system or treatment plant should be included. The author wants to know what to do about companies that consistently, but just

barely exceed their discharge standards. This is a hard question to answer.

The next section of the survey deals with laboratory sample analysis. Depending on the resources of the POTW different labs test different parts of the analysis including:

TABLE IX

TYPE LABORATORY USED FOR EACH PARAMETER CLASS

(by percent of all POTWs Responders)				
PARAMETERS by:	Contract Lab	City Lab	Own Lab	Industrial Waste Lab
Surcharge (BOD,etc.)	31%	20%	37%	12%
Grease and Oil (G&O)	42%	17%	35%	5%
Metals Analysis	60%	8%	30%	5%
Cyanides	60%	10%	25%	5%
TTO	83%	0%	10%	7%

Cities reported that 30% never, 42% infrequently, and 23% regularly submit quality control samples to test these labs. The author believes and this writer concurs, that the only way to know if these labs are producing good results is to submit control samples for them to test. After all, doesn't the EPA do the same thing to POTW labs to make sure the labs are reporting accurately? The only

problem then is what should the difference between the POTW lab and the contract lab be so that the POTW feels confident with the results? When the GPSD sent out samples to check other labs the rule of thumb was a difference of 10% on TSS and 15% on BOD because BOD samples results are harder to duplicate.

Seventy-five percent of the POTWs are getting BOD results back from the labs in seven days.

For metals:

7% - 3 days
33% - 4 - 10 days
23% - 11-21 days
37% - > 21 days

Greater than 21 days was the norm both for the GPSD lab and for the contract labs in Peoria for metal analysis. In fact, the contract labs were usually much slower than the GPSD lab.

For TTO samples:

12% - 5 days
32% - 6-14 days
32% - 15-30 days
24% - > 31 days

Per the author, industries may feel that the POTW is not concerned with their discharge because the results are getting back to the IU in a very untimely fashion.

Eighty percent of POTWs running TTO use EPA 600 method (gas chromatograph) compared to 35% that use EPA 624 and 625 GCMS (gas chromatograph with mass spectrometry detector). The average number of TTO's run appear to be between

3 - 12 samples/year/city. These TTO samples run between $900 - $1100 for the 113 compounds.

Copper analysis cost	- $8 - $20/sample
Cyanide cost	- $15 - $30/sample
EPA 601 Purge and Trap Method Cost	- $90 - $125/sample

If the POTW is satisfied with the contract lab as far as quality of results and the timely way samples come back do not go looking for a cheaper price. It is not worth the time and effort because it will take several months before the POTW will have confidence in the sample results from the new lab.

The next to last part of the survey deals with training of employees. Almost all of the POTWs are attending EPA Regional Seminars. Forty-seven percent are attending State Seminars, however, 65% of the POTWs can only attend one seminar per year. Some POTWs can go out of state or out of their EPA Region to attend a conference. All POTWs use in-house training for new employees. Some small POTWs are visiting larger POTWs to see how they run their program.

The final part of the Survey deals with EPA audits. Fifty-nine percent of all POTWs have been audited. The most frequent complaints from auditors were inspections, enforcement actions, failing to issue permits, not enough sampling, bad recordkeeping, lab Quality Assurance and Quality Control items and Baseline Monitoring Reports (BMR's) and Self Monitoring Reports (SMR's). Ninety-eight percent of POTWs did not have any arguments with their

audits. It usually took between two weeks and three months to get a written copy of the audit back to the POTW.

What does this survey with all this information really say? It says that there are many different ways to accomplish the objectives of the pretreatment program. The development of the local program really depends on how much money is available to do an adequate job to properly inspect and enforce this federally mandated program.

Case Histories

Illinois has one of the strongest water pollution control programs in the Nation. The Sanitary Water Board in June, 1967, established effluent standards for the waters of the State. On April 1, 1968, the U. S. Department of Interior approved these standards (Lue-Hing, etal., 1980). The Environmental Protection Act of July, 1970 established the Illinois Environmental Protection Agency (IEPA), which replaced the Sanitary Water Board, to inspect, monitor and conduct surveillance for the regulations of the Act. The judicial arm of all pollution regulations are conducted by the five member Illinois Pollution Control Board.

In Illinois, there are over 800 POTWs and approximately 3000 industries subject to Pretreatment regulations (Lue-Hing, etal., 1980). The Greater Peoria Sanitary District is the second largest POTW in Illinois outside of the Greater Chicago Area. In 1985, the daily dry weather average flow was 24.8 MGD. The GPSD has been designed to

average 37 MGD and is a tertiary treatment plant with 72 Rotating Biological Contactors for nitrification reduction.

The GPSD services an area of 33,000 acres with about 175,000 customers, in three communities. The GPSD serves Peoria, Bartonville, and Peoria Heights, Illinois. The Sanitary District also has approximately 200 industries and 21 categorical industries regulated under the pretreatment program. The categorical industries include metal finishing, organic chemicals, plastic processing, iron and steel, metal molding and casting, electroplating, and rubber processing.

There is a diverse range of industries within the Sanitary District. However, the 4 largest are an ethanol manufacturer, a paper bag manufacturer, a central waste treatment facility that reduces oil concentrations, and an organic chemical manufacturer. The POTW was constructed in 1929 and has been updated several times. The Sanitary District has combined sewers in the downtown Peoria area and separate sewers everywhere else with a total of 582 miles of sewers.

The Sanitary District has four anaerobic digesters and the sludge is air dried in 11 lagoons with a combined total of 82.3 acres. The drying time is approximately 219 days. The sludge is given away to the public as a sludge conditioner and to farmers as a fertilizer. As of 1986, there was not any problem with heavy metals contamination. The

limiting metals as far as land application is concerned are copper and zinc.

The effluent limits at the GPSD are BOD - 20 mg/l, SS - 25 mg/l, and NH(3)-N 2.5 mg/l summer and 4.0 mg/l winter. These limits are consistently being met with BOD and SS usually less than 10 mg/l. The only trouble the Sanitary District has is trying to meet the ammonia standard. The effluent from the POTW discharges to the Illinois River. This is a slow moving river that is murky colored from the high suspended solids concentration in it from soil runoff.

The Sanitary District has had very few problems that have caused operational problems. This can be attributed to a good industrial waste ordinance that was enacted on April 18, 1978. The Ordinance also established the user charge system for residential, commercial and industrial users. The Sanitary District has a very good working relationship with the industries in the three cities.

The problems the Sanitary District has had are slugs from industries that hit the plant before the operators can handle it. An example of this problem is slugs from the ethanol facility. The ethanol plant is:

1) less than 30 minutes by sewer from the POTW;

2) 60% of the BOD to the POTW; and

3) careless in reporting spills or slugs.

Therefore, whenever the ethanol plant makes a mistake and

discharges something to the sewer, the Sanitary District knows it almost immediately.

The GPSD's Pretreatment Ordinance was developed from 1982 - 1984 and passed on May 14, 1985. The effluent guidelines were based on the Sanitary District's NPDES Permit limitation, and IEPA sludge permit and/or sludge disposal practices. The GPSD used the State of Illinois Rules and Regulations Title 35: Environmental Protection Subtitle C: Water Pollution Chapter I: Pollution Control Board to implement the Sanitary District limits.

The GPSD believes that the industries should meet the same discharge limits that the POTW has to meet on effluent to the Illinois River. The effluent limits for all dischargers unless otherwise specified in a wastewater discharge permit are as follows:

TABLE X

EFFLUENT LIMITS OF THE GREATER PEORIA SANITARY DISTRICT

Pollutant	Maximum Allowed Concentration (mg/l)
Arsenic	0.25
Barium	2.0
Cadmium	0.15
Chromium - Total	1.0
- Hexavalent	0.1
Copper	0.5
Cyanide	0.1
Fluoride	15.0

TABLE X (Continued)

Grease and Oil	100
Iron	2.0
Lead	0.2
Manganese	1.0
Mercury	0.0005
Nickel	1.0
Phenols	0.3
Silver	0.1
Total Dissolved Solids	3500
Zinc	1.0
All pollutants listed in 40 CFR Part 403 Appendix B not listed elsewhere in this ordinance	0.1
pH	5.5 - 9.0
Temperature	65 degree C (150 F) at industry or 40 C (104 F) at POTW
Gas - Carbon Monoxide	50 ppm by volume
- Hydrogen Sulfide	10 ppm by volume
- Oxygen	< 19.5% by volume
- Methane	> 5% lower explosive limit (LEL) two successive readings
	> 10% LEL for one reading

Existing industrial users shall apply for a Wastewater Discharge Permit within 90 days after the effective date of this Ordinance (May 14, 1985) and new industrial users shall apply at least 90 days prior to discharge to the POTW. The time schedule to meet categorical standards should not exceed 9 months for any part of the schedule.

New sources subject to categorical standards shall submit a Baseline Monitoring Report no later than 180 days after discharging to the POTW.

Wastewater Discharge Permits are issued for a specified time period not to exceed 5 years. The industrial user shall apply for a renewal at least 90 days prior to expiration. The industrial user shall be informed of any proposed changes 30 days prior to the effective date of that change.

The GPSD has developed several procedures to comply with the pretreatment program. All users who discharge waste that are different from domestic waste, regardless of frequency or quantities, are required to have a Wastewater Discharge Permit. The Sanitary District, after an inventory of industries using the Illinois Manufacturing Directory, the Chamber of Commerce Directory, the Illinois Bell phone book, Donnelley's Directory, and an IEPA audit of industries, classified and notified all known affected industrial users of the applicable local and federal pretreatment standards along with the Resources Conservation and Recovery Act (RCRA). When Federal pretreatment standards are promulgated the new standards will be incorporated into the permit for the affected industry.

The Industrial Surveillance Division will analyze the Baseline Monitoring and Self-Monitoring Reports. Industry samples will be analyzed by a laboratory that the Sanitary District approves of. The categorical industry must get the approval of the Sanitary District for the laboratory before submitting the industrial samples to that particular laboratory. All sampling and analysis must follow

Standard Methods. All industrial users subject to Categorical Standards will sample twice a year for their Self-Monitoring Reports. The GPSD may require more frequent sampling if the industry is consistently in noncompliance. The GPSD will conduct an inspection and take samples at categorical industries at least once a year. The GPSD will also inspect and take samples at industrial users on a regular basis to determine user charge concentrations, and compliance with effluent standards. A significant industrial user, either based on flow or concentration, will also be required to install a continuous monitoring facility to check pH, flow and temperature and to take 24-hour composite samples. A check sample of the 24-hour composite will be split between the industry and the Sanitary District to determine if the industry is reporting the results correctly. A monthly comparison of results will be sent to the industry. If there is a significant discrepancy between results, the District's results will be used. A chain-of-custody sheet will be used with the sample date, parameters to check for, name of company, name of inspector and name of industrial representative on the sheet. These check samples will be split either once a week or once a month, on different days, depending upon the impact on the Sanitary District. The significant industries will submit a monthly report to the GPSD to determine monthly user charge billings.

The Sanitary District will also sample the influent, effluent and sludge whenever it is deemed necessary to check for the priority pollutants.

Legal action will include the following compliance procedure for violations of the Ordinance. A written Notice of Violation will be sent to the violating industry. A Compliance Meeting between the industry and Sanitary District will be set up in this letter. After the meeting a Compliance Directive will be issued to control and prevent continued violations of the Ordinance. If the industry fails to comply with the directive a revocation of the user's Wastewater Discharge Permit may be in order. A Wastewater Discharge Permit may be revoked for any of the following reasons:

1) Tampering with, disrupting, or destroying Sanitary District equipment;

2) Failure of a user to report a slug discharge;

3) Failure of a user to report an accidental discharge of a pollutant;

4) Failure of a user to report an upset in the industry's pretreatment facility; and

5) Violations of conditions of the user's Wastewater Discharge Permit.

A user who causes or allows any action which may revoke the Wastewater Discharge Permit will appear before the Board of Trustees of the District for a "Show - Cause" Hearing as to why their permit should not be revoked. The Show - Cause Hearing will be served at least 10 days before the hearing. After the Board has reviewed the evidence, it

will issue an Order to the industrial user to halt or prevent pollutants which present dangers to sewer workers or welfare of the treatment plant. The GPSD may obtain a restraining order from the Circuit Court or an injunction to prevent violations of this Ordinance. Any industry violating this Ordinance will be liable to the Sanitary District for any expenses, loss, damage or fines issued by the IEPA or Federal EPA. In addition, the GPSD may fine the violating industry not less than $300 or greater than $500 for each violation of the Ordinance. Also, the Sanitary District may recover attorney fees, court costs, court reporter fees and other expenses for litigation. Any person who makes false statements or who tampers with any monitoring device will be guilty of a misdemeanor and upon conviction be fined not more than $1000 and/or shall be incarcerated for a period not to exceed 6 months. The Sanitary District shall also publish a list of significant violators in the largest daily newspaper in the area every 12 months.

Before the Pretreatment Ordinance, the GPSD was concentrating its efforts toward large industrial users which could adversely affect the POTW. Today, the Sanitary District is concentrating on very small industries, usually less than 5,000 GPD, which may or may not have high concentrations of toxic pollutants. These small industries require a great deal of time and a heavy paper work load. The GPSD is not quite sure the time, money, and effort is

worth it as far as pretreatment in Peoria Illinois is concerned.

A POTW in Illinois which is unique is the Rockford Sanitary District in Rockford, Illinois. Rockford is the fastener capitol of the world. It also includes one of the largest electroplating concentrations in the country with 42 electroplaters. Some of these electroplaters are quite sizable. An estimated 26-28% of the flow to the POTW is from plating waste.

The Rockford Sanitary District is the largest POTW outside of the Chicago area. The average flow is 40 MGD. The 36,772 acre service area includes a population of 217,000 in three cities. The cities include Rockford, Loves Park and Cherry Valley.

The Rockford Sanitary District had a primary treatment plant by 1932 and expanded to secondary treatment by 1977. The first Ordinance was adopted in 1971. Rockford bills by an ad velorem tax system for residential users and supplemented by a user charge system incorporated into an industrial waste ordinance in 1976. This latest ordinance also includes charges for monitoring and analytical costs. Rockford expects 650 industries out of the 1200 in the service area to be under pretreatment regulations.

The Rockford Sanitary District has had many operational problems including a mid-1960 toxic spill which killed off the digester and was the result of heavy metals and cyanide. Shockloading of cyanide and other complex

mixtures is also a problem. The toxic problem with the sludge at the Rockford Sanitary District was also a nagging problem. The sludge had to be taken to a hazardous waste landfill because the sludge was very toxic. The Rockford Sanitary District has also had problems with grease and oil, slugs, organic solvents, and phenols from time to time.

Rockford took the approach of going to the industries early in the pretreatment process and believes it is better to get the industries involved instead of waiting for the program to be fully developed. Many of the major industries were very cooperative but, the small job shop electroplaters had to be taken to court to enforce compliance.

The Pretreatment Ordinance was passed October 1, 1982. This was in time to be incorporated into the renewal of Rockford's NPDES permit. The discharge standards were based on removal efficiencies at the POTW. The following limitations are based on a 24 hour composite sample.

TABLE XI

EFFLUENT LIMITS AT THE ROCKFORD SANITARY DISTRICT

Pollutant	Maximum (1984) Concentration (mg/l)
Cadmium	0.9

TABLE XI (Continued)

Chromium - Total	25.0
- Hexavalent	6.0
Copper	10.0
Cyanide	0.7
Grease and Oil	100
Iron	100.0
Manganese	40.0
Nickel	13.0
Zinc	15.0
pH	not less than 5.0
Temperature	65 degree C (150 F) at industry or 40 C (104 F) at POTW
Gas - Methane	> 5% lower explosive limit (LEL) two successive readings
	> 10% LEL for one reading

Any slug reaching the POTW shall not exceed more than 5 times the average 24 hour concentrations or 24 hour flow during normal operations from an industrial user. Users may obtain a variance for a period not to exceed beyond one year of the 1984 date for compliance. A significant industrial user is:

1) a user who has a discharge flow of 50,000 gallons or more per average working day;

2) a user who has a flow of greater than 5% of the wastewater flow to the District;

3) a user who has incompatible pollutants in its wastewater;

4) a user who has a significant impact on the POTW.

All significant industrial users shall obtain a General Industrial Wastewater Discharge Permit within 180 days of the effective date of this Ordinance (October 1, 1982). A permit fee of $35 will be collected to process this permit application. The time schedule shall not exceed 6 months for any part of the schedule. Permits shall be issued 180 days after application if no other information is requested by the Rockford Sanitary District or 270 days if information is requested by Rockford.

The Rockford Sanitary District had already located most of the industries in their service area. However, the Illinois EPA sent out a survey to identify industries Rockford might have missed.

Industries are required to self-monitor according to volume. Those with flows above 500,000 GPD must monitor daily, those with less must monitor once a week. The samples are checked for metals and Rockford spot checks for other pollutants. Samples are split between the industry and the Rockford Sanitary District.

Any categorical industrial user shall submit on or before the 20th day of the months of April, July, October, and January for the proceeding quarter, a certified report indicating the nature and concentrations of pollutants.

The monitoring requirements for the significant industrial users are quite different than the GPSD. The sampling chamber shall contain a Palmer-Bowlus flume and samples are required to be taken every hour or half-hour

for a representative 24 hour sample. The entrance to such monitoring facilities shall be secured by a breakaway key-top locking device installed by Rockford. Rockford shall have the only key to the locking device and has complete control of the access. The continuous monitoring facility must also have an access for electrical power. Automatic sampling devices provided by Rockford will be operated 24 hours per day seven days per week. Samples will be collected by Rockford personnel. The Rockford Sanitary District will provide a split with the industry upon written request. Rockford's two man inspection team collects 18 composite samples each day. Rockford's laboratory performs 1400 chemical analysis per week for metals, cyanide, BOD, and solids.

A continued problem is the industries own labs along with the two consulting labs in the area. The Rockford Sanitary District checks the other labs for cyanide, metals and BOD.

Rockford follows a three-step review system for enforcement procedures and penalties. A Compliance Directive is initiated if the user brings forth plans to Rockford to correct non-compliance. The user shall, within 180 days submit a schedule for compliance. The user shall keep Rockford informed as to progress being made on a monthly basis. Any industrial user issued a Compliance Directive shall apply for a variance with the Board of Trustees of the Rockford Sanitary District. No variance

granted may allow a discharge greater than 2.5 times the limitation for specific pollutants based on 24 hour composite samples or shall last longer than the Compliance Directive.

Again the Board of Trustees has the responsibilities for reviewing all revocation of permits and variances and disconnection of service from the sewer. The Rockford Sanitary District also has a Show-Cause Hearing. This is the second review process.

A Variance is issued because such sanctions would cause an arbitrary or unreasonable hardship on the industry. A variance will be issued one year at a time, with a maximum time period of 5 years. A progress report must be given to the Board every year to insure that the industry is making sufficient progress toward meeting the standards. If the limits of the variance are exceeded the variance may be revoked within a 30 day period.

An appeal procedure is the third part of the review process. When the industrial user does not agree with the Industrial Waste Section of the Rockford Sanitary District, the user may appeal directly to the Board of Trustees.

Any user who has violated the Ordinance may be fined an amount not to exceed $500 for each violation. Any person who knowingly or renders inaccurate the monitoring facility violates this Ordinance and may face a misdemeanor for $1000 or jail term not to exceed 6 months.

Rockford has in the past disconnected users from the sewer who have continued to violate the Ordinance and have made no attempt to correct the pollution problem. However, this is a rare event. The Rockford Sanitary District will also summarize in a large local paper any enforcement actions taken against significant violators of the Ordinance.

The Rockford Sanitary District sees the pretreatment program as an expansion of the efforts that have previously developed with the Industrial Waste Ordinance. Rockford believes that the programs objectives can be accomplished using an increased monitoring capability. The Rockford Sanitary District believes that the pretreatment program helped to reduce metal concentration in the sludge so that now (1985), the sludge is being disposed of in a regular sanitary landfill instead of a hazardous landfill.

The Rockford Sanitary District also believes that the pretreatment program has been able to help track slugs and where they may be coming from.

The two other pretreatment programs discussed are both in Oklahoma. The State of Oklahoma does not implement NPDES regulations themselves, therefore, the Federal EPA out of Region 6 in Dallas has ultimate control of pretreatment programs. There are six different agencies within the State of Oklahoma that regulate environmental legislation. Although, the only agency that regulates municipalities is the State Department of Health.

The first pretreatment program investigated in Oklahoma is the Stillwater program. Stillwater serves a population of 40,000 people with about 13,000 connections. It also has Oklahoma State University in town with an on campus enrollment of 8900 students.

Stillwater's POTW is a secondary treatment plant. The plant was put into operation on April 22, 1965. The plant was modified between 1979 and 1981 and has a capacity of 6 MGD.

When the pretreatment program was implemented, Stillwater had four categorical industrial users connected to the system. Only two of these industries might be discharging toxic pollutants. The original four categorical industries included a carbonless paper forms manufacturer, a marine motor manufacturer, a steel wire manufacturer, and a hose manufacturer.

There have been numerous changes to the Stillwater POTW pretreatment program. The changes include: 1) the carbonless paper forms manufacturer now has two discharge permits; 2) the OSU power plant was connected to the system and is now permitted; 3) a small plating shop was found and is now permitted; 4) a printing operation was permitted; 5) the hose manufacturer went out of business; 6) the printing operation that bought the building from the hose manufacturer is now being permitted; and 7) the marine motor manufacturer is now both a metal finisher and a metal molding and casting categorical industry. The combined

wastestream formula was used for this industry. Therefore, there are now eight permitted industries in Stillwater.

There has been little evidence of problems with industries over the last fifteen years. The two major problems noticed have been a documented case of pass-through from boron and in 1986, the POTW was out of compliance for pounds of contaminants from heavy rain. The POTW is also concerned with grease and oil from restaurants and grit from car washes.

The sludge from this treatment plant is anaerobically digested and air dried. The liquid digested sludge is also used on pasture land. The sludge concentrations are well within limits for land application.

C. H. Griernsey and Co. conducted an industrial waste survey to determine which industries within the city of Stillwater may be subject to pretreatment standards, had large flows, and had the potential for toxics. The consulting engineer divided the industries into four main industrial groups: 1) Significant industries (toxics, significant impact, and categorical industries); 2) Intermediate users (2000 gal/hr maximum, BOD and SS do not exceed 300 mg/l standard); 3) Minor industries (1042 gal/hr or less, BOD and SS do not exceed 80% of the 300 mg/l standard); and 4) Insignificant industrial users (dry industries, sanitary waste only, and insignificant impact).

The significant industries will receive the brunt of the inspection and monitoring program. An industrial waste questionnaire was sent to these significant industries. If these questionnaires were not received in a timely manner, either phone calls or visits were made to these industries. Stillwater will continue to update the list of industrial users in town to make sure all users know about Pretreatment Requirements. The City Attorney will review the Federal Register weekly to stay informed of new pre-treatment regulations.

The Pretreatment Ordinance was adopted by the city of Stillwater on June 13, 1983. The local discharge limits are based on the analysis of significant industrial dischargers, water quality standards, POTW effects, best engineering judgment, organic pollutants entering the POTW and sludge quality.

TABLE XII

EFFLUENT LIMITS AT THE STILLWATER POTW

Parameter	Avg Conc mg/l consecutive 30 day period	Max Conc mg/l 24 hr flow proportional composite sample
Aluminum		100.0
Antimony	0.01	0.1
Arsenic	0.1	5.0
Barium		100.0
Boron	1.0	5.0
Cadmium	0.5	1.2

TABLE XII (Continued)

Chromium - Hexavalent	1.0	1.0
Chromium - Total	5.0	7.0
Cobalt		5.0
Copper	1.0	4.5
Cyanide	1.0	1.9
Fluoride	1.5	200
Iron		1000
Lead	0.4	0.6
Manganese		10.0
Mercury	0.002	0.2
Nickel	1.8	4.1
Phenol		200
Silver	0.3	5.0
Vanadium	5.0	5.0
Titanium		5.0
Zinc	4.2	4.2
Oil and Grease		100
Selenium		1.0
Total Kjeldahl Nitrogen		500
MBAS		100
COD		2000
Total Dissolved Solids		5000
Total Metals		10.5
Flow - MGD		0.5
BOD		> 300 surcharge takes effect
TSS		> 300 surcharge takes effect
pH		6.0 - 9.0
Temperature		40 degrees C (104 degrees F) at POTW 50 degrees C at industry
Gas - Methane		same as Rockford Sanitary District

Another limit given in the Ordinance that is different from Rockford and the GPSD is that no slug should reach the POTW from an industrial user that lasts longer than 15 minutes.

All users will be billed based on flow. If BOD and SS concentrations are greater than 300 mg/l then a surcharge system will be added on to the charge for flow. The City of Stillwater has not implemented the surcharge system to date.

If a user of a property feels that effluent discharged to the sewer does not reflect the 300 mg/l BOD and SS concentration then the user can ask the City Manager to have samples analyzed from the property to determine the proper concentrations.

Minor users concentrations will be determined based on book values. For intermediate users industries will collect a sample at least once every 12 months. The POTW requires significant industrial users to sample at least once a month. The Operations Department of the City of Stillwater will collect a grab sample one or more times per year for intermediate users and two or more times for significant users.

A laboratory report from an industry may be invalid if: 1) the analysis is incomplete; 2) Standard Methods was not followed and a state-certified lab was not used; 3) results cannot be verified; and 4) monitoring equipment was tampered with.

All significant users will be required to obtain a Industrial Wastewater Contribution Permit. This permit will have specific limits for each industry. The schedule to meet categorical standards is the same as the Peoria

Pretreatment Plan. Progress reports to the Director of Operations should not exceed nine months. Permits shall not be issued to exceed one year.

Categorical industries must submit: 1) A baseline report; 2) Compliance Schedule reports; 3) A Compliance Data report; 4) Semi-annual reports; and 5) Slug notices. A periodic compliance report should be submitted to the Director of Operations in the same months as the Peoria Pretreatment Plan, unless required more frequently, indicating concentrations of pollutants in the effluent.

The Director of Operations may impose a mass limitation on users which use dilution to meet pretreatment requirements. Monitoring facilities must be completed within 90 days of written notification by the City. These monitoring facilities must be suitable for sampling.

Stillwater may apply for consistent removal if it can remove a pollutant to a consistent concentration 95% of the time samples are taken. However, the City of Stillwater has not taken this approach so far.

The user shall submit a plan by January 1, 1984 so that prohibited pollutants will not get into the sewer. The industry must also report to the POTW when significant changes occur to the process or pretreatment facilities.

Stillwater may disconnect service from the industrial user. The Industrial Wastewater Contribution Permit may also be withdrawn. The only difference, in the Permit, between this Ordinance and other Ordinances studied so far

is a refusal of reasonable access for inspecting or monitoring may be a condition for withdrawal of the permit.

The legal part of the Stillwater Pretreatment Ordinance includes a Notice of Violation, (30 days to plan or correct a violation), Show-Cause Hearing before the City Commissioners, an Order may be issued and finally Legal Action may be taken in District Court if the user refuses to correct the problem. Fines, penalties, permit modification, permit revocation and emergency action are the types of legal action which may be taken. A person who falsifies information may constitute a Class A offense.

The significant industrial users began sending in monitoring reports and the POTW began sampling these industries to confirm the findings beginning on March 17, 1981. All categorical industries will be required to monitor at least monthly and report quarterly. (Pb, Cd, Hg, Pb, As, Se, Ni, Ag, Se, Ba - Quarterly, 113 priority pollutants Annually). Industries with high strength wastewater should be inspected and sampled with a 24 - hour composite quarterly. Categorical industries should be inspected and monitored monthly. Chemical waste generators should be inspected and monitored once per year. Industries that discharge other than sanitary waste should be inspected and sampled once per year. The City of Stillwater will also sample the influent at the POTW for priority pollutants and the effluent will be tested if warranted. The data

collected will be reliable enough to be admissible in court action or enforcement procedures. Data will be collected to ensure compliance, compare results with previous years and discover process changes with industries.

Some problems were discovered by Stillwater with the pretreatment program. There has been no easy mechanism devised by the EPA for a local pretreatment program to be revised if changes occur. The whole program would have to be resubmitted to the EPA and the City Commissioners for any major changes and the City Manager believes that this is unnecessary. Also, the City Attorney did not know what he was looking for when reviewing the Federal Register weekly for changes in the pretreatment program. Therefore, the attorney missed the final categorical regulations for metal molding and casting and Stillwater ran into trouble for not implementing those regulations on the marine motor manufacturer. Stillwater then had to hire a consultant to make sure the pretreatment rules were being administered properly.

The final pretreatment program to be examined in Oklahoma is for Okmulgee. The average flow for this two-stage activated sludge treatment plant is 2 MGD. The POTW serves a population of 16,000 and was modified in 1977. The sludge is aerobically digested and either air dried or disposed of off-site.

The Okmulgee POTW has had many serious violations. High strength waste has caused most of the problems. A brief history of violations is included here:

August, 1978 - Administrative Order - EPA

April, 1981 - Consent Order - State of Oklahoma

Okmulgee was fined $25,000 in 1984 by Region Six of the EPA for not having their Pretreatment Plan on line. In July, 1987, Okmulgee received a new NPDES permit and a Municipal Compliance Plan was developed to improve the treatment plant to comply with this permit.

The Industrial Waste Survey was conducted by POE and Associates by consulting the telephone book, and the Oklahoma Directory of Manufacturers and Products, 1974. A list of 23 industries was reduced to seven and an "Industrial Waste Survey Questionnaire" was sent to these industries on June 1, 1981. Another survey was sent out during the Fall of 1984 with a larger list of businesses included. A total of 67 potential industrial users were determined from this survey. A list of significant industrial users (flow $\geq$ 25,000 GPD, flow > 5% of total flow to the POTW, or has toxic pollutants in its wastes), were determined. Four significant industrial users were identified. A producer of porcelain enamel on wall boards manufacturer, a manufacturer of glass containers, a manufacturer of xanthan gum and a manufacturer of soft drinks are the significant industries. The manufacturer of xanthan gum is 50 - 60% of the BOD to the plant. The manufacturer of soft

drinks has a flow of 5,400,000 gallons/month which is the second largest and contributes 5 - 10% of the BOD to the POTW.

The Engineering Technician will keep track of new businesses in Okmulgee and the City Attorney will review the Federal Register monthly. The Pretreatment Ordinance was adopted by the City of Okmulgee on June 14, 1983 with revisions on August 29, 1983 and August 27, 1985. The local discharge limits are based on State of Oklahoma water quality stream standards, POTW effects, and in the best engineering judgment of pretreatment staff and the engineering consultant.

TABLE XIII

EFFLUENT LIMITS AT THE OKMULGEE POTW

Parameter	Max Conc mg/l any one day
Arsenic	0.35
Barium	10.0
Cadmium	0.30
Chromium - Total	1.30
Copper	1.50
Lead	0.50
Mercury	0.03
Nickel	1.00
Selenium	1.00
Silver	0.50
Zinc	1.0

TABLE XIII (Continued)

Chlorinated hydrocarbons	1.00	
Total Phenols	.500	
Pesticides	1.00	
Organic Priority Pollutant	5.00	
Oil and Grease	100	
Cyanide	0.10	
Total Dissolved Solids	8000.0	
Temperature (industry)		50 degrees Celsius
Temperature (POTW)		40 degrees Celsius
pH maximum		10.0
pH minimum		5.0
BOD		> 300 surcharge takes effect
TSS		> 300 surcharge takes effect
Gas - Methane		same as Rockford and Stillwater Sanitary District

The POTW charges are based on flow for all users and a base rate for industrial users. Surcharges are added for all industries that discharge either BOD or TSS or both above 300 mg/l. Pounds per day limits will also be established based on NPDES permit requirements for the POTW.

The City of Okmulgee may adopt fees for the following parts of the pretreatment program:

1) setting up and operating the pretreatment program;

2) monitoring and inspecting and surveillance procedures ($300/month for each affected industry);

3) reviewing accidental discharge procedures and construction;

4) permit applications;

5) consistent removal of pollutants by Okmulgee;

6) other fees the City of Okmulgee deems necessary.

A Wastewater Contribution Permit is required of all significant industrial users within 180 days of August 27, 1985 and the users must apply for a permit within 60 days. The application fee for the permit is $100.00. A permit is not to exceed 5 years. This is the same as the Peoria Pre-treatment plan. The permit conditions include: 1) the schedule of user charges; 2) limits on average and maximum concentrations; 3) maximum rate and time of discharge; 4) monitoring specifications; 5) compliance schedules; 6) dates for technical or discharge reports; 7) plant records; 8) notification for substantial change in characteristics or volumes; and 9) notification for slug discharges. Again like all other programs except Rockford, compliance reports have to be submitted in June and December.

A baseline report, progress reports, compliance report, semi-annual reports and slug loading must be submitted by categorical industries. These reports will be analyzed by the Engineering Technician.

Any significant changes within the industry must be reported to the POTW. One industry changed production schedules and did not inform the POTW. In the past, this industry sampled once a month. Samples are now taken three times a week and may be required to sample five times a week if days with high concentrations are not reported.

All industries which are permitted will monitor their waste and report the results on a monthly basis except for heavy metals. If the industry does not have metal limits in the permit than analysis will be on an annual basis only. If however, the permit limits heavy metals then the industry will monitor on a monthly basis. The City of Okmulgee will take samples every three months for categorical industries. The influent and effluent of the POTW will also be monitored for priority pollutants once a year.

The legal action follows this chain of events. Emergency action may be recommended if the violation is damaging to the POTW, environment or human health. If the industrial user objects, a show cause hearing will be called. When a decision is made, enforcement action will be started.

If no emergency action is needed, the City Manager will write a letter to the user and request a halt to the violation. A hearing will be held if the user protests or refuses to correct the violation. This scenario takes place in both Okmulgee and Stillwater, Oklahoma.

Public participation is supported by the City of Okmulgee. The objectives of the program and public suggestions will be printed in the local paper when the program goes into effect. All records other than confidential information is available for public inspection. The City of Okmulgee will also publish in the local paper

annually any significant violations of 45 days or more from an industry which remains uncorrected after noncompliance notification.

What do these four different pretreatment programs have in common? The main sections of the different pretreatment programs are all very similar. The main differences are in the local discharge limits and how they were arrived at. Another major difference is how the money is derived to run the program. The final and probably the most important aspect of the differences between these programs is how the programs are enforced.

Evaluation. The pretreatment program is something the country needed to control toxics that interfere with POTWs, pass-through the treatment plants to the receiving streams and contaminate sludge. The pretreatment program is very hard to administer because of all the paperwork both the states and the Federal EPA require.

This first part of the evaluation will examine whether the different POTWs are meeting the intent of the law. This writer will compare the regulations with the four case histories and with the survey. This writer will base the evaluation on personal experience and judgment. Two Tables will be developed showing adequate and inadequate areas of the program (See Table XIV and Table XV).

Table XIV is for the Surveyed POTWs and Table XV reflects the four POTWs in the Case Histories. These

Tables will show the key elements of the pretreatment plan and how the POTWs are meeting the regulations. I have established a rating scale with one being the worst and four being the best rating that can be achieved.

TABLE XIV

SURVEYED POTWS - MEETING THE REGULATIONS

Ratings - Based on Personal Judgement

1 = The surveyed POTWs are not meeting the minimum standards required by the federal regulation.
2 = The surveyed POTWs meet some of the requirements but needs improvement to meet all the requirements.
3 = The surveyed POTWs meet all the requirements of the regulation.
4 = The surveyed POTWs exceed all the requirements of the regulation.

Key Elements of the Pretreatment Program	Ratings 1	2	3	4
Educational Requirements	37% High school	-------	23% 2-3 yrs col.	3% BS degrees
Permit Issuance	10% none issued	-------	45% categor. only	7% categor. and others
Annual Permit Fee	17% no fees	15% $20-$50	17% $50-$100	5% schedule of fees 3-4 classes
Types of Industries Sampled	-------	-------	31% categor. & signif. industry	24% are sampling food estab.
Flow Monitoring	30% do not check	50% check infreqtly	-------	20%check regular

TABLE XIV (Continued)

Surcharge Rates			63% adjust at some time	23% adjust yearly
Sampling	20% do not ice samples		70% sam. every surcharge customer	15% use auto. & manual samplers
Sampling Frequency Categorical			13% sam. quarterly	23% sample 24/year
Notice of Violations	65% verbal warnings	22% simple citation	20% formal citation	2% show-cause hearings
Fines			27% court procedure	42% penalty
Sampling Access	20% 4" sanitary tee	20% unique structure	43% manhole	18% a primary flow device
Quality Control Samples	30% never submit	42% submit seldom		23% submit regular
Metals returned from lab	37% > 21 days	23% 11 - 21 days	33% 4 days	7% 3 days
TTO Samples from lab	24% > 31 days	32% 15 - 30 days	32% 6 - 14 days	12% 5 days

ABBREVIATIONS:

col. = college
categor. = categorical
signif. = significant
estab. = establishments
infreqtly= infrequently
sam. = sample
auto. = automatic

TABLE XV

FOUR POTWS PRETREATMENT PLANS
MEETING THE REGULATIONS

Ratings - Based on Personal Judgement

1 = The pretreatment plan is not meeting the minimum standards required by the federal regulation.

2 = The pretreatment plan may meet some of the requirements but not all of the requirements of the regulation.

3 = The pretreatment plan meets all of the requirements of the regulation.

4 = The pretreatment plan exceeds all the requirements of the regulation.

Key Elements of the Pretreatment Program	Ratings 1	2	3	4
Review of the Federal Register	No info. Rockford	Monthly Okmulgee	Weekly Stillwtr.	Daily Peoria
Certification of Contract Labs	-------	None in Illinois labs are monitored	-------	Already in Ok.
Enforceable Plan	Rockford	Peoria sampling	Stillwtr.	Okmulgee

TABLE XV (Continued)

Self - Monitoring	-------	2 times yr categor. Peoria Okmulgee	4 times yr categor. Rockford Once a month signif. users Stillwtr.	Priority Pollu- tants Annually categor. industry Stillwtr Signif. users daily Peoria Rockford Once a month categor. Stillwtr Once a month per- mitted industry Okmulgee
POTW Monitoring	-------	1 time a year Peoria categor.	4 times a year Stillwtr signif. users signif. users once a wk to once a month Peoria 4 times a year permitted industry Okmulgee	Monthly categor. Stillwtr 5 times a week 18 sam. per day categor. Rockford $300/mo. for each affected industry Okmulgee

TABLE XV (Continued)

Fines	-------	$200/day maximum Oklahoma State law	$300/day suggested Federal minimum	$300-500 Peoria per violation $500 per violation Rockford
Effluent Limits (Example Total Chromium mg/l)	24 hour composite 25.0 mg/l Rockford	24 hour composite 7.0 mg/l Stillwtr.	maximum 1.3 mg/l Okmulgee	maximum 1.0 mg/l Peoria exceeds all other limits
Timed Schedule for Non-compliance	-------	-------	9 months Peoria, Stillwtr. Okmulgee	6 months Rockford
Disconnection	-------	------	Peoria Okmulgee Stillwtr. have the power	Rockford has disconnected users
Discharge Permits	-------	-------	All categor. users Rockford All signif. users Okmulgee	All industry users Peoria All signif. and categor. users Stillwtr
Time Period for Permits	-------	-------	5 years Peoria Rockford Okmulgee	one year Stillwtr
Permit Fee Application	-------	None Peoria Stillwtr.	-------	$35 Rockford $100 Okmulgee

TABLE XV (Continued)

Legal Action		Variance Allowed Rockford		Show-cause Hearing Peoria, Stillwtr Okmulgee
Enforcement				$1000/ 6 months in jail Peoria, Rockford Class A Offense Stillwtr Okmulgee
Slugs	5 times av. conc. or 24 hr. flow Rockford		15 minute max. slug allowed Stillwtr. Okmulgee	No slug variance allowed Peoria
Surcharge System		Flow Stillwtr.	Surcharge Okmulgee	User charge Peoria Rockford

ABBREVIATIONS:

Info.	= information	wk.	= week
Stillwtr.	= Stillwater	mo.	= month
Ok.	= Oklahoma	av.	= average
categor.	= categorical	conc.	= concentration
signif.	= significant	max.	= maximum
sam.	= samples	hr.	= hour

The second part of this evaluation deals with my own personal comments, PIRT recommendations, other Sanitary District's recommendations, proposed rules in the Federal

Register for pretreatment improvements, and finally general drawbacks and advantages the pretreatment program has created since the inception of the program.

Total Toxic Organics are addressed by Peoria and Okmulgee. This writer feels that Total Toxic Organics (TTO) will become an important issue in the near future. Also, in the near future POTWs NPDES permits may contain whole - effluent toxicity limits for water quality standards. That is why the limits for TTO should be as low as possible.

The pretreatment program does not address how the POTWs should determine flow from industrial users. This writer believes that this is an important aspect of the program for significant industrial users. Continuous flow monitoring by flumes or weirs are the most accurate way to determine flow for significant users. This is discussed primarily by Peoria and Rockford. Credit water meters for water not entering the sewer is another important aspect of flow monitoring. Water meters should be used to measure flow only for industries not considered significant by the POTW.

Another important aspect to consider when examining the pretreatment program, is whether federal and state inspectors are requiring the POTW to do too much. This aspect is partly addressed later in this evaluation when discussing certification of consulting labs. Here, this writer will discuss whether the EPA or state inspectors

are wasting the POTWs or consultants time and money requiring them to do things the program never intended.

For example, when the state inspector was auditing the Stillwater Pretreatment Plan recently he wondered why the POTW was not monitoring restaurants. Stillwater has a very low influent BOD to the plant and the consultant feels, and this writer agrees, that the POTW should not be wasting time and resources when there is no problem with BOD entering the plant. It seems like the inspectors are just trying to require more and more paper work from POTWs. The paper work requirement especially does not make sense for POTWs that have very few problems with toxics, sludge contamination, high influent BOD or problem industries.

Mr. Gene Seebald of the IEPA also believes that paper shuffling should be reduced and more emphasis should be placed on getting results (Civil Engineering, 1982).

Another help to pretreatment could be better trained operators. The State of Illinois has set up an operating treatment plant at Southern Illinois University. Operators from around the State can take treatment plant operation courses and can get hands on experience. This could be a great help to POTWs and other states could benefit from such a program.

Although this writer may be biased, the effluent limits promulgated by the Greater Peoria Sanitary District is the most restrictive and therefore, would be the best as far as sludge quality is concerned, if enforced vigorously.

Also, the EPA, by mid-1989, will tighten pretreatment standards for hazardous waste constituents under the Domestic Sewage Exclusion for metals and organics in POTW sludges. Therefore, all POTWs will have to tighten their regulations so that the effluent standards are closer to the limits of the Greater Peoria Sanitary District. Rick Brandes, the acting chief of Program Development and Permits said, "to meet state water quality standards for toxics, POTWs will probably have to go back up the pipe and attempt to beef up the pretreatment standards of local industries" (Nichols, 1988).

The Pretreatment Implementation Review Task Force (PIRT) suggested five main areas of improvement for the Pretreatment Program. These improvements were addressed in the June 12, 1986 Federal Register. However, these improvements in the Federal Register were only in the form of a proposed rule. These new regulations have never been promulgated! These changes need to be implemented as soon as possible to improve the Pretreatment Program. This writer will review each of the five areas individually with my own personal comments.

1) Clarification of the program requirements. It would help if all Guidance Manuals and Development Documents were available at the time a regulation is promulgated. This would assist the POTW in understanding the regulation and would expedite their implementation.

Some categorical standards are production-based. This is one of the hardest concepts to determine. Per the Federal Register, production rates are based on daily production rates. What is an average daily production rate anyway? The Combined Wastestream Formula is also a very hard concept for the POTWs to understand and implement properly. More work is needed by the Federal EPA to explain this concept to the POTWs so that they are not afraid to use it.

The general and categorical regulations do not address the amount of sampling needed by the industrial users. Is twice a year (June and December) for the self-monitoring reports enough times to sample for categorical industries? This writer believes that twice a year is definitely not enough sampling. Once a month should be enough sampling to establish a pattern for the first two years from an industrial user. If a problem is determined from this amount of sampling, more monitoring can be required. If, however, after this two year period, the categorical industrial user does not have any violations then the POTW could relax the sampling frequency to the self-monitoring reports only. If any violation reoccur then more monitoring could be reinstated.

Certification of private labs is needed to determine if these labs are testing total toxic organic samples properly. The State of Oklahoma has already implemented this idea. However, when the Stillwater Pretreatment Plan was

audited, the inspector felt that certified labs should be inspected too. Is this going overboard as far as the pretreatment program is concerned? This writer feels that this is asking too much from the POTW.

The State of Illinois has not implemented this certification process yet. However, when this writer left the Greater Peoria Sanitary District in 1986, the state IEPA was starting to look at the certification process for both private labs and POTW labs.

More defensible local limits are needed at POTWs. The local limits are not well understood and are not being applied consistently by EPA states or POTWs. All municipalities will have to calculate local limits in the future based on scientific findings. How is the POTW to do this when there has been data obtained for only thirty priority pollutants? All of this data was collected under an EPA grant by Dr. Don Kincannon of the Civil Engineering Department at Oklahoma State University.

Have we set local limits too low for industries to meet? Why should there be low limits for categorical industries and very high local limits for everyone else? Some POTWs have set local limits based on categorical standards. This is a very good idea and should be implemented by more POTWs.

Some limits are stricter for industries then what is in domestic sewage. Significant contributors of toxics, from recent studies, are from storm runoff, infiltration,

and septic tank wastes. These studies were conducted in New York, Chicago, Camden County and Bergen County, New Jersey, and Chattanooga, Tennessee (Lynam, etal., 1980 and Ziaks and Derucher, 1983). The studies also cast doubt on the ability of the pretreatment program to eliminate industrial pollutants from POTW sludge.

2) Improvement in enforcement procedures. The brunt of enforcement has been placed on local authority for the pretreatment program. EPA has, therefore, pushed enforcement back on someone else. This has caused problems with some POTWs. There have been many POTWs that do not want to enforce standards against their industrial users. For example, some industrial users are not submitting BMR's, progress reports or compliance reports on time, if at all. If these reports are not submitted and the POTW refuses to enforce the program, then the Federal EPA should step in and enforce the program by going directly after the industries.

The regulated pollutants should be measured and included in each self-monitoring report. Some industries are not including the regulated pollutants in each self-monitoring report. The PIRT Committee and this writer believes that the regulated pollutants need to be included for each report to determine compliance.

Enforcement is centered around writing. The POTW needs to write letters to industries whenever noncompliance is discovered. Phone calls and meetings are necessary but,

letters are needed to determine compliance by industrial users as well as POTWs. Industries also need to answer the letters to inform the POTW how noncompliance will be eliminated.

A great deal of human judgment is included in decisions to implement enforcement actions. More guidance is needed at the Federal level to help POTWs determine when enforcement actions are necessary.

3) Allocation of additional resources to the program. Because of the budget crisis the federal government does not have enough money to effectively run the pretreatment program. Also, more money is needed at the Federal level for surveillance equipment to help the local program. Sharp cuts in Research and Development funds may eventually have a detrimental effect on the pretreatment program.

Only 21 of the 37 NPDES states have obtained approval of their pretreatment program. EPA should require states receiving funds for pretreatment to use these funds for that purpose only. Some states have used this money to run other environmental programs within their states. In other words, the Federal EPA needs to keep a closer watch on the state programs. Therefore, more money is needed at all levels of government to run a successful pretreatment program.

4) Better definition of the roles and relationships of program participants. There must be a true partnership

with mutual trust and understanding between the EPA, the states and the local POTW.

The states and the EPA Regions interpret the pretreatment regulations differently across the country. There have been inconsistencies in the past with a wide variety of pretreatment plans being approved. These inconsistencies have been very troublesome especially with towns that have had toxic problems in the past. A good example of this is Rockford, they have had problems with toxic kills of their digesters and toxic sludge and yet their effluent standards are higher than any other POTW in the Case Histories studied. How can a program like this be approved?

This writer believes that there should be consistency throughout the Nation. Some PIRT Committee members have documented cases of these instances. These actions very widely from the focus of the program and may have high costs, no basis and may be based on politics.

The federal government should provide overall technical guidance for treatment technologies for industrial wastes. The EPA should also provide guidance to states on pretreatment programs. The state should provide an oversight function and should assist small POTWs that lack technical expertise.

5) Consideration of regulatory changes. New definitions are needed for interference and pass-through to show causation mandated by Congress in the Clean Water Act.

This new definition would only add three words. The words are "in whole or in part". Therefore, if an industrial user would cause interference or pass-through "in whole or in part" the user would be held responsible for that upset at the POTW.

Paul Keturi of the Greater Peoria Sanitary District stated, "A new definition of significant noncompliance which will replace significant violation needs to be promulgated as soon as possible. This new definition is more precise when determining noncompliance and when determining which industries should be placed in the local newspaper once a year. The new definition is only in the form of guidance and it is questionable whether it would stand up in the courts if used in an enforcement action".

Some thoughts from the PIRT Committee which were addressed in the June 12, 1986 proposed regulation of the Federal Register. This writer believes that the suggestions that follow from the Federal Register should be implemented as soon as possible to make the pretreatment program more enforceable.

Many POTWs are not knowledgeable enough to properly inform industrial users of their requirements under RCRA of 403.8(f)(2)(iii). Therefore, the EPA should develop a handbook to distribute to POTWs on these requirements.

POTWs should be allowed to take samples for industries to report results in the baseline monitoring and self-monitoring reports if the POTW does not trust the industry

or consultant. Sometimes it is easier for the POTW to take samples instead of waiting for the industry to submit sample results. Time-proportional samples or four grab samples should be representative of industrial effluent if flow-proportional samples are not feasible. This simplification should help both POTWs and industries because some regulated flow is very small and flow-proportional samples would not work well in these instances. Also, time-proportional and grab samples are much cheaper to take then flow-proportional samples are.

All monitoring taken by the industrial user should be listed in the compliance reports instead of using the best result which is probably in compliance. Some industries only report results which are in compliance. These industries now would have to report all results even those not in compliance.

Specific reporting requirements need to be implemented for non-categorical industrial users if these industries interfere or pass-through POTWs. Most POTWs have already taken this action but there was some confusion on some POTWs part whether non-categorical industries could be regulated. Therefore, this statement was added to the proposed regulation.

A minority of the PIRT Committee had a different prospective on the categorical standards. The Rockford Sanitary District, the City of York, Pennsylvania, the City of Chattanooga, Tennessee, and the State of New Jersey

still believe that an engineered approach as an alternative to National Categorical Pretreatment Standards, based on local options, is more economical and much less of an administrative burden. Mr. Gene Seebald of the IEPA also thinks that an engineering approach could avoid redundant treatment (Civil Engineering, 1982). This writer disagrees with this belief. National Categorical Standards are the best method, to date, that is reasonable to reduce toxic loadings to POTWs.

There are several other areas where this writer disagrees with the PIRT Committee recommendations. For the Baseline Monitoring Report the Committee recommends that a minimum of one sample is required from the categorical industries to determine compliance. This writer believes that more than one sample is needed as a minimum to determine compliance. A continuous sampling for one week of production should be a minimum as far as Baseline Monitoring Reports are concerned.

Mr. Paul Keturi of the Greater Peoria Sanitary District also said, " there should be a minimum flow standard under which the regulation should not apply. For example, a metal finisher that discharges 200 gal/month on a batch basis and has one or two parameters just out of compliance, it is hard to justify the costs involved with treatment and testing for this small amount of pollutants". This problem also exists with industries that consistently but just barely exceed their discharge standards. The POTW could

waive this exemption on a case by case basis if the discharge interferes or passes through the POTW. I agree with Mr. Keturi that it is hard to justify the costs involved with this type of violator. The PIRT Committee disagrees, however, and believes that all industrial users must comply with their categorical standards.

Some other major problems discovered with the pretreatment program include the following statements. The Rockford Sanitary District and this writer believe from first hand experience that, it is very difficult to determine which industrial category a particular industry falls within and whether an industry is a categorical industry or not. If Standard Industrial Classifications (SIC codes) are used to determine industrial categories, these categories may not reflect actual processes within an industry. There may be different operations within an industry which might produce pollutants not typical for that particular SIC code. The inspector who visits the industry has to be very knowledgeable about many particular industries and must make sure that the industry is categorized correctly.

Another problem for smaller POTWs, in particular, is that they do not have anyone on staff who is familiar with the pretreatment program or has enough expertise to prepare or implement the program. Stillwater, Okmulgee and Ponca City in Oklahoma have all had to hire outside consultants because these small cities experienced trouble trying to

prepare, implement, or enforce the pretreatment program themselves.

This writer has seen instances where POTWs hire a consultant to prepare a pretreatment program and after it is promulgated the program sits on a shelf and never is enforced properly. That is why this writer believes that smaller POTWs need to keep a consultant on staff or hire a pretreatment program coordinator to help the POTW implement the program effectively.

Some important benefits of the pretreatment program are mentioned below. The biggest benefit this writer sees is now most POTWs know what is in the influent to their treatment plants and where some of these pollutants may be coming from. These POTWs had no idea previous to pretreatment program implementation what was in the influent. Now if these POTWs discover a spill or a slug, in the influent to the plant, then the operator should now have a good educated guess where the spill or slug may be originating.

Two other important aspects of the pretreatment program, which are sometimes ignored, are the benefits to the POTW budget. These costs can be generated from user charges, surcharges, permit fees, sampling and other monitoring activities. The pretreatment program has increased some POTWs budgets by as much as 50% over the last five years.

The rates for the POTW should be set in such a way that industries have an economic decision to make as far

as pretreatment is concerned. This not only includes toxics for enforcement procedures and fines but traditional pollutants such as BOD, TSS, and NH3-N. If the cost for surcharge or user charge are made high enough, the industry will not only build pretreatment facilities to lower costs to the POTW but will lower the load to the treatment plant as well.

CHAPTER V

SUMMARY AND CONCLUSIONS

In summary, the General Pretreatment Regulations are very complex and very hard to understand. This thesis explained the background for pretreatment legislation, identified the major points of the pretreatment regulation, evaluated four different pretreatment programs and recommended some improvements for the program.

The General Pretreatment Regulations of June 26, 1978 established: 1) the enforcement of technology-based pretreatment standards; 2) general prohibitive discharge standards which defined interference, pass-through, and contamination of POTW sludge; 3) removal of priority pollutants at the source of discharge; and, 4) the increased protection of sewer system personnel.

The major advantages of the pretreatment program include: 1) more control over what industries discharge to the sewer; 2) a better handle on what is in the influent to POTWs and where these pollutants are coming from; and, 3) the money generated by pretreatment activities for the POTW budget.

A valuable byproduct of the pretreatment program has been to get POTWs to look at their systems and to optimize

the operation of their POTWs. The pretreatment program should promise for better system maintenance, a stronger updated sewer use ordinance, and a firmer hand in septage disposal, grease, acids, cyanides, latex and other maintenance problems.

The pretreatment program promises an opportunity to learn more about the industrial contributors to the sewer system and their flow patterns, slugs, and other unusual discharges, and the causes of treatment plant upsets. It may enable the utility to establish methods for spill tracing and for control of untreatable odors and colors. The pretreatment program could be another tool for protection of the sewers and treatment plants, which are major urban investments and the primary responsibility of the wastewater utility manager.

Some managers have found that pretreatment regulation requirements help them secure long-sought information. Extensive treatment plant and industrial sampling increases the knowledge of the chemical characteristics of the wastes in the system. Computerized inventories of non-residential system users can be used for many purposes, including more equitable cost allocation, spill tracing, maintenance load projections and sewer design. Computer techniques make rapid retrieval of data practical. Some wastewater utility managers are building a capability for rapid retrieval of data from specific substances and developing methods for plotting such data on sewer system maps. This technique

can be used to track down the source of a prohibited discharge or other problems in the sewers.

The permit requirements potentially provide data for updating the industrial inventory and thus, keeping a record of departing and arriving industries. It is also possible that the increasing knowledge of the character of industrial discharges will provide a better understanding of residential wastewater characteristics and of inflow and infiltration.

The major areas of improvement needed are: 1) more justified effluent limits for some POTWs; 2) more guidance from EPA on the Combined Wastestream Formula so that POTWs are not afraid to use it; 3) Sampling requirements need to be identified; 4) enforcement needs to be more consistent across the country; 5) small flow categorical industries need relaxed standards to meet; 6) POTWs with flows of 5 MGD or less need to have someone on staff who knows and can enforce the pretreatment standards; and, 7) the program is very hard to administer.

Although the pretreatment program has some faults, as can be seen by the previous pages, the program is the best the country has to remove toxics prior to their arrival at the POTWs.

In conclusion, although data collection and evaluation are cumbersome and costly, strides are being made and many potential benefits are being realized by municipalities conducting pretreatment programs.

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VITA 2

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