CHAPTER 6S - U. S. FOREST SERVICE SPECIAL PROBLEM

Introduction

During the progress of this report the Town of Saratoga and W.E.A.I. was approached by officals of the U.S. Forest Service (USFS). The USFS has requested permission to take toilet vault wastes that are routinely collected from summer mountain campgrounds, etc., and dump them into the Saratoga Lagoon System. The USFS is willing to pay the Town for any costs incurred by increasing the capacity or treatment capabilities of the present system in order to use the system. The USFS is also planning to sign a contractual agreement with the Town for payment of construction, maintenance and dumping fees. The question put to W.E.A.I., was can the present system handle the proposed loadings, and if not, what will it require in construction costs to renovate and upgrade the existing system to adequately treat the FS loadings.

Waste Characteristics

The characteristics of the waste proposed to be dumped into the lagoon system are summarized below:

Average BOD_5	20,000 mg/l
Average total solids	45,000 mg/l
Average suspended solids	25,000 mg/l
Average COD	40,000 mg/l
Average pH	8.1

Although the characteristics of the Saratoga wastewater entering the lagoon system are not known or documented, waste characteristics gathered from the lagoon system for the City of Laramie are summarized below:

Average BOD_5	100 mg/l
Average total solids	1500 mg/l
Average suspended solids	150 mg/l
Average COD	none taken
Average pH	7.6

Most waste water reference texts summarize sewage characteristics as follows:(7)

Average BOD_5	200 mg/l
Average total solids	700 mg/l
Average suspended solids	200 mg/l
Average C.O.D.	500 mg/l
Average pH	6 - 8

Obviously, the USFS toilet vault wastes are very concentrated, as much as 100 times stronger than average waste. As can be shown, the proposed BOD_5 loading on the lagoon system is equivalent to a population of 2000, assuming an average BOD_5 loading of .17 lb./cap./day and a flow of 100 g.p.c.p.d. The total volume of flow to be added to the lagoon is only 2000 g.p.d. which is equivalent to a population of 20. The proposed waste can best be described as sludge.

Description of the Proposed USFS Dump Station

Fig. 6S-1 schematically shows the proposed USFS dump station. The waste will be collected from the recreational areas and hauled to be dumped into the dumping trough, with the large objects being seived out by the bar screen. The waste is then held in the holding tank. From the holding tank the waste is run through the controls tanks where it is ground up, metered and pumped into the lagoon system. A dump would be made about every 24 hours, through the summer months, approximately 100 days.

In addition to the dump station the FS proposal includes installation of four 5 H.P. floating aerators in the first cell of the lagoon, drilling a water well for washing down the bar screen, etc., and building an access gate into the dump station.

The FS has written up an agreement to be contracted with the Town, concerning ownership operation and maintenance, and construction of the dump station and lagoon improvements. The F.S. "fair share" cost of the project in 1974 was $55,636.00 and expected a 315.00/month annual service charge from the Town.

Evaluation of the Forest Service Proposal

As pointed out in Chapter 5S, the present lagoon system is overloaded. By adding on a population equivalent of 2000 in 1979 the lagoon loading would be 5200 people. The present treating capacity is 1800 people. As Table 5S-1 shows, the present treatment requirements for a population of 5000 include an additional 4.41 acre pond, and additional power of 30 H.P. for aeration. The costs for this renovation are shown in Table 5S-2.

TABLE 6S-1

ESTIMATED COSTS OF A LAGOON FOR 2000 PEOPLE

ITEM	DESCRIPTION	UNIT	UNIT EA.	EXTENSION
1.	Piping and Flow Measuring Device	L.S.	$ 10,000	$ 10,000
2.	Chlorination -10 PPD Auto-changeover	1 ea.	3,500	3,500
3.	Chlorine contact Chamber, 10' Deep	1 ea.	15,000	15,000
4.	Lagoon Excavation	44,563 c.y.	1.50 c.y.	66,844
5.	Lagoon sealing	65,600 sq.ft.	.10 sq.ft.	6,560
6.	Compacted side slopes	1,900 c.y.	2.50 c.y.	4,750
7.	Scaled Discharge Ditch	300 c.y	1.80 c.y.	540
8.	Aerators and Controls (10 H.P.)	2 ea.	7,500	15,000
9.	Fence	1,000 l.f	5.00/l.f.	5,000

COST OF CONSTRUCTION	$127,194
10% CONTINGENCY	12,719
	$139,913
ENGINEERING 8%	11,193
Surveys & Staking 1.5%	2,099
Inspection 3%	4,197
Administration & Leg 1 1%	1,399
TOTAL CONSTRUCTION COST	$158,801
USE	160,000

It may be mistakenly believed that by letting the Forest Service dump a waste population equivalent of 2000 into a system with a capacity of 5000, that the capacity of system would limit the Towns service to 3000 people. This is not true. The 5000 and 10,000 population lagoon system designs are both based on the worst of summer and winter weather conditions. For example the winter design is based on 85% BOD reduction at a temperature of 1°C. This requires a winter detention time of 30 days. The summer design is based on a BOD removal rate of 90% at a temperature of 16°C. The detention time required to accomplish this is only 16 summer days.

Since the F.S. dumping period is 100 days during the summer tourist season and the volume is small no great deficit should occur in the 5000 population lagoon system, except for the availability of oxygen. The oxygen demand exerted on the system will be equivalent to 2000 more people than are on the Towns system when the F.S. is allowed to dump. For this reason, aeration equipment for a 5000 population system will be required during the summer as soon as the Town reaches a population of 3000, or almost immediately. This oxygen requirement is shown in Table 5S-1 as 66.0 lb. of O_2 per hour, or a power requirement of 40.5 H.P. to deliver that amount of oxygen.

Our recommendation to the Town, and Joint Powers Board is a conditional one. We recommend that the Forest Service be allowed to contract with the Town for the proposed dump station only if the following conditions are satisfied:

1. The waste similar to that proposed to be dumped into the lagoon, will first be thorcughly analyzed by a certified wastewater laboratory. A series of 3 or 4 sampling periods spaced at least 2 days apart should be required and the results furnished to the Town for the Town's Engineering

Consultant to examine prior to any contractual committment by the Town or before detailed plans and specifications are proposed. Upon examination, the Town's Engineer shall advise whether or not the Town should enter into a contractual agreement with the F.S.

2. Assuming that a contractual agreement is entered into by the Town and the Forest Service, the Town, the Town's Consultant, the Town's Attorney and the F.S. should meet and negotiate a fair and equitable contract. The contract should include the F.S.'s "Fair share" of the cost for renovation, and a service to be paid to the Town for maintaining the dump station. Table 6S-1 shows the estimated cost of constructing a lagoon for 2000 people. The figures and requirements are similar to those used in the cost estimates in Chapter 5S. We feel that if the F.S. were required to build their own aerated lagoon type of treatment system, that this reflects their approximate cost for treatment alone.

The dump station is a service that the F.S. badly needs for disposing of their recreational area wastes. By providing this service to the F.S., the Town is risking both a financial burden, and possibly a health and esthetic burden if the proposal is not handled properly. If the proposal can be handled properly and be of benificial value to both parties invelved, then we recommend that negotiations be started.

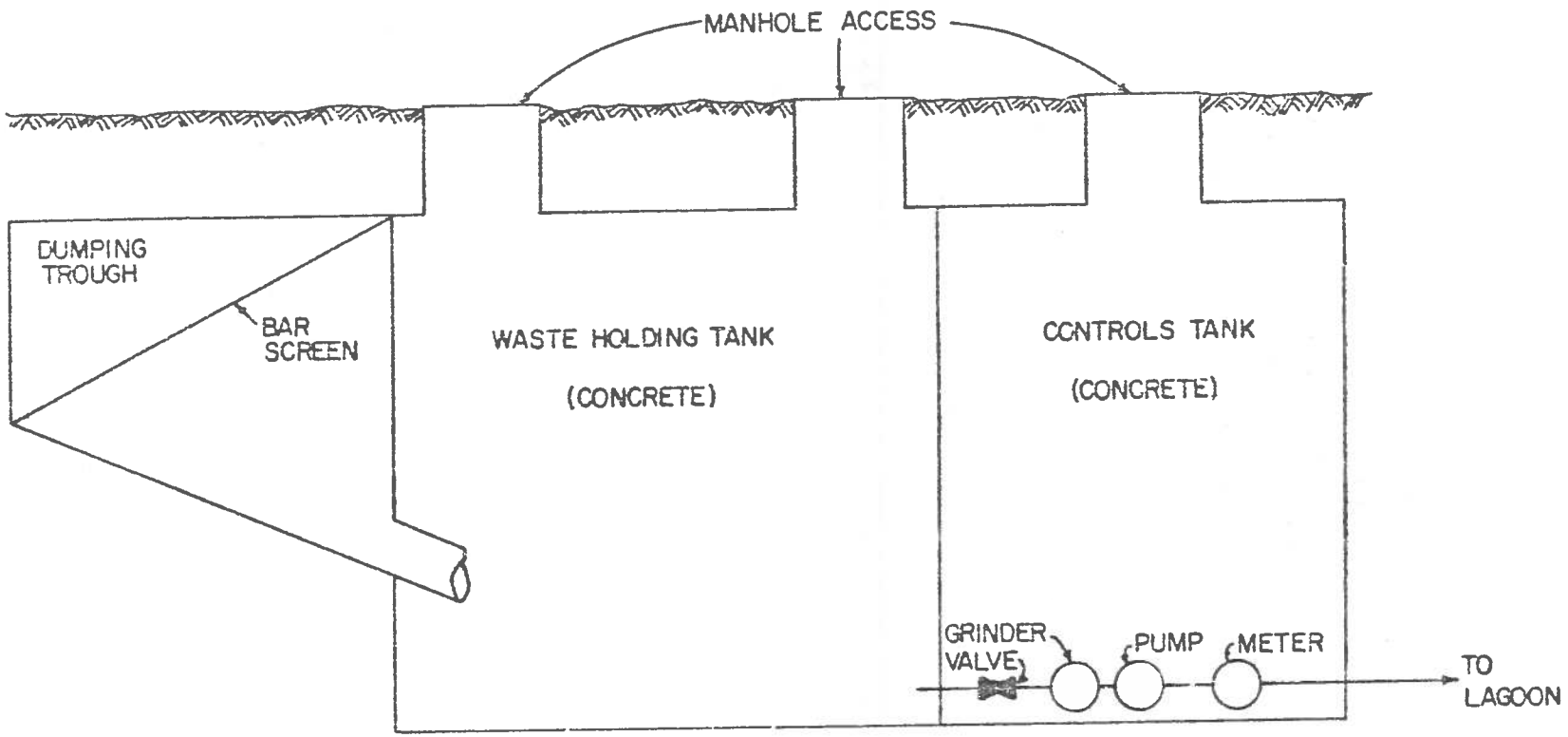

FIG. 6S-1
SCHEMATIC - U.S.F.S. DUMP STATION

CHAPTER 7S

MAINTENANCE AND OPERATION

In the past, the general procedure has been to fix the system when something went wrong.

It is our recommendation that the Town undertake a routine preventative maintenance program on the sewer system. The major areas for concern are the two lift stations, the existing lines and the ponds. The pumps and valves should be thoroughly inspected and maintained a minimum of twice a year. The generators should undergo routine switchover and maintenance so that they are prepared for use in times of power failures.

Other recommended maintenance areas for the Town to be upgrading are listed below:

1. Routine rodding of trouble spots instead of waiting until serious clogging occurs.
2. Check and maintain the aerators and time clocks at the lagoon.
3. Maintain the discharge ditch at the lagoon.
4. Maintain accurate operation of the new flow measuring device being installed on the lagoon effluent line.

With proper personnel management and work effort the Town should not need additional personnel to provide good maintenance.

P A R T 5

CONSTRUCTION IMPLEMENTATION

CHAPTER 1C

PRIORITIES OF CONSTRUCTION - WATER SYSTEM

Many of the priorities listed below are interchangeable, depending on the amount and type of funding available for use. W.E.A.I. lists the water system priorities in the following order:

1. Replace all old and/or inoperable fire hydrants. Tie all existing and new fire hydrants to 6 inch diameter or larger water mains. Install additional hydrants where fire protection is inadequate.

2. Provide a 12 inch diameter main crossing the river as shown on Figs.12W-4 & 7, and tie it into the East side system. This includes tieing in the present 12 inch diameter line crossing from the water plant to the 10 inch diameter line under construction at the Saratoga Inn area. The second 12 inch line crossing the River will provide a more reliable supply to the East side of Town, since the present 12 inch line is the only line serving that area, and when it is interrupted will cause water outage to the entire East side.

3. Abandon and replace all 2 inch diameter water lines with 6 and 8 inch diameter lines immediately. Replace all service taps from the 2 in. dia. water lines to the property line of each service.

4. Abandon and replace all 4 inch diameter water lines with 6 and 8 inch diameter lines as soon as funding is available. Again, replace all service taps from the 4 inch lines to the property line of each service. As these 2 and 4 inch diameter lines are replaced, the proper valving and looping can be coordinated through the Master Water System Plans.

5. Provide two blocks of new 10 inch water line and connect 10 inch main line to directly supply the elevated water storage tank. This includes abandoning the 2 inch line shown on Spring and Fourth St.

6. Install all water meters with remote registers and adopt an equitable method of billing for all water users. This priority should be a high priority, since it lengthens the design period of the new water treatment plant. However, unless a routine sand blow off and line flushing program is immediately undertaken as is recommended the water meters will be damaged and expensive, inconvenient maintenance will be required. We also recommend that any service taps that are old or are of inferior quality should be replaced at the time of meter installation.

7. As development continues, construct a 12 inch diameter water main around the perimeter of Saratoga to serve as a major loop, and provide adequate supplies to future development.

CHAPTER 2C

PRIORITIES OF CONSTRUCTION - SEWER SYSTEM

It is difficult to determine an equitable order of priority for a sewer system in the condition as that of Saratoga. The order of priority that we used in the following is based first on health, secondly on maintenance and reliability of the system and thirdly on government regulations.

We recommend the following order of priority for sewer construction for Saratoga:

1. Purchase and install reliable power backup systems for both lift stations. The power generating systems should come on automatically when the main power fails, or be capable of being put into service in adequate time to prevent any backups into service lines.

2. Replace or satisfactorily repair all broken and leaky sewer service and sewer mains in the Town. This construction will reduce backups and clogging, reduce ground water and water service line contamination, and reduce the rodding required to keep the lines flowing. Most of the problem areas are those where clay tile sewer pipe is in use.

3. Construct the 10 inch diameter bypass line around the slough crossing above Sixth Street as shown on the plans. This will ease the loading on the Third Street main as discussed previously.

4. Upgrade the lagoon system as recommended previously. This will eliminate the odor caused by the lack of oxygen.

5. Begin applying for grants and loan monies especially from EPA for upgrading the present lagoon system to a population capacity of 5000.

6. Seal the Hugus-Mullison Ditch if required to prevent infiltration inflow.

In addition to these priorities, it must be emphasized that a routine sampling and monitoring program be established. The costs and information gained by gathering this data will easily pay for itself many times over when future planning and construction are contemplated.

APPENDIX A

NATIONAL PRIMARY AND SECONDARY

DRINKING WATER STANDARDS

federal register

WEDNESDAY, DECEMBER 24, 1975

PART IV:

ENVIRONMENTAL PROTECTION AGENCY

■

WATER PROGRAMS

National Interim Primary Drinking Water Regulations

Title 40—Protection of Environment

CHAPTER I—ENVIRONMENTAL PROTECTION AGENCY

SUBCHAPTER D—WATER PROGRAMS

[FRL 464-7]

PART 141—NATIONAL INTERIM PRIMARY DRINKING WATER REGULATIONS

On March 14, 1975, the Environmental Protection Agency (EPA) proposed National Interim Primary Drinking Water Regulations pursuant to sections 1412, 1414, 1415, and 1450 of the Public Health Service Act ("the Act"), as amended by the Safe Drinking Water Act ("SDWA," Pub. L. 93-523), 40 FR 11990. EPA held public hearings on the proposed regulations in Boston, Chicago, San Francisco, and Washington during the month of April. Several thousand pages of comments on the proposed regulations were received and evaluated. In addition, the Agency has received comments and information on the proposed regulations from the National Drinking Water Advisory Council, the Secretary of Health, Education, and Welfare, and from numerous others during meetings with representatives of State agencies, public interest groups and others.

The regulations deal only with the basic legal requirements. Descriptive material will be provided in a guidance manual for use by public water systems and the States.

The purpose of this preamble to the final regulations is to summarize the most significant changes made in the proposed regulations as a result of comments received and the further consideration of available information. A more detailed discussion of the comments and of changes in the proposed regulations is attached as Appendix A.

Water Systems Covered

The Safe Drinking Water Act applies to each "public water system," which is defined in Section 1401(4) of the Act as "a system for the provision to the public of piped water for human consumption, if such system has at least fifteen service connections or regularly serves at least twenty-five individuals." Privately owned as well as publicly owned systems are covered. Service "to the public" is interpreted by EPA to include factories and private housing developments. (See generally, House Report, pp. 16–17.)

The definition of "public water system" proposed in the Interim Primary Drinking Water Regulations sought to explain the meaning of the statutory reference to "regular" service. It was proposed to interpret this term as including service for as much as three months during the year. Because the proposed definition would have excluded many large campgrounds, lodges, and other public accommodations which serve large numbers of tourists but which are open for slightly less than three months each year, the definition in the final version covers systems serving an average of at least twenty-five individuals at least 60 days out of the year. The use of a minimum number of days rather than months also makes clear that a system may qualify as a public water system even if it is not open every day during a given month.

Once "public water system" has been defined, it is necessary to define the two major types of public water systems—those serving residents and those serving transients or intermittent users. The possible health effects of a contaminant in drinking water in many cases are quite different for a person drinking the water for a long period of time than for a person drinking the water only briefly or intermittently. Different regulatory considerations may in some cases apply to systems which serve residents as opposed to systems which serve transients or intermittent users. Accordingly, § 141.2(e) makes clear that all "public water systems" fall within either the category of "community water systems" or the category of "non-community water systems." To make clear which regulatory requirements apply to which type of system, the category covered is specifically indicated throughout the regulations.

The proposed regulations defined a "community water system" as "a public water system which serves a population of which 70 percent or greater are residents." Reliance in the proposed definition on the percentage of water system users who are residents would result in treating some fairly large resort communities with many year-round residents as non-community systems. Therefore, the definition of "community water system" has been changed to cover any system which serves at least 15 service connections used by year-round residents or serves at least 25 year-round residents.

Small Community Water Systems

Many community water systems in the country are quite small. Since it is the intention of the Act to provide basically the same level of health protection to residents of small communities as to residents of large cities, and since a number of advanced water treatment techniques are made feasible only by economies of scale, the cost of compliance with the requirements of the Act may pose a serious problem for many small communities. The regulations seek to recognize the financial problems of small communities by requiring more realistic monitoring for systems serving fewer than 1,000 persons. Variances and exemptions authorized by the Act can also assist in dealing with economic problems of small community systems in appropriate cases, at least temporarily. EPA will provide technical assistance on effective treatment techniques which can be used by small systems.

These methods of dealing with the financial problems of some small community systems may not be sufficient in specific instances to make compliance with all applicable regulatory requirements feasible. EPA is commencing a study of potential problems faced by small community systems in meeting applicable requirements under the Act and these regulations, and, if necessary, will make additional adjustments in the Interim Primary Drinking Water Regulations prior to their effective date.

Non-Community Systems

"Non-community systems" are basically those systems which serve transients. They include hotels, motels, restaurants, campgrounds, service stations, and other public accommodations which have their own water system and which have at least 15 service connections or serve water to a daily average of at least 25 persons. Some schools, factories and churches are also included in this category. It is conservatively estimated that there are over 200,000 non-community water systems in the country. However, it should be recognized that while their number is large, they normally are not the principal source of water for the people they serve.

The regulations as proposed would have applied all maximum contaminant levels to non-community systems as well as to community systems. This approach failed to take into account the fact that the proposed maximum contaminant levels for organic chemicals and most inorganic chemicals were based on the potential health effects of long-term exposure. Those levels are not necessary to protect transients or intermittent users. Therefore, the final regulations provide that maximum contaminant levels for organic chemicals, and for inorganic chemicals other than nitrates, are not applicable to non-community systems. An exception was made for nitrates because they can have an adverse health effect on susceptible infants in a short period of time.

Even without monitoring for organic chemicals or most inorganic chemicals, in the initial stages of implementation of the drinking water regulations, monitoring results from tens of thousands of non-community systems could overwhelm laboratory capabilities and other resources. This could delay effective implementation of the regulations with respect to the community systems which provide the water which Americans drink every day. To avoid this result, non-community systems will be given two years after the effective date of the regulations to commence monitoring. In the meantime, non-community systems which already monitor their water are encouraged to continue to do so, and the States are encouraged to take appropriate measures to test or require monitoring for non-community systems that serve large numbers of people.

Of course, non-community systems which pose a threat to health should be dealt with as quickly as possible. The maximum contaminant levels applicable to non-community water systems therefore will take effect 18 months after promulgation, at the same time as levels applicable to community systems. Inspection and enforcement authority will apply to non-community systems at the same time as to community systems.

Sanitary Surveys

EPA encourages the States to conduct sanitary surveys on a systematic basis.

These on-site inspections of water systems are more effective in assuring safe water to the public than individual tests taken in the absence of sanitary surveys. The regulations provide that monitoring frequencies for coliform bacteria can be changed by the entity with primary enforcement responsibility for an individual non-community system, and in certain circumstances for an individual community system, based on the results of a sanitary survey.

Maximum Contaminant Levels

Numerous comments were received by EPA on the substances selected for the establishment of maximum contaminant levels and on the levels chosen. Congress anticipated that the initial Interim Primary Drinking Water Regulations would be based on the Public Health Service Standards of 1962, and this Congressional intent has been followed. Comments received on the various levels did not contain new data sufficient to require the establishment of levels different from those contained in the Public Health Service Standards.

Water Consumption

The maximum contaminant levels are based, directly or indirectly, on an assumed consumption of two liters of water per day. The same assumption was used in the 1962 Standards. This assumption has been challenged because of instances where much higher water consumption rates occur. EPA's justification for using the two-liter figure is that it already represents an above average water or water-based fluid intake. Moreover, while the factor of safety may be somewhat reduced when greater quantities of water are ingested, the maximum contaminant levels based on the two-liter figure provide substantial protection to virtually all consumers. If, as has been suggested, a water consumption rate of eight liters per day is used as the basis for maximum contaminant level, all of the proposed MCL's would have to be divided by four, greatly increasing the monitoring difficulties, and in some cases challenging the sensitivity of accepted analytical procedures. It could be expected, in such a case, that the maximum contaminant levels would be exceeded to a significant degree, and that specialized treatment techniques would be required to order that the contaminant levels would be reduced. The economic impact of a move in this direction would be enormous. It is not technically or economically feasible to base maximum contaminant levels on unusually high consumption rates.

Safety Factors

A question was raised about the fact that different safety factors are contained in various maximum contaminant levels. The levels are not intended to have a uniform safety factor, at least partly because the knowledge of and the nature of the health risks of the various contaminants vary widely. The levels set are the result of experience, evaluation of the available data, and professional judgment. They have withstood the test of time and of professional review. They are being subjected to further review by the National Academy of Sciences in connection with development of data for the Revised Primary Drinking Water Regulations.

MCL's Based on Temperature

A question was also raised as to whether ranges of maximum contaminant levels should be established on the basis of the climate in the area served by the public water system, as was done with fluoride. EPA believes that the use of a temperature scale for fluoride is more appropriate than for other chemicals because of the studies available on the fluoride-temperature relationship and because there is a small margin with fluoride between beneficial levels and levels that cause adverse health effects.

MCL's Deleted

Three proposed maximum contaminant levels have been eliminated in the final regulations because they are not justified by the available data. One of these is carbon chloroform extract (CCE), which is discussed separately below. The others are the proposed levels for the standard bacterial plate count and cyanide. In the case of the plate count, it is believed that the coliform limits contained in the regulations, combined with the turbidity maximum contaminant level, adequately deal with bacterial contamination. However, EPA continues to believe that the standard plate count is a valid indicator of bacteriological quality of drinking water, and recommends that it be used in appropriate cases in conjunction with the coliform tests as an operational tool.

The proposed maximum contaminant level for cyanide was eliminated because the possibility of cyanide contamination can be effectively addressed only by the use of emergency action, such as under Section 1431 of the Act. EPA's 1969 Community Water Supply Study did not reveal a single instance in which cyanide was present in a water system at a level greater than one-thousandth of the level at which cyanide is toxic to humans.

Available data indicate that cyanide will be present in water systems at toxic levels only in the event of an accident, such as a spill from a barge collision. Maximum contaminant levels are not the appropriate vehicle for dealing with such rare, accidental contamination.

Heptachor, heptachlor epoxide and chlordane have also been removed from the list of maximum contaminant levels at least temporarily in view of the pending cancellation and suspension proceedings under the Federal Insecticide, Fungicide and Rodenticide Act involving those pesticides. When the results of these proceedings are available, EPA will again consider whether maximum contaminant levels should be established for those three pesticides.

Sodium and Sulfates

A number of comments were received on the potential health effects of sodium and sulfates. The National Drinking Water Advisory Council has recommended that consideration be given to the monitoring of these constituents, but has not recommended the adoption of maximum contaminant levels because available data do not support the adoption of any specific levels. EPA has requested the National Academy of Sciences to include sodium and sulfates among the contaminants to be studied by NAS, and to include information on the health effects of sodium and sulfates in the report to be made by NAS in December 1970.

Since a number of persons suffer from diseases which are influenced by dietary sodium intake and since there are others who wish to restrict their sodium intake, it is desirable that the sodium content of drinking water be known. Those affected can, by knowing the sodium concentration in their drinking water, make adjustments to their diets or, in extreme cases, seek alternative sources of water to be used for drinking and food preparation. It is recommended that the States institute programs for regular monitoring of the sodium content of drinking water served to the public, and for informing physicians and consumers of the sodium concentration in drinking water.

A relatively high concentration of sulfate in drinking water has little or no known laxative effect on regular users of the water, but transients using such water sometimes experience a laxative effect. It is recommended that the States institute monitoring programs for sulfates, and that transients be notified if the sulfate content of the water is high. Such notification should include an assessment of the possible physiological effects of consumption of the water.

PCB's and Asbestos

An interagency comment expressed concern for asbestos and PCB's in the environment and noted the need for at least a monitoring requirement, if not for MCL's, for these contaminants. EPA is also concerned, but for the moment lacks sufficient evidence regarding analytical methods, health effects, or occurrence in the environment to establish MCL's. The Agency is conducting research and cooperating in research projects to develop criteria for establishing needed limits as quickly as possible. A monitoring study on a number of organic chemical contaminants, including PCB's, for which MCL's are not being established at this time, will be contained in an organic chemical monitoring regulation that is being promulgated with these regulations. Regarding asbestos, HEW and EPA are sponsoring a number of studies this year at an approximate cost of $16 million to establish health effects, anayitical methods and occurrence.

Point of Measurement

Other comments on maximum contaminant levels focused on the proposed requirement that such levels be tested at the consumer's tap. Concern was expressed over the inability of the public water system to control potential sources

of contaminants which are under the control of the consumer.

The promulgated definition of "maximum contaminant level," § 141.2(d), retains the requirement that the maximum contaminant level be measured at the tap except in the case of turbidity, which should be measured at the point of entry to the distribution system. However, the definition has been expanded to make clear that contaminants added to the water by circumstances under the control of the consumer are not the responsibility of the supplier of water, unless the contaminants result from corrosion of piping and plumbing resulting from the quality of the water supplied. It should be noted, however, that this requirement should not be interpreted as to discourage local, aggressive cross connection control measures.

Coliform Bacteria MCL's

The promulgated MCL's for coliform bacteria are basically the 1962 Public Health Service Standards, with minor refinements and clarifications. However, further changes may be desirable. For example, the MCL's for the membrane filter analytical method do not resolve the question of how many coliform bacteria are assumed to be present in a single highly contaminated sample. Some laboratories assume an upper limit of 50, while others seek to continue to count individual bacteria to a level of 100 or even higher in a single sample. The upper limit assumed will affect the monthly average which is calculated to determine compliance with the MCL's.

Another question relating to the coliform bacteria MCL's is the matter of possible spurious positive samples. As the regulations are written, all routine samples taken to determine compliance with the MCL's must be counted, regardless of the results of analysis of any check samples that may be taken. The reason for this is that bacterial contamination is often intermittent or transient, and as a result negative check samples taken a day or more after a positive sample cannot demonstrate that the positive result was in error. It may be possible, however, to prescribe a means of dealing with spurious positive results without compromising the integrity of the MCL's.

A third question concerning the MCL's for coliform bacteria is the relationship of monthly averages of coliform bacteria levels to monthly percentages of positive samples. For example, the monthly average MCL for the membrane filter method is violated if the monthly average exceeds one coliform bacterium per sample. However, for purposes of determining whether the monthly-percentage-of-positive-samples MCL is violated, a sample is counted as positive only if it contains more than four coliform bacteria. Thus, it is possible, particularly when a relatively small number of samples is taken, for a system to fail the monthly average MCL even when no single sample taken during the month is out of compliance with the limit.

These and other questions concerning the coliform bacteria MCL's will be reviewed further by EPA. If review indicates that changes in the MCL's are desirable, those changes will be made as soon as possible but within 6 months, in time to take effect at the same time as the initial Interim Primary Drinking Water Regulations.

Organic Chemicals

The proposed maximum contaminant levels for organic pesticides, other than the three which are the subject of cancellation and suspension proceedings, have been retained. It is anticipated that additional organic pesticides will be added to the regulations if surveys of pesticides in drinking water being conducted by EPA indicate that this is needed.

The proposed regulations also contained a maximum contaminant level for organic chemicals obtained by the carbon chloroform extract (CCE) method. It was anticipated by Congress that organic chemicals would be dealt with primarily in the Revised Primary Drinking Water Regulations because of the paucity of accurate data on the health effects of various organic chemicals, the large number of such chemicals, uncertainities over appropriate treatment techniques, and the need for additional information on the incidence of specific organic chemicals in drinking water supplies. EPA thought that the CCE standard might provide an appropriate means of dealing with organic chemicals as a class pending action on the Revised Primary Regulations.

The CCE standard was originally developed as a test for undesirable tastes and odors in drinking water. As concern developed over the health effects of organic chemicals, the possibility of using CCE as a health standard rather than an esthetic standard was considered.

As pointed out by numerous comments, CCE has many failings as an indicator of health effects of organic chemicals. To begin with, the test obtains information on only a fraction of the total amount of organic chemicals in the water sampled. Furthermore, there is serious question as to the reliability of CCE in identifying those organic chemicals which are most suspected of adverse health effects. In addition, there are no existing data on which a specific level for CCE can be established on a rational basis. To establish a maximum contaminant level under these circumstances would almost certainly do more harm than good. It could give a false sense of security to persons served by systems which are within the established level and a false sense of alarm to persons served by systems which exceed the level. It also would divert resources from efforts to find more effective ways of dealing with the organic chemicals problem.

EPA believes that the intelligent approach to the organic chemicals question is to move ahead as rapidly as possible along two fronts. First, EPA is adopting simultaneously with these regulations a Subpart E of Part 141, containing requirements for organic chemical monitoring pursuant to Sections 1445 and 1450 of the Act.

The regulations require that designated public water systems collect samples of raw and treated water for submission to EPA for organics analysis. EPA will analyze the samples for a number of broad organic parameters, including carbon chloroform extract (CCE), volatile and non-volatile total organic carbon (VTOC and NVTOC), total organic chlorine (TOCl), ultraviolet absorbancy, and fluorescence. In addition, monitoring will be required for probably 21 specific organic compounds. Selection of the specific compounds has been based on the occurrence or likelihood of occurrence in treated water, toxicity data and availability of practical analytical methods. Laboratory analyses will be used to evaluate the extent and nature of organic chemical contamination of drinking water, to evaluate the validity of the general organic parameters as surrogates for measures of harmful organic chemicals, and to determine whether there is an adequate basis for establishing maximum contaminant levels for specific organics or groups of organics.

Second, EPA is embarking on an intensive research program to find answers to the following four questions:

1. What are the effects of commonly occurring organic compounds on human health?

2. What analytical procedures should be used to monitor finished drinking water to assure that any Primary Drinking Water Regulations dealing with organics are met?

3. Because some of these organic compounds are formed during water treatment, what changes in treatment practices are required to minimize the formation of these compounds in treated water?

4. What treatment technology must be applied to reduce contaminant levels to concentrations that may be specified in the Primary Drinking Water Regulations?

This research will involve health-effects and epidemiological studies, investigations of analytical methodology, and pilot plant and field studies of organic removal unit processes. Some phases of the research are to be completed by the end of this year, while much of the remainder are to be completed within the next calendar year.

As soon as sufficient information is derived from the monitoring program and related research, the Interim Primary Drinking Water Regulations will be amended so that the organic chemicals problem can be dealt with without delay. The monitoring process will be completed within 1 year.

During the interim period, while satisfactory MCL's for organic contamination in drinking water are being developed, EPA will act in specific cases where appropriate to deal with organic contamination. If the EPA monitoring program reveals serious specific cases of contamination, EPA will work with State and local authorities to identify the source and nature of the problem and to

take remedial action. EPA will also aid the States in identifying additional community water supplies that require analysis.

Public Notice

The public notice requirements proposed in § 141.32 did not distinguish between community and non-community public water systems. They would have required that public notice of non-compliance with applicable regulations be made by newspaper, in water bills, and by other media for all public water systems. These requirements are inappropriate and ineffective in the case of most non-community water systems. Those systems principally serve transients who do not receive water bills from the system and who probably are not exposed significantly to the local media. A more effective approach would be to require notice that can inform the transient before he drinks the system's water, and thereby both warn the transient and provide an incentive to the supplier of water to remedy the violation. Accordingly, Section 141.32 as adopted provides that in the case of non-community systems, the entity with primary enforcement responsibility shall require that notice be given in a form and manner that will insure that the public using the public water system is adequately informed.

The proposed public notice requirements also failed to distinguish between different types of violations of the Interim Primary Drinking Water Regulations. Since the urgency and importance of a notice varies according to the nature of the violation involved, § 141.32 as promulgated seeks to match the type of notice required with the type of violation involved. Written notice accompanying a water bill or other direct notice by mail is required for all violations of the regulations, including violations of monitoring requirements, and for the grant of a variance or exemption. In addition, notice by newspaper and notification to radio and television stations is required whenever a maximum contaminant level is exceeded, or when the entity with primary enforcement responsibility requires such broader notice.

Quality Control and Testing Procedures

Section 1401(1) of the Act defines "primary drinking water regulation" to include "quality control and testing procedures." The promulgated regulations include testing requirements for each maximum contaminant level, including check samples and special samples in appropriate cases. The regulations also specify the procedures to be followed in analyzing samples for each of the maximum contaminant levels. These procedures will be updated from time to time as advances are made in analytical methods. For example, references to "Standard Methods for the Examination of Water and Wastewater" are to the current, 13th, edition, but these references will be changed to cite the 14th edition when it is available in the near future.

A key element of quality control for public water systems is accurate laboratory analysis. Section 141.28 of the regulations provides that analyses conducted for the purpose of determining compliance with maximum contaminant levels must be conducted by a laboratory approved by the entity with primary enforcement responsibility. EPA will develop as soon as possible, in cooperation with the States and other interested parties, criteria and procedures for laboratory certification. A State with primary enforcement responsibility will have a laboratory certified by EPA pursuant to the prescribed criteria and procedures, and in turn will certify laboratories within the State.

Record-keeping requirements and reports to the State also will assist in quality control efforts.

Record-Keeping

Adequate record-keeping is necessary for the proper operation and administration of a public water system. It is also important for providing information to the public, providing appropriate data for inspection and enforcement activities and providing information on which future regulations can be based. Accordingly, a new § 141.33 has been added to the regulations to require that each public water system maintain records of sample analyses and of actions to correct violations of the Primary Drinking Water Regulations.

Economic and Cost Analysis

A comprehensive economics study has been made of the Interim Primary Drinking Water Regulations. This study estimates the costs of the regulations, evaluates the potential economic impact, and considers possible material and labor shortages. The results of this analysis are summarized here.

Total investment costs to community water systems to achieve compliance with these regulations are estimated to be between $1,050 and $1,765 million. It is estimated that non-community systems will invest an additional $24 million. The range of the estimate is due to uncertainty as to the design flow that will be used in installing treatment facilities. Systems not in compliance will have to consider sizing their new components to reflect average daily flow conditions, or maximum daily flow conditions in cases where system storage is not adequate.

This investment will be spread over several years. Investor-owned systems will bear about one-fourth of these costs, and publicly-owned systems the remainder. It is not anticipated that systems will have difficulty financing these capital requirements.

In annual terms, national costs are expected to be within the following ranges:

	In millions
Capital costs	$146–247
Operations and maintenance	263–303
Monitoring (routine only)	17– 35
Total	$426–545

Although these aggregate figures are large, most water consumers will not be significantly affected. For those users in systems serving 10,000 persons or more, the average annual treatment cost per capita may increase from less than $1.00 for systems requiring disinfection and lead control, to between $15 to $35 for control of turbidity and heavy metal removal. For systems serving less than 100 persons, the average annual per capita costs of disinfection, lead control and fluoride/arsenic removal are estimated to be between $2.10 and $11.80. However, if turbidity control or heavy metal removal were required in a system of this size then costs are expected to range from $52 to $237 per year per capita. EPA is aware of the serious potential economic impact on users in these small systems. However, the legislative history specifies that the regulations should be based on costs that can be reasonably afforded by large metropolitan or regional systems. Further economic evaluation of these systems is being conducted, and realistic options for these small systems are being reviewed. Options that will be under consideration include less costly treatment technologies; formation of regional systems; and use of alternative water sources. Industrial and commercial users, whether providing their own water or using public systems, are not expected to be significantly affected by these regulations.

Possible constraints to the implementation of the interim primary regulations were examined. Although there will be an increase in demand for chemicals, manpower, laboratories, and construction of treatment facilities, it is not anticipated that any of these factors will be a serious obstacle to implementation of these regulations over a reasonable time frame.

For the reasons given above, Chapter 40 of the Code of Federal Regulations is hereby amended by the addition of the following new Part 141. These regulations will take effect 18 months after promulgation.

(It is hereby certified that the economic and inflationary impacts of these regulations have been carefully evaluated in accordance with Executive Order 11821)

Dated: December 10, 1975.

Russell E. Train,
Administrator.

Subpart A—General

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Subpart D—Reporting, Public Notification, and Record keeping

141.31 Reporting requirements.
141.32 Public notification of variances, exemptions, and non-compliance with regulations.
141.33 Record maintenance.

AUTHORITY: Secs. 1412, 1414, 1445, and 1450 of the Public Health Service Act, 88 Stat. 1660 (42 U.S.C. 300g–1, 300g–3, 300j–4, and 300j–9).

Subpart A—General

§ 141.1 Applicability.

This part establishes primary drinking water regulations pursuant to section 1412 of the Public Health Service Act, as amended by the Safe Drinking Water Act (Pub. L. 93–523); and related regulations applicable to public water systems.

§ 141.2 Definitions.

As used in this part, the term:

(a) "Act" means the Public Health Service Act, as amended by the Safe Drinking Water Act, Pub. L. 93–523.

(b) "Contaminant" means any physical, chemical, biological, or radiological substance or matter in water.

(c) "Maximum contaminant level" means the maximum permissible level of a contaminant in water which is delivered to the free flowing outlet of the ultimate user of a public water system, except in the case of turbidity where the maximum permissible level is measured at the point of entry to the distribution system. Contaminants added to the water under circumstances controlled by the user, except those resulting from corrosion of piping and plumbing caused by water quality, are excluded from this definition.

(d) "Person" means an individual, corporation, company, association, partnership, State, municipality, or Federal agency.

(e) "Public water system" means a system for the provision to the public of piped water for human consumption, if such system has at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily at least 60 days out of the year. Such term includes (1) any collection, treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system, and (2) any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system. A public water system is either a "community water system" or a "non-community water system."

(i) "Community water system" means a public water system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

(ii) "Non-community water system" means a public water system that is not a community water system.

(f) "Sanitary survey" means an on-site review of the water source, facilities, equipment, operation and maintenance of a public water system for the purpose of evaluating the adequacy of such source, facilities, equipment, operation and maintenance for producing and distributing safe drinking water.

(g) "Standard sample" means the aliquot of finished drinking water that is examined for the presence of coliform bacteria.

(h) "State" means the agency of the State government which has jurisdiction over public water systems. During any period when a State does not have primary enforcement responsibility pursuant to Section 1413 of the Act, the term "State" means the Regional Administrator, U.S. Environmental Protection Agency.

(i) "Supplier of water" means any person who owns or operates a public water system.

§ 141.3 Coverage.

This part shall apply to each public water system, unless the public water system meets all of the following conditions:

(a) Consists only of distribution and storage facilities (and does not have any collection and treatment facilities);

(b) Obtains all of its water from, but is not owned or operated by, a public water system to which such regulations apply;

(c) Does not sell water to any person; and

(d) Is not a carrier which conveys passengers in interstate commerce.

§ 141.4 Variances and exemptions.

Variances or exemptions from certain provisions of these regulations may be granted pursuant to Sections 1415 and 1416 of the Act by the entity with primary enforcement responsibility. Provisions under Part 142, *National Interim Primary Drinking Water Regulations Implementation*—subpart E (Variances) and subpart F (Exemptions)—apply where EPA has primary enforcement responsibility.

§ 141.5 Siting requirements.

Before a person may enter into a financial commitment for or initiate construction of a new public water system or increase the capacity of an existing public water system, he shall notify the State and, to the extent practicable, avoid locating part or all of the new or expanded facility at a site which:

(a) Is subject to a significant risk from earthquakes, floods, fires or other disasters which could cause a breakdown of the public water system or a portion thereof; or

(b) Except for intake structures, is within the floodplain of a 100-year flood or is lower than any recorded high tide where appropriate records exist.

The U.S. Environmental Protection Agency will not seek to override land use decisions affecting public water systems siting which are made at the State or local government levels.

§ 141.6 Effective date.

The regulations set forth in this part shall take effect 18 months after the date of promulgation.

Subpart B—Maximum Contaminant Levels

§ 141.11 Maximum contaminant levels for inorganic chemicals.

(a) The maximum contaminant level for nitrate is applicable to both community water systems and non-community water systems. The levels for the other inorganic chemicals apply only to community water systems. Compliance with maximum contaminant levels for inorganic chemicals is calculated pursuant to § 141.23.

(b) The following are the maximum contaminant levels for inorganic chemicals other than fluoride:

Contaminant	*Level, milligrams per liter*
Arsenic	0.05
Barium	1.
Cadmium	0.010
Chromium	0.05
Lead	0.05
Mercury	0.002
Nitrate (as N)	10.
Selenium	0.01
Silver	0.05

(c) When the annual average of the maximum daily air temperatures for the location in which the community water system is situated is the following, the maximum contaminant levels for fluoride are:

Temperature Degrees Fahrenheit	Degrees Celsius	Level, milligrams per liter
53.7 and below	12.0 and below	2.4
53.8 to 58.3	12.1 to 14.6	2.2
58.4 to 63.8	14.7 to 17.6	2.0
63.9 to 70.6	17.7 to 21.4	1.8
70.7 to 79.2	21.5 to 26.2	1.6
79.3 to 90.5	26.3 to 32.5	1.4

§ 141.12 Maximum contaminant levels for organic chemicals.

The following are the maximum contaminant levels for organic chemicals. They apply only to community water systems. Compliance with maximum contaminant levels for organic chemicals is calculated pursuant to § 141.24.

	Level, milligrams per liter
(a) Chlorinated hydrocarbons:	
Endrin (1,2,3,4,10, 10-hexachloro-6,7-epoxy-1,4, 4a,5,6,7,8,8a-octahydro-1,4-endo, endo-5,8 - dimethano naphthalene).	0.0002
Lindane (1,2,3,4,5,6-hexachlorocyclohexane, gamma isomer).	0.004
Methoxychlor (1,1,1-Trichloro-2, 2 - bis [p-methoxyphenyl] ethane).	0.1
Toxaphene ($C_{10}H_{10}Cl_8$-Technical chlorinated camphene, 67–69 percent chlorine).	0.005

(b) Chlorophenoxys:	
2,4 - D, (2,4-Dichlorophenoxyacetic acid).	0.1
2,4,5-TP Silvex (2,4,5-Trichlorophenoxypropionic acid).	0.01

§ 141.13 Maximum contaminant levels for turbidity.

The maximum contaminant levels for turbidity are applicable to both community water systems and non-community water systems using surface water sources in whole or in part. The maximum contaminant levels for turbidity in drinking water, measured at a representative entry point(s) to the distribution system, are:

(a) One turbidity unit (TU), as determined by a monthly average pursuant to § 141.22, except that five or fewer turbidity units may be allowed if the supplier of water can demonstrate to the State that the higher turbidity does not do any of the following:

(1) Interfere with disinfection;

(2) Prevent maintenance of an effective disinfectant agent throughout the distribution system; or

(3) Interfere with microbiological determinations.

(b) Five turbidity units based on an average for two consecutive days pursuant to § 141.22.

§ 141.14 Maximum microbiological contaminant levels.

The maximum contaminant levels for coliform bacteria, applicable to community water systems and non-community water systems, are as follows:

(a) When the membrane filter technique pursuant to § 141.21(a) is used, the number of coliform bacteria shall not exceed any of the following:

(1) One per 100 milliliters as the arithmetic mean of all samples examined per month pursuant to § 141.21 (b) or (c);

(2) Four per 100 milliliters in more than one sample when less than 20 are examined per month; or

(3) Four per 100 milliliters in more than five percent of the samples when 20 or more are examined per month.

(b) (1) When the fermentation tube method and 10 milliliter standard portions pursuant to § 141.21(a) are used, coliform bacteria shall not be present in any of the following:

(i) more than 10 percent of the portions in any month pursuant to § 141.21 (b) or (c);

(ii) three or more portions in more than one sample when less than 20 samples are examined per month; or

(iii) three or more portions in more than five percent of the samples when 20 or more samples are examined per month.

(2) When the fermentation tube method and 100 milliliter standard portions pursuant to § 141.21(a) are used, coliform bacteria shall not be present in any of the following:

(i) more than 60 percent of the portions in any month pursuant to § 141.21 (b) or (c);

(ii) five portions in more than one sample when less than five samples are examined per month; or

(iii) five portions in more than 30 percent of the samples when five or more samples are examined per month.

(c) For community or non-community systems that are required to sample at a rate of less than 4 per month, compliance with paragraphs (a), (b)(1), or (b)(2) of this section shall be based upon sampling during a 3 month period, except that, at the discretion of the State, compliance may be based upon sampling during a one month period.

Subpart C—Monitoring and Analytical Requirements

§ 141.21 Microbiological contaminant sampling and analytical requirements.

(a) Suppliers of water for community water systems and non-community water systems shall analyze for coliform bacteria for the purpose of determining compliance with § 141.14. Analyses shall be conducted in accordance with the analytical recommendations set forth in "Standard Methods for the Examination of Water and Wastewater," American Public Health Association, 13th Edition, pp. 662–688, except that a standard sample size shall be employed. The standard sample used in the membrane filter procedure shall be 100 milliliters. The standard sample used in the 5 tube most probable number (MPN) procedure (fermentation tube method) shall be 5 times the standard portion. The standard portion is either 10 milliliters or 100 milliliters as described in § 141.14 (b) and (c). The samples shall be taken at points which are representative of the conditions within the distribution system.

(b) The supplier of water for a community water system shall take coliform density samples at regular time intervals, and in number proportionate to the population served by the system. In no event shall the frequency be less than as set forth below:

Population served:	*Minimum number of samples per month*
25 to 1,000	1
1,001 to 2,500	2
2,501 to 3,300	3
3,301 to 4,100	4
4,101 to 4,900	5
4,901 to 5,800	6
5,801 to 6,700	7
6,701 to 7,600	8
7,601 to 8,500	9
8,501 to 9,400	10
9,401 to 10,300	11
10,301 to 11,100	12
11,101 to 12,000	13
12,001 to 12,900	14
12,901 to 13,700	15
13,701 to 14,600	16
14,601 to 15,500	17
15,501 to 16,300	18
16,301 to 17,200	19
17,201 to 18,100	20
18,101 to 18,900	21
18,901 to 19,800	22
19,801 to 20,700	23
20,701 to 21,500	24
21,501 to 22,300	25
22,301 to 23,200	26
23,201 to 24,000	27
24,001 to 24,900	28
24,901 to 25,000	29
25,001 to 28,000	30
28,001 to 32,000	35
33,001 to 37,000	40
37,001 to 41,000	45
41,001 to 46,000	50
46,001 to 50,000	55
50,001 to 54,000	60
54,001 to 59,000	65
59,001 to 64,000	70
64,001 to 70,000	75
70,001 to 76,000	80
76,001 to 83,000	85
83,001 to 90,000	90
90,001 to 96,000	95
96,001 to 111,000	100
111,001 to 130,000	110
130,001 to 160,000	120
160,001 to 190,000	130
190,001 to 220,000	140
220,001 to 250,000	150
250,001 to 290,000	160
290,001 to 320,000	170
320,001 to 360,000	180
360,001 to 410,000	190
410,001 to 450,000	200
450,001 to 500,000	210
500,001 to 550,000	220
550,001 to 600,000	230
600,001 to 660,000	240
660,001 to 720,000	250
720,001 to 780,000	260
780,001 to 840,000	270
840,001 to 910,000	280
910,001 to 970,000	290
970,001 to 1,050,000	300
1,050,001 to 1,140,000	310
1,140,001 to 1,230,000	320
1,230,001 to 1,320,000	330
1,320,001 to 1,420,000	340
1,420,001 to 1,520,000	350
1,520,001 to 1,630,000	360
1,630,001 to 1,730,000	370
1,730,001 to 1,850,000	380
1,850,001 to 1,970,000	390
1,970,001 to 2,060,000	400
2,060,001 to 2,270,000	410
2,270,001 to 2,510,000	420
2,510,001 to 2,750,000	430
2,750,001 to 3,020,000	440
3,020,001 to 3,320,000	450
3,320,001 to 3,620,000	460
3,620,001 to 3,960,000	470
3,960,001 to 4,310,000	480
4,310,001 to 4,690,000	490
4,690,001 or more	500

Based on a history of no coliform bacterial contamination and on a sanitary survey by the State showing the water system to be supplied solely by a protected ground water source and free of sanitary defects, a community water system serving 25 to 1,000 persons, with written permission from the State, may reduce this sampling frequency except that in no case shall it be reduced to less than one per quarter.

(c) The supplier of water for a non-community water system shall sample for coliform bacteria in each calendar quarter during which the system provides water to the public. Such sampling shall begin within two years after the effective date of this part. If the State, on the basis of a sanitary survey, determines that some other frequency is more appropriate, that frequency shall be the frequency required under these regulations. Such frequency shall be confirmed or changed on the basis of subsequent surveys.

(d) (1) When the coliform bacteria in a single sample exceed four per 100 milliliters (§ 141.14(a)), at least two consecutive daily check samples shall be collected and examined from the same sampling point. Additional check samples shall be collected daily, or at a frequency estab-

lished by the State, until the results obtained from at least two consecutive check samples show less than one coliform bacterium per 100 milliliters.

(2) When coliform bacteria occur in three or more 10 ml portions of a single sample (§ 141.14(b)(1)), at least two consecutive daily check samples shall be collected and examined from the same sampling point. Additional check samples shall be collected daily, or at a frequency established by the State, until the results obtained from at least two consecutive check samples show no positive tubes.

(3) When coliform bacteria occur in all five of the 100 ml portions of a single sample (§ 141.14(b)(2)), at least two daily check samples shall be collected and examined from the same sampling point. Additional check samples shall be collected daily, or at a frequency established by the State, until the results obtained from at least two consecutive check samples show no positive tubes.

(4) The location at which the check samples were taken pursuant to paragraphs (d) (1), (2), or (3) of this section shall not be eliminated from future sampling without approval of the State. The results from all coliform bacterial analyses performed pursuant to this subpart, except those obtained from check samples and special purpose samples, shall be used to determine compliance with the maximum contaminant level for coliform bacteria as established in § 141.14. Check samples shall not be included in calculating the total number of samples taken each month to determine compliance with § 141.21 (b) or (c).

(e) When the presence of coliform bacteria in water taken from a particular sampling point has been confirmed by any check samples examined as directed in paragraphs (d) (1), (2), or (3) of this section, the supplier of water shall report to the State within 48 hours.

(f) When a maximum contaminant level set forth in paragraphs (a), (b) or (c) of § 141.14 is exceeded, the supplier of water shall report to the State and notify the public as prescribed in § 141.31 and § 141.32.

(g) Special purpose samples, such as those taken to determine whether disinfection practices following pipe placement, replacement, or repair have been sufficient, shall not be used to determine compliance with § 141.14 or § 141.21 (b) or (c).

(h) A supplier of water of a community water system or a non-community water system may, with the approval of the State and based upon a sanitary survey, substitute the use of chlorine residual monitoring for not more than 75 percent of the samples required to be taken by paragraph (b) of this section, *Provided*, That the supplier of water takes chlorine residual samples at points which are representative of the conditions within the distribution system at the frequency of at least four for each substituted microbiological sample. There shall be at least daily determinations of chlorine residual. When the supplier of water exercises the option provided in this paragraph (h) of this section, he shall maintain no less than 0.2 mg/l free chlorine throughout the public water distribution system. When a particular sampling point has been shown to have a free chlorine residual less than 0.2 mg/l, the water at that location shall be retested as soon as practicable and in any event within one hour. If the original analysis is confirmed, this fact shall be reported to the State within 48 hours. Also, if the analysis is confirmed, a sample for coliform bacterial analysis must be collected from that sampling point as soon as practicable and preferably within one hour, and the results of such analysis reported to the State within 48 hours after the results are known to the supplier of water. Analyses for residual chlorine shall be made in accordance with "Standard Methods for the Examination of Water and Wastewater," 13th Ed., pp. 129–132. Compliance with the maximum contaminant levels for coliform bacteria shall be determined on the monthly mean or quarterly mean basis specified in § 141.14, including those samples taken as a result of failure to maintain the required chlorine residual level. The State may withdraw its approval of the use of chlorine residual substitution at any time.

§ 141.22 Turbidity sampling and analytical requirements.

(a) Samples shall be taken by suppliers of water for both community water systems and non-community water systems at a representative entry point(s) to the water distribution system at least once per day, for the purpose of making turbidity measurements to determine compliance with § 141.13. The measurement shall be made by the Nephelometric Method in accordance with the recommendations set forth in "Standard Methods for the Examination of Water and Wastewater," American Public Health Association, 13th Edition, pp. 350–353, or "Methods for Chemical Analysis of Water and Wastes," pp. 295–298, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(b) If the result of a turbidity analysis indicates that the maximum allowable limit has been exceeded, the sampling and measurement shall be confirmed by resampling as soon as practicable and preferably within one hour. If the repeat sample confirms that the maximum allowable limit has been exceeded, the supplier of water shall report to the State within 48 hours. The repeat sample shall be the sample used for the purpose of calculating the monthly average. If the monthly average of the daily samples exceeds the maximum allowable limit, or if the average of two samples taken on consecutive days exceeds 5 TU, the supplier of water shall report to the State and notify the public as directed in § 141.31 and § 141.32.

(c) Sampling for non-community water systems shall begin within two years after the effective date of this part.

(d) The requirements of this § 141.22 shall apply only to public water systems which use water obtained in whole or in part from surface sources.

§ 141.23 Inorganic chemical sampling and analytical requirements.

(a) Analyses for the purpose of determining compliance with § 141.11 are required as follows:

(1) Analyses for all community water systems utilizing surface water sources shall be completed within one year following the effective date of this part. These analyses shall be repeated at yearly intervals.

(2) Analyses for all community water systems utilizing only ground water sources shall be completed within two years following the effective date of this part. These analyses shall be repeated at three-year intervals.

(3) For non-community water systems, whether supplied by surface or ground water sources, analyses for nitrate shall be completed within two years following the effective date of this part. These analyses shall be repeated at intervals determined by the State.

(b) If the result of an analysis made pursuant to paragraph (a) indicates that the level of any contaminant listed in § 141.11 exceeds the maximum contaminant level, the supplier of water shall report to the State within 7 days and initiate three additional analyses at the same sampling point within one month.

(c) When the average of four analyses made pursuant to paragraph (b) of this section, rounded to the same number of significant figures as the maximum contaminant level for the substance in question, exceeds the maximum contaminant level, the supplier of water shall notify the State pursuant to § 141.31 and give notice to the public pursuant to § 141.32. Monitoring after public notification shall be at a frequency designated by the State and shall continue until the maximum contaminant level has not been exceeded in two successive samples or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

(d) The provisions of paragraphs (b) and (c) of this section notwithstanding, compliance with the maximum contaminant level for nitrate shall be determined on the basis of the mean of two analyses. When a level exceeding the maximum contaminant level for nitrate is found, a second analysis shall be initiated within 24 hours, and if the mean of the two analyses exceeds the maximum contaminant level, the supplier of water shall report his findings to the State pursuant to § 141.31 and shall notify the public pursuant to § 141.32.

(e) For the initial analyses required by paragraph (a)(1), (2) or (3) of this section, data for surface waters acquired within one year prior to the effective date and data for ground waters acquired within 3 years prior to the effective date of this part may be substituted at the discretion of the State.

(f) Analyses conducted to determine compliance with § 141.11 shall be made in accordance with the following methods:

(1) Arsenic—Atomic Absorption Method, "Methods for Chemical Analysis of Water and Wastes," pp. 95–96, Environ-

mental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(2) Barium—Atomic Absorption Method, "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 210-215, or "Methods for Chemical Analysis of Water and Wastes," pp. 97-98, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(3) Cadmium—Atomic Absorption Method, "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 210-215, or "Methods for Chemical Analysis of Water and Wastes," pp. 101-103, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(4) Chromium—Atomic Absorption Method, "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 210-215, or "Methods for Chemical Analysis of Water and Wastes," pp. 105-106, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(5) Lead—Atomic Absorption Method, "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 210-215, or "Methods for Chemical Analysis of Water and Wastes," pp. 112-113, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(6) Mercury—Flameless Atomic Absorption Method, "Methods for Chemical Analysis of Water and Wastes," pp. 118-126, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(7) Nitrate—Brucine Colorimetric Method, "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 461-464, or Cadmium Reduction Method, "Methods for Chemical Analysis of Water and Wastes," pp. 201-206, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(8) Selenium—Atomic Absorption Method, "Methods for Chemical Analysis of Water and Wastes," p. 145, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(9) Silver—Atomic Absorption Method, "Standard Methods for the Examination of Water and Wastewater", 13th Edition, pp. 210-215, or "Methods for Chemical Analysis of Water and Wastes", p. 140, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(10) Fluoride—Electrode Method, "Standard Methods for the Examination of Water and Wastewater", 13th Edition, pp. 172-174, or "Methods for Chemical Analysis of Water and Wastes," pp. 65-37, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974, or Colorimetric Method with Preliminary Distillation, "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 171-172 and 174-176, or "Methods for Chemical Analysis of Water and Wastes," pp. 59-60, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

§ 141.24 Organic chemical sampling and analytical requirements.

(a) An analysis of substances for the purpose of determining compliance with § 141.12 shall be made as follows:

(1) For all community water systems utilizing surface water sources, analyses shall be completed within one year following the effective date of this part. Samples analyzed shall be collected during the period of the year designated by the State as the period when contamination by pesticides is most likely to occur. These analyses shall be repeated at intervals specified by the State but in no event less frequently than at three year intervals.

(2) For community water systems utilizing only ground water sources, analyses shall be completed by those systems specified by the State.

(b) If the result of an analysis made pursuant to paragraph (a) of this section indicates that the level of any contaminant listed in § 141.12 exceeds the maximum contaminant level, the supplier of water shall report to the State within 7 days and initiate three additional analyses within one month.

(c) When the average of four analyses made pursuant to paragraph (b) of this section, rounded to the same number of significant figures as the maximum contaminant level for the substance in question, exceeds the maximum contaminant level, the supplier of water shall report to the State pursuant to § 141.31 and give notice to the public pursuant to § 141.32. Monitoring after public notification shall be at a frequency designated by the State and shall continue until the maximum contaminant level has not been exceeded in two successive samples or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

(d) For the initial analysis required by paragraph (a) (1) and (2) of this section, data for surface water acquired within one year prior to the effective date of this part and data for ground water acquired within three years prior to the effective date of this part may be substituted at the discretion of the State.

(e) Analyses made to determine compliance with § 141.12(a) shall be made in accordance with "Method for Organochlorine Pesticides in Industrial Effluents," MDQARL, Environmental Protection Agency, Cincinnati, Ohio, November 28, 1973.

(f) Analyses made to determine compliance with § 141.12(b) shall be conducted in accordance with "Methods for Chlorinated Phenoxy Acid Herbicides in Industrial Effluents," MDQARL, Environmental Protection Agency, Cincinnati, Ohio, November 28, 1973.

§ 141.27 Alternative analytical techniques.

With the written permission of the State, concurred in by the Administrator of the U.S. Environmental Protection Agency, an alternative analytical technique may be employed. An alternative technique shall be acceptable only if it is substantially equivalent to the prescribed test in both precision and accuracy as it relates to the determination of compliance with any maximum contaminant level. The use of the alternative analytical technique shall not decrease the frequency of monitoring required by this part.

§ 141.28 Approved laboratories.

For the purpose of determining compliance with § 141.21 through § 141.27, samples may be considered only if they have been analyzed by a laboratory approved by the State except that measurements for turbidity and free chlorine residual may be performed by any person acceptable to the State.

§ 141.29 Monitoring of consecutive public water systems.

When a public water system supplies water to one or more other public water systems, the State may modify the monitoring requirements imposed by this part to the extent that the interconnection of the sysems jusifies treating them as a single system for monitoring purposes. Any modified monitoring shall be conducted pursuant to a schedule specified by the State and concurred in by the Administrator of the U.S. Environmental Protection Agency.

Subpart D—Reporting, Public Notification and Record Keeping

§ 141.31 Reporting requirements.

(a) Except where a shorter reporting period is specified in this part, the supplier of water shall report to the State within 40 days following a test, measurement or analysis required to be made by this part, the results of that test, measurement or analysis.

(b) The supplier of water shall report to the State within 48 hours the failure to comply with any primary drinking water regulation (including failure to comply with monitoring requirements) set forth in this part.

(c) The supplier of water is not required to report analytical results to the State in cases where a State laboratory performs the analysis and reports the results to the State office which would normally receive such notification from the supplier.

§ 141.32 Public notification.

(a) If a community water system fails to comply with an applicable maximum contaminant level established in Subpart B, fails to comply with an applicable testing procedure established in Subpart C of this part, is granted a variance or an exemption from an applicable maximum contaminant level, fails to comply with the requirements of any schedule prescribed pursuant to a variance or exemption, or fails to perform any monitoring required pursuant to Section 1445 (a) of the Act, the supplier of water shall notify persons served by the system of the failure or grant by inclusion of a notice in the first set of water bills of the system issued after the failure or grant

and in any event by written notice within three months. Such notice shall be repeated at least once every three months so long as the system's failure continues or the variance or exemption remains in effect. If the system issues water bills less frequently than quarterly, or does not issue water bills, the notice shall be made by or supplemented by another form of direct mail.

(b) If a community water system has failed to comply with an applicable maximum contaminant level, the supplier of water shall notify the public of such failure, in addition to the notification required by paragraph (a) of this section, as follows:

(1) By publication on not less than three consecutive days in a newspaper or newspapers of general circulation in the area served by the system. Such notice shall be completed within fourteen days after the supplier of water learns of the failure.

(2) By furnishing a copy of the notice to the radio and television stations serving the area served by the system. Such notice shall be furnished within seven days after the supplier of water learns of the failure.

(c) If the area served by a community water system is not served by a daily newspaper of general circulation, notification by newspaper required by paragraph (b) of this section shall instead be given by publication on three consecutive weeks in a weekly newspaper of general circulation serving the area. If no weekly or daily newspaper of general circulation serves the area, notice shall be given by posting the notice in post offices within the area served by the system.

(d) If a non-community water system fails to comply with an applicable maximum contaminant level established in Subpart B of this part, fails to comply with an applicable testing procedure established in Subpart C of this part, is granted a variance or an exemption from an applicable maximum contaminant level, fails to comply with the requirement of any schedule prescribed pursuant to a variance or exemption or fails to perform any monitoring required pursuant to Section 1445(a) of the Act, the supplier of water shall given notice of such failure or grant to the persons served by the system. The form and manner of such notice shall be prescribed by the State, and shall insure that the public using the system is adequately informed of the failure or grant.

(e) Notices given pursuant to this section shall be written in a manner reasonably designed to inform fully the users of the system. The notice shall be conspicuous and shall not use unduly technical language, unduly small print or other methods which would frustrate the purpose of the notice. The notice shall disclose all material facts regarding the subject including the nature of the problem and, when appropriate, a clear statement that a primary drinking water regulation has been violated and any preventive measures that should be taken by the public. Where appropriate, or where designated by the State, bilingual notice shall be given. Notices may include a balanced explanation of the significance or seriousness to the public health of the subject of the notice, a fair explanation of steps taken by the system to correct any problem and the results of any additional sampling.

(f) Notice to the public required by this section may be given by the State on behalf of the supplier of water.

(g) In any instance in which notification by mail is required by paragraph (a) of this section but notification by newspaper or to radio or television stations is not required by paragraph (b) of this section, the State may order the supplier of water to provide notification by newspaper and to radio and television stations when circumstances make more immediate or broader notice appropriate to protect the public health.

§ 141.33 Record maintenance.

Any owner or operator of a public water system subject to the provisions of this part shall retain on its premises or at a convenient location near its premises the following records:

(a) Records of bacteriological analyses made pursuant to this part shall be kept for not less than 5 years. Records of chemical analyses made pursuant to this part shall be kept for not less than 10 years. Actual laboratory reports may be kept, or data may be transferred to tabular summaries, provided that the following information is included:

(1) The date, place, and time of sampling, and the name of the person who collected the sample;

(2) Identification of the sample as to whether it was a routine distribution system sample, check sample, raw or process water sample or other special purpose sample;

(3) Date of analysis;

(4) Laboratory and person responsible for performing analysis;

(5) The analytical technique/method used; and

(6) The results of the analysis.

(b) Records of action taken by the system to correct violations of primary drinking water regulations shall be kept for a period not less than 3 years after the last action taken with respect to the particular violation involved.

(c) Copies of any written reports, summaries or communications relating to sanitary surveys of the system conducted by the system itself, by a private consultant, or by any local, State or Federal agency, shall be kept for a period not less than 10 years after completion of the sanitary survey involved.

(d) Records concerning a variance or exemption granted to the system shall be kept for a period ending not less than 5 years following the expiration of such variance or exemption.

Federal Register
March 31, 1977

ENVIRONMENTAL PROTECTION AGENCY

[40 CFR Part 143]

NATIONAL SECONDARY DRINKING WATER REGULATIONS

Proposed Regulations

Notice is hereby given that pursuant to section 1412 of the Public Health Service Act, as amended by the Safe Drinking Water Act ("the Act," Pub. L. 93-523), the Administrator of the Environmental Protection Agency (EPA) proposes to issue a new 40 CFR Part 143 setting forth Secondary Drinking Water Regulations.

The Act was signed by the President on December 16, 1974. It is the first Federal Act dealing in depth with providing safe drinking water for public use. National Interim Primary Drinking Water Regulations were proposed on March 14, 1975, and promulgated on December 24, 1975. Regulations covering radionuclides were added on July 9, 1976. The regulations proposed today, the secondary regulations, follow and complement the primary regulations. While primary regulations are devoted to constituents and regulations affecting the health of consumers, secondary regulations are those which deal with the esthetic qualities of drinking water. The contaminants for which Secondary Maximum Contaminant Levels are set in these regulations may not have a significant direct impact on the health of consumers, but their presence in excessive quantities may discourage the utilization of a drinking water supply by the public.

Primary drinking water regulations are applicable to all public water systems and are enforceable by EPA or the States which have accepted primacy; secondary regulations are not Federally enforceable and are intended as guidelines for the States. EPA expects the States to give priority attention to implementation of the mandatory primary regulations which provide health requirements.

Section 1414 of the Act provides:

> (d) Whenever, on the basis of information available to him, the Administrator finds that within a reasonable time after National Secondary Drinking Water Regulations have been promulgated, one or more public water systems in a State do not comply with such secondary regulations, and that such noncompliance appears to result from a failure of such State to take reasonable action to assure that public water systems throughout such State meet such secondary regulations, he shall so notify the State.

EPA does not propose to use its resources, on a routine basis, to independently determine compliance or noncompliance with the secondary regulations. It will, however, review data which may be reported by the States on a discretionary basis or which is received incidental to other studies. On the basis of such review, the agency will consult with the States to determine the action taken by them to assure compliance and where appropriate, notify States of noncompliance which has not been acted on.

Secondary Maximum Contaminant Levels

The Secondary Drinking Water Regulations contain maximum contaminant levels for chloride, color, copper, corrosivity, foaming agents, hydrogen sulfide, iron, manganese, odor, pH, sulfate, total dissolved solids and zinc. Brief statements on the effects of these on water quality are listed, and more detailed comments are available in the Statement of Basis and Purpose, available as described in the last section of the preamble.

Chloride in reasonable concentrations is not harmful to humans, but in concentrations above 250 mg/l chloride causes a salty taste in water which is objectionable to many people. Chloride can be removed from drinking water by distillation, reverse osmosis or electrodialysis, but in some cases the entry of chloride into a drinking water source can be minimized by proper aquifer selection and well construction.

Color may be indicative of dissolved organic material which may lead to generation of trihalomethanes and other organohalogen compounds during chlorination. Color can also be caused by inorganic species such as manganese or iron. Color becomes objectionable and unesthetic to most people at levels over 15 C.U. (Color Units). In some cases, color can be objectionable at the 5 C.U. level, and States, therefore, should also consider the regulation of color at levels below 15 C.U. Depending on the nature of the substances causing color, conventional water treatment (flocculation and filtering), oxidation or carbon adsorption are processes used for removing color.

Copper is an essential and beneficial element in human metabolism, but copper imparts an undesirable taste to drinking water. Small amounts of copper are generally regarded as nontoxic. Copper can be removed from water by ion exchange, and by proper control of pH, where the source of copper is the corrosion of copper pipes.

Corrosivity is a complex characteristic of water related to pH, alkalinity, dissolved oxygen and total dissolved solids plus other factors. A corrosive water, in addition to dissolving metals with which it comes in contact, also produces objectionable stains on plumbing fixtures. Corrosivity is controlled by pH adjustment, the use of chemical stabilizers, or other means which are dependent upon the specific conditions of the water system.

The corrosivity of drinking water is a parameter which has not only esthetic significance, but health and economic significance as well. The products of corrosion having the greatest health significance, cadmium and lead, are addressed in primary regulations, but there is also a sufficient basis to include corrosivity in secondary regulations. The problem lies in the lack of a simple, generally acceptable means for measuring the corrosivity of water and thus the lack of a generally acceptable numerical index for assessing and limiting corrosivity. There are a number of indices in use, but no agreement on a single one which would, in all cases, definitively say whether or not a given water was corrosive. An attempt to circumvent the problem can be made by specifying, in lieu of an index, practical tests of corrosivity using pipe sections, metal coupons or water analyses for the determination of the corrosive properties of the water. Unfortunately, most of these tests, as well as most indices, are not universally applicable and require long periods of time to carry out or develop. For a corrosivity test or index to be widely used and applied, the testing procedure must be rapid, simple and generally applicable. Comments are solicited from the public on a practical means for assessing corrosivity, as well as an associated number to be used as a Secondary Maximum Contaminant Level.

Foaming is a characteristic of water caused principally by the presence of detergents and similar substances. Water which foams is definitely unesthetic and considered unfit for consumption. The foamability of water is measured by the quantity of methylene blue active substances (MBAS) present. Foaming substances can be removed from drinking water by carbon adsorption, but it is preferable to prevent contamination of water by these substances.

Hydrogen sulfide is an odorous gas. Its presence in drinking water is often attributed to microbial action on organic matter or the reduction of sulfate ions to sulfide. In addition to its obnoxious odor, hydrogen sulfide in association with soluble iron produces black stains on laundered items and black deposits on piping and fixtures. Hydrogen sulfide is removed from drinking water by aeration or chemical oxidation.

Iron is a highly objectionable constituent of water supplies for either domestic or industrial use. Iron may impart brownish discolorations to laundered goods. The taste that it imparts to water may be described as bitter or astringent, and iron may adversely affect the taste of other beverages made from water. The amount of iron causing objectionable taste or laundry staining constitutes only a small fraction of the amount normally consumed in the daily diet and thus does not have toxicologic significance. Iron can be removed from water by conventional water treatment processes or ion exchange and also by oxidation processes followed by filtering. If the iron comes from the corrosion of iron or steel piping the problem can often be eliminated by practicing corrosion control.

Manganese, like iron, produces discoloration in laundered goods and impairs the taste in drinking water and beverages, including tea and coffee. At concentrations in excess of 0.05 milligrams per liter, manganese can occasionally cause buildup of coatings in distribution piping which can slough off and cause brown spots in laundry items and unethetic black precipitates. Managanese can usually be removed from water by the same process used for iron removal.

Odor is an important esthetic quality of water for domestic consumers and process industries such as food, beverage and pharmaceutical manufacturers, which require water essentially free of taste and ordor. It is usually impractical and often impossible to isolate and identify the odor-producing chemical. Evaluation of odors and tastes is thus dependent on the individual senses of smell and taste. In many cases, sensations ascribed to the sense of taste are actually odors. Odors are usually removed by carbon adsorption or aeration.

The range of pH in public water systems may have a variety of esthetic and

health effects. Corrosion effects are commonly associated with pH levels below 6.5. As pH levels are increased to above 8.5 mineral incrustations and bitter taste can occur, the germicidal activity of chlorine is substantially reduced and the rate of formation of trihalomethanes is significantly increased. However, the impact of pH in any one water system will vary depending on the overall chemistry and composition of the water so that a more or less restrictive range may be appropriate under specific circumstances.

Sulfate may cause detectable tastes at concentrations of 300–400 milligrams per liter; at concentrations above 600 milligrams per liter it may have a laxative effect. High concentrations of sulfate also contribute to the formation of scale in boilers and heat exchangers. Sulfate can be removed from drinking water by distillation, reverse osmosis or electrodialysis. The laxative effect noted above seldom affects regular users of the water but transients are particularly susceptible. For this reason it is recommended that States institute monitoring programs for sulfate, and that transients be notified if the sulfate content of the water is high. Such notification should include an assessment of the possible physiological effects of consumption of the water.

Total Dissolved Solids (TDS) may have an influence on the acceptability of water in general, and in addition a high TDS value may be an indication of the presence of an excessive concentration of some specific substance that would be esthetically objectionable to the consumer. Excessive hardness, taste, mineral deposition or corrosion are common properties of highly mineralized water. Dissolved solids can be removed by chemical precipitation in some cases, but distillation, reverse osmosis, electrodialysis and ion exchange are more generally applicable.

Zinc, like copper, is an essential and beneficial element in human metabolism. Zinc can also impart an undesirable taste to water. At higher concentrations, zinc salts impart a milky appearance to water. Zinc can be removed from water by conventional water treatment processes or ion exchange, but since the source of zinc is often the coating of galvanized iron, corrosion control will minimize the introduction of zinc into drinking water. At the same time, corrosion control will minimize the introduction of lead and cadmium into the drinking water, since lead and cadmium are often contaminants of the zinc used in galvanizing.

Contaminants Considered But Not Included In The Regulations

In addition to the above contaminants, several other drinking water parameters were considered for inclusion in these regulations. Among these are hardness, alkalinity, phenols, sodium and standard plate count.

Since high levels of hardness have significant esthetic and economic effects, the removal of hardness (softening) can be considered beneficial from a non-health standpoint. However, correlations between the softness of water and the incidence of cardiovascular disease have been shown, in some studies, so the practice of softening drinking water is being discouraged by some scientists and physicians. Available information is not sufficient at this time to balance the esthetic desirabilty of setting a limit for hardness against the potential health risk of water softening.

Phenols, particularly the chlorophenols, are esthetically objectionable because of the taste and ordor they produce. Some of the chlorophenols produce a detectable taste or odor at concentrations as low as 1 ppb. While analysis for phenols in this concentration area might present some difficulties, the odor test can easily detect the presence of these compounds and thus makes the inclusion of a limit for phenols unnecessary.

The principal concern with respect to sodium relates to its potential health significance rather than to esthetic effects. However, existing data did not support the establishment of a Maximum Contaminant Level for sodium in the Interim Primary Drinking Water Regulations. It is recommended that the States institute programs for regular monitoring of the sodium content of drinking water served to the public, and for informing physicians and consumers of the sodium concentration in drinking water. By this means, those affected by high sodium concentrations can make adjustments to their diets, or seek alternative sources of water to be used for drinking and food preparation.

It has been suggested that standard plate count, a measure of bacterial concentration, be included as an esthetic parameter in these regulations but it causes no observable esthetic effect and consequently is not appropriate for inclusion. Microbiological MCL's are contained in the National Interim Primary Regulations.

Monitoring

Since these regulations are not Federally enforceable, there are no associated monitoring requirements. As a practical minimum, however, it is recommended that the contaminants listed in these regulations be monitored along with the inorganic chemicals monitored to determine compliance with the primary regulations. Obviously, some parameters are subject to frequent variations and, therefore, may need to be monitored more frequently. The States may wish to supplement these regulations with more specific monitoring requirements in their own laws and regulations.

Economic Impact

As noted above, the Secondary Drinking Water Regulations are not Federally enforceable, so the extent of their implementation and thus the associated economic impact is impossible to judge. However, since there are data available on the prevalence of some of the contaminants listed in these regulations and since treatment costs are also available, a limited economic evaluation has been prepared. Actual compliance will depend on the level of State implementation, and customer dissatisfaction and willingness to pay for improvements.

The limited evaluation considers cost impacts on consumers in different size systems for treatment to remove iron and manganese and to adjust pH levels for corrosion control. It demonstrates that esthetic parameters are exceeded most often in small water systems with only a low rate of exceeders in the larger systems. For example, in the National Community Water Supply Study, 25 percent of the systems failed at least one esthetic limit but this represented only 12 percent of the study population; conversely 88 percent of the study population had esthetically satisfactory water.

The per-customer costs of providing iron and manganese control and pH adjustment for corrosion control were substantially greater for small water systems than for the large systems. The monthly cost per household was estimated at $3.60 (25–99 persons served) as against $1.10 for systems serving over 100,000 and recent field data indicate that the small system costs may be much higher under some circumstances. These data may provide the reason for the probable existence of more frequent esthetic quality problems in small systems where the customer may be willing to accept a lower esthetic quality water rather than to pay higher treatment costs. These cost data can be used by States and communities as indicators of approximate cost of compliance. Further information regarding the economic evaluation may be obtained from the Office of Water Supply.

Comments and Public Hearing

Interested persons may participate in this rulemaking process by submitting written comments in triplicate to the Office of Water Supply (WH-550), Criteria and Standards Division, Environmental Protection Agency, Washington, D.C. 20460.

During the development of these proposed regulations, additional suggestions were received, including a recommendation that, for Total Dissolved Solids, chloride and sulfate, three different levels be set (1) a Recommended Level, (2) an Upper Limit and (3) a Short-Term Limit. The Recommended Level would represent the desirable concentration for a high degree of consumer acceptance; the Upper Limit would be acceptable when it is not reasonably feasible to provide more suitable water; and the Short-Term Limit would be considered acceptable only for existing systems pending construction of treatment facilities or development of new water sources. Other suggestions were that more frequent monitoring be recommended for constituents, such as color and odor, whose concentrations vary from day to day. Sodium has also been suggested for inclusion in the secondary MCL's.

Comments on the above and all other aspects of the proposed regulations, particularly corrosivity measuring methods, are solicited. Comments regarding additional contaminants or the deletion of any of the listed contaminants, as well as comments regarding the proposed Secondary Maximum Contaminant Levels will be welcome. All comments received on or before June 1, 1977, will be considered. Later comments will be considered as time permits.

Copies of the Statement of Basis and Purpose for these Proposed Secondary Drinking Water Regulations and other relevant documents will be available after April 1, 1977, from the EPA Public Information Reference Unit, Room 2922, Waterside Mall, 401 M Street, S.W., Washington, D.C. 20460. A copy of all public comments and transcripts of the public hearing will be available for inspection and copying from the EPA Public Information Reference Unit. For public review and copying, the EPA Information Regulation (40 CFR Part 2) provides that a reasonable fee may be charged for the copying service.

In addition to considering public comments sent to EPA, the Agency will hold a public hearing at Room 2117, EPA Headquarters, Waterside Mall, 401 M Street, S.W., Washington, D.C. 20460 on May 3, 1977 beginning at 9:30 AM. Persons who wish to make statements at this hearing should register with Dr. Joseph A. Cotruvo, Director, Criteria and Standards Division, Office of Water Supply by April 29, 1977 (202–755–5643) and are urged to submit written copies of their remarks in triplicate at the time they are presented for inclusion in the record.

Dated: March 21, 1977.

DOUGLAS M. COSTLE,
Administrator.

It is proposed to amend Chapter I of Title 40 of the Code of Federal Regulations by adding Part 143, as follows:

PART 143—NATIONAL SECONDARY DRINKING WATER REGULATIONS

Sec.
143.1 Purpose
143.2 Definitions
143.3 Secondary Maximum Contaminant Levels
143.4 Monitoring

AUTHORITY: Sec. 1412(c) of the Public Health Service Act, 68 Stat. 1660 (42 USC 300g–1)

§ 143.1 Purpose.

This part establishes Secondary Drinking Water Regulations pursuant to Section 1412 of the Public Health Service Act, as amended by the Safe Drinking Water Act (Pub. L. 93–523).

§ 143.2 Definitions.

(a) "Act" means the Public Health Service Act as amended by the Safe Drinking Water Act, Pub. L. 93–523.

(b) "Contaminant" means any physical, chemical, biological, or radiological substance or matter in water.

(c) "Secondary Maximum Contaminant Level" means the advisable maximum level of a contaminant in water which is delivered to the free-flowing outlet of the ultimate user of a public water system. Contaminants added to the water under circumstances controlled by the user, except those resulting from corrosion of piping and plumbing caused by water quality, are excluded from this definition.

(d) "Public water system" means a system for the provision to the public of piped water for human consumption, if such system has at least fifteen service connections or regularly serves at least twenty-five individuals daily at least 60 days out of the year.

(e) "State" means the agency of the State government which has jurisdiction over public water systems.

(f) "Supplier of water" means any person who owns or operates a public water system.

§ 143.3 Secondary maximum contaminant levels.

The Secondary Maximum Contaminant Levels for public water systems are as follows:

Contaminant:	*Level*
Chloride	250 mg/l.
Color	15 Color Units.
Copper	1 mg/l.
Corrosivity	Non-corrosive.
Foaming Agents	0.5 mg/l.
Hydrogen Sulfide	0.05 mg/l.
Iron	0.3 mg/l.
Manganese	0.05 mg/l.
Odor	3 Threshold Odor Number.
pH	6.5–8.5.
Sulfate	250 mg/l.
TDS	500 mg/l.
Zinc	5 mg/l.

§ 143.4 Monitoring.

(a) It is recommended that the parameters in these regulations should be monitored at intervals no less frequent than the monitoring performed for inorganic chemical contaminants listed in the National Interim Primary Drinking Water Regulations as applicable to community water systems. More frequent monitoring may be appropriate for specific parameters under certain circumstances or may be directed by the State.

(b) Analyses conducted to determine compliance with § 143.3 should be made in accordance with the following methods:

(1) Chloride—Potentiometric Method, "Standard Methods for the Examination of Water and Wastewater," 14th Edition, P. 306.

(2) Color—Platinum-Cobalt Method, "Methods for Chemical Analysis of Water and Wastes," pp. 36–38, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 160–162, 14th Edition, p. 64.

(3) Copper—Atomic Absorption Method, "Methods for Chemical Analysis of Water and Wastes, pp. 108–109, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater,: 13th Edition, pp. 210–215, 14th Edition p 144.

(4) Corrosion—Reserved.

(5) Foaming Agents—Methylene Blue Method, "Methods for Chemical Analysis of Water and Wastes," pp. 157–158, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater, 13th Edition, pp. 337–342, 14th Edition, p. 600.

(6) Hydrogen Sulfide—Titrimetric Iodine Method, "Methods for Chemical Analysis of Water and Wastes," p. 284, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 551–555, 14th Edition, p. 505.

(7) Iron—Atomic Absorption Method, "Methods for Chemical Analysis of Water and Wastes," pp. 110–111, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 210–215, 14th Edition, p. 144.

(8) Manganese—Atomic Absorption Method, "Methods for Chemical Analysis of Water and Wastes," pp. 116–117, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 210–215, 14th Edition, p. 144.

(9) Odor—Consistent Series Method, "Methods for Chemical Analysis of Water and Wastes," pp. 287–294, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 248–254, 14th Edition, p. 75.

(10) pH—Glass Electrode Method "Methods for Chemical Analysis of Water and Wastes," pp. 239–240, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 276–281, 14th Edition, pp. 460–465.

(11) Sulfate—Turbidimetric Method, "Methods for Chemical Analysis of Water and Wastes," pp. 277–278, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 334–335, 14th Edition, p. 496.

(12) Total Dissolved Solids—Total Residue Method, "Methods for Chemical Analysis of Water and Wastes," pp. 270–271, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 288–290, 14th Edition, p. 91.

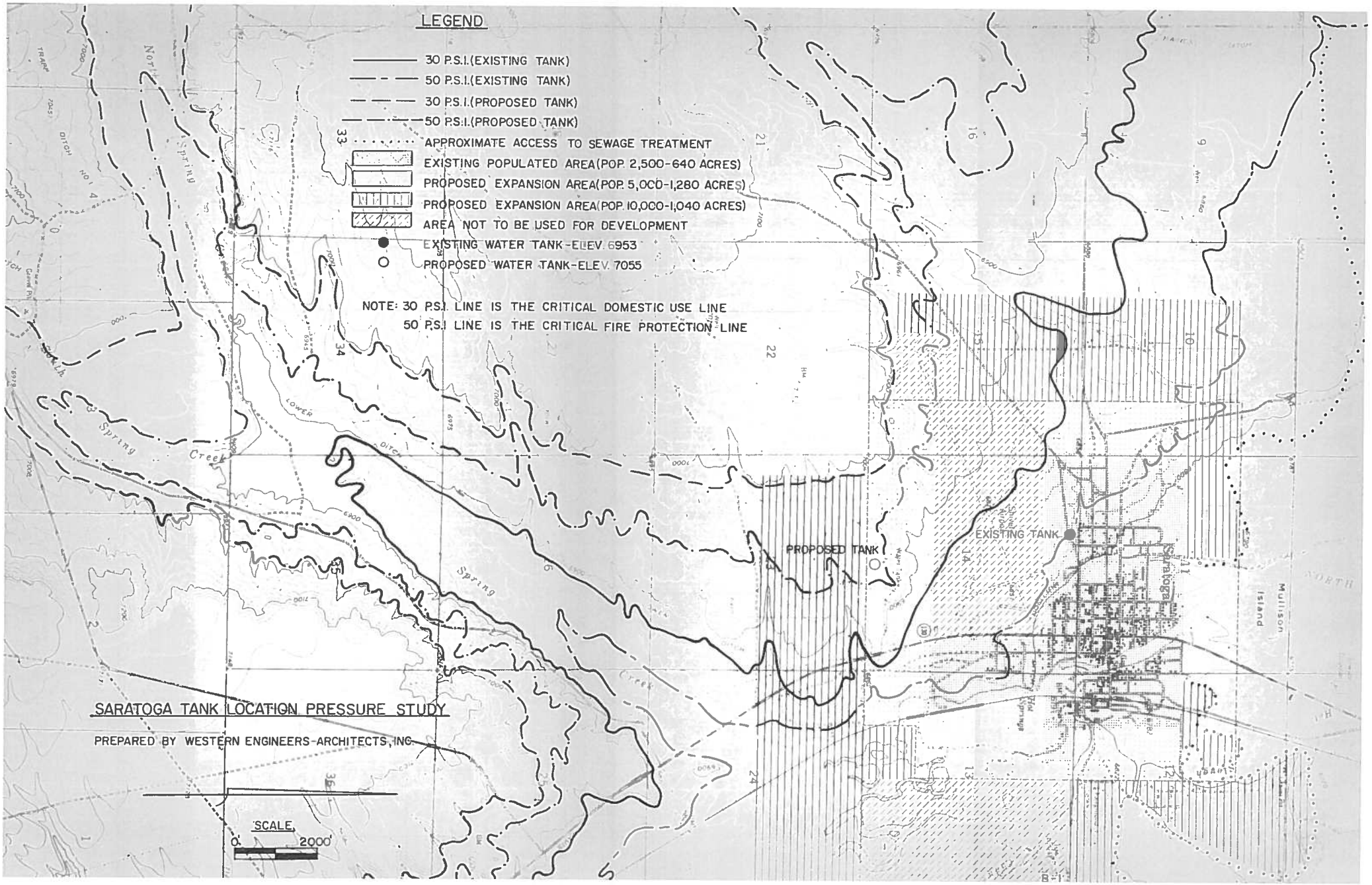
(13) Zinc—Atomic Absorption Method, "Methods for Chemical Analysis of Water and Wastes," pp. 155–156, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 210–215, 14th Edition, p. 144.

[FR Doc 77-9532 Filed 3-30-77;8:45 am]

APPENDIX B

SARATOGA TANK LOCATION

PRESSURE STUDY



SARATOGA TANK LOCATION PRESSURE STUDY

PREPARED BY WESTERN ENGINEERS-ARCHITECTS, INC.

APPENDIX C

OZONE/D.E. SAMPLING RESULTS
BOULDER AND CASPER

APPENDIX C

SUMMARY OF COLOR TESTING RESULTS OBTAINED AT THE
UNIVERSITY OF COLORADO AT BOULDER W/DR. R. SEIVERS

TABLE C-1

SUMMARY OF COLOR REMOVAL TESTING USING OZONE 6/2/77

ample No.	Initial Color	% Light Transmitted at 354_{nm}	% Light Transmitted at 380_{nm}	Initial T.O.C.	Initial O_3 Dose (ppm.)	Detention Time (minutes)	Hach Color	% Light Transmitted at 354_{nm}	% Light Transmitted at 380_{nm}	T.O.C.
1	58	81.0	86	10	5	1	35	88.2	91.2	7.2
2	35	88.2	91.2	7.2	10	1		90.6	92.9	6.3

TABLE C-2

SUMMARY OF COLOR REMOVAL TESTING USING DIATOMACEOUS EARTH WITH GRANULAR ACTIVATED CARBON 6/2/77

ample No.	Initial Color	% Light Transmitted at 354_{nm}	% Light Transmitted at 380_{nm}	T.O.C.			Hach Color after filtering	% Light Transmitted at 354_{nm}	% Light Transmitted at 380_{nm}	T.O.C. after filtering
3	58	81.0	86.0	10			20	92.0	93.0	<4.0

TABLE C-3

SUMMARY OF COLOR REMOVAL TESTING USING DIATOMACEOUS EARTH FILTRATION
WITH GRANULAR ACTIVATED CARBON FOLLOWED BY OZONATION 6/2/77

ample No.	Initial Hach Color from Sample 3	% Light Transmitted at 354 nm	% Light Transmitted at 380_{nm}	T.O.C. see Sample No. 3	Ozone dose (ppm)	Detention Time (minutes)	Hach Color	% Light Transmitted at 354_{nm}	% Light Transmitted at 380_{nm}	T.O.C.
4	20	92.0	93.0	≤ 4.0	10	2	<5.0	>99.0	>99.0	<4.0

TABLE C-4

COLOR REMOVAL TESTING - CHLORINE FEED ONLY 5/14/77

Sample No.	Initial Color	Initial Chlorine Dose	Detention time (min.)	Hach Color	Detention time (min.)	Hach Color	Detention time (min.)	Hach Color
1	18	0	15	18	30	15	60	18
2	18	1	15	11	30	11	60	N.T.
3	18	2	15	7	30	8	60	N.T.
4	18	5	15	7	30	8	60	N.T.
5	18	7	15	5	30	5	60	N.T.
6	18	10	15	5	30	5	60	5

N.T. = no test

TABLE C-5

COLOR REMOVAL TESTING USING ACTIVATED CARBON FILTRATION AT 6 gpm/ft^2 5/14/77

Sample No.	Initial Color	Hach* Color
1	22	8
2	22	4

* Color one time through the A-C Filter

TABLE C-6

COLOR REMOVAL TESTING - CHLORINE FEED ONLY 5/20/77

Sample No.	Initial Color	Initial Chlorine Dose	Detention time (min.)	Hach Color	Detention time (min.)	Hach Color	Detention time (hrs.)	Hach Color
1	80	0	60	80	105	N.T.	16	75
2	80	2	60	N.T	105	N.T.	N.T.	N.T.
3	80	3	60	55	105	N.T.	N.T	N.T.
4	80	5	60	65	105	N.T.	N.T	N.T.
5	80	7	60	N.T	105	N.T.	N.T.	N.T.
6	80	10	60	N.T	105	55	16	45

N.T. = No. test

APPENDIX C (cont'd.)

TABLE C-7

COLOR REMOVAL TESTING - USING ACTIVATED CARBON FILTER 6 gpm/ft^2 5/20/77

Sample No.	Initial Color	Hach Color*	Initial C_1^- dose	Detention time (min.)	Hach Color	Detention time (min.)	Hach Color	
1	80	18						
2	80	18						

* Color one time through the A-C Filter

TABLE C-8

COLOR REMOVAL TESTING - CHLORINE FEED ONLY 5/21/77

Sample No.	Initial Color	Hach Color	Initial C_1^- dose	Detention time (min.)	Hach Color	Detention time (min.)	Hach Color	
1	75		0	15	75	90	75	
2	75		3	15	50	90	50	
3	75		5	15	41	90	50	

TABLE C-9

COLOR REMOVAL TESTING - ACTIVATED CARBON FILTRATION FOLLOWED BY CHLORINE FEED 5/21/77

Sample No.	Initial Color	Hach Color*	Initial C_1^- dose	Detention time (min.)	Hach Color	Detention time (min.)	Hach Color	Detention time (days)	Hach Color
1	75	25	0	15	25	90	25	2	31
2	75	25	3	15	15	90	22	2	10
3	75	25	5	15	14	90	20	2	14
4	75	25	7	15	12	90	12	2	8

* Color one time through the A-C Filter