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NAS WHITING FIELD
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FINAL PHASE 2 LONG TERM TREATMENT OF WATER SUPPLY WELLS AMENDMENT 2

NAS WHITING FIELD FL

1/2/1989

HENDON ENGINEERING

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FINAL REPORT
CONTRACT N62467-86-D-0222, AMENDMENT NUMBER 2
TREATMENT OF WATER SUPPLY WELLS
PHASE II - LONG TERM SOLUTION
NAS WHITING FIELD, MILTON, FLORIDA

FINAL REPORT
CONTRACT N62467-86-D-0222
AMENDMENT NUMBER 2
TREATMENT OF WATER SUPPLY WELLS
PHASE II - LONG TERM SOLUTION

NAS, WHITING FIELD

MILTON, FLORIDA

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

PREPARED BY

HENDON ENGINEERING ASSOCIATES, INC.
BIRMINGHAM, ALABAMA

PROJECT NUMBER 808

January, 1989

EXECUTIVE SUMMARY

A. Description of Project

The south and west water supply wells serving Naval Air Station, Whiting Field, Milton, Florida have been shut down because of organic contamination. The purpose of this project is to evaluate alternatives to insure a continuing supply of potable water to meet the needs of NAS Whiting Field. The project has been divided into two phases; the first to determine an interim solution and the second to determine a long-term or permanent solution to insuring a continuing supply of potable water.

B. Final Phase I Report

The final Phase I Report, dated March, 1987, presented findings, recommendations and the technical specifications necessary to provide treatment facilities to enable the west well to again supply potable water for NAS Whiting Field. Included in the Report were:

1. A synopsis of regulatory agency requirements.
2. Determination of water quality and water supply requirements.
3. Evaluations of viable treatment and water supply alternatives including:
   a. Provision of bottled or tanked-in potable water.
   b. Leasing air stripping facilities.
   c. Leasing an activated carbon adsorption system.
   d. Direct purchase of treatment facilities.

The evaluation of interim leasing alternatives discussed in the Phase I Report indicated that immediate purchase of facilities to treat water from the west well would apparently be less expensive than a one-year lease. Therefore, during the 100 Percent Review Meeting, it was agreed that the Final Interim Solution Report would evaluate purchase and installation of

permanent treatment facilities for the west well on a turn-key basis.

C. Activated Carbon Adsorption System for West Well

1. Performance Parameters

a. Treatment Requirements

(1) Maximum anticipated trichloroethylene (TCE) concentration of raw water - 11 ug/L.

(2) Design capability for maximum TCE concentration of raw water - 22 ug/L.

(3) Required maximum contaminant level (MCL) of treated water - 1 ug/L.

b. Hydraulic Capacity

(1) Nominal flow - 600 gallons per minute (gpm) or 0.864 million gallon per day (MGD)

(2) Maximum head loss through treatment facilities and connecting piping at 600 gpm - 23 feet.

c. Discharge Conditions

(1) Static head - 123 feet.

(2) Pressure of discharge from treatment facilities - 52 to 55 psi.

2. Installed Facilities

The State of Florida Department of Environmental Regulation issued Permit Number WC57-137136, dated September 14, 1987, to NAS Whiting Field for the construction of a granular activated carbon adsorption system for the west well. The facilities were placed in service on 1 December 1987.

3. Life Cycle Costs

The as-built cost of the granular activated carbon adsorption

facilities was $93,280. A comparison of life cycle costs indicates that activated carbon adsorption with an average annual equivalent cost of $25,909 will save approximately 40 percent when compared to air stripping with an average annual equivalent cost of $36,307.

D. South Well

Analyses indicated that installation of an activated carbon adsorption system for water pumped from the south well would be as effective and almost as economical in removing benzene and TCE from this water as this type treatment will be for removing TCE from the west well.

1. Treatment Requirements

   a. Maximum anticipated TCE concentration of raw water - 4 ug/L.

   b. Design capability for maximum TCE concentration of raw water- 10 ug/L.

   c. Required TCE maximum contaminant level (MCL) of treated water - 1 ug/L.

   d. Maximum anticipated Benzene concentration of raw water- 29 ug/L.

   e. Design capability for maximum Benzene concentration of raw water - 60 ug/L.

   f. Required benzene MCL of treated water - 0.5 ug/L.

2. Hydraulic Capacity

   a. Nominal flow - 500 gallons per minute (gpm) or 0.720 million gallons per day (MGD).

   b. Maximum head loss through treatment facilities and connecting piping at 500 gpm - 23 feet.

3. Discharge Conditions

a. Static Head - 125 feet.

b. Pressure of discharge from treatment facilities - 52 to 55 psi.

4. Life Cycle Costs

A comparison of estimated costs for viable alternatives for direct purchase of treatment facilities for the south well indicates that activated carbon adsorption with a capital cost of $95,000 and an average annual equivalent cost of $35,509 would save approximately 9 percent when compared to air stripping with an average annual equivalent cost of $38,813. It is therefore recommended that a granular activated carbon adsorption system be installed adjacent to the south well. Special Project Request forms and technical specifications for turn-key purchase and installation of these facilities are presented in the appendicies.

E. North Well

No volatile organic compounds (VOC's) have been found in water from the north well and the synthetic organic chemicals (SOC's) which have been identified have not approached maximum contaminant levels (MCL's) established by the Safe Drinking Water Act. It is, therefore, recommended that no treatment be provided for water from the north well at this time. Should the concentrations of SOC's increase or VOC's be identified in the water at some future date, an activated carbon adsorption filter could then be installed at the north well.

F. Additional Well Supplies

1. Potential for Additional Contamination

If no more toxic organic wastes are introduced to the soil and groundwater on or in the vicinity of NAS Whiting Field, movement

and resulting dilution of organic contaminants from or to NAS should result in no new well contamination problems.

2. Additional Sources of Water

Potentially satisfactory new well sites are at such a distance from the point of origin of the distribution system that new well field development would not be cost effective as an alternative to activated carbon treatment of water from the present wells. Such sites, especially to the north and north east of the present north well could be developed should the need for additional water arise.

G. Water Supply Alternatives for the Golf Course

Irrigation water for the golf course and potable water for the club house and water fountains on the golf course are currently being supplied through a booster pump from the NAS potable water supply system. As this arrangement uses treated potable water for irrigation, two alternatives for separating irrigation water from potable water have been evaluated. Separating irrigation water from potable water serving the golf course would be significantly more cost effective than continued use of potable water for irrigation at an annual usage of 53 million gallons but would be significantly less cost effective at the earlier identified lower annual irrigation water usage of 16 million gallons. Until a more firm irrigation water demand can be ascertained and until the problem with groundwater contamination in the area of the old north well can be resolved, the only viable alternative is the continued use of potable water for irrigation of the golf course. Any alternatives for supplying potable water at the golf course will require installation of back-flow prevention equipment as discussed in a report entitled "Final Report, Contract N62467-86-D-0222, Potable Water

Distribution System Evaluation, Naval Air Station Whiting Field, Milton, Florida."

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I. INTRODUCTION

A. Background

The south and west water supply wells serving Naval Air Station, Whiting Field, Milton, Florida have been shut down because of organic contamination. NAS Whiting Field has been operating with service from only the north water supply well; however, tests began on 3 November 1987 of an activated carbon adsorption filtration system to treat water from the west well for trichloroethylene removal. Upon completion of these operational tests on 1 December 1987, this well was returned to service. The location of NAS Whiting Field is indicated in Figure A and the locations of the water supply wells are shown in Figure B.

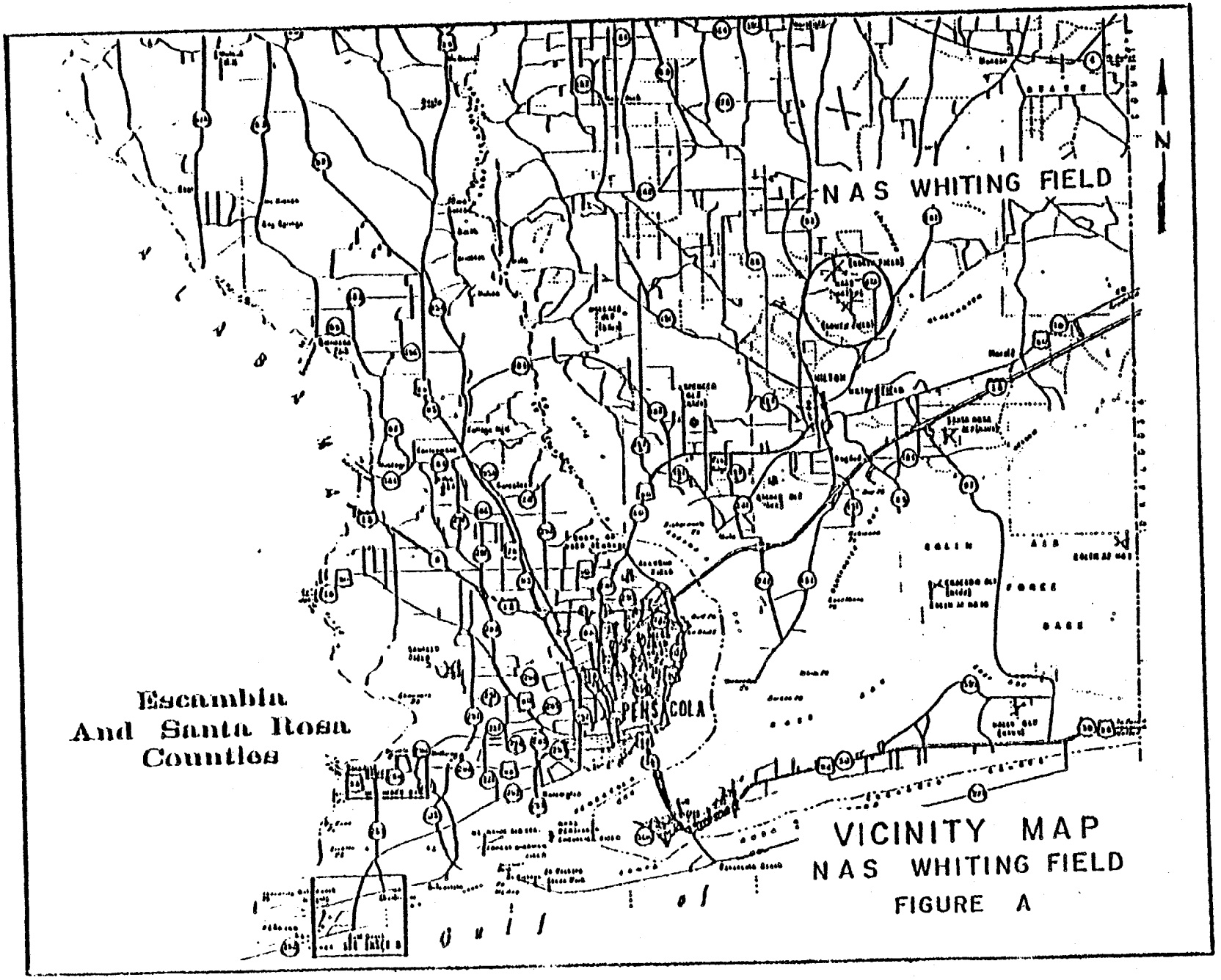
B. Description of Project

The purpose of this project is to evaluate alternatives to insure a continuing supply of potable water to meet the needs of NAS Whiting Field. The project has been divided into two phases; the first to determine an interim solution and the second to determine a long-term or permanent solution to insuring a continuing supply of potable water. The Plan of Work for both phases is presented in Appendix I. The schedule indicated was adjusted during Phase I to permit early implementation of the interim solution.

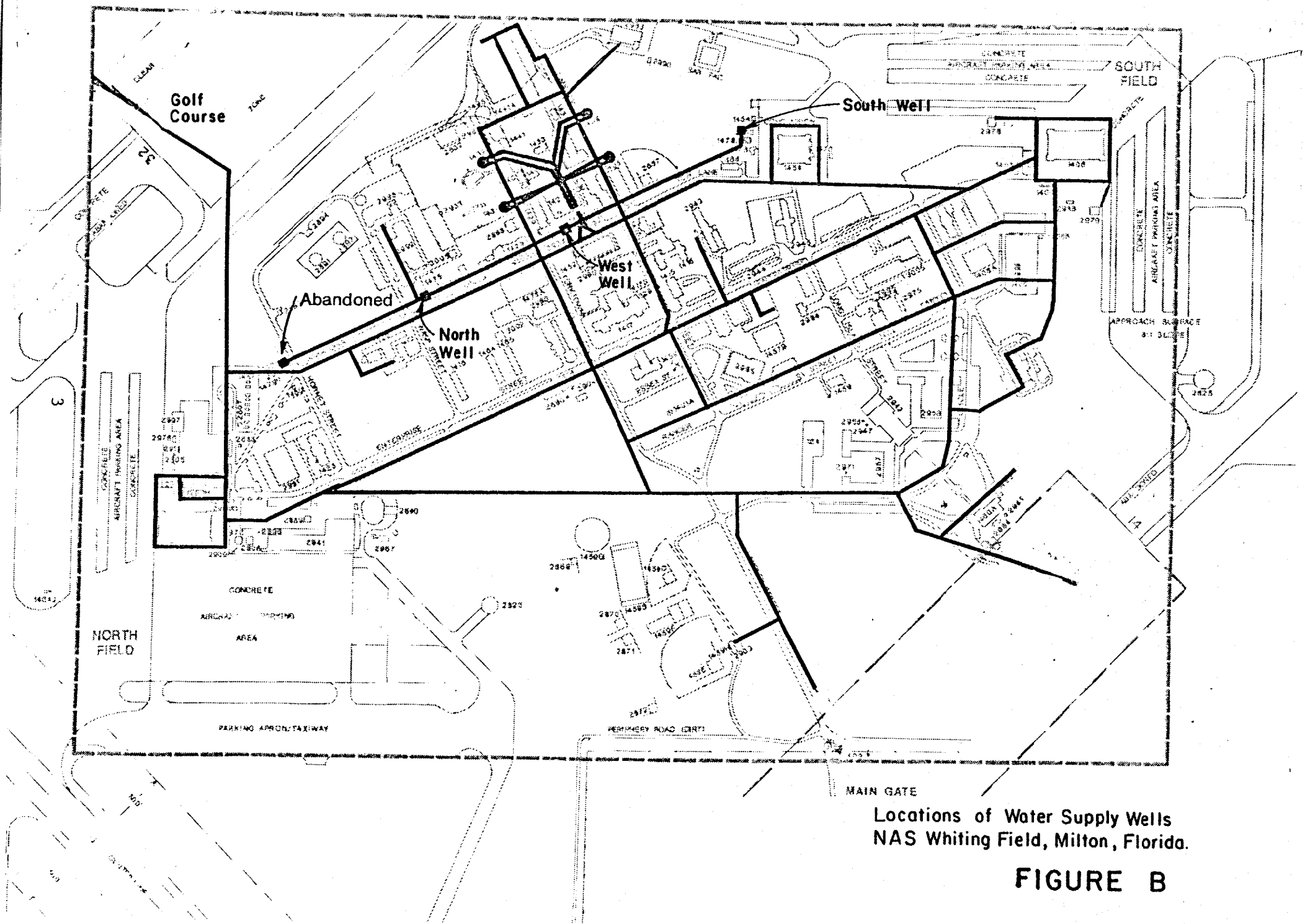
C. Purposes of Phase I Study

The purposes of Phase I were to define and evaluate alternatives to insure an adequate supply of potable water to supplement the potable water supply provided to NAS Whiting Field by the north water supply well. These actions included:

1. An investigation to determine the most cost effective and immediate solution for treating water from the west water supply well to meet applicable state and federal requirements.



VICINITY MAP
NAS WHITING FIELD
FIGURE A



Locations of Water Supply Wells
NAS Whiting Field, Milton, Florida.

FIGURE B

2. An evaluation of leasing the applicable equipment and the provision of bottled or tanked-in potable water.

3. An evaluation of obtaining permanent treatment facilities for the west well.

4. A comparison of viable alternatives including:

   a. Cost Estimates.

   b. Applicable project documentation.

   c. A recommended Plan of Action.

5. Leasing alternatives considered assumed provision by the supplier of total services for:

   a. Installation.

   b. Operation.

   c. Maintenance.

6. Purchase alternatives considered assumed provision by the supplier for:

   a. Turn-key supply and installation.

   b. Sealed engineering plans for proposed installation.

D. Final Phase I Report

The final Phase I Report, dated March, 1987, presented findings, recommendations and the technical specifications necessary to provide treatment facilities to enable the west well to again supply potable water for NAS Whiting Field. Included in the Report were:

1. A synopsis of regulatory agency requirements.

2. Determination of water quality and water supply requirements.

3. Evaluations of viable treatment and water supply alternatives.

4. Technical specifications for the alternative recommended: turn-key supply and installation of an activated carbon ad-

sorption system at and for the west well.

E. Synopsis of Regulatory Agency Compliance Requirements

Potable or drinking water quality requirements have been based on the following:

1. Federal Law and Regulations

   a. "The Safe Drinking Water Act Amendments of 1986," PL 99-339.

   b. "National Primary Drinking Water Regulations," 40 CFR Part 141, July 8, 1987.

   c. "National Primary Drinking Water Implementation Regulations," 40 CFR Part 142, July 8, 1987.

   d. "National Secondary Drinking Water Regulations," 40 CFR Part 143, July 3, 1986.

   e. "National Primary Drinking Water Regulations: Volatile Synthetic Organic Chemicals," Proposed Rulemaking, 40 CFR Parts 141 and 142, November 13, 1985.

   f. "Regulating Organics," Michael Cook, Director, Office of Drinking Water, U.S. Environmental Protection Agency in Discussion with Nancy Zeilig, Editor, Journal American Works Association, November 7, 1986, Jour. AWWA, 79, 1, 10, January 1, 1987.

2. Navy Publications

   a. "Economic Analysis Handbook," NACFAC P-442, July, 1980.

3. Florida Administrative Code (F.A.C.)

   a. "Public Drinking Water Systems," F.A.C., Chapter 17-22.

   b. "Florida Air Stripping Policy Guidelines" pending as per Conversation with Clair Fancy, Bureau of Air Quality

Management, January 27, 1987.

4. Groundwater Quality Assessment

a. "Verification Study, Assessment of Potential Ground-Water Pollution at Naval Air Station Whiting Field, Florida," Geraghty and Miller, Inc., December, 1986.

II. WATER QUALITY AND WATER SUPPLY REQUIREMENTS

A. Quality of Water from Water Supply Wells at NAS Whiting Field

1. Water Quality Analyses at NAS Whiting Field

The Santa Rosa County Health Unit of the Florida Department of Health and Rehabilitation Services and the NAS Public Works Department have repeatedly sampled water supply wells at NAS Whiting Field for organic contamination. Results of analyses of these samples are presented in Table 1. These analyses indicated the following concentrations of organic contaminants:

a. South Well - 4 ug/L Trichloroethylene (TCE).
2 to 29 ug/L Benzene.
Trace total Xylenes.

b. West Well - Trace to 11 ug/L TCE.

c. North Well - No organics detected to a trace of Toluene and a trace of total Xylenes.

2. Florida Standards

The Florida Administrative Code, Chapter 17-22, "Public Drinking Water Systems," Section 17-22.1404,(1),(g), Appendix II to this Report, establishes the following maximum concentrations:

a. Trichloroethylene - 3 ug/L.

TABLE 1

Analyses of Samples from Water Supply Wells
NAS Whiting Field, Milton, Florida

Date of Sample	Contaminant	Analyst
South Well (W-S2)		
November 1, 1985	4 ug/L[1] Trichloroethylene[2]	Pioneer Lab
March 21, 1986	4 ug/L Benzene	Pioneer Lab
April 21, 1986	2 ug/L Benzene	Pioneer Lab
September 14, 1986	29 ug/L Benzene	DHRS[3]
October 1, 1986	14 ug/L Benzene	Pioneer Lab
October 1, 1986	17 ug/L Benzene	Compu Chem
October 1, 1986	6 ug/L Benzene[4]	Pioneer Lab
October 1, 1986	7.4 ug/L Benzene[4]	Compu Chem
October 6, 1986	11.9 ug/L Benzene	DHRS
October 6, 1986	Trace Total Xylenes	DHRS
December 9, 1986	4.96 ug/L Benzene	DHRS
January 5, 1987	7.82 ug/L Benzene	DHRS
West Well (W-W3)		
September 14, 1986	7.9 ug/L Trichloroethylene	DHRS
October 1, 1986	10 ug/L Trichloroethylene	Pioneer Lab
October 1, 1986	6 ug/L Trichloroethylene[4]	Pioneer Lab
October 1, 1986	10.5 ug/L Trichloroethylene	DHRS
December 9, 1986	Trace Trichloroethylene	DHRS
January 5, 1987	Trace Trichloroethylene	DHRS
January 9, 1987	Trace Trichloroethylene	DHRS
North Well (W-N4)		
September 14, 1986	Trace toluene	DHRS
October 1, 1986	No organics detected	Pioneer Lab
October 6, 1986	No organics detected	DHRS
December 9, 1986	No organics detected	DHRS
January 5, 1987	No organics detected	DHRS
Distribution System		
October 6, 1986	Trace Total Xylenes	DHRS
December 9, 1986	No organics detected	DHRS
January 5, 1987	Trace chlorodibromomethane	DHRS

Notes:
1. ug/L = micrograms per liter, ppb or parts per billion.
2. Trichloroethylene = Trichloroethene or TCE.
3. DHRS = Florida Department of Health and Rehabilitation Services.
4. Samples taken after treatment by chlorination and stability control.

RPT10/Q1

b. Benzene - 1 ug/L.

c. Toluene - no maximum concentration established.

d. Total Xylenes - no maximum concentration established.

3. Federal Requirements

Section 1412.(a)(2) of the Safe Drinking Water Act included herein as Appendix III states that:

> After the enactment of the Safe Drinking Water Act Amendments of 1986 each recommended maximum contaminant level published before the enactment of such amendments shall be treated as a maximum contaminant level goal.

These levels were specified in the National Primary Drinking Water Regulations of July 8, 1987, Appendix IV hereto. Section 141.50 established recommended maximum contaminant levels (RMCL's) of zero for five volatile organic compounds (VOC's) and maximum contaminant level goals (MCLG's) for three additional VOC's. Section 141.61 of the Regulations establishes maximum contaminant levels (MCL's) for these VOC's. Of concern here are:

a. Benzene - 0 ug/L RMCL.

5 ug/L MCL.

b. Trichloroethylene - 0 ug/L RMCL.

5 ug/L MCL.

Proposed interim primary drinking water regulations contained RMCL's for several synthetic organic chemicals (SOC's). Although not contained in the current Drinking Water Regulations, planned additions will undoubtedly include SOC's. Of concern here are:

c. Toluene - 2.0 mg/L RMCL.

d. Xylene - 0.44 mg/L RMCL.

4. Treatment Requirements

In order to meet state and federal water quality requirements, the well supply at NAS Whiting Field would require treatment as indicated in Table 2.

B. Water Supply Requirements

1. Well Supply for Present Requirements

Water well capacities and water usage are presented in Table 3. As the south well would not meet the anticipated present water demand, it was not considered further in the Phase I Report. With adequate treatment, the west well can meet the present monthly water demand of NAS Whiting Field as an alternate to the north well.

2. Water Supply for Future Requirements

None of the wells at NAS have sufficient capacity to alone meet the peak summer daily demand which was as high as 1.079 MGD in July, 1986 as is shown in Table 3. To safely meet this peak demand, two wells must be in operation with the third on available stand-by or an alternate supply must be developed.

III. PHASE I ACTIONS

A. Scope Change to Phase I - Interim Solution

The evaluation of interim leasing alternatives discussed in the Phase I Report indicated that immediate purchase of facilities to treat water from the west well would apparently be less expensive than a one-year lease. Therefore, during the 100 Percent Review Meeting, it was agreed that the Final Interim Solution Report would evaluate purchase and installation

TABLE 2

Water Treatment Requirements
NAS Whiting Field, Milton, Florida

Well	Contaminant	State MCL	Federal MCL	Design MCL
South	4 ug/L TCE	3 ug/L	5 ug/L[1]	1 ug/L
	29 ug/L Benzene	1 ug/L	5 ug/L[1]	0.5 ug/L
West	11 ug/L TCE	3 ug/L	5 ug/L	1 ug/L
North	Trace Toluene	---	2.0 mg/L	1.0 mg/L[2]
	Trace Xylene	---	0.44 mg/L	0.22 mg/L[2]

Notes:
1. Federal recommended maximum contaminant levels (RMCL's) of 0 are unattainable.
2. Contaminant levels are well below design maximum contaminant levels (MCL's) and no treatment would be required.

TABLE 3

Water Supply and Demand
NAS Whiting Field, Milton, Florida

Water Well Capacities

South Well	450 gpm	0.648 MGD	19.44 MG/Month
West Well	700 gpm[1]	1.008 MGD[1]	30.24 MG/Month
North Well	600 gpm	0.684	25.92 MG/Month

Water Usage or Demand

	Average Flow	Average Flow	Peak Flow	Peak Flow
July, 1985	14 MG/Month	314 gpm	0.831 MGD	577 gpm
August, 1985	16 MG/Month	358 gpm	0.775 MGD	538 gpm
September, 1985 [2]	17 MG/Month	394 gpm	0.792 MGD	550 gpm
October, 1985 [2]	17 MG/Month	381 gpm	0.874 MGD	607 gpm
November, 1985 [2]	18 MG/Month	417 gpm	0.911 MGD	633 gpm
December, 1985 [2]	19 MG/Month	426 gpm	0.768 MGD	533 gpm
July, 1986	19 Mg/Month	426 gpm	1.079 MGD	749 gpm
August, 1986	15 MG/Month	336 gpm	0.772 MGD	536 gpm
September, 1986	13 MG//Month	301 gpm	0.660 MGD	458 gpm
October, 1986	14.1 MG/Month	316 gpm	0.766 MGD	543 gpm
November, 1986	9.5 MG/Month	220 gpm	0.435 MGD	302 gpm
December, 1986	10.5 MG/Month	235 gpm	0.517 MGD	359 gpm
January, 1987	11.2 MG/Month	251 gpm	-	-
February, 1987	8.9 MG/Month	221 gpm	-	-
March, 1987	10.0 MG/Month	224 gpm	-	-
April, 1987	16.5 MG/Month [3]	382 gpm	-	-
May, 1987	14.3 MG/Month [3]	320 gpm	-	-
June, 1987	17.2 MG/Month [3]	398 gpm	-	-
July, 1987	14.3 MG/Month [3]	320 gpm	-	-
August, 1987	15.6 MG/Month [3]	349 gpm	-	-
September, 1987	13.7 MG/Month [3]	317 gpm	-	-

1. Estimated to be reduced to 600 gpm or 0.864 MGD afrter installation of an activated carbon adsorption filtration system

2. Broken water main

3. Non-essential water usage during the summer of 1987 was restricted because only the north well was in service.

of permanent treatment facilities for the west well on a turn-key basis.

B. Evaluation of Viable Alternatives

1. Performance Parameters

a. Treatment Requirements

(1) Maximum anticipated TCE concentration of raw water- 11 ug/L.

(2) Design capability for maximum TCE concentration of raw water - 22 ug/L.

(3) Required maximum containmant level (MCL) of treated water - 1 ug/L.

b. Hydraulic Capacity

(1) Nominal flow - 600 gallons per minute (gpm) or 0.864 million gallon per day (MGD).

(2) Maximum head loss through treatment facilities and connecting piping at 600 gpm - 23 feet.

c. Discharge Conditions

(1) Static head - 123 feet.

(2) Pressure of discharge from treatment facilities - 52 to 55 psi.

2. Air Stripping Facilities

a. Description of Scheme

Volatile organic compounds (VOC's) such as TCE can be removed from water by purging the water with air. Such a system is described in Appendix V.

b. Cost of Air Stripping Facilities

A cost estimate for the purchase and operation of an air stripping facility is also presented in Appendix V.

The estimated costs for air stripping were as follows:

(1) Capital cost $64,500.

(2) Operation and Maintenance

(a) Year 1 $24,700.

(b) Year 20 $33,700.

c. Advantages of Air Stripping Towers

Treatment of the west well with air stripping towers offers the following advantages:

(1) Short delivery and installation time.

(2) Mr. Berry Andrews of the Bureau of Air Quality Management indicated on January 28, 1987, that air stripping would create no air quality problems based on the following:

(a) Maximum TCE concentration of 11 ug/L.

(b) Pumping 700 gpm.

(c) 100% removal.

(d) Total of (a), (b), and (c) would be 0.092 #/D.

(e) Discharge from a 15' tower.

(f) Anticipated TCE discharge concentration 2.7×10^{-3} ug/m^3.

(g) Florida Guideline - 0.64 ug/m^3 acceptable.

d. Disadvantages of Air Stripping Towers

Treatment of the west well with air stripping towers presents the following disadvantages:

(1) Double pumping is required.

(2) Should synthetic organic chemicals (SOC's) appear in the groundwater, activated carbon adsorption would be

the treatment method of choice. The Safe Drinking Water Act, Section 1412.(b)(D)(5) states:

> For the purposes of this subsection, the term "feasible" means feasible with the use of the best technology, treatment techniques and other means which the Administrator finds, after examination for efficacy under laboratory conditions, are available (taking cost into consideration). For the purpose of paragraph (4), granular activated carbon is feasible for the control of synthetic organic chemicals, and any technology, treatment technique, or other means found to be the best available for the control of synthetic organic chemicals must be at least as effective in controlling synthetic organic chemicals as granular activate carbon.

Mr. Michael Cook, Director, Office of Drinking Water, U.S. EPA in the reference cited in Section I.E.1.f. above further elaborated as follows:

> The amendments name granular activated carbon as the best available technology for controlling synthetic organic chemicals. What other treatment techniques are likely to be considered best available technologies?
>
> Aeration, certainly, for volatile organics or radon. For water supplies containing metals that can't be removed by granulated activated carbon, we're probably looking at some kind of softening process, like lime. Basically, what we hope to do is to identify the processes that are typically used and have proved to be effective against the contaminant in question. We certainly have in mind allowing utilities to use

other kinds of technologies as long as they met the MCL's.

3. Activated Carbon Adsorption Facility

a. Description of Scheme

VOC's such as TCE and SOC's can be removed from water by pumping the water through an activated carbon filter. Such a system is described in Appendix VI.

b. Cost of Activated Carbon Adsorption Facility

A cost estimate for the purchase and operation of an activated carbon adsorption facility as computed in the Phase I Final Report is also presented in Appendix VI. The estimated costs for activated carbon adsorption were as follows:

(1)	Capital Cost	$75,000.
(2)	Operation and Maintenance	
	(a) Year 1	$15,100.
	(b) Year 20	$15,100.

c. Advantages of Activated Carbon Adsorption

Treatment of the west well with activated carbon adsorption offers the following advantages:

(1) No additional pumping required.

(2) Specifically mentioned in the Safe Drinking Water Act for use with SOC's.

d. Disadvantages of Activated Carbon Adsorption

Treatment of the west well with activated carbon adsorption presents the following disadvantage:

(1) Spent carbon could possibly be classified as a hazardous waste. Disposal would then require the

formalities and expense of hazardous waste disposal. This is not likely, however, as the maximum concentration of TCE on the carbon would not exceed 0.5 mg/Kg after normal use for two years.

4. Life Cycle Costs

a. Costing Parameters

Discount rate parameters are presented in Appendix VII. Life cycle costs have been based on the following parameters.

(1) USN discount rate - 10 percent.

(2) Life cycle - 20 years.

(3) Well operation:

(a) Year 1 - 2,000 hours.

(b) Year 20 - 6,000 hours.

(4) Replacement of air stripping media every 2 years and exhausted at end of 20th year.

(5) Replacement of activated carbon every 2 years with cost of additional replacement at end of 20th year to provide payment for disposal.

b. Life Cycle Costs

A comparison of costs estimated at the time of the Phase I Final Report is presented in Table 4 for viable alternatives for direct purchase of treatment facilities for the west well. This comparison indicated that activated carbon adsorption with an average annual equivalent cost of $23,794 would save approximately 52 percent when compared to air stripping with an average

TABLE 4

Comparison of Estimated Life Cycle Costs
Treatment Alternatives for West Well
NAS Whiting Field, Milton, Florida

Cost	Air Stripping	Activated Carbon Adsorption
Total Capital Cost	$ 64,500	$ 75,000
O & M Cost - Year 1	$ 24,700	$ 15,100
O & M Cost - Year 20	$ 36,700	$ 15,100
Present Worth of Alternative	$307,000	$202,500
Average Annual Equivalent Cost	$ 36,072	$ 23,794

annual equivalent cost of $36,072.

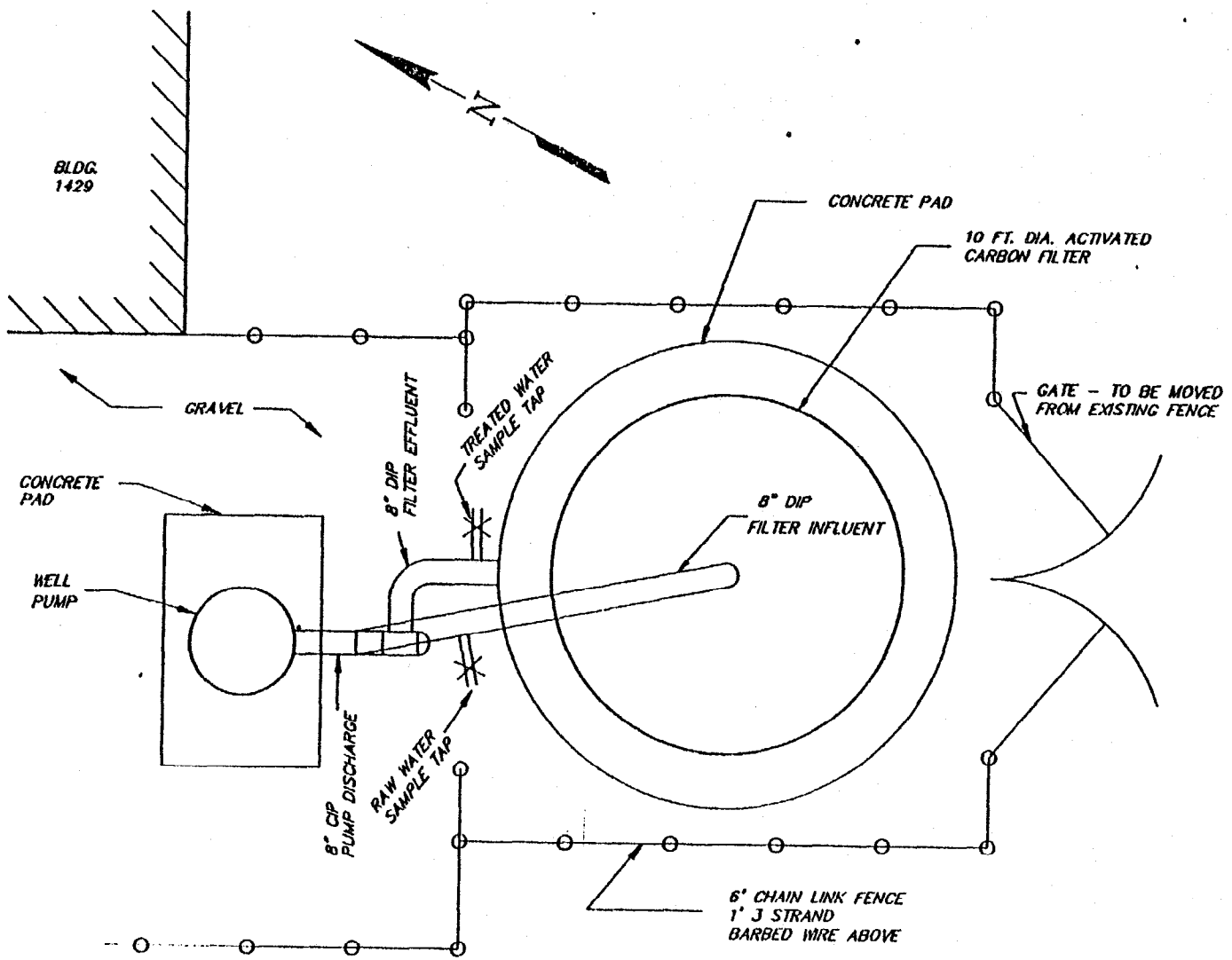
C. Initially Recommended Interim Solution

It was recommended in the Phase I Final Report that permission from the Florida Department of Environmental Regulation (DER) be sought to reactivate the west well on an interim basis as analyses of water from the west well in December, 1986 and January, 1987 had indicated that the TCE concentration in the west well had decreased to an acceptable level. The procedures to be followed in reactivating the west well on an interim basis are described in Appendix VIII. It was also recommended that, at the same time as the west well was being reactivated, provision of a permanent treatment facility for the west well should be expedited.

D. Permanent Treatment Solution for West Well

1. Recommended Plan

In accordance with findings of the Phase I Final Report and with the consensus of those present at the Phase I 100 Percent Review Meeting, it was recommended that provision of a permanent treatment facility for the west well should be expedited and, therefore, emergency funding be sought and that an activated carbon adsorption filter facility be provided for removal of TCE from water from the west well. The estimated capital cost for these facilities was $75,000 and annual operating and maintenance costs were estimated to average $15,100. Technical specifications for turn-key purchase and installation of these facilities are presented in Appendix IX. A tentative layout is shown in Figure C. Implementation of this permanent treatment plan for the west well was made imperative when the concentration of TCE increased to the



PROPOSED ACTIVATED
CARBON ABSORPTION SYSTEM
WEST WELL
NAS WHITING FIELD
MILTON, FLORIDA

FIGURE C

previously observed maximum concentration of 11 ug/L upon initiation of the pumping tests described in Appendix VIII. The plan was implemented with an advertisement with a bid date of 12 May 1987.

2. Installed Facilities

a. DER Permit for GAC System for West Well

The State of Florida Department of Environmental Regulation issued Permit Number WC57-137136, dated September 14, 1987, to NAS Whiting Field for the construction of a granular activated carbon absorption [adsorption] system for the west well. This Permit, reproduced in Appendix X, lists a number of procedural requirements and three specific physical requirements which mandated the following additions to the facilities:

(1) Drain line to the storm drain.

(2) Sample taps at three depths within the filter in addition to the influent and effluent taps previously specified.

(3) Warning sign near the access manway.

b. Revised Cost Analysis

The as-built cost of the granular activated carbon adsorption facilities of $93,280 and the current power cost of $0.055 per KWH have been used to revise the Life Cycle Costs. This comparison, computed in Appendix XI and presented in Table 5, indicates that activated carbon adsorption with an average annual equivalent cost of $25,909 will save approximately 40 percent when compared

TABLE 5

Comparison of As-Built Life Cycle Costs
Treatment Alternatives for West Well
NAS Whiting Field, Milton, Florida

Cost	Air Stripping	Activated Carbon Adsorption
Total Capital Cost	$ 64,500	$ 93,280
O & M Cost - Year 1	$ 25,100	$ 15,100
O & M Cost - Year 20	$ 37,800	$ 15,100
Present Worth of Alternative	$309,000	$220,500
Average Annual Equivalent Cost	$ 36,307	$ 25,909

to air stripping with an average annual equivalent cost of $36,307.

IV. PHASE II EVALUATIONS OF ACTIVE WELLS AND GROUNDWATER

A. Chemical Treatment for West Well

1. Implementation of Plan

As was noted in Section III.D., the permanent solution for reclaiming the west well was expedited as it proved to be significantly more cost effective and almost as timely to implement as any of the temporary alternatives considered. The recommended plan was implemented as follows:

a. The Phase I Final Report, Phase I - Interim Solution, which included specifications for the recommended plan for the west well, was submitted to Southern Division, Naval Facilities Engineering Command on 30 March 1987.

b. A contract for a granular activated carbon adsorption system was then advertised with a bid date of 12 May 1987.

c. The contract was awarded to Calgon Carbon Corporation on 1 June 1987.

d. Authorization for construction of the facilities was received from DER on 14 September 1987 (Appendix X).

e. Performance testing of the treatment facilities began on 3 November 1987.

f. The west well was returned to full service on 1 December 1987.

2. Performance of Treatment Facilities for West Well

a. Monitoring of Performance

The DER Permit for the granular activated carbon adsorption facilities for the west well required that sample taps be provided at 45 percent, 56 percent and 67 percent of the depth of the carbon bed as well as the influent and effluent sample taps required in the specifications. As the inside of the filter had already been finished to specifications, the required sample ports were inserted through an access in the top of the filter instead of through new holes in the side.

b. Performance Testing

Results of the performance tests required by DER are presented in Appendix XII and summarized in Table 6. The analyses always indicated TCE present at the 45 percent depth and part of the time at the 56 percent depth in the activated carbon filter bed. This presence of TCE apparently is the result of untreated water flowing down the surfaces of the sample pipes on the inside of the bundle of sample pipes without significantly contacting activated carbon. Further evidence of this explanation for the apparent lack of treatment at the 45 percent depth is that no TCE has ever been observed at the 65 percent depth through a sample line that is in direct contact with the activated carbon around its entire circumference.

c. Projected Life of Granular Activated Carbon

Calgon Carbon Corporation conducted an accelerated

Table 6

Activated Carbon Filter Performance
At West Well
NAS Whiting Field, Milton, Florida

Date	Influent TCE, ug/L	45% Depth TCE, ug/L	56% Depth TCE, ug/L	67% Depth TCE, ug/L	Effluent TCE, ug/L
11/3/87	3.5	2	-	-	BDL*
11/6/87	-	7	-	-	BDL
11/8/87	-	5	-	-	BDL
11/16/87	5	3	-	-	BDL
11/18/87	16	7	2	BDL	BDL
11/19/87	16	4	1	BDL	BDL
12/1/87	24	9	1	BDL	BDL
12/2/87	19	5	BDL	BDL	BDL
12/19/87	17	7	-	-	BDL

* BDL - Below Detection Limit

column test (ACT) to project the effective life of a bed of carbon treating water from the west well. This study, presented in Appendix XIII, substantiates the estimate used in the preliminary Life Cycle Costing that the carbon bed for the west well will require replacement at about two year intervals.

B. South Well

1. Preliminary Consideration for South Well

Preliminary analyses indicated that installation of an activated carbon adsorption system for water pumped from the south well would be as effective and almost as economical in removing benzene and TCE from this water as this type treatment will be for removing TCE from the west well. As all well discharge lines merge at Building 1929, it was originally proposed that this activated carbon adsorption system be located adjacent to the system for the west well at Building 1429 and that the piping between the two systems be interconnected. The Commanding Officer, NAS Whiting Field, has requested that, because of space constraints and the complexity of underground utilities adjacent to Building 1429 and because of the expense and complexity of interconnecting piping, the treatment system for the south well be located adjacent to the south well. Further consideration of treatment facilities for the south well will, therefore, be based on locating such facilities at the south well.

2. Cost Analysis for South Well

a. Performance Parameters

(1) Treatment Requirements

(a) Maximum anticipated TCE contaminant of raw water - 4 ug/L.

(b) Design capability for maximum TCE concentration of raw water - 10 ug/L.

(c) Required TCE maximum contaminant level (MCL) of treated water - 1 ug/L.

(d) Maximum anticipated Benzene concentration of raw water - 29 ug/L.

(e) Design capability for maximum Benzene concentration of raw water - 60 ug/L.

(f) Required benzene MCL of treated water - 0.5 ug/L.

(2) Hydraulic Capacity

(a) Nominal flow - 500 gallons per minute (gpm) or 0.720 million gallons per day (MGD).

(b) Maximum head loss through treatment facilities and connecting piping at 500 gpm - 23 feet.

(3) Discharge Conditions

(a) Static head - 125 feet.

(b) Pressure of discharge from treatment facilities - 52 to 55 psi.

b Cost of Air Stripping Facilities for the South Well

A cost estimate for the purchase and operation of an air stripping facility for the south well is presented in Appendix XIV. The estimated costs for air stripping facilities are as follows:

(1) Capital cost $61,500.

(2) Operation and Maintenance

(a) Year 1 $26,100.

(b) Year 20 $37,000.

c. Cost of Activated Carbon Adsorption Facility

A cost estimate for the purchase and operation of an activated carbon adsorption facility for the south well is also presented in Appendix XIV. Calgon Carbon Corporation, in a letter included in Appendix IV, indicated that the activated carbon bed for the south well would require replacement after 300 days of use. As the south well would not be used continuously, it is anticipated that carbon replacement would be an annual requirement. The estimated costs for activated carbon adsorption are as follows:

(1) Capital Costs $95,000.

(b) Operation and Maintenance

(a) Year 1 $24,500.

(b) Year 20 $24,500.

d. Life Cycle Costs

A comparison of estimated costs for viable alternatives for direct purchase of treatment facilities for the south well is presented in Table 7. This comparison indicates that activated carbon adsorption with an average annual equivalent cost of $35,509 would save approximately 9 percent when compared to air stripping with an average annual equivalent cost of $38,813.

TABLE 7

Comparison of Estimated Life Cycle Costs
Treatment Alternatives for South Well
NAS Whiting Field, Milton, Florida

Cost	Air Stripping	Activated Carbon Adsorption
Total Capital Cost	$ 61,500	$ 95,000
O & M Cost - Year 1	$ 26,100	$ 24,500
O & M Cost - Year 20	$ 37,000	$ 24,500
Present Worth of Alternative	$313,300	$302,200
Average Annual Equivalent Cost	$ 38,813	$ 35,509

C. North Well

As shown in Table 2, no volatile organic compounds (VOC's) have been found in water from the north well and the synthetic organic chemicals (SOC's) which have been identified have not approached maximum contaminant levels (MCL's) established by the Safe Drinking Water Act. It is, therefore, recommended that no treatment be provided for water from the north well at this time. Should the concentrations of SOC's increase or VOC's be identified in this water at some future date, an activated carbon adsorption filter could then be installed at the north well.

D. Extent of Organic Contamination

1. Report by Geraghty and Miller, Inc.

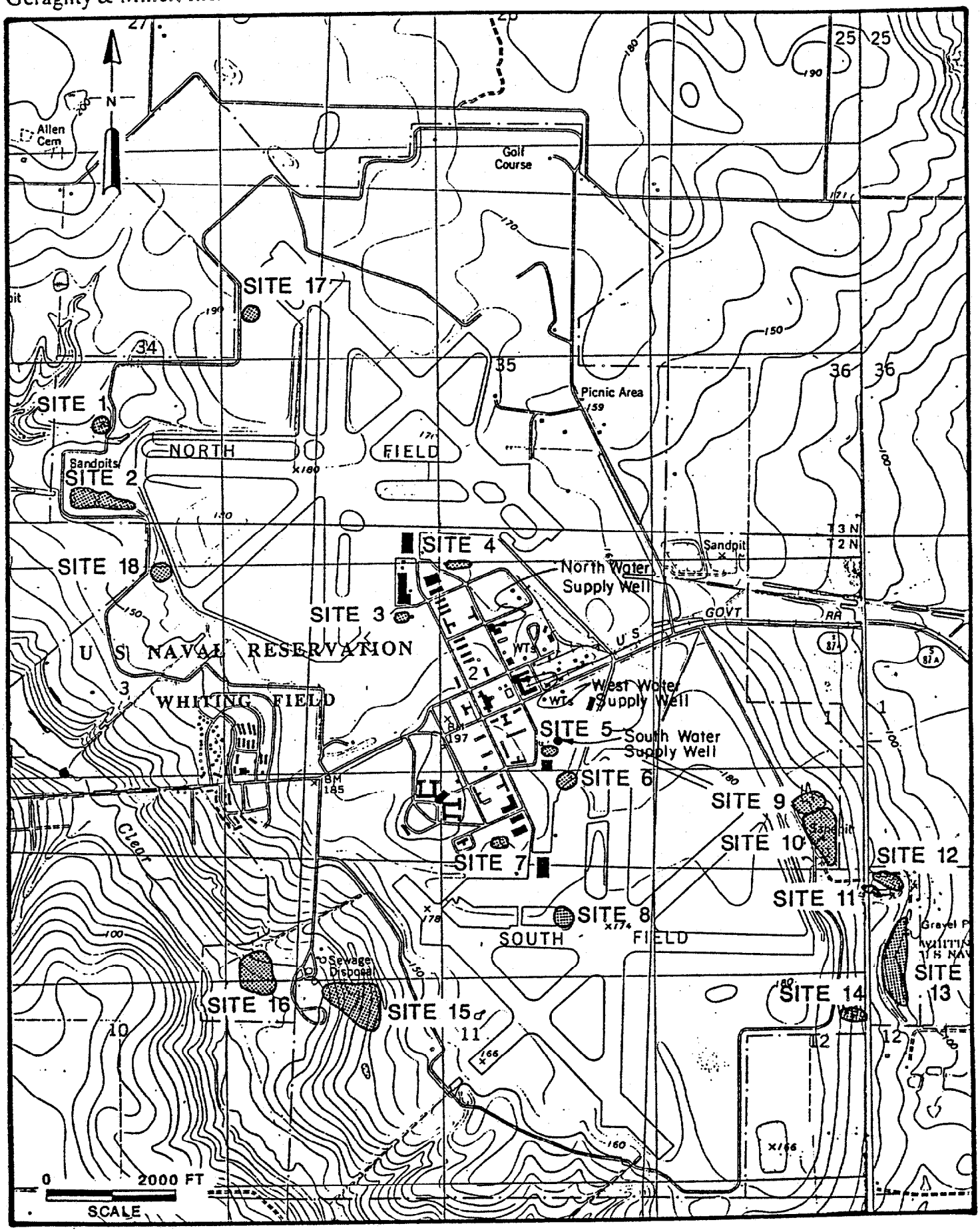
The study by Geraghty and Miller, Inc., referenced in Section I.E.4.a to this Report, evaluated present and potential groundwater contamination problems at and adjacent to NAS Whiting Field. Sites investigated are indicated in Figure D. The quality of water at these sites is presented in Table 8. Movement of groundwater at NAS Whiting Field is generally southward except where draw down from actively pumping wells influences groundwater movement. The only identified sites of groundwater contamination which appear to be likely sources of present or future contamination of the NAS Water supply wells are:

a. Site 3 - Underground Waste Solvent Storage Areas.

It is possible that hydrocarbons could migrate from this site to the north well and possibly to the west well.

b. Site 4 - North AVGAS Tank Sludge Disposal Area.

It is possible that hydrocarbons could migrate from



Locations of Sites Investigated at NAS Whiting Field.

FIGURE D

TABLE 8

Quality of Groundwater
At Sites Investigated by Geraghty and Miller
NAS Whiting Field, Milton, Florida

Site	Area Description	Groundwater Contamination
1	Northwest Refuse Disposal	Trace (Tr) lead
2	Not Defined or Analyzed	
3	Underground Waste Solvent Storage	Tr arsenic, Tr lead, 13 ug/L 1,1,1-trichloroethane, 111 ug/L 1,1,2-trichloroethane, 18 ug/L TCE
4	North AVGAS Tank Sludge Disposal	17 ug/L benzene, 10 ug/L toluene, Tr lead
5	Not Defined or Analyzed	
6	South Transfer Oil Disposal	None Detected (ND)
7	South AVGAS Tank Sludge Disposal	8,800/c ug/L benzene, 43,800 ug/L toluene, 23,560 ug/L EDB, 0.86 mg/l lead
8	AVGAS Fuel Spill	2 ug/L benzene, 26 ug/L toluene, Tr EDB, Tr lead
9	Waste Fuel Disposal Pit	Tr lead
10	Southeast Open Disposal (A)	Tr lead, Tr zinc, Tr silver
11	Southeast Open Disposal (B)	Tr lead, Tr mercury, 23 ug/l bis-(2-ethylhexyl) phthalate
12	Tetraethyl Lead Disposal	Tr lead
13	Sanitary Landfill	Tr lead, Tr mercury, Tr zinc, 0.06 mg/L nickel
14	Short-Term Sanitary Landfill	Tr lead, Tr zinc
15	Southwest Landfill	Tr lead, Tr zinc, 118 ug/L bis-(2-ethylhexyl) phthalate
16	Open Disposal and Burning	Tr lead, Tr zinc, 36 ug/L bis-(2-ethylhexyl) phthalate

this site to the north well and possibly to the west well.

c. Site 7 - South AVGAS Tank Sludge Disposal Area.

It is quite possible that hydrocarbons are migrating from this site to the south well and possibly to the west well.

d. Site 8 - AVGAS Field Spill Areas.

It is possible that hydrocarbons could migrate from this site to the south well and possibly to the west well.

2. Study by Santa Rosa County Health Department

The Santa Rosa County Health Department sampled all known wells in the vicinity of NAS Whiting Field to ascertain whether or not the contamination discovered in the water supply wells at NAS had migrated to other wells in the vicinity or had migrated to NAS from some unidentified off-site source. One well north or up gradient from NAS and ten wells generally south or down gradient from NAS, Figure E, were sampled on October 8, 1986. Analyses of samples from these wells identified a trace of bromoform in Milton Well Number 4 and no other organic contaminates at any of these wells.

3. Projection of Organic Contamination

a. Water Supply Wells at NAS

From information presented in the Geraghty and Miller study and from analyses of water from the three producing water supply wells at NAS, it is likely that organic contamination at the south well and the west well will persist at about the present levels. Water from these wells can be adequately treated by granular activated

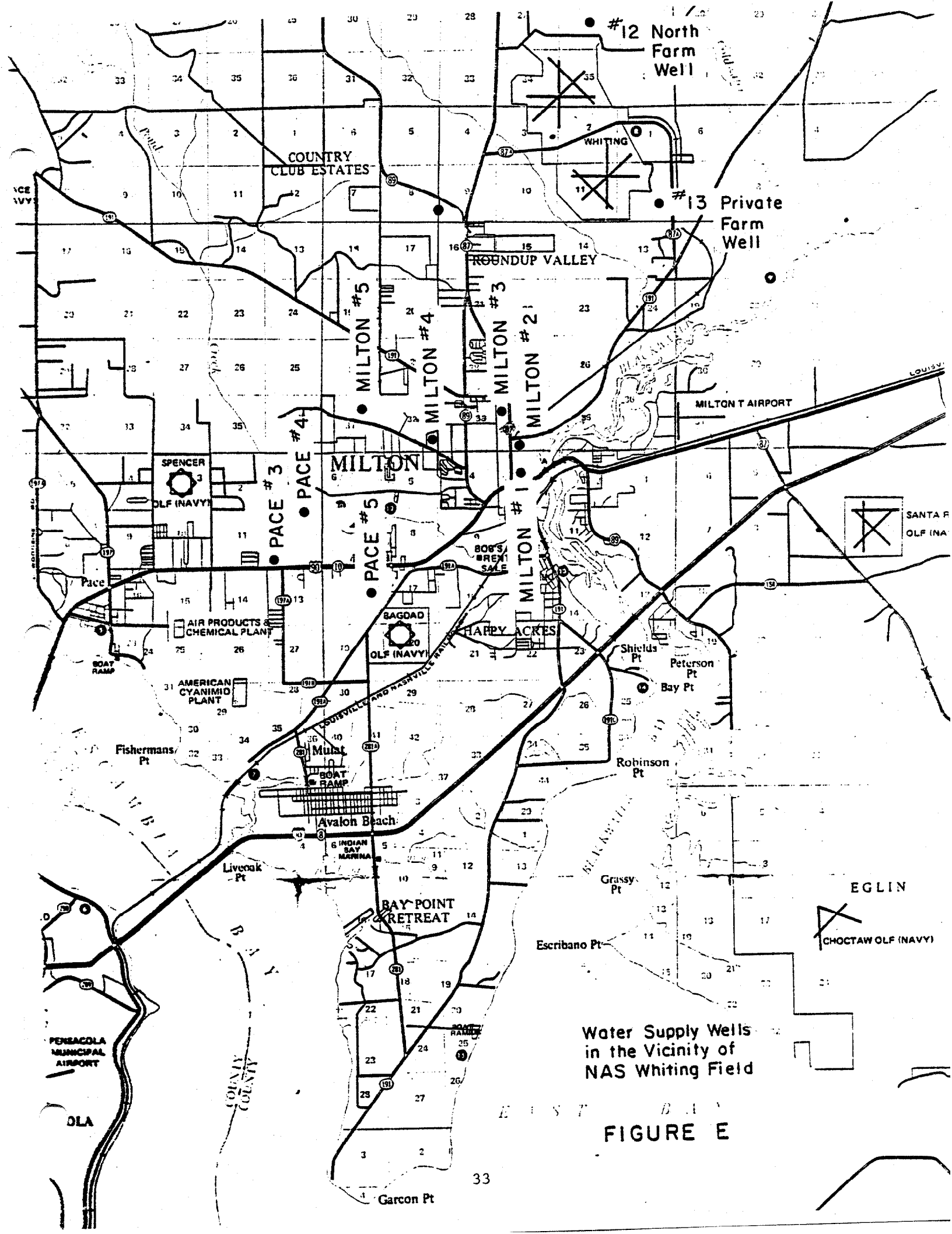

#12 North Farm Well
#13 Private Farm Well
COUNTRY CLUB ESTATES
WHITING
ROUNDUP VALLEY
MILTON #5
MILTON #4
MILTON #3
MILTON #2
MILTON #1
PACE #4
PACE #3
PACE #5
MILTON
MILTON T AIRPORT
SPENCER
OLF (NAVY)
Pace
AIR PRODUCTS & CHEMICAL PLANT
BOAT RAMP
AMERICAN CYANIMID PLANT
BAGDAD
OLF (NAVY)
HAPPY ACRES
Shields Pt
Peterson Pt
Bay Pt
Fishermans Pt
Mulat
BOAT RAMP
Avalon Beach
INDIAN BAY MARINA
Robinson Pt
Liveoak Pt
BAY POINT RETREAT
Grassy Pt
Escribano Pt
EGLIN
CHOCTAW OLF (NAVY)
PENSACOLA MUNICIPAL AIRPORT
Garcon Pt
Water Supply Wells in the Vicinity of NAS Whiting Field

FIGURE E

carbon adsorption filters. It is possible that organic contamination at the north well will eventually increase to where treatment would be required. Installation, at that time, of a granular activated carbon filter at the north well would provide adequate treatment.

b. Wells in the Vicinity of NAS Whiting Field

If no more toxic organic wastes are introduced to the soil and groundwater on or in the vicinity of NAS Whiting Field, movement and resulting dilution of organic contaminants from or to NAS should result in no new well contamination problems.

4. Quality of Available Groundwater

There are basically three water-bearing strata at NAS. They are:

a. Surficial Sand and Gravel Aquifer

It is the uppermost water-bearing formation in Santa Rosa County and is the source of water for NAS Whiting Field. It extends to a depth of about 350 feet below the surface. In some areas such as at the old north well, the lower part of this aquifer contains a significant concentration of iron making it unsuitable for use without treatment for iron removal.

b. Upper Floridan Aquifer

The upper Floridan lies about 700 to 900 feet below the surface and is an important source of water in eastern Santa Rosa County but in the western part of the County including NAS the water is generally too brackish for use.

c. Lower Floridan Aquifer

The lower Floridan lies about 1,000 to 2,000 feet below the surface and is highly mineralized and is of no use as a water supply.

d. Alternate Water Supplies

From the above, alternate water supply sources have been evaluated indicating that:

(1) Moderate increases in well depths of existing wells would likely produce water high in iron necessitating iron removal facilities.

(2) Further increases in well depths would yield brackish or saline water unfit for use.

(3) Potentially satisfactory new well sites are at such a distance from the point of origin of the distribution system, Building 1429, that new well field development would not be cost effective as an alternative to activated carbon treatment of water from the present wells.

E. Water Supply Alternatives for the Golf Course

Irrigation water for the golf course and potable water for the club house and water fountains on the golf course are currently being supplied through a booster pump from the NAS potable water supply system. As this arrangement uses treated potable water for irrigation, two alternatives for separating irrigation water from potable water have been evaluated.

1. Assumptions Used in Previous Draft Evaluation

These evaluations have been based on the following assumptions:

a. Irrigation Water - 4 MG per month, 4 months per year.

b. Irrigation Water Applied - 4 hours per day, 5 days per week.

c. Irrigation Water Used - 16 MG per year at 780 gpm.

d. Potable Water Rate

(1) 8 commodes at 5 gpm - 40 gpm

(2) 6 water fountains at 1 gpm - 6 gpm

(3) Total peak demand - 46 gpm - Use 50 gpm.

e. Potable Water Usage

(1) 2 gpm.

(2) 12 hours per day.

(3) 40 weeks per year..

(4) Total consumption - 57,600 gal per year.

f. Cost of Potable Water

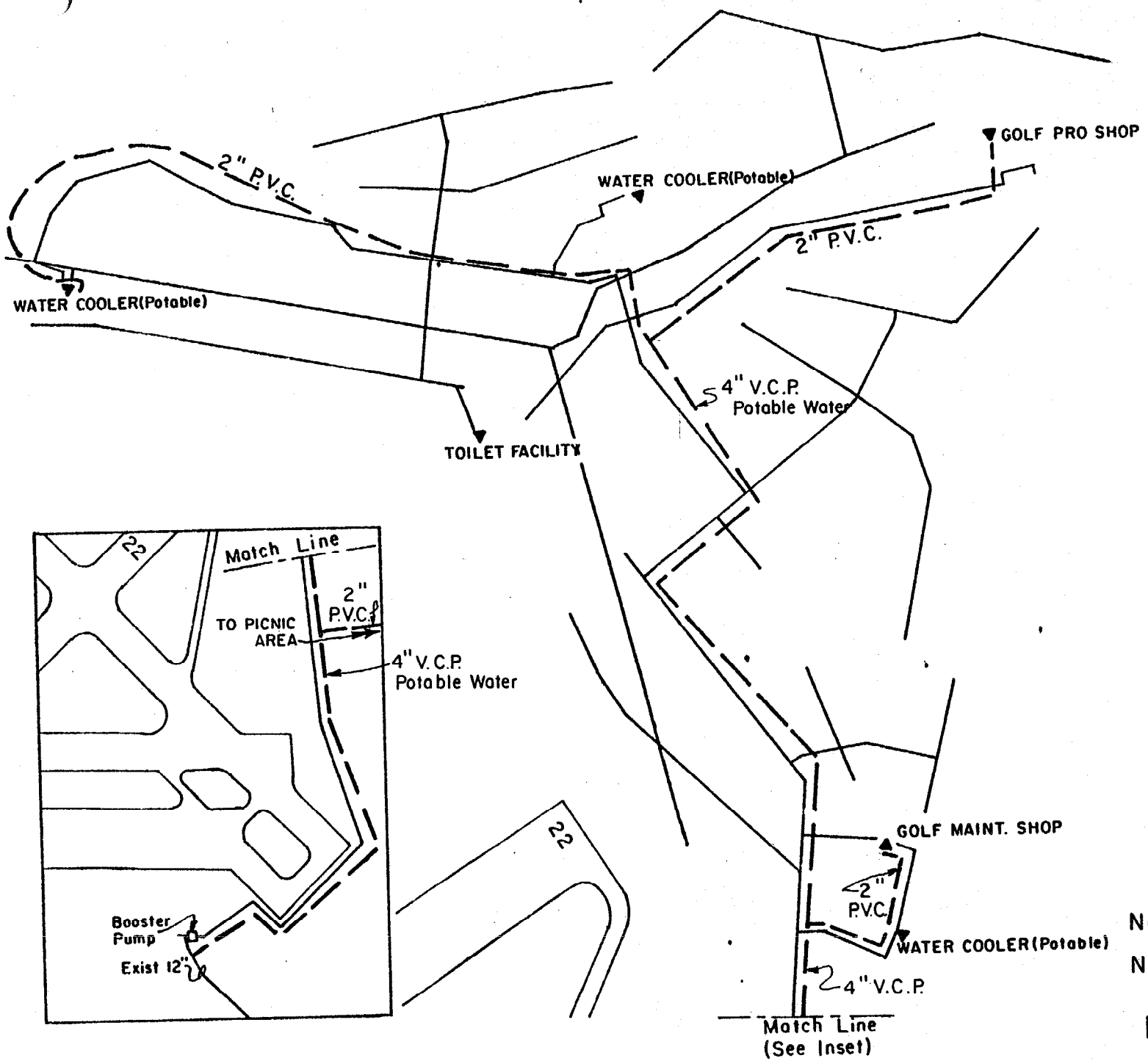
(1) Present total cost of potable water - $0.86 per 1,000 gal.

(2) Additional cost for carbon adsorption - $0.25 per 1,000 gal.

(3) Total cost of potable water - $1.11 per 1,000 gal.

2. <u>New Potable Water Line to Club House</u>

This system, shown in Figure F, would parallel existing lines from the site of the old north well and booster pump station to the club house with a 4-inch PVC line to minimize friction and to make service to a fire hydrant at the club house possible. All other lines to points of potable water



New Potable Water Line
to Club House
NAS Whiting Field
Milton, Florida.

FIGURE F

use would be 2-inch PVC. This alternative would require an estimated capital cost of $241,000 and an annual operation and maintenance cost of $3,530 as calculated in Appendix XV.

3. New Potable Water Well at Club House

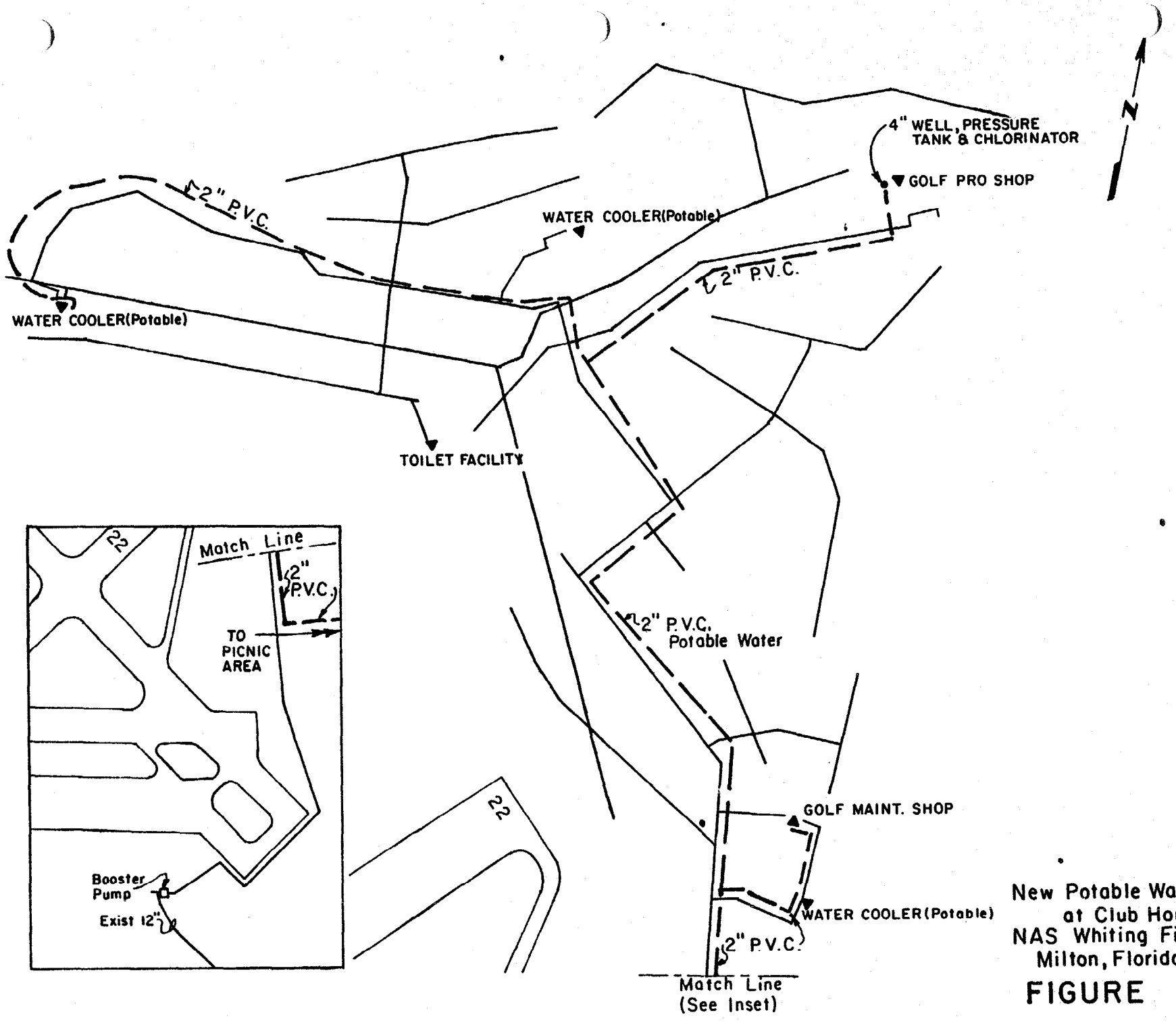
This system, shown in Figure G, would require a 4-inch well with a capacity of 50 gpm to be drilled at the club house. All outlying points of potable water use would be served with 2-inch PVC pipe. This alternative would require an estimated capital cost of $200,800 and an annual operation and maintenance cost of $7,700 as calculated in Appendix XV. It should be noted that this alternative would offer no fire protection for the club house.

4. Existing System for Golf Course

This system requires use of the booster pump shown in Figures F and G and chemical treatment of all irrigation water. This alternative would require installation of back-flow prevention equipment for potable water uses as would the other alternatives to supply potable water to the golf course. These costs have been evaluated in a separate report entitled "Final Report, Contract N62467-86-D-0222, Potable Water Distribution System Evaluation, Naval Air Station, Whiting Field, Milton, Florida." This alternative would require no other new capital but would incur a continuing annual operation and maintenance cost of $20,500 as calculated in Appendix XV.

5. Assumptions Used in this Report

An increased demand for irrigation water has necessitiated a reevaluation of the alternatives for supplying the golf



New Potable Water Well
at Club House
NAS Whiting Field
Milton, Florida.

FIGURE G

course. These evaluations have been based on the following assumptions:

a. Irrigation Water - 7.1 MG per month, 7.5 months per year.

b. Irrigation Water Applied - 8 hours per day, 5 days per week.

c. Irrigation Water Used - 53 MG per year at 780 gpm.

d. Potable Water Rate

(1) 8 commodes at 5 gpm - 40 gpm

(2) 6 water fountains at 1 gpm - 6 gpm

(3) Total peak demand - 46 gpm - Use 50 gpm

e. Potable Water Usage

(1) 2 gpm

(2) 12 hours per day.

(3) 40 weeks per year.

(4) Total consumption - 57,600 gal per year

f. Cost of Potable Water

(1) Present total cost of potable water - $0.86 per 1,000 gal.

(2) Additional cost for carbon adsorption - $0.25 per 1,000 gal.

(3) Total cost of potable water - $1.11 per 1,000 gal.

6. <u>New Potable Water Line to Club House with Increased Demand</u>

This system, shown in Figure F, would parallel existing lines from the site of the old north well and booster pump station to the club house with a 4-inch PVC line to minimize friction and to make service to a fire hydrant at the club house possible. All other lines to points of potable water use would be 2-inch PVC. This alternative would require an estimated capital cost of $241,000 and an annual operation and

maintenance cost of $6,470 as calculated in Appendix XV.

7. New Potable Water Well at Club House with Increased Demand

This system, shown in Figure G, would require a 4-inch well with a capacity of 50 gpm to be drilled at the club house. All outlying points of potable water use would be served with 2-inch PVC pipe. This alternative would require an estimated capital cost of $200,800 and an annual operation and maintenance cost of $11,339 as calculated in Appendix XV. It should be noted that this alternative would offer no fire protection for the club house.

8. Existing System for Golf Course with Increased Demand

This system requires contained use of the booster pump shown in Figures F and G and chemical treatment of all irrigation water. This alternative would require no new capital and a continuing annual operation and maintenance cost of $62,582 as calculated in Appendix XV.

9. Cost Effective Analysis

A comparison of estimated costs for separating irrigation water from potable water serving the golf course is presented in Table 9. Separating irrigation water from potable water serving the golf course would significantly reduce the O & M cost of treating irrigation water. The cost of reactivating the old north well and providing a separate potable water system for the golf course would make the annual equivalent cost of separating the systems, $30,870 per year, approximately 51 percent more expensive than the estimated annual cost of the existing system of $20,500 for an irriga-

TABLE 9

Life Cycle Cost for Alternatives to Serve Golf Course
NAS Whiting Field, Milton, Florida

Cost	New Potable Water Lines	New Potable Water Wells	Present System
	16 Million Gallons per Year Irrigation Water		
Total Capital Cost	$ 241,000	$ 200,800	-
O & M Cost - Year 1	$ 3,500	$ 7,700	$ 20,490
O & M Cost - Year 20	$ 3,500	$ 7,700	$ 20,490
Present Worth of Alternative	$ 265,500	$ 262,750	$ 174,440
Average Annual Equivalent Cost	$ 31,200	$ 30,870	$ 20,500
	53 Million Gallons Per Year Irrigation Water		
Total Capital Cost	$ 241,000	$ 200,800	$ -------
O & M Cost - Year 1	$ 6,470	$ 11,340	$ 62,560
O & M Cost - Year 20	$ 6,470	$ 11,340	$ 62,560
Present Worth of Alternative	$ 290,600	$293,200	$ 532,610
Average Annual Equivalent Cost	$ 34,145	$ 34,510	$ 62,582

tion demand of 16 million gallons per year but the annual equivalent cost of separating the systems, $34,145, would be approximatedly 83 percent more cost effective than the estimated annual cost of the existing system of $62,582 if the irrigation demand remains at 53 million gallons per year.

10. Potential for Organic Contamination

The groundwater contamination at Site 4 - North AVGAS Tank Sludge Disposal Area, discussed in Section IV. D.I. a. above, has been identified in an observation well approximately 100 feet from the old north well being evaluated for use as irrigation water. Extended pumping of this well could quite possibly draw sufficient benzene, toluene and lead into this well to make the water unsuitable for use as irrigation water.

V. RECOMMENDATIONS

A. Treatment for West Well

1. Implemented Plan

Installing a granular activated carbon adsorption system, the permanent solution for reclaiming the west well, has been expedited and implemented as it proved to be more cost effective and almost as timely to implement as any of the temporary alternatives considered. The west well has been returned to full service as of 1 December 1987.

2. Cost of Treatment for West Well

The as-built cost of granular activated carbon adsorption facilities for the west well was $93,280. Average annual operating and maintenance costs are projected to be $15,100.

3. Operational Requirements

Several permitting and operating conditions for the west well, as contained in the Construction Permit issued by the Florida Department of Environmental Regulation (DER), are presented in Appendix V. Specific continuing operating requirements included in the Permit are as follows:

a. 18. For initial filter startup, analysis and thereafter, when filter media is changed, the well shall pump thru the filter to the storm sewer for two (2) hours prior to taking samples.

b. 19. A request to clear the system for the initial operation startup shall be submitted to the Department for approval within thirty (30) days of completion of construction, testing and disinfection.

This approval will be granted upon:

a. Receipt of certification by a registered professional engineer as to construction in accordance with the approved plans and specifications and compliance with Section 17-22.106, Florida Administrative Code; and

b. Receipt of two (2) TCE analysis sets from the filter made at 4 hour intervals (with treated water product still flushed to waste) with resulting treated water product TCE level [is] equal to or less than 1.8 ug/l.

c. 20. Conditions 18 and 19 shall be repeated for the filter body before putting the filter into service and after each change of GAC materials or if the test results from Specific Condition 19.b exceed 1.8 ug/l. Under no circumstances will treated water that exceeds 2.8 ug/l be introduced into the potable water distribution system.

d. 21. Permittee shall sample influent and effluent from the filter for TCE. Five sample taps are to be provided on each filter. These are to be installed at 0.45 [45], 56, 67, and 100% of the carbon bed depth. (Influent to filter is at the top and corresponds to 0% level of bed depth).

(a) During Initial Start-Up and Test Period

Day 1. Influent and plant effluent between two and four hours after flow established.

Day 2. Common influent and 45% tap and 100% tap on the filter.

•Day 4. 100% tap on the filter.

Day 6. 45% and 100% taps on the filter.

Day 9. 100% tap on the filter.

Day 12. 100% tap on the filter.

Day 14. Common influent and 45% and 100% taps on the filter.

(b) <u>During Routine Operation</u>

Every 2 weeks - influent and effluent.

Every 4 weeks - 45% tap on the filter.

This schedule is based on previously reported VOC's in the influent and is subject to adjustment based on results reported. The four-week sampling on the filter shall be moved to the next lower tap when break-through is detected.

Bacteriological analyses shall be taken concurrently with the above sampling.

The effluent (product) TCE data results shall be plotted or mathematically analyzed to statistically predict when the carbon should be removed and replaced based on gallons of water treated or calendar days of usage. As soon as the common effluent (product) water TCE level reaches a value of 1.8 ppb the routine sampling shall be increased to one per week. The Department shall be notified and consulted in order to review and approve the final stage sampling and test program.

Sampling and testing shall be in accordance with EPA Methods 601, 602 and 6234. Testing shall be performed at a laboratory certified by the Department of Health and Rehabilitative Services to perform drinking water analysis.

e. 22. Upon receipt of effluent samples with TCE levels greater than or equal to 2.8 ug/l, the filter shall be taken out of service.

f. Implied in the Permit is that, upon taking the filter out of service in response to conditions as described in Item 22 of the DER operating requirements, the filter is to be recharged with granular activated carbon under procedures described in Items 18, 19, 20 and 21 of the operating requirements.

B. Treatment for South Well

1. Recommended Implementation Plan

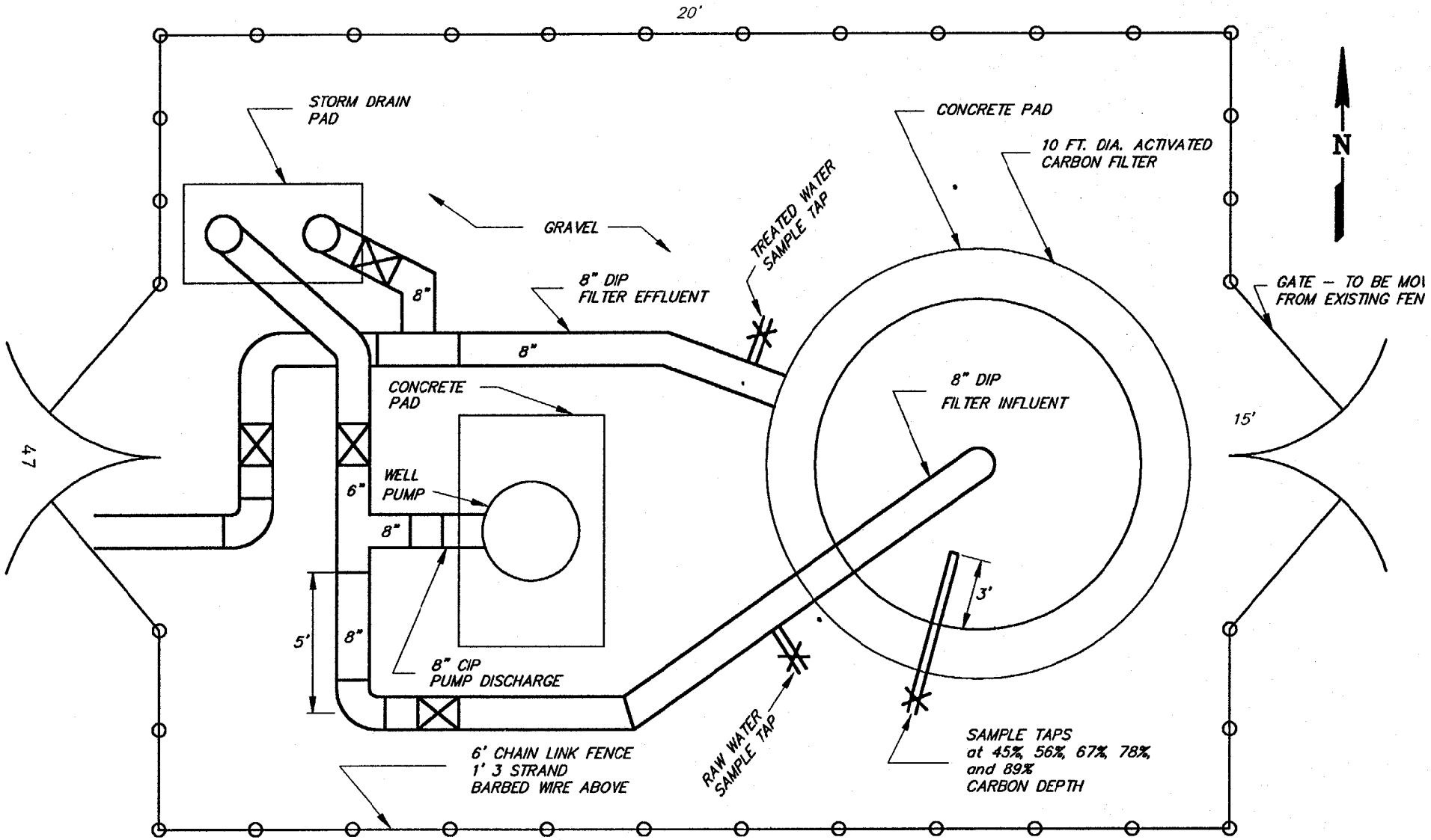
Preliminary analyses indicated that installation of an activated carbon adsorption system for water pumped from the south well would be as effective and almost as economical in removing benzene and TCE from this water as this type treatment will be for removing TCE from the west well. It is therefore recommended that a granular activated carbon adsorption system be installed adjacent to the south well as shown in Figure H.

2. Procurement of Treatment for South Well

The estimated cost of granular activated carbon adsorption facilities for the south well is $95,000. Average annual operating and maintenance costs are projected to be $24,500. Special Project Request forms for these facilities are presented in Appendix XVI and technical specifications for turnkey purchase and installation of these facilities are presented in Appendix XVII.

C. North Well

No volatile organic compounds (VOC's) have been found in water from the north well and the synthetic organic chemicals (SOC's) which have been identified have not approached maximum contaminant levels (MCL's) established by the Safe Drinking Water Act. It is, therefore, recommended that no treatment be provided for water from the north well at this time. Should the concentrations of SOC's increase or VOC's be identified in this water at some future date, an activated carbon adsorption filter could then be installed at the north well.



Not to Scale

PROPOSED ACTIVATED CARBON ABSORPTION SYSTEM

SOUTH WELL

NAS WHITING FIELD
MILTON, FLORIDA

FIGURE H

01.05.89
WHIT-H

D. Additional Well Supplies

1. Potential for Additional Contamination

From information presented in the Geraghty and Miller study and from analyses of water from the three producing water supply wells at NAS, it is likely that organic contamination at the south well and the west well will persist at about the present levels. Water from these wells can be adequately treated by granular activated carbon adsorption filters. It is possible that organic contamination at the north well will eventually increase to where treatment would be required. Installation at that time of a granular activated carbon filter at the north well would provide adequate treatment. If no more toxic organic wastes are introduced to the soil and groundwater on or in the vicinity of NAS Whiting Field, movement and resulting dilution of organic contaminants from or to NAS should result in no new well contamination problems.

2. Additional Sources of Water

There are basically three water-bearing strata at NAS. The uppermost water-bearing formation in Santa Rosa County is the source of water for NAS Whiting Field. It extends to a depth of about 350 feet below the surface. In some areas such as at the old north well, the lower part of this aquifer contains a significant concentration of iron making it unsuitable for use without treatment for iron removal.

Potentially satisfactory new well sites are at such a distance from the point of origin of the distribution system

that new well field development would not be cost effective as an alternative to activated carbon treatment of water from the present wells. Such sites, especially to the north and north east of the present north well, could be developed should the need for additional water arise.

E. Water Supply Alternatives for the Golf Course

Irrigation water for the golf course and potable water for the club house and water fountains on the golf course are currently being supplied through a booster pump from the NAS potable water supply system. As this arrangement uses treated potable water for irrigation, two alternatives for separating irrigation water from potable water have been evaluated. Separating irrigation water from potable water serving the golf course would be significantly more cost effective than continued use of potable water for irrigation at an annual usage of 53 million gallons but would be significantly less cost effective at the earlier identified lower annual irrigation water usage of 16 million gallons. Until a more firm irrigation water demand can be ascertained and until the problem with groundwater contamination in the area of the old north well can be resolved, the only viable alternative is the continued use of potable water for irrigation of the golf course.

APPENDIX I

Plan of Work

Hendon Engineering Associates
INCORPORATED
TELEPHONE (205) 823-7480
ADDRESS REPLY TO P. O. BOX 20348
SOUTHCREST BUILDING, VESTAVIA HILLS · BIRMINGHAM, ALABAMA 35216

• HARRY H. HENDON
(1904-1973)
P. L. BENTLEY
H. D. HUBER
M. G. BUCKLEY, JR.
R. F. HOLBROOK

R. P. BINNINGS
J. O. BREWER
W. H. DUKE
H. S. KAHLON
G. S. RAJAN
G. H. RHODES
L. R. ROBINSON, JR.
W. C. TALLON
D. F. WARNAT
A. E. WILLARD, JR.

January 20, 1987

Commanding Officer
Southern Division
Naval Facilities Engineering Command
Attention: 5090, Code 1141
2155 Eagle Drive
P. O. Box 10068
Charleston, South Carolina 29411

Subject: Contract N62467-86-D-0222, Open-End Contract for Engineering Services to Conduct Utility Technical Studies (UTS) at Various Activities in the Southern Division, Naval Facilities Engineering Command Geographical Region; Amendment #2, NAS Whiting Field, Milton, Florida, Treatment of Water Supply Wells.

Dear Sir:

Enclosed herewith are two (2) copies of the Plan of Work for the subject project. Phase I is well under way and project completion will be expedited.

Very truly yours,

HENDON ENGINEERING ASSOCIATES, INC.

By Lloyd R. Robinson Jr.
Lloyd R. Robinson, Jr., Ph.D., P.E.

LRR:b
Enclosures (2)
WK27/X1

cc: CDR. R. A. Kechter, w/enclosures
Public Works Officer
Building 1418
Public Works Center
Naval Air Station
Whiting Field
Milton, Florida 32570

January 20, 1987

cc: Mr. Ludwig H. Opager, w/enclosures
Public Works Planning Supervisor
Building 1418
Public Works Center
Naval Air Station
Whiting Field
Milton, Florida 32570

Mr. Danny Locklear, w/enclosures
Building 1418
Public Works Center
Naval Air Station
Whiting Field
Milton, Florida 32570

Mr. Mike Goldston
Southern Division
Naval Facilities Engineering Command
Attention: 5090, Code 1141
P. O. Box 10068
Charleston, South Carolina 29411

Plan of Work
Treatment of Water Supply Wells
NAS Whiting Field, Milton, Florida
Contract N62467-86-D-0222
Amendment # 2
January, 1987

Phase I

1/5/87 to 1/9/87	Initial meeting at NAS Whiting Field Assemble basic data (Maps, Flow Requirements, Chemical Analyses, etc.)
1/12/87 to 1/23/87	Assimilition of cost data estimates for interim solution alternatives.
1/26/87 to 1/30/87	Preparation of draft service contract, draft cost estimates, recommendations and 100% Report.
2/2/87 to 2/15/87	Discussion of 100% Report
2/15/87 to 3/15/87	Review of 100% Report
3/16/87 to 3/30/87	Preparation of Final Report

Phase II

1/5/87 to 1/9/87	Initial meeting at NAS Whiting Field Assemble basic data (Maps, Flow Requirements, Chemical Analyses, etc.)
1/12/87 to 2/27/87	Evaluation of treatment alternatives and alternate water sources
3/2/87 to 3/20/87	Preparation of 35% Report
3/23/87 to 4/17/87	Review of 35% Report
3/23/87 to 4/17/87	Identification and evaluation of air emission requirements and water quality requirements.
4/20/87 to 6/1/87	Final evaluation of alternatives, preparation of cost estimates, recommendations and 100% Report
6/1/87 to 7/2/87	Review of 100% Report
7/2/87 to 7/17/87	Preparation of Final Report

WK27/T1

Project Schedule and Work Plan
Treatment of Water Supply Wells
NAS Whiting Field, Milton, Florida
Contract N63467-86-D-0222
Amendment # 2

Task	Jan 87				Feb 87				Mar 87					Apr 87				May 87				June 87				July 87		
	5	12	19	26	2	9	16	23	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15	22	29	6	13	17
Phase I																													
Initial Meeting	X																												
Assemble Basic Data	X																												
Assimilation of Cost Data		X	X	X	X	X	X	X																					
Preparation of 100% Report					X	X	X	X																					
Discussion of 100% Report									X	X	X	X	X	X															
Review of 100% Report												X	X	X	X	X	X	X	X										
Preparation of Final Report															X	X	X	X	X	X	X								
Phase II																													
Initial Meeting	X																												
Assemble Basic Data	X																												
Evaluation of Alternatives		X	X	X	X	X	X	X	X	X	X	X	X	X															
Preparation of 35% Report											X	X	X	X															
Review of 35% Report														X	X	X	X	X	X	X	X								
Evaluation of Regulatory Requirements														X	X	X	X	X	X	X	X								
Final Evaluation of Alternatives																	X	X	X	X	X	X	X	X	X	X			
Preparation of 100% Report																	X	X	X	X	X	X	X	X	X	X			
Review of 100% Report																						X	X	X	X	X	X	X	X
Preparation of Final Report																											X	X	X

WK27/T2

APPENDIX II

Public Drinking Water Systems
(Florida Drinking Water Regulations)

CHAPTER 17-22

PUBLIC DRINKING WATER SYSTEMS
(Formerly 10D-4)

17-22.01 Definitions.
17-22.02 Water Supply-General.
17-22.03 Potable Water-Standards.
17-22.04 Public Water Supply Systems-Approval.
17-22.05 Public Water Supply Systems-Application.
17-22.06 Public Water Supply Systems-Plans-Alterations.
17-22.07 Public Water Supply Systems-Cleaning & Disinfection.
17-22.08 Public Water Supply Systems-Operation-Fluoridation.
17-22.09 Public Water Supply Systems-Cross Connection & Use of Dual Supplies.
17-22.10 Water Supply Wells-Drilling Permit, Application.
17-22.11 Water Supply Wells-Location, Construction.
17-22.12 Water Supply Wells-Cleanup and Disinfection Use.
17-22.13 Water Supply Wells-Submission of Logs & Drilling Samples.
17-22.14 Water Supply Wells-Abandonment.
17-22.15 Potable Water in Places Serving the Public.
17-22.16 General.

PART I
GENERAL

17-22.101 Authority, Intent & Policy.
17-22.102 Coverage.
17-22.103 Definitions.

PART II
QUALITY STANDARDS, ANALYTICAL METHODS, SAMPLING

17-22.104 Quality Standards: Maximum Contaminant Levels and Treatment Techniques.
17-22.105 Sampling and Analytical Methods.

PART III
CONSTRUCTION, OPERATION AND MAINTENANCE

17-22.106 Construction.
17-22.107 Operation and Maintenance.

PART IV
PERMITTING, VARIANCES, EXEMPTIONS, WAIVERS

17-22.108 Permitting.
17-22.109 Variances, Exemptions and Waivers.

10-1-85

PART V
SURVEILLANCE, RECORDS AND REPORTING

17-22.110 Surveillance.
17-22.111 Records and Reporting.

PART VI
PUBLIC NOTIFICATION, IMMINENT HAZARDS, VIOLATIONS

17-22.112 Public Notification.
17-22.113 Imminent Hazards.
17-22.114 Violations.
17-22.115 Fee Schedule.

PART VII
FORMS

(Amended and Transferred to 17-1.1221; 2-18-79)

17-22.01 Definitions.
Specific Authority: 381.031(1)(g)3, 381.271, 381.061(8) F.S.
Law Implemented: 381.031(1)(a)(b)(c)(d)(e)(f), 381.061(2)(3)(4)(5)(9), 381.071, 381.101, 381.111, 381.121, 381.271, 381.281, 381.291, 381.293, 381.311, 381.351, 381.411(1)(2)(3), 386, F.S.
History: Repromulgated 1-1-75, Repealed 3-9-78.

17-22.02 Water Supply-General.
Specific Authority: 381.031(1)(g)3, 381.271, 381.061(8), F.S.
Law Implemented: 381.031(1)(a)(b)(c)(d)(e)(f), 381.061(2)(3)(4)(5)(6)(9), 381.071, 381.101, 381.111, 381.121, 381.271, 381.281, 381.291, 381.293, 381.311, 381.351, 381.411(1)(2)(3), 386, F.S.
History: Revised 1-1-75, Repealed 3-9-78.

17-22.03 Potable Water-Standards.
Specific Authority: 381.031(1)(g)3, 381.271, 381.061(8), F.S.
Law Implemented: 381.031(1)(a)(b)(c)(d)(e)(f), 381.061(2)(3)(4)(5)(6)(9), 381.071, 381.101, 381.111, 381.121, 381.271, 381.281, 381.291, 381.293, 381.311, 381.351, 381.411(1)(2)(3), 386, F.S.
History: Repromulgated 1-1-75, Repealed 3-9-78.

17-22.04 Public Water Supply Systems-Approval.
Specific Authority: 381.031(1)(g)3, 381.271, 381.061(8), F.S.
Law Implemented: 381.031(1)(a)(b)(c)(d)(e)(f), 381.061(2)(3)(4)(5)(6)(9), 381.071, 381.101, 381.111, 381.121, 381.271, 381.281, 381.291, 381.293, 381.311, 381.351, 381.411(1)(2)(3), 386, F.S.
History: Repromulgated 1-1-75, Repealed 3-9-78.

17-22.05 Public Water Supply Systems-Applications.
Specific Authority: 381.031(1)(g)3, 381.271, 381.061(8), F.S.
Law Implemented 381.031(1)(a)(b)(c)(d)(e)(f), 381.061(2)(3)(4)(5)(6)(9), 381.071, 381.101, 381.111, 381.121, 381.271, 381.281, 381.291, 381.293, 381.311, 381.351, 381.411(1)(2)(3), 386, F.S.
History: Repromulgated 1-1-75, Repealed 3-9-78.

17-22.06 Public Water Supply System Plans-Alterations.
Specific Authority: 381.031(1)(g)3, 381.271, 381.061(8), F.S.
Law Implemented 381.031(1)(a)(b)(c)(d)(e)(f), 381.061(2)(3)(4)(5)(6)(9), 381.071, 381.101, 381.111, 381.121, 381.271, 381.293, 381.311, 381.351, 381.411(1)(2)(3), 386, F.S.
History: Repromulgated 1-1-75, Repealed 3-9-78.

17-22.07 Public Water Supply Systems-Cleaning & Disinfection.
Specific Authority: 381.031(1)(g)3, 381.271, 381.061(8), F.S.
Law Implemented: 381.031(1)(a)(b)(c)(d)(e)(f), 381.061(2)(3)(4)(5)(6)(9), 381.071, 381.101, 381.111, 381.121, 381.271, 381.281, 381.291, 381.293, 381.311, 381.351, 381.411(1)(2)(3), 386, F.S.
History: Repromulgated 1-1-75, Repealed 3-9-78.

17-22.08 Public Water Supply Systems-Operation.
Specific Authority: 381.031(1)(g)3, 381.271, 381.061(8), F.S.
Law Implemented: 381.031(1)(a)(b)(c)(d)(e)(f), 381.061(2)(3)(4)(5)(6)(9), 381.071, 381.101, 381.111, 381.121, 381.271, 381.281, 381.291, 381.293, 381.311, 381.351, 381.411(1)(2)(3), 386, F.S.
History: Revised 1-1-75, Repealed 3-9-78.

17-22.09 Public Water Supply Systems-Cross-Connections & Use of Dual Supplies.
Specific Authority: 381.031(1)(g)3, 381.271, 381.061(8), F.S.
Law Implemented: 381.031(1)(a)(b)(c)(d)(e)(f), 381.061(2)(3)(4)(5)(6)(9), 381.071, 381.101, 381.111, 381.121, 381.271, 381.281, 381.291, 381.293, 381.311, 381.351, 381.411(1)(2)(3), 386; F.S.
History: Repromulgated 1-1-75, Repealed 3-9-78.

17-22.10 Water Supply Wells-Drilling Permit, Application.
Specific Authority: 381.031(1)(g)3, 381.271, 381.061(8), F.S.
Law Implemented: 381.031(1)(a)(b)(c)(d)(e)(f), 381.061(2)(3)(4)(5)(6)(9), 381.071, 381.101, 381.111, 381.121, 381.271, 381.281, 381.291, 381.293, 381.311, 381.351, 381.411(1)(2)(3), 386, F.S.
History: Repromulgated 1-1-75, Repealed 3-9-78.

17-22.11 Water Supply Wells-Location, Construction.
Specific Authority: 381.031(1)(g)3, 381.271, 381.061(8), F.S.
Law Implemented: 381.031(1)(a)(b)(c)(d)(e)(f), 381.061(2)(3)(4)(5)(6)(9), 381.071, 381.101, 381.111, 381.121, 381.271, 381.281, 381.291, 381.293, 381.311, 381.351, 381.411(1)(2)(3), 386, F.S.
History: Repromulgated 1-1-75, Repealed 3-9-78.

17-22.12 Water Supply Wells-Cleanup and Disinfection, Use.
Specific Authority: 381.031(1)(g)3, 381.271, 381.061(8), F.S.
Law Implemented: 381.031(1)(a)(b)(c)(d)(e)(f), 381.061(2)(3)(4)(5)(6)(9), 381.071, 381.101, 381.111, 381.121, 381.271, 381.281, 381.291, 381.293, 381.311, 381.351, 381.411(1)(2)(3), 386, F.S.
History: Repromulgated 1-1-75, Repealed 3-9-78.

17-22.13 Water Supply Wells-Submission of Logs & Drilling Samples.
Specific Authority: 381.031(1)(g)3, 381.271, 381.061(8), F.S.
Law Implemented: 381.031(1)(a)(b)(c)(d)(e)(f), 381.061(2)(3)(4)(5)(6)(9), 381.071, 381.101, 381.111, 381.121, 381.271, 381.281, 381.291, 381.293, 381.311, 381.351, 381.411(1)(1)(3), 386, F.S.
History: Repromulgated 1-1-75, Repealed 3-9-78.

17-22.14 Water Supply Wells-Abandonment.
Specific Authority: 381.031(1)(g)3, 381.271, 381.061(8), F.S.
Law Implemented: 381.031(1)(a)(b)(c)(d)(e)(f), 381.061(2)(3)(4)(5)(6)(9), 381.071, 381.101, 381.111, 381.121, 381.271, 381.281, 381.291, 381.293, 381.311, 381.351, 381.411(1)(2)(3), 386, F.S.
History: Repromulgated 1-1-75, Repealed 3-9-78.

17-22.15 Potable Water in Places Serving the Public.
Specific Authority: 381.031(1)(g)3, 381.271, 381.061(8), F.S.
Law Implemented: 381.031(1)(a)(b)(c)(d)(e)(f), 381.061(2)(3)(4)(5)(6)(9), 381.071, 381.101, 381.111, 381.121, 381.271, 381.281, 381.291, 381.293, 381.311, 381.351, 381.411(1)(2)(3), 386, F.S.
History: Repromulgated 1-1-75, Repealed 3-9-78.

17-22.16 General.
Specific Authority: 381.031(1)(g)3, 381.271, 381.061(8), F.S.
Law Implemented: 381.031(1)(a)(b)(c)(d)(e)(f), 381.061(2)(3)(4)(5)(6)(9), 381.071, 381.101, 381.111, 381.121, 381.271, 381.281, 381.291, 381.293, 381.411(1)(2)(3), 386, F.S.
History: New 1-1-75, Repealed 3-9-78.

PART I
GENERAL

17-22.101 Authority, Intent and Policy. To assure that public water systems supply drinking water which meets minimum requirements, the Federal government enacted PL 93-523, the "Safe Drinking Water Act". The scheme of PL 93-523 was to impart primary responsibility for public water system programs to those states capable of and actually implementing an acceptable public water system program. To this end the legislature of the State of Florida enacted the "Florida Safe Drinking Water Act", Sections 403.850--403.864, Florida Statutes.

These regulations are promulgated to implement the requirements of the Florida Safe Drinking Water Act as well as acquire primacy for the State of Florida under the Federal Act. These regulations adopt the national primary and secondary drinking water regulations of the federal government where possible and otherwise create additional regulations fulfilling state and federal requirements.

Specific Authority: 403.861(1), F.S.
Law Implemented: 403.851, F.S.
History: New 11-9-77.

17-22.102 Coverage.

(1) The Safe Drinking Water Act and the Florida Safe Drinking Water Act exclude certain public water systems from coverage by those acts. The drinking water regulations contained in Chapter 17-22, Florida Administrative Code, apply to all public water systems except those which meet all of the following criteria:

(a) Consists of distribution and storage facilities only and does not have any collection or 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.

Specific Authority: 403.861(8), F.S.
Law Implemented: 403.851, 403.853(2), F.S.
History: New 11-9-77, Amended 1-13-81.

NOTE: Section 381.261, F.S., gives general supervision and control over all private water systems and public water systems not covered or included in the Florida Safe Drinking Water Act to the Department of Health and Rehabilitative Services (DHRS). The Department interprets this as meaning that DHRS is given supervision and control of all water systems which meet all of the four exception criteria and which also have at least 15 service connections or which regularly serve at least 25 individuals daily at least 60 days out of the year. The Department also interprets Section 381.261, F.S., as meaning that DHRS is given supervision and control of all water systems that have less than 15 service connections or which regularly serve less than 25 individuals daily at least 60 days out of the year, or at least 25 individuals daily less than 60 days out of the year.

17-22.103 Definitions. For the purpose of this rule the following words, phrases or terms shall have the following meaning:

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

(2) "MAXIMUM CONTAMINANT LEVEL" (MCL) 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 the definition.

(3) "PERSON" means an individual, public or private corporation, company, association, partnership, municipality, agency of the state, district, Federal agency, or any other legal entity, or its legal representative, agent or assigns.

(4) "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. Such terms include 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".

(5) "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.

(6) "NON-COMMUNITY WATER SYSTEM" means a public water system for provision to the public of piped water for human consumption that serves at least 25 individuals daily at least 60 days out of the year but that is not a community water system.

NOTE: Community water systems serve at least 25 year-round residents. Non-community water systems serve at least 25 individuals daily. The difference between the two is that the former addresses inhabitants whereas the latter addresses transients or persons who otherwise do not inhabit a building, etc., non-residents.

(7) "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.

(8) "STANDARD BACTERIA SAMPLE" means the aliquot of raw or unfinished drinking water that is examined for the presence of coliform bacteria, and shall consist of: a. For the bacteriological fermentation tube test, five (5) standard portions of either: 1. Ten milliliters (10 ml); 2. One hundred milliliters (100 ml); b. For the membrane filter technique, not less than one hundred milliliters (100 ml).

(9) "DEPARTMENT" means the Department of Environmental Regulation and, where the context is appropriate, its employees or the employees of DHRS or the County Health Departments.

(10) "SUPPLIER OF WATER" means any person who owns or operates a public water system.

(11) "DRINKING WATER" means water satisfactory for drinking, culinary and domestic purposes meeting the quality standards of the Department of Environmental Regulation.

(12) "ADEQUATE PROTECTION BY TREATMENT" means any one or any combination of the controlled processes of coagulation, sedimentation, absorption, filtration, or other processes in addition to disinfection which produce a water consistently meeting the requirements of the Standards in Section 17-22.104 including processes which are appropriate to the source of supply; systems which are of adequate capacity to meet maximum demands without creating health hazards, and which are located, designed and constructed to eliminate or prevent violations of these rules; and conscientious operation by well-trained and competent personnel who meet the requirements of Chapter 17-16, Florida Administrative Code.

(13) "HEALTH HAZARDS" mean any conditions, devices, or practices in a water supply system or its operation which create or may create an imminent and substantial danger to the health and well-being of the water consumer.

(14) "CROSS-CONNECTION" means any physical arrangement whereby a public water supply is connected, directly or indirectly, with any other water supply system, sewer, drain, conduit, pool, storage reservoir, plumbing fixture, or other device which contains or may contain contaminated water, sewage or other waste or liquid of unknown or unsafe quality which may be capable of imparting contamination to the public water supply as the result of backflow. By-pass arrangements, jumper connections, removable sections, swivel or changeable devices and other temporary or permanent devices through which or because of which backflow could occur are considered to be cross connections.

(15) "WELL" means any excavation that is drilled, cored, bored, washed, driven, dug, jetted, or otherwise constructed when the intended use of such excavation is to conduct groundwater from a source bed to the surface, by pumping or natural flow, when groundwater from such excavation is used or is to be used for a public water supply system.

(16) "SOURCE BED" means an underground water-bearing formation sufficiently permeable to yield quantities of water to wells.

(17) "CASING" means the tubular material utilized to shut off or exclude a stratum or strata other than the source bed and conduct water from only the source bed to the surface.

(18) "ANNULAR SPACE" means the space between two casings or between the outer casing and the wall of the well hole.

(19) "LINER" means the tubular material utilized to seal off caving materials which may be encountered below the bottom end of the well casing. A liner shall not be allowed to over lap or telescope into any portion of the well casing.

(20) "INDIVIDUAL WATER SUPPLY" means a source of water, and pump and piping if any, located on the premises and which serves to supply only a single home of a family.

(21) "DOSE EQUIVALENT" means the product of the absorbed dose from ionizing radiation and such factors as account for differences in biological

effectiveness due to the type of radiation and its distribution in the body, specified by International Commission on Radiological Units and Measurements. (ICRU).

(22) "REM" means the unit of dose equivalent from ionizing radiation to the total body or any internal organ or organ system. A "millirem (mrem)" is 1/1000 of a rem.

(23) "PICOCURIE (pCi)" means that quantity of radioactive material producing 2.22 nuclear transformations per minute.

(24) "GROSS ALPHA PARTICLE ACTIVITY" means the total radioactivity due to alpha particle emission as inferred from measurements on a dry sample.

(25) "MAN-MADE BETA PARTICLE AND PHOTON EMITTERS" means all radionuclides emitting beta particles and/or photons listed in "Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure," NBS Handbook 69, except the daughter products of thorium 232, uranium-235 and uranium-238.

(26) "GROSS BETA PARTICLE ACTIVITY" means the total radioactivity due to beta particle emission as inferred from measurements on a dry sample.

(27) "VARIANCE" means sanction from the Department affording a public water system an extended time for compliance with an MCL or treatment technique contained in a primary drinking water regulation. A variance pertains to non-compliance with an MCL due to the inability to meet the MCL even when a treatment method generally available at reasonable cost to a larger system has been applied to the raw water source. The non-compliance is due to the quality of the raw water.

(28) "EXEMPTION" means sanction from the Department affording a public water system existing as of the effective date of these rules an extended time for compliance with an MCL or treatment technique contained in a primary drinking water regulation. An exemption pertains to non-compliance with an MCL due to inability for reasons other than that instance where application of a treatment method generally available fails to adequately treat the raw water source.

(29) "TREATMENT TECHNIQUE" shall have the same meaning as in the federal "Safe Drinking Water Act", PL 93-523, and implementing federal regulations.

(30) "HALOGEN" as used in the present context of this rule means one of the chemical elements chlorine or bromine.

(31) "TRIHALOMETHANE" (THM) means one of the family of organic compounds named as derivatives of methane, wherein three of the four hydrogen atoms in methane are each substituted by a halogen atom in the molecular structure.

(32) "TOTAL TRIHALOMETHANES" (TTHM) means the sum of the concentration in milligrams per liter of the trihalomethane compounds (trichloromethane [chloroform], dibromochloromethane, bromodichloromethane and tribromomethane [bromoform]), rounded to two significant figures.

(33) "MAXIMUM TOTAL TRIHALOMETHANE POTENTIAL" (MTP) means the maximum concentration of total trihalomethanes produced in a given water containing a disinfectant residual after 7 days at a temperature of 25°C or above.

(34) "DISINFECTANT" means any oxidant, including but not limited to chlorine, chlorine dioxide, chloramines, and ozone added to water in any part of the treatment or distribution process, that is intended to kill or inactivate pathogenic microorganisms.

(35) "SANITARY HAZARD" means an existing physical condition as determined by an employee of the Department or other appropriate regulatory agency which may involve or affect any part of a drinking water system, and that may create an imminent or future adverse effect on the health of any person consuming water from that system.

(36) "WAIVER" means sanction from the Department for reduction of chlorination and retention of certified water plant operator requirements. A waiver applies only to chlorination and certified operator requirements for non-community water systems.

Specific Authroity: 403.861(8), F.S.
Law Implemented: 403.853, 403.863, F.S.
History: New 11-9-77, Amended 1-13-81.

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PART II

QUALITY STANDARDS, ANALYTICAL METHODS, SAMPLING

General--The ultimate concern of a public drinking water program is the quality of the water when the water reaches the citizens. The following regulations establish the maximum contaminant levels or the treatment technique as well as sampling and analysis requirements for the water within public water systems. All samples must be collected from locations representative of the distribution system, unless otherwise specified.

17-22.104 Quality Standards: Maximum Contaminant Levels or Treatment Techniques.

(1) PRIMARY DRINKING WATER REGULATIONS-maximum contaminant levels.

(a) INORGANICS

1. The following are maximum contaminant levels applicable to community water systems.

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
Sodium	160

2. The maximum contaminant level for nitrate (as N) applicable to non-community water systems is 10 milligrams per liter unless all of the following conditions are met, in which case the Department or designated county health unit can allow a maximum contaminant level for nitrate (as N) of up to 20 milligrams per liter.

a. The water distributed by the water system is not available to children under 6 months of age.

b. There is continuous posting of the fact that nitrate levels exceed 10 milligrams per liter and the potential health effects of exposure.

c. Local and state public health authorities are notified annually of nitrate levels that exceed 10 milligrams per liter.

d. No adverse health effects shall result from the increased nitrate level.

e. Monitoring is increased to once per quarter for the first year 10 milligrams per liter is exceeded, semiannually for the second year, and once per year thereafter.

3. 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	Temperature 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

(b) ORGANICS-The following are maximum contaminant levels applicable to community water systems.

Contaminant	Level, milligrams per liter
1. Chlorinated hydrocarbons:	
Endrin (1,2,3,4,10,10-hexachloro-6,7-epoxy--1,4,4a,5,6,7,8,8a-octa-hydro-endo, endo--1,4:5,8--dimethano naphthalene).	0.0002
Lindane (1,2,3,4,5,6,-hexachloro-cyclohexane, gamma isomer).	0.004
Methoxychlor (1,1,1,-Trichloro-2,2-bis (p-methoxyphenyl) ethane.	0.1
Toxaphene ($C_{10}H_{10}C_8$-Technical chlorinated camphene, 67-69 percent chlorine).	0.005
2. Chlorophenoxys:	
2,4,--D,(2,4,--Dichlorophenoxyacetic acid).	0.1
2,4,5,-TP, Silvex (2,4,5-Trichloro-phenoxypropionic acid).	0.01

(c) 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 level for turbidity also applies to community water supply systems utilizing groundwater source(s). The maximum contaminant levels for turbidity in drinking water, measured at a representative entry point(s) to this distribution system or at other points on each system as may be significant to such as post-precipitation conditions or iron precipitate build up and release, are:

1. One turbidity unit, as determined by a monthly average for surface water systems or a single triennial analysis for groundwater systems, except that five or fewer turbidity units may be allowed if the supplier of water can demonstrate to the Department that the higher turbidity does not do any of the following:

a. Interfere with disinfection;

b. Prevent maintenance of an effective disinfectant agent throughout the distribution system; or

c. Interfere with microbiological determinations.

2. Five turbidity units based on average for two consecutive days.

(d) MICROBIOLOGICAL-The maximum contaminant levels for coliform bacteria, applicable to community water systems and non-community water systems, are as follows;

1. When the membrane filter technique is used, the number of coliform bacteria shall not exceed any of the following:

a. One per 100 milliliters as the arithmetic means of all samples examined per month;

b. Four per 100 milliliters in more than one sample when less than 20 are examined per month; or

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

2. When the fermentation tube method and 10 milliliter standard portions are used, coliform bacteria shall not be present in any of the following:

a. more than 10 percent of the portions in any month;

b. three or more portions in more than one sample when less than 20 samples are examined per month; or

c. three or more portions in more than five percent of the samples when 20 or more samples are examined per month;

3. When the fermentation tube method and 100 milliliter standard portions are used, coliform bacteria shall not be present in any of the following:

a. more than 60 percent of the portions in any month;

b. five portions in more than one sample when less than five samples are examined per month; or

c. five portions in more than 20 percent of the samples when five or more samples are examined per month.

4. At the Department's discretion, community systems required to take 10 or fewer samples per month may be authorized to exclude one positive membrane filter routine sample (+1 or greater) per month or one positive routine sample per month consisting of one or more positive tubes from the monthly or quarterly average calculation if all of the following conditions are met.

a. As approved on a case-by-case basis, the Department determines and indicates in writing to the public water system that no unreasonable risk to health existed under the conditions of this modification. This determination should be based upon a number of factors including but not limited to the following:

(i) the system provided and had maintained an active disinfectant residual in the distribution system,

(ii) a minimal potential for contamination as indicated by a sanitary survey, and,

(iii) the history of the water quality at the public water system.

b. The supplier shall initiate a check sample on each of two consecutive days from the same sampling point within 24 hours after notification that the routine sample is positive, and each of these check samples must be negative.

c. The original positive routine sample is reported and recorded by the supplier pursuant to 17-22.111(1)(a) and 17-22.111(2)(a). The supplier shall report to the Department its compliance with the conditions specified in this paragraph and a summary of the corrective action taken to resolve the prior positive sample result. If a positive routine sample is not used for the monthly calculation, another routine sample must be analyzed for compliance purposes. This provision may be used only once during two consecutive compliance periods.

5. For community or non-community systems that are required to sample at a rate of less than 4 per month, compliance with Sections (1)(d)1., 2., or 3. shall be based upon sampling during a 3-month period. The Department may upon request authorize compliance to be based upon sampling during a one-month period.

6. If an average MCL violation is caused by a single sample MCL violation as described in 17-22.104(1)(d)1.b., then the case shall be treated as one violation with respect to the public notification requirements of 17-22.112.

(e) RADIONUCLIDES-The following are maximum contaminant levels applicable to community water system:

1. Radium-226, radium-228, and gross alpha particle radioactivity.

a. Combined radium-226 and radium-228 - 5 pCi/l.

b. Gross alpha particle activity (including radium-226, but excluding radon and uranium) - 15 pCi/l.

2. Beta particle and photon radioactivity from man-made radionuclides.

a. The average annual concentration of beta particle and photon radioactivity from man-made radionuclides in drinking water shall not produce an annual dose equivalent to the total body or any internal organ greater than 4 millirem/year.

b. Except for the radionuclide listed in Table A, the concentration of man-made radionuclides causing 4 mrem total body or organ dose equivalents shall be calculated on the basis of a 2 liter per day drinking water intake using the 168-hour data listed in "Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure," NBS Handbook 69 as amended August 1963, U.S. Department of Commerce. If two or more radionuclides are present, the sum of their annual

dose equivalent to the total body or to any organ shall not exceed 4 millirem/year.

Table A-Average Annual Concentration Assumed to Produce a Total Body or Organ Dose of 4 mrem/year.

Radionuclide	Critical organ	pCi per liter
Tritium	Total body	20,000
Strontium-90	Bone marrow	8

(f) TRIHALOMETHANE-The following maximum contaminant levels are for trihalomethanes (THM's) and are applicable to all community water supply systems serving a population of 10,000 or more individuals and which add a disinfectant (oxidant) to the water in any part of the drinking water treatment process:

1. Total Trihalomethanes (TTHM) shall include the sum of the concentrations bromodichloromethane, dibromochloromethane, tribomomethane (bromoform) and trichloromethane (chloroform)-0.10 mg/l (MCL).

(g) VOLATILE ORGANICS - The following maximum contaminant levels (MCLs) for volatile organics are applicable to all community water systems. These concentrations are based on present "state of the art" analytical detection limits as applied to routine sampling, risk analysis, carcinogenicity and chronic toxicity, and may be altered in the future, commensurate with increasing laboratory capability or further data indicating adverse effects on human health.

Contaminant	Level, Micrograms Per Liter
Trichloroethylene	3
Tetrachloroethylene	3
Carbon Tetrachloride	3
Vinyl Chloride	1
1,1,1-Trichloroethane	200
1,2-Dichloroethane	3
Benzene	1
Ethylene Dibromide	0.02

(2) SECONDARY DRINKING WATER REGULATIONS-maximum contaminant levels. These levels shall not be exceeded in community water systems. If an MCL is exceeded, appropriate action, acceptable to the Department, including water treatment plant additions and modifications, shall be taken to provide water in which the MCL is not exceeded. Results of secondary contaminant analyses performed by a certified laboratory prior to the effective date of these revised regulations shall be considered for acceptance by the Department. The following are maximum contaminant levels applicable to community water systems:

Contaminant	Levels, Milligrams Per Liter*
Chloride	250
Color	15 color units
Copper	1
Corrosivity	**neither corrosive nor scale forming.
Foaming agents	0.5
Iron	0.3
Manganese	0.05
Odor	3 (threshold odor number)
pH (at collection point)	6.5 (min. allowable - no max.)
Sulfate	250
TDS	500 (may be greater if no other MCL is exceeded)
Zinc	5

*except color, odor, corrosivity and pH.
**Assessment of degree of corrosion or scale forming tendencies must be based on historical water characteristics of the system. A Langelier Index range of -0.2 to +0.2 should be used as a guideline toward obtaining water stability if calcium carbonate is present. If stabilizers are used, the -0.2 to +0.2 range may not be applicable.

(3) OTHER CONTAMINANTS WITHOUT A STANDARD-It is prohibited to introduce into a public water system any contaminant which creates or has the potential to create an imminent and substantial danger to the public.

(4) RELATIONSHIP BETWEEN 17-22.104 & 17-22.105, FLORIDA ADMINISTRATIVE CODE-All contaminants having an MCL established by Section 17-22.104, Florida Administrative Code, are required to be sampled and analyzed as established by Section 17-22.105, Florida Administrative Code.
Specific Authority: 403.861(8), F.S. Law Implemented: 403.852(12)(13), 403.853(1), F.S. History: New 11-9-77, Amended 1-13-81, 3-30-82, 5-23-84.

17-22.105 Sampling and Analytical Methods.

(1) SAMPLING AND ANALYTICAL REQUIREMENTS FOR PRIMARY CONTAMINANTS

(a) INORGANIC chemical sampling and analytical requirements.

1. Analyses for the purpose of determining compliance with 17-22.104(1)(a) are required as follows:

a. Analyses for all community water systems utilizing surface water sources shall be completed by June 24, 1978. These analyses shall be repeated at yearly intervals.

b. Analyses for all community water systems utilizing only ground water sources, shall be completed by June 24, 1979. These analyses shall be repeated at three-year intervals.

c. For non-community water systems, whether supplied by surface or ground water sources, analyses for nitrate shall be completed by June 24, 1979. These analyses shall be repeated at five-year intervals.

2. If the result of an analysis made pursuant to paragraph 17-22.105(1)(a)1. indicates that the level of any contaminant listed in 17-22.104(1)(a) exceeds the maximum contaminant level, the supplier of water shall report said fact to the Department within 7 days and initiate and complete three additional analyses for the suspect contaminant at the same sampling point within one month.

3. When the average of four analyses made pursuant to paragraph 17-22.105(1)(a)1. and 2. 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 Department pursuant to 17-22.111(2). Monitoring after public notification shall be at a frequency designated by the Department 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.

4. The provisions of paragraphs (1)(a)2. and 3. 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 Department pursuant to 17-22.111(2) and shall notify the public pursuant to 17-22.112.

5. For the initial analyses required by paragraph 17-22.105(1)(a)1.a., b., or c. of this section, data for surface waters acquired within one year prior to June 24, 1977 and data for groundwaters acquired within 3 years prior to June 24, 1977 may be substituted at the discretion of the Department.

6. Analyses conducted to determine compliance with Section 17-22.104(1)(a) shall be made in accordance with the following methods:

a. Arsenic-Method[1] 206.2, Atomic Absorption Furnace Technique; or Method[1] 206.3, or Method[4] D2972-78B, or Method[2] 301.A VII, pp. 159-162, or Method[3] I-1062-78B, pp. 61-63, Atomic Absorption-Gaseous Hydride; or Method[1] 206.4, or Method[4] D-2972-78A, or Method[2] 404-A and 404-B(4), Spectrophotometric, Silver Diethyldithiocarbamate.

b. Barium-Method[1] 208.1, or Method[2] 301-A IV, pp. 152-155, Atomic Absorption-Direct Aspiration; or Method[1] 208.2, Atomic Absorption Furnace Technique.

c. Cadmium-Method[1] 213.1. or Method[4] D3557-78A or B, or Method[2] 301-A II or III, pp. 148-152, Atomic Absorption-Direct Aspiration; or Method[1] 213.2, Atomic Absorption Furnace Technique.

d. Chromium-Method[1] 218.1, or Method[4] D-1687-77D, or Method[2] 301-A II or III, pp. 148-152, Atomic Absorption-Direct Aspiration; or Chromium-Method[1] 218.2, Atomic Absorption Furnace Technique.

e. Lead-Method[1] 239.1, or Method[4] D-3559-78A or B, or Method[2] 301-A II or III, pp. 148-152, Atomic Absorption-Direct Aspiration; or Method[1] 239.2, Atomic Absorption Furnace Technique.

f. Mercury-Method[1] 245.1, or Method[4] D-3223-79, or Method[2] 301-A VI, pp. 156-159, Manual Cold Vapor Technique; or Method[1] 245.2, Automated Cold Vapor Technique.

g. Nitrate-Method[1] 352.1, or Method[4] D-992-71 (1978), or Method[2] 419-D, pp. 427-429, Colorimetric Brucine; or Method[1] 353.3, or Method[4] D-3867-79B, or Method[2] 419-C, pp. 423-427, Spectrometric, Cadmium Reduction; Method[1] 353.1, Automated Hydrazine Reduction; or Method[1] 353.2, or Method[4] D-3867-79A, or Method[2] 605, pp. 620-624, Automated Cadmium Reduction.

h. Selenium-Method[1] 270.2, Atomic Absorption Furnace Technique, or Method[1] 270.3; or Method[3] I-1667-78, pp. 237-239, or Method[4] D-3859-79, or Method[2] 301-A VII, pp. 159-162, Hydride Generation-Atomic Absorption Spectrophotometry.

i. Silver-Method[1] 272.1, or Method[2] 301-A II, pp. 148-151, Atomic Absorption-Direct Aspiration; or Method[1] 272.2, Atomic Absorption Furnace Techniques.

j. Fluoride-Electrode Method, or SPADNS Method, Method[2] 414-A and C, pp. 391-394, or Method[1] 340.1 or ASTM Method[4] D1179-72A (1978), "Colorimetric SPADNS with Bellack Distillation", or Method[1] 340.2, "Potentiometric Ion Selective Electrode," or ASTM Method[4] D1179-72B (1978); or Colorimetric Method with Preliminary Distillation, Method[2] 603, Automated Complexone Method (alizarin Fluoride Blue) pp. 614-616; or Automated Electrode Method, "Fluoride in Water and Wastewater," Industrial Method No. 380-75WE, Technicon Industrial Systems, Tarrytown, New York 10591, February 1976, or "Fluoride in Water and Wastewater Industrial Method No. 129-71WE," Technicon Industrial Systems, Tarryton, New York 10591, December 1972; or Fluoride, Total Colorimetric, Zirconium-Eriochrome Cyanine R Method[3] I-3325-78, pp. 365-367.

k. Sodium-Method[2] pp 250-253, Flame Photometric Method; or Method[1] 273.1, Atomic Absorption-Direct Aspiration or Method[1] 273.2 Atomic Absorption-Graphite Furnace; or Method[4] D1428-64(a).

[1]"Methods of Chemical Analysis of Water and Wastes," EPA Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268 (EPA-600/4-79-020), March 1979. Available from ORD Publications, CERI, EPA, Cincinnati, Ohio 45268. For approved Analytical procedures for metals, the technique applicable to total metals must be used.

[2]"Standard Methods for the Examination of Water and Wastewater," 14th Edition, American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1976.

[3]Techniques of Water-Resources Investigation of the United States Geological Survey, Chapter A-1, "Methods for Determination of Inorganic Substances in Water and Fluvial Sediments," Book 5, 1979, Stock No. 024-001-03177-9. Available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

[4]Annual Book of ASTM Standards, part 31, Water, American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

[5]Techniques of Water-Resources Investigation of the United States Geological Survey, Chapter A-3, "Methods for Analysis of Organic Substances in Water," Book 5, 1972, Stock No.2401-1227. Available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

(b) ORGANIC chemical sampling and analytical requirements.

1. An analysis of substances for the purpose of determining compliance with 17-22.104(1)(b) shall be made as follows:

a. For all community water systems utilizing surface water sources, analyses shall be completed by June 24, 1978. Samples analyzed shall be collected during the period of the year designated by the Department as the period when contamination by pesticides is most likely to occur. These analyses shall be repeated at one year intervals thereafter.

b. For community water systems utilizing only groundwater sources, analyses shall be completed by June 24, 1979 and repeated at intervals as deemed necessary by the Department based upon evaluation of initial analysis or as conditions warrant.

2. If the result of an analysis made pursuant to paragraph (b)1. of this section indicates that the level of any contaminant listed in 17-22.104(1)(b) exceeds the maximum contaminant level, the supplier of water shall report said fact to the Department within 7 days and initiate and complete three additional analyses for the suspect contaminant within one month.

3. When the average of four analyses made pursuant to paragraph (b)1. and 2. 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 Department pursuant to 17-22.111(2) and give notice to the public pursuant to 17-22.112. Monitoring after public notification shall be at a frequency designated by the Department 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.

4. For the initial analysis required by paragraph (b)1. of this section, data for surface water acquired within one year prior to June 24, 1977 and data for ground water acquired within three years prior to June 24, 1977 may be substituted at the discretion of the Department.

5. Analysis made to determine compliance with 17-22.104(1) (b)1. shall be made in accordance with "Methods for Organochlorine Pesticides and Chlorophenoxy Acid Herbicides in Drinking Water and Raw Source Water," available from ORD Publications, CERI, EPA, Cincinnati, Ohio 45268; or "Organochlorine Pesticides in Water," Annual Book of ASTM Standards, part 31, Water, Method D3086-79; or Method 509-A, pp. 555-565;[2] or Gas Chromatographic Methods for Analysis of Organic Substances in Water,[5] USGS, Book 5, Chapter A-5, pp. 24-39.

6. Analysis made to determine compliance with 17-22.104(1)(b)2 shall be conducted in accordance with "Methods for Organochlorine Pesticides and Chlorophenoxy Acid Herbicides in Drinking Water and Raw Source Water," available from ORD Publications, CERI, EPA, Cincinnati, Ohio 45268; or "Chlorinated Phenoxy Acid Herbicides in Water," Annual Book of ASTM Standards, part 31, Method D3478-79; or Method 509-B, pp. 555-569;[2] or Gas Chromatographic Methods for Analysis of Organic Substances in Water,[5] USGS, Book 5, Chapter A-3, pp. 24-39.

(c) TURBIDITY sampling and analytical requirements.

1. Samples shall be taken by suppliers of water for both community water systems and non-community water systems that obtain raw water from a surface

source 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 Section 17-22.104(1)(c). Community water systems utilizing ground water sources shall analyze for turbidity at the same frequency as required for inorganic contaminants, or at such other frequency and location as deemed appropriate by the Department. If the Department determines that a reduced sampling frequency in a non-community system will not pose a risk to public health, it can reduce the required sampling frequency. The option of reducing the turbidity frequency shall be permitted only in those public water systems that practice disinfection and which maintain an active residual disinfectant in the distribution system, and in those cases where the Department has indicated in writing that no unreasonable risk to health existed under the circumstances of this option. 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, 14th Edition, pp. 132-134 or "Methods for Chemical Analysis of Water and Wastes," Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1979.

2. 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 Department 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 Department and as directed in Sections 17-22.111(2) and 17-22.112.

3. Sampling for non-community water systems shall begin by June 24, 1979. Sampling for community water systems should have begun on June 24, 1977 per PL 93-523.

(d) MICROBIOLOGICAL-Monitoring and Analytical Requirements.

1. Suppliers of water for community water systems and non-community water systems shall analyze for coliform bacteria for the purpose of determining compliance with Section 17-22.104(1)(d). Analyses shall be conducted in accordance with analytical recommendations set forth in "Standard Methods for the Examination of Water and Wastewater," American Public Health Association, 14th Edition, pp. 916-935, 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 Section 17-22.104(1)(d)2. and 3. The samples shall be taken at points which are representative of the drinking water delivered to the user.

2. 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 addition, a minimum of 1 representative

raw water sample per month shall be taken. In no event shall the frequency be less than as set forth below:

Population Served	Minimum number of samples per month
25 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 33,000	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

3. 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. Sampling shall consist of a minimum of 1 raw water and 1 representative distribution sample per quarter. When more than one structure is supplied by a non-community distribution line, quarterly sampling based on the number of persons per day using the system shall be in accordance with the preceding bacteriological sampling table. Such sampling shall begin

within two years after June 24, 1977. 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. The frequency shall not be reduced until the non-community water system has performed at least one coliform analysis of its drinking water and is shown to be in compliance with 17-22.104(1)(d).

4.a. A supplier of water of a community water system or a non-community water system may, with the approval of the Department 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 (1)(d)2. 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.

b. When the supplier of water exercises the option provided for in Section 4.a. above, he shall maintain no less than 0.2 mg/l free chlorine residual throughout the 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 Department within 48 hours. Also, if the analysis is confirmed, another 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.

c. Chlorine residual analysis shall be made in accordance with the 13th Edition, pp. 129-132, of "Standard Methods for the Examination of Water and Wastewater." Compliance with the maximum contaminant levels for coliform bacteria shall be determined on the monthly mean basis specified in Section 17-22. 104(1)(d) including those samples taken as a result of failure to maintain the required chlorine residual level. The Department may withdraw its overall approval of the use of chlorine residual substitution by written public notice in the Florida Administrative Weekly, or to a given public water system by actual notice.

5.a. When the coliform bacteria in a single sample exceed four per 100 milliliters using the membrane filter technique, 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 Department, until the results obtained from at least two consecutive check samples show less than one coliform bacterium per 100 milliliters.

b. When coliform bacteria occur in three or more 10 ml portions of a single sample using the fermentation tube method, 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 Department until the results obtained from at least two consecutive check samples show no positive tubes.

c. When coliform bacteria occur in all five of the 100 ml portions of a single sample using the fermentation tube method, 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 Department, until the results obtained from at least two consecutive check samples show no positive tubes.

d. The location at which the check samples were taken pursuant to paragraph 5a., b., or c. of this section shall not be eliminated from future sampling without approval of the Department. The results from all coliform bacterial analyses performed pursuant to this subsection 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 Section 17-22.104(1)(d). Check samples shall not be included in calculating the total number of samples taken each month to determine compliance with Section 17-22.105(1)(d)2. or 3.

6. 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 5a., b. or c. of this section, the supplier of water shall report to the Department within 48 hours.

7. When a maximum contaminant level set forth in Section 17-22.104(1)(d)1., 2. or 3. is exceeded, the supplier of water shall report to the Department and notify the public as prescribed in Sections 17-22.111(2) and 17-22.112.

8. 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 Section 17-22.104(1)(d)4. or Section 17-22.105(1)(d)2.

(e) RADIONUCLIDES

1. Monitoring Frequency for Radioactivity in Community Water Systems.

a. Monitoring requirements for gross alpha particle activity, radium-226 and radium-228.

(i) Initial sampling to determine compliance with Section 17-22.104(1)(e) shall begin by June 24, 1979, and the analysis shall be completed by June 24, 1980. Compliance shall be based on the analysis of an annual composite of four consecutive quarterly samples or the average of the analyses of four samples obtained at quarterly intervals.

a. A gross alpha particle activity measurement may be substituted for the required radium-226 and radium-228 analysis, PROVIDED, that the measured gross alpha particle activity does not exceed 5 pCi/l at a confidence level of 95 percent [1.65 (sigma) where (sigma) is the standard deviation of the net counting rate of the sample]. In localities where radium-228 is known to be present or may reasonably be expected to be present in drinking water, radium-226 and/or radium-228 analyses shall be provided when the gross alpha particle activity exceeds 2 pCi/l.

b. When the gross alpha particle activity exceeds 5 pCi/l, the same or an equivalent sample shall be analyzed for radium-226. If the concentration of

radium-226 exceeds 3 pCi/l the same or an equivalent sample shall be analyzed for radium-228.

(ii) For the initial analysis required by paragraph 1.a.(i), data acquired within one year prior to June 24, 1977, may be substituted.

(iii) Suppliers of water shall monitor at least once every four years following the procedure required by paragraph 1.a.(i). When an annual record taken in conformance with paragraph 1.a.(i) has established that the average annual concentration is less than half the maximum contaminant levels established by 17-22.104(1)(e), analysis of a single sample may be substituted for the quarterly sampling procedure required by paragraph 1.a.(i).

a. More frequent monitoring shall be conducted when ordered by the Department in the vicinity of mining or other operations which may contribute alpha particle radioactivity to either surface or groundwater sources of drinking water.

b. A supplier of water shall monitor in conformance with paragraph 1.a.(i). within one year of the introduction of a new water source for a community water system. More frequent monitoring shall be conducted when ordered by the Department in the event of possible contamination or when changes in the distribution system or treatment processes occur which may increase the concentration of radioactivity in finished water.

c. A community water system using two or more sources having different concentrations of radioactivity shall monitor source water, in addition to water from a free-flowing tap, when ordered by the Department.

d. Monitoring for compliance with Section 17-22.104(1)(e) after the initial period need not include radium-228 except when required by the Department, PROVIDED, that the average annual concentration of radium-228 has been assayed at least once using the quarterly sampling procedure required by paragraph 1.a.(i).

e. Suppliers of water shall conduct annual monitoring of any community water system in which the radium-226 concentration exceeds 3 pCi/l, when ordered by the Department.

(iv) If the average annual maximum contaminant level for gross alpha particle activity or total radium as set forth in Section 17-22.104(1)(e)1, is exceeded, the supplier of a community water system shall give notice to the Department pursuant to Section 17-22.11(2) and notify the public as required by Section 17-22.112. Monitoring at quarterly intervals shall be continued until the annual average concentration no longer exceeds the maximum contaminant level or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

a. Reserved.

b. Monitoring requirements for man-made radioactivity in community water systems-beta particle and photon radioactivity.

(i) By June 24, 1979, systems using surface water sources and serving more than 100,000 persons, and such other community water systems as are designated by the Department, shall be monitored for compliance with Section 17-22.104(1)(e)2. by analysis of a composite of four consecutive quarterly samples or analysis of four quarterly samples. Compliance with Section 17-22.104(1)(e)2. may be assumed without further analysis if the average

annual concentration of gross beta particle activity is less than 50 pCi/l and if the average annual concentrations of tritium and strontium-90 are less than those listed on Table A, PROVIDED, that if both radionuclides are present the sum of their annual dose equivalents to bone marrow shall not exceed 4 millirem/year.

a. If the gross beta particle activity exceeds 50 pCi/l, an analysis of the sample must be performed to identify the major radioactive constituents present and the appropriate organ and total body doses shall be calculated to determine compliance with Section 17-22.104(1)(e)2.

b. Suppliers of water shall conduct additional monitoring, as ordered by the Department, to determine the concentration of man-made radioactivity in principal watersheds designated by the Department.

c. At the discretion of the Department suppliers of water utilizing only groundwaters may be required to monitor for man-made radioactivity.

(ii) For the initial analysis required by paragraph 1.b.(i), data acquired within one year prior to June 14, 1977, may be substituted.

(iii) After the initial analysis required by paragraph 1.b.(i), suppliers of water shall monitor at least every four years following the procedure given in paragraph 1.b.(i).

(iv) By June 24, 1979, the supplier of any community water system designated by the Department as utilizing waters contaminated by effluents from nuclear facilities shall initiate quarterly monitoring for gross beta particle and iodine-131 radioactivity and annual monitoring for strontium-90 and tritium.

a. Quarterly monitoring for gross beta particle activity shall be based on the analysis of monthly samples or the analysis of a composite of three monthly samples. The former is recommended. If the gross beta particle activity in a sample exceeds 15 pCi/l, the same or an equivalent sample shall be analyzed for strontium-89 and cesium-134. If the gross beta particle activity exceeds 50 pCi/l, an analysis of the sample must be performed to identify the major radioactive constituents present and the appropriate organ and total body doses shall be calculated to determine compliance with Section 17-22.104(1)(e)2.

b. For iodine-131, a composite of five consecutive daily samples shall be analyzed once each quarter. As ordered by the Department, more frequent monitoring shall be conducted when iodine-131 is identified in the finished water.

c. Annual monitoring for strontium-90 and tritium shall be conducted by means of the analysis of a composite of four consecutive quarterly samples or analysis of four quarterly samples. The latter procedure is recommended.

d. The Department will allow the substitution of environmental surveillance data taken in conjunction with a nuclear facility for direct monitoring of man-made radioactivity by the supplier of water where the Department determines such data is applicable to a particular community water system.

(v) If the average annual maximum contaminant level for man-made radioactivity set forth in Section 17-22.104(1)(e)2. is exceeded, the operator of a community water system shall give notice to the Department pursuant to Section 17-22.111(2) and to the public as required by Section 17-22.112. Monitoring at monthly intervals shall be continued until the concentration no longer

exceeds the maximum contaminant level or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

2. Analytical Methods for Radioactivity

a. The methods specified in "Interim Radiochemical Methodology for Drinking Water", Environmental Monitoring and Support Laboratory, EPA-600.4-75-008, USEPA, Cincinnati, Ohio 45268, or those listed below, are to be used to determine compliance with Section 17-22.104(1)(e)1. and Section 17-22.104(1)(e)2. (radioactivity) except in cases where alternative methods have been approved in accordance with Section 17-22.105(3).

(i) Gross Alpha and Beta-Method 302 "Gross Alpha and Beta Radioactivity in Water" Standard Methods for the Examination of Water and Wastewater, 13th Edition, 1971, American Public Health Association, New York, N.Y.

(ii) Total Radium--Method 304 "Radium in Water by Precipitation" Ibid.

(iii) Radium-226--Method 305 "Radium-226 by Radon in Water" Ibid.

(iv) Strontium-89, 90--Method 303 "Total Strontium and Strontium-90 in Water" Ibid.

(v) Tritium--Method 306 "Tritium in Water" Ibid.

(vi) Cesium-134--ASTM D-2459 "Gamma Spectrometry in Water", 1975 Annual Book of ASTM Standards, Water and Atmospheric Analysis, Part 31, American Society for Testing and Materials, Philadelphia, PA (1975).

(vii) Uranium--ASTM D-2907 "Micro-quantities of Uranium in Water by Fluorometry", Ibid.

b. When the identification and measurement of radionuclides other than those listed in paragraph 17-22.105(1)(e)2.a. is required, the following reference are to be used, except in cases where alternative methods have been approved in accordance with 17-22.105(3).

(i) Procedures for Radiochemical Analysis of Nuclear Reactor Aqueous Solutions, H.L. Krieger and S. Gold, EPA-R4-73-014, USEPA, Cincinnati, Ohio, May 1973.

(ii) HASL Procedure Manual, Edited by John H. Harley. HASL 300, ERDA Health and Safety Laboratory, New York, N.Y. 1973.

c. For the purpose of Monitoring radioactivity concentrations in drinking water, the required sensitivity of the radioanalysis is defined in terms of a detection limit. The detection limit shall be that concentration which can be counted with a precision of plus or minus 100 percent at the 95 percent confidence level [1.96 (sigma) where (sigma) is the standard deviation of the net counting rate of the sample].

(i) To determine compliance with Section 17-11.204(1)(e)1.a., the detection limit shall not exceed 1 pCi/l. To determine compliance with Section 17-22.104(1)(e)1.b., the detection limit shall not exceed 3 pCi/l.

(ii) To determine compliance with Section 17-22.104(1)(e)2., the detection limits shall not exceed the concentrations listed in Table B.

Table B-Detection Limits for Man-made Beta Particle and Photon Emitters.

Radionuclide	Detection Limit
Tritium	1,000 pCi/l
Strontium-89	10 pCi/l
Strontium-90	2 pCi/l
Iodine-131	1 pCi/l
Cesium-134	10 pCi/l
Gross beta	4 pCi/l
Other radionuclides	1/10 of the applicable limit

d. To judge compliance with the maximum contaminant levels listed in Section 17-22.104(2)(e)1, and 17-22.104(1)(e)2., averages of data shall be used and shall be rounded to the same number of significant figures as the maximum contaminant level for the substance in question.

(f) TRIHALOMETHANE-sampling and analytical requirements.

1. The regulations for total trihalomethanes as set forth in 17-22.104(1)(f) shall take effect on November 29, 1981 for community water systems serving 75,000 or more individuals and on November 29, 1983 for communities serving 10,000 to 74,999 individuals. Commencement of monitoring for total trihalomethanes shall begin not later than January 1, 1981 for systems serving 75,000 or more individuals and not later than November 29, 1982 for systems serving from 10,000 to 74,999 individuals. For the purpose of this section, the minimum number of samples required to be taken by the system shall be based on the number of treatment plants used by the system, except that multiple wells drawing raw water from a single aquifer may, with the Department's approval be considered one treatment plant for determining the minimum number of samples. All samples taken at an established frequency shall be collected within a 24 hour period. Free and/or combined chlorine residual shall be taken and recorded concurrently with all trihalomethane samples.

2.a. For all community water systems utilizing surface water sources in whole or in part and for all community water systems utilizing only groundwater sources that have not been determined by the Department to qualify for the monitoring requirements of subparagraph 3. of this subsection, analyses for total trihalomethanes shall be performed at quarterly intervals on at least four water distribution system samples for each treatment plant used by the system. At least 25 percent of the samples shall be taken on locations within the distribution system reflecting the maximum residence time of the water in the system. The remaining 75 percent shall be taken at representative locations in the distribution system, taking into account number of persons served, different sources of water and different treatment methods employed. The results of all analyses per quarter shall be arithmetically averaged and reported to the Department within 30 days of the system's receipt of such results. All samples collected shall be used in the computation of the average unless the analytical results are invalidated for technical reasons. Sampling and analyses shall be conducted in accordance with the methods listed in subparagraph 5. of this subsection.

b. Total Trihalomethane content as a basis to lessen monitoring requirements. Upon the written request of a community water system, the monitoring frequency required by subparagraph 2.a. of this subsection may be reduced by the Department to a minimum of one sample analyzed for TTHM's per quarter taken at a point in the distribution system reflecting the maximum residence time of the water in the system, upon written determination by the Department that the data from at least 1 year of monitoring in accordance with subparagraph 2.a. of this subsection and local conditions demonstrate that trihalomethane concentrations will be consistently below the maximum contaminant level.

c. If at any time during which the reduced monitoring frequency prescribed under this paragraph applies, the results from any analysis exceed 0.10 mg/l of TTHM's and such results are confirmed by at least one check sample taken promptly after such results are received, or if the system makes any significant change to its source of water or treatment program, the system shall immediately begin monitoring in accordance with the requirements of subparagraph 2.a. of this subsection, which monitoring shall continue for at least 1 year before the frequency may be reduced again. The Department may require an increase in monitoring frequency above the minimum established by these rules where necessary to detect variations of TTHM levels within the distribution system.

3.a. Total Trihalomethane Potential as a basis to lessen monitoring requirements. Upon written request to the Department, a community water system utilizing only groundwater sources may seek to have the monitoring frequency required by subparagraph 2.a. of this subsection reduced to a minimum of one sample for maximum TTHM potential per year for each treatment plant used by the system taken at a point in the distribution system reflecting maximum residence time of the water in the system. The system shall submit to the Department the result of at least one sample analyzed for maximum TTHM potential for each treatment plant used by the system taken at a point in the distribution system reflecting the maximum residence time of the water in the system. The system's monitoring frequency may only be reduced upon a written determination by the Department that the system has a maximum TTHM potential of less than 0.10 mg/l and that, based upon an assessment of the system and local conditions affecting it the system is not likely to approach or exceed the maximum contaminant level for TTHM's. The results of all analyses shall be reported to the Department within 30 days of the system's receipt of such results. All samples collected shall be used for determining whether the system must comply with the monitoring requirements of subparagraph 2. of this subsection, unless the analytical results are invalidated for technical reasons. Sampling and analyses shall be conducted in accordance with the methods listed in subparagraph 5. of this subsection.

b. If at any time during which the reduced monitoring frequency prescribed under subparagraph 3.a. of this subsection applies, the results from any analysis taken by the system for maximum TTHM potential are equal to or greater than 0.10 mg/l, and such results are confirmed by at least one check sample taken promptly after such results are received, the system shall immediately begin monitoring in accordance with the requirements of

paragraph 2. of the subsection and such monitoring shall continue for at least 1 year before the frequency may be reduced again. In the event of any significant change to the system's raw water or treatment program, the system shall immediately analyze an additional sample for maximum TTHM potential taken at a point in the distribution system reflecting maximum residence time of the water in the system for the purpose of determining whether the system must comply with the monitoring requirements of subparagraph 2. of this subsection. The Department may require an increase in monitoring frequency above the minimum established by these rules where necessary to detect variations of TTHM levels within the distribution system.

4. Compliance with 17-22.104(1)(f) shall be determined based on a running annual average of quarterly samples collected by the system as prescribed in a. or b. of subparagraph 2. of this subsection. If the average of samples covering any 12 month period exceeds the Maximum Contaminant Level, the supplier of water shall report to the Department pursuant to 17-22.111(2) and notify the public pursuant to 17-22.112. Monitoring after public notification shall be at a frequency designated by the Department and shall continue unless a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

5. Sampling and analyses made pursuant to this section shall be conducted by one of the following EPA approved methods:

a. "The Analysis of Trihalomethanes in Drinking Waters by the Purge and Trap Method", Method 501.1, EMSL, EPA Cincinnati, Ohio.

b. "The Analysis of Trihalomethanes in Drinking Water by Liquid/Liquid Extraction", Method 501.2, EMSL, EPA Cincinnati, Ohio.

Samples for TTHM shall be dechlorinated upon collection to prevent further production of Trihalomethanes, according to the procedures described in the above two methods. Samples for maximum TTHM potential should not be dechlorinated, and should be held for seven days at 25°C prior to analysis, according to the procedure described in the above two methods. Since lack of a disinfectant residual in the TTHM potential samples at the end of seven days invalidates the sample results, 1 drop of a 1% to 5% chlorine solution must be added to the initial 40 milliliter sample.

(g) VOLATILE ORGANICS - Sampling and Analytical Requirements:

1. Regulations for volatile organic MCLs as set forth in 17-22.104(1)(g) shall take effect June 1, 1985 for systems serving more than 1,000 persons, and January 1, 1987 for systems serving less than 1,000 persons. Analyses for contaminants shall be performed at three-year intervals. Sampling shall be performed on finished water leaving the water treatment plant except for ethylene dibromide which shall be sampled before chlorination. When a system is provided water from multiple treatment plants a sample(s) representative of the distribution system's water will be sufficient. If a sample analysis exceeding the MCL occurs, two additional samples shall be collected and confirmed by GC/MS within one month. If the average value of the three sample results exceeds the MCL, quarterly sampling will be required until two consecutive sample results do not exceed the MCL value.

2. Analyses conducted to determine compliance with 17-22.104(1)(g) shall be made in accordance with the following methods further identified at the end of 17-22.105(1)(h)4.

Trichloroethylene, Tetrachloroethylene, Carbon Tetrachloride, Vinyl Chloride, 1,1,1-Trichloroethane, and 1,2-Dichloroethane - Methods 501.1, 501.2, 501.3, 502.1, 503.1, 601, 602, and 624.

Benzene - Methods 501.1, 501.2, 501.3, 502.1, 503.1, 601, 602, and 624.

Ethylene Dibromide - "Analysis of 1,2-Dibromoethane in Drinking Water", Florida Department of Health and Rehabilitative Services, Jacksonville Central Laboratory, 1217 Pearl Street, Post Office Box 210, Jacksonville, Florida 32231-0042.

(h) SYNTHETIC ORGANIC CONTAMINANTS MONITORING - Analyses for synthetic organic contaminants (SOCs) shall be submitted to the department by January 1, 1985 for all community systems serving 1,000 or more persons, and by April 1, 1986 for all community systems serving less than 1,000 persons. Analyses for the following list of SOCs shall be performed every three years on finished water except when results or conditions warrant more frequent monitoring as determined by the department. After the first round of sampling, this list may be modified to include the addition or deletion of certain SOCs based on their actual or potential occurrence in Florida waters.

1. PURGEABLES - Methods 501.1, 501.2 501.3, 502.1, 503.1, 601, 602, 603, and 624. Identification of methods is listed at the end of 17-22.105(1)(h)4.

Acrolein
Acrylonitrile
Bromodichloromethane
Bromoform
Bromomethane
Chlorobenzene
Chloroethane
2-Chloroethylvinyl ether
Chloroform
Chloromethane
Dibromochloromethane
Dichlorodifluoromethane
1,1-Dichloroethane
1,1-Dichloroethene
trans-1,3-Dichloropropene
1,2-Dichloroethene
1,2-Dichloropropane
cis-1,3-Dichloropropene
Ethylbenzene
Methylene chloride
1,1,2-Trichloroethane
Trichlorofluoromethane
*Toluene
*Xylene
Styrene
Dichlorobenzene

17-22.105(1)(g)2. -- 17-22.105(1)(h)1.

1,2-Dibromo-3-Chloropropane
1,1,2,2-Tetrachloroethane

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*Can be analyzed using Methods 602 and 624, though not specifically indicated in these methods.

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2. PESTICIDES - Methods 509-A, 606, 608, 612, 614, 617, 625, and HPLC. Identification of methods is listed at the end of 17-22.105(1)(h)4.

Aldrin
a-BHC
b-BHC
g-BHC
d-BHC
Chlordane
4,4'-DDD
4,4'-DDE
4,4'-DDT
Dieldrin
Endosulfan I
Endosulfan II
Endosulfan Sulfate
Ethion
Trithion
o,p-DDT,DDE and DDD
Tedion
Endrin Aldehyde
Heptachlor
Heptachlor Epoxide
Toxaphene
PCB-1016
PCB-1221
PCB-1232
PCB-1242
PCB-1248
PCB-1254
PCB-1260
Aldicarb (non-extractable)
Diazinon
Malathion
Parathion
Guthion
Kelthane (Dicofal)

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3. BASE NEUTRAL EXTRACTABLES - Methods 605, 606, 607, 609, 610, 612, 613, and 625. Identification of methods is listed at the end of 17-22.105(1)(h)4.

17-22.105(1)(h)1. -- 17-22.105(1)(h)3.

10-1-85

Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(a)pyrene
Benzo(g,h,i)perylene
Benzidine
Bis(2-chloroethyl)ether
Bis(2-chloroethoxy)methane
Bis(2-ethylhexyl)phthalate
Bis(2-chloroisopropyl)ether
4-Bromophenyl phenyl ether
Butyl benzyl phthalate
2-Chloronaphthalene
4-Chlorophenyl phenyl ether
Chrysene
Dibenzo(a,h)anthracene
Di-n-butylphthalate
1,3-Dichlorobenzene
1,4-Dichlorobenzene
1,2-Dichlorobenzene
3,3-Dichlorobenzidine
Diethylphthalate
Dimethylphthalate
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Dioctylphthalate
1,2-Diphenylhydrazine
Fluoranthene
Fluorene
Hexachlorobenzene
Hexachlorobutadiene
Hexachloroethane
Hexachlorocyclopentadiene
Indeno(1,2,3-cd)pyrene
Isophorone
Naphthalene
Nitrobenzene
N-Nitrosodimethylamine
N-Nitrosodi-n-propylamine
N-Nitrosodiphenylamine
Phenanthrene
Pyrene
2,3,7,8-Tetrachlorodibenzo-p-dioxin (Dioxin)
1,2,4-Trichlorobenzene

4. ACID EXTRACTABLES - Methods 604 and 625. Identification of methods is listed at the end of 17-22.105(1)(h)4.

2-Chlorophenol	4-Nitrophenol
2,4-Dichlorophenol	Pentachlorophenol
2,4-Dimethylphenol	Phenol
2,4-Dinitrophenol	2,4,6-Trichlorophenol
2-Methyl-4,6-Dinitrophenol	

Methods 501.1 and 501.2 - "Analysis of Trihalomethanes in Drinking Water", Federal Register, Vol. 44, number 231, Thursday, November 29, 1979/Rules and Regulations, and Correction to Federal Register Thursday, November 29, 1979, Part III, Appendix C; "Analysis of Trihalomethanes in Drinking Water", Federal Register, Vol. 45, Number 49, Tuesday, March 11, 1980.

Method 501.3 - "Measurement of Trihalomethanes in Drinking Water with Gas Chromatography and Selected Ion Monitoring", U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

Method 502.1 - "The Determination of Halogenated Chemical Indicators of Industrial Contamination in Water by the Purge and Trap Method", Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268.

Method 503.1 - "The Analysis of Aromatic Chemicals in Water by the Purge and Trap Method", Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268.

Method 509-A - "Standard Methods for the Examination of Water and Wastewater", 15th Edition, 1980.

Methods 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 624, and 625 - "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268.

Method 614 - "The Determination of Organophosphorus Pesticides in Industrial and Municipal Wastewater", National Technical Information Services, 5285 Port Royal Road, Springfield, Virginia 22165.

Method 617 - "The Determination of Organic Pesticides and PCB's in Industrial and Municipal Wastewater", National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22165.

HPLC Method - Journal of Chromatography, Vol. 185, 1979, pp 615-624. Resolution, Sensitivity, and Selectivity of a High-Performance Liquid Chromatographic Post-Column Fluorometric Labeling Technique for Determination of Carbamate Insecticides, by Richard T. Krause.

(2) SAMPLING AND ANALYTICAL REQUIREMENTS FOR SECONDARY CONTAMINANTS- Secondary contaminant sampling and analytical requirements are as follows:

(a) Analysis for the purpose of determining compliance with 17-22.104(2) shall be completed by November 1, 1981, and shall be repeated at three year intervals.

(b) If the results of an analysis made pursuant to 17-22.105(2)(a) indicates that the level of any secondary contaminant listed in 17-22.104(2) exceeds the maximum contaminant level, the supplier of water shall report said fact to the Department within 7 days and initiate and complete 3 additional analyses for the suspect contaminant at the same sampling point within one month.

(c) When the average of four analyses made pursuant to paragraph 17-22.105(a) and (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 Department pursuant to 17-22.111(2).

(d) Analyses conducted to determine compliance with Section 17-22.104(2) shall 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; or Argentometric Method, "Standard Methods for the Examination of Water and Wastewater," 14th Edition, p. 303; or Ferricyanide Method (automated), "Standard Methods for the Examination of Water and Wastewater," 14th Edition, p. 613; "Methods for Chemical Analysis of Water and Wastes," p. 325.1 and 325.2, EPA, Office of Technology Transfer, Washington, D.C. 20460, 1979; or Mercuric Nitrate Method, "Standard Methods for the Examination of Water and Wastewater," 14th Edition, p. 304, Methods for Chemical Analysis of Water and Wastes," p. 325.3, EPA, Office of Technology Transfer, Washington, D.C. 20460, 1979.

2. Color-Platinum-Cobalt Method, "Methods for Chemical Analysis of Water and Wastes," p. 110.2, EPA, Office of Technology Transfer, Washington, D.C. 20460, 1979; or Visual Comparison Method, "Standard Methods for the Examination of Water and Wastewater," 14th Edition, p. 64; or Spectrophotometric Method, "Standard Methods for the Examination of Water and Wastewater," 14th Edition, p. 66, or "Methods for Chemical Analysis of Water and Wastes," p. 110.3, EPA, Office of Technology Transfer, Washington, D.C. 20460, 1979; or Tristimulus Filter Method (ADMI Method), "Standard Methods for the Examination of Water and Wastewater," 14th Edition, p. 68, or "Methods for Chemical Analysis of Water and Wastes," p. 110.1, EPA, Office of Technology Transfer, Washington, D.C. 20460, 1979.

3. Corrosivity-Calcium Carbonate Saturation, "Standard Methods for the Examination of Water and Wastewater," 14th Edition pp. 61-63.

4. Copper-Atomic Absorption Spectrophotometric Flame Method, "Methods for Chemical Analysis of Water and Wastes," p. 220.1, EPA, Office of Technology Transfer, Washington, D.C. 20460, 1979, "Standard Methods for the Examination of Water and Wastewater," 14th Edition, p. 144; or Atomic Absorption Spectrophotometric Furnace Method, "Methods for Chemical Analysis of Water and Wastes," p. 220.2, EPA, Office of Technology Transfer, Washington, D.C. 20460, 1979.

5. Foaming Agents-Methylene Blue Method, "Methods for Chemical Analysis of Water and Wastes," p. 425.1, EPA, Office of Technology Transfer, Washington, D.C. 20460, 1979, or "Standard Methods for the Examination of Water and Wastewater," 14th Edition, p. 600.

6. Iron-Atomic Absorption Spectrophotometric Flame Method, "Methods for Chemical Analysis of Water and Wastes," p. 236.1, EPA, Office of Technology

Transfer, Washington, D.C. 20460, 1979, or "Standard Methods for the Examination of Water and Wastewater," 14th Edition, p. 144; or Atomic Absorption Spectrophotometric Furnace Method, "Methods for Chemical Analysis of Water and Wastes," p. 236.2, EPA, Office of Technology Transfer, Washington, D.C. 20460, 1979.

7. Manganese-Atomic Absorption Spectrophotometic Flame Method, "Methods for Chemical Analysis of Water and Wastes," p.243.1, EPA, Office of Technology Transfer, Washington, D.C. 20460, 1979, or "Standard Methods for the Examination of Water and Wastewater," 14th Edition, p. 144; or Atomic Absorption Spectrophotometric Furnace Method, "Methods for Chemical Analysis of Water and Wastes," p. 243.2, EPA, Office of Technology Transfer, Washington, D.C. 20460, 1979.

8. Odor-Consistent Series Method, "Methods for Chemical Analysis of Water and Wastes," p. 140.1, EPA, Office of Technology Transfer, Washington, D.C. 20460, 1979, or "Standard Methods for the Examination of Water and Wastewater," 14th Edition, pp. 75-82.

9. pH-Electrometric Method, "Methods for Chemical Analysis of Water and Wastes," p. 150.1, EPA, Office of Technology Transfer, Washington, D.C. 20460, 1979, or "Annual Book of ASTM Standards," Method D1293-78A or B, or "Standard Methods for the Examination of Water and Wastewater," 14th Edition, pp. 460-465.

10. Sulfate-Turbidimetric Method, "Methods for Chemical Analysis of Water and Wastes," p. 375.4, EPA, Office of Technology Transfer, Washington, D.C. 20460, 1979, or "Standard Methods for the Examination of Water and Wastewater," 14th Edition, p. 496; or Gravimetric Method, "Methods for Chemical Analysis of Water and Wastes," p. 375.3, EPA, Office of Technology Transfer, Washington, D.C. 20460, 1979, or "Standard Methods for the Examination of Water and Wastewater," 14th Edition, p. 495; or Methylthymol Blue Method (automated) "Methods for Chemical Analysis of Water and Wastes," p. 375.2' EPA, Office of Technology Transfer, Washington, D.C. 20460, 1979, or "Standard Methods for the Examination of Water and Wastewater," 14th Edition, p. 628; or Chloranilate Method (automated), "Methods for Chemical Analysis of Water and Wastes," p. 375.1, EPA, Office of Technology Transfer' Washington, D.C., 20460, 1979.

11. Total Dissolved Solids-Total Filterable Residue Dried at 180°C Method' "Methods for Chemical Analysis of Water and Wastes," p. 160.1, EPA, Office of Technolgy Transfer, Washington, D.C. 20460, 1979, or "Standard Methods for the Examination of Water and Wastewater," 14th Edition, p. 92.

12. Zinc-Atomic Absorption Spectrophotometric Flame Method, "Methods for Chemical Analysis of Water and Wastes," p. 289.1, EPA, Office of Technology Transfer, Washington, D.C. 20460, 1979, or "Standard Methods for the Examination of Water and Wastewater," 14th Edition, p. 144; or Atomic Absorption Spectrophotometric Furnace Method, "Methods for Chemical Analysis of Water and Wastes," p. 289.2, EPA, Office of Technology Transfer, Washington, D.C. 20460, 1979.

13. Aggressiveness Index-"AWWA Standard for Asbestos-Cement Pipe, 4 in. through 24 in. for Water and Other Liquids," AWWA C400-77, Revision of C400-75, AWWA, Denver, Colorado.

14. Temperature-"Standard Methods for the Examination of Water and Wastewater," 14th Edition, Method 212 pp. 125-126.

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15. Calcium Hardness-EDTA Titrimetric Method "Standard Methods for the Examination of Water and Wastewater," 14th Edition, Method 309B, pp. 202-206; or "Annual Book ASTM Standards," Method D1126-67(B).

16. Alkalinity-Methyl Orange end point pH 4.5. "Standard Methods for the Examination of Water and Wastewater," 14th Edition, Method 403, pp. 278-281; or "Annual Book of ASTM Standards," Method D1067-70B; or "Methods for Chemical Analysis of Water and Wastes," Method 310.1.

17. Carbon Dioxide-"Standard Methods for the Examination of Water and Wastewater," 15th Edition, pp. 262-269.

18. Dissolved Oxygen-"Standard Methods for the Examination of Water and Wastewater," 15th Edition, pp. 388-398.

19. Conductivity-"Standard Methods for the Examination of Water and Wastewater," 15th Edition, pp. 70-73.

(3) SPECIAL MONITORING REQUIREMENTS FOR SODIUM AND CORROSIVITY CHARACTERISTICS. Sodium monitoring requirements are effective April 1, 1982. First round monitoring for sodium shall be completed by February 27, 1983. Since completion of first round sampling was required by November 1981, completion of second round sampling for corrosivity characteristics must be accomplished by November 1982 for surface water systems and November 1984 for groundwater systems. Sampling for sodium and corrosivity characteristics shall continue on an annual and triennial basis for surface water and groundwater systems, respectively, thereafter.

(a) Sodium.

1. Suppliers of water for community public water systems shall collect and analyze one sample per plant at the entry point of the distribution system for the determination of sodium concentration levels; samples must be collected and analyzed annually for systems utilizing surface water sources in whole or in part, and at least every three years for systems utilizing solely groundwater sources. The minimum number of samples required to be taken by the system shall be based on the number of treatment plants used by the system, except that multiple wells drawing raw water from a single aquifer may, with the Department's approval, be considered one treatment plant for determining the minimum number of samples. The supplier of water may be required by the Department to collect and analyze water samples for sodium more frequently in locations where the sodium content is variable.

2. The supplier of water shall report to the Department the results of the analyses for sodium within the first 10 days of the month following the month in which the sample results were received or within the first 10 days following the end of the required monitoring period as stipulated by the State, whichever of these is first. If more than annual sampling is required the supplier shall report the average sodium concentration within 10 days of the month following the month in which the analytical results of the last sample used for the annual average were received.

3. The supplier of water shall notify appropriate local county health unit public health officials of the sodium levels by written notice by direct mail within three months. A copy of each notice required to be provided by this paragraph shall be sent to the Department within 10 days of its issuance.

(b) Corrosivity Characteristics.

1. Suppliers of water for community public water systems shall collect samples from a representative entry point to the water distribution system for the purpose of analysis to determine the corrosivity characteristics of the water.

a. The supplier shall collect two samples per plant for analysis for each plant using surface water sources wholly or in part; one during midwinter and one during midsummer. The supplier of the water shall collect one sample per plant for analysis for each plant using groundwater sources. More samples shall be collected by the supplier utilizing either surface or groundwater sources, if required by the Department. The minimum number of samples required to be taken by the system shall be based on the number of treatment plants used by the system, except that multiple wells drawing raw water from a single aquifer may, with the Department's approval, be considered one treatment plant for determining the minimum number of samples.

b. Determination of the corrosivity characteristics of the water shall include measurement of pH, calcium hardness, alkalinity, temperature, total dissolved solids (total filterable residue), chloride, sulfate, carbon dioxide, dissolved oxygen, conductivity and calculation of the Langelier Index in accordance with paragraph 3. below. The determination of corrosivity characteristics shall include sampling at three year intervals for groundwater supplies and one year intervals for surface water supplies. In certain cases, the Aggressiveness Index, as described in paragraph 3. below, can be used instead of the Langelier Index. The supplier shall request permission to use the Aggressive Index in writing, to the Department.

2. The supplier of water shall report to the Department the results of the analyses for the corrosivity characteristics in accordance with Section 17-22.111(2).

3. Analysis conducted to determine the corrosivity of the water shall be made in accordance with the following methods as listed in 17-22.105(2):

a. Langelier Index
b. Aggressiveness Index
c. Total Filterable Residue (TDS)
d. Temperature
e. Calcium Hardness
f. Alkalinity
g. pH (at sample point)
h. Chloride
i. Sulfate
j. Carbon Dioxide
k. Dissolved Oxygen
l. Conductivity

(4) ALTERNATIVE ANALYTICAL TECHNIQUE-With the written permission of the Department 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.

(5) APPROVED LABORATORIES-For the purpose of determining compliance with Section 17-22.105(1)(2)(3)(4), samples for compliance monitoring of MCLs may be considered only if they have been analyzed by a laboratory approved by the Department of Health and Rehabilitative Services, except that measurements for turbidity, free chlorine residual, temperature, and pH may be performed by any person acceptable to the Department. Nothing in this Part shall be construed to preclude the State or any duly designated representative of the Department from taking samples or from using the results from such samples to determine compliance by a supplier of water with the applicable requirements of this Part.

(6) MONITORING OF CONSECUTIVE PUBLIC SYSTEMS-When one public water system receives water from another public water system, the recipient public water system is the consecutive public water system. The consecutive public water system shall provide microbiological and chlorine residual monitoring in a manner complying with Section 17-22.105(1)(d). At the discretion of the Department, additional monitoring of primary and secondary contaminants may be required for some consecutive systems which, due to their size or other factors, merit such additional monitoring.

Specific Authority: 403.861(8)(15)(16), F.S.
Law Implemented: 403.852(12)(13), 403.853(1)(3), F.S.
History: New 1-8-77, Amended 1-8-77, 1-13-81, 3-30-82, 5-23-84.

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PART III
CONSTRUCTION, OPERATION AND MAINTENANCE

General-The quality of drinking water when it reaches the citizens depends on the construction, the operation, and maintenance of a public water system. The following regulations establish requirements for construction and operation and maintenance of a public water system and cover all aspects of a public water system from collection through treatment, storage and distribution.

17-22.106 Construction.

(1) SOURCE AND PLANT SITE-Raw water should be obtained from the most desirable source that is available, and effort should be made to prevent or control contamination of the source. The plant site area should not be 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.

(2) DRINKING WATER SUPPLY WELLS OR TEST WELLS THAT MAY LATER BE USED FOR DRINKING WATER SUPPLY-Number, Location, Construction, Clearing, Drilling Samples and Abandonment. In addition to the regulations set forth in Chapter 17-21, Florida Administrative Code, Part II--Minimum Water Well Construction Standards, the requirements of this subsection apply to drinking water supply wells or test wells that may later be used for drinking water supply. The exception provision of 17-21.10(2)(d) regarding grout is applicable hereto.

(a) Number of wells required-A minimum of two drinking water supply wells shall be provided for all community water systems that will serve 350 or more persons upon completion of construction.

(b) Location-Well sites shall be located on ground least subject to localized flooding, and as far as is practical when the direction of ground water slope or movement is known, wells shall be located on the upstream side of sanitary hazards and as far from these hazards as practical. Wells serving systems having total sewage flows greater than 2,000 gallons per day shall be placed no closer than 200 feet from an on-site sewage disposal system and 100 feet from other sanitary hazards. Wells serving systems with a total sewage flow of less than or equal to 2,000 gallons per day shall be placed no closer than 100 feet from an on-site sewage disposal system or other sanitary hazards. The Department may decrease or increase these distances if justified by the presence or absence of natural barriers such as impermeable geological strata, adequate protection by water treatment or proper construction practices. The Department may increase these distances to the calculated one foot drawdown boundary of the cone of depression in shallow unconfined aquifers. For level areas, well tamped or puddled earth shall be placed around the well so as to elevate the concrete platform or apron. The apron must be a minimum size of 6' x 6'.

(c) Well construction.

1. Access-Every well shall be accessible for such attention as may be necessary.

2. Casing Materials and Grouting Requirements.

a. Casing and pipe other than as specified in Chapter 17-21.110(1) must be approved by the Department prior to installation and use.

b. Where telescoped casing is utilized, the casings shall be overlapped by not less than twenty (20) feet where increases or reductions occur in casing size. Not less than two (2) centralizing spacers shall be used in the overlapped sections and the annular space existing in the overlapped sections shall be completely sealed with cement grout. A liner as defined in the Rule is not allowed to be overlapped or telescoped into the well casing and, therefore, a cement grout seal is not required for liner installation.

c. Casing for wells which obtain their water from a rock layer or other such consolidated formation, shall, as a minimum be seated firmly into it and sealed with cement grout by an approved method.

d. For well construction with driven casing, the minimum acceptable seal shall be accomplished by undercutting or under reaming the last five (5) feet of the hole before seating the casing. A minimum of one (1) foot of such enlarged hole must be into the consolidated formation in which the casing will be seated. The entire enlarged portion shall be filled with cement grout and then the casing driven through the grout to refusal. The upper twenty (20) feet of casing shall be sealed with not less than a two-inch nominal thickness of cement grout. No other minimum seal shall be acceptable unless approved in advance by the water management district or the Department. Any part of a well which is constructed by setting the casing in a previously constructed borehole which is of larger diameter than the outside diameter of the casing, shall be sealed by filling the annular space, from bottom to top, with cement grout. Grouting methods and minimum standards shall at all times conform to those stated in Chapter 17-21. A minimum set time of twelve (12) hours is required.

e. The top of the casing shall be so constructed as to exclude any influent.

f. Prior to emplacing the pumps at the wells, wells shall be protected at all times by sanitary seal, threaded caps or welded flange so as to prevent entrance of contaminating material.

3. Pump Pits-Where a pump pit is planned, it must be provided with gravity drainage.

4. Housing of well pump-Both well and pump shall be protected by a housing of adequate size having an impervious floor and weatherproof walls and roof, however, completely weatherproof or submersible installations need only be protected from tampering and vandalism.

5. Well vent-Where provided, well vents shall be adequately protected.

6. Sampling tap-A conveniently accessible, down-opening sampling tap located a minimum distance of 12 to 18 inches above the ground surface shall be provided on the discharge side of each well pump, so that samples of raw water may be obtained from the well.

7. Dynamiting of wells-The use of dynamite or other explosives in the construction or maintenance of wells is hereby prohibited.

8. Infiltration galleries, etc.-Dug wells, infiltration galleries and other such sources of water supply requiring rearrangements of natural features are hereby prohibited as a source of public water supply unless water is treated in a manner approved by the Department.

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(d) Cleaning-The following procedure shall be followed for the cleaning of water supply wells. Water supply wells are to be cleaned of any microbiological or other contaminant due to well drilling activities so that the true microbiological character of the well water can be ascertained and so that the public water system may draw upon well water free of contamination from well construction activities.

1. Cleaning-Every well shall be equipped with an opening in the casing which will allow introduction of disinfection agents and the measurement of static water level, drawdown, or artesian pressure. Before a new well, or one suspected to be contaminated, or one which has been repaired, is placed in use, it shall be pumped clean with the permanent pump and it shall then be disinfected in accordance with an applicable method of "American Water Works Association Standards" or a method acceptable to the Department, followed by a bacteriological survey. Samples of raw water from the well must be submitted to the Laboratories of the Department of Health and Rehabilitative Services or other laboratory certified by the Department of Health and Rehabilitative Services for bacterial analysis as outlined in Section 17-22.106(2)(d)2. and use of the well will not be allowed until completion of survey and satisfactory interpretation of the results by the Department.

2. Bacteriological survey.

a. After thoroughly pumping the well until no trace of the disinfecting agent can be found, daily samples for 20 or more consecutive workdays shall be collected after pumping the well for 20 to 30 minutes at the rated capacity of the permanent pump each consecutive day. The daily samples shall be handled according to acceptable methods as stated in "Standard Methods for the Examination of Water and Wastewater", 13th Edition, 1971. The daily samples shall be submitted to a DHRS laboratory or other laboratory certified by DHRS for bacteriological analyses. When the Department determines that circumstances warrant it, the required number of samples and/or collection interval may be modified. In no case, however, is the daily collection of more than duplicate samples acceptable.

b. Interpretation of laboratory results in the well survey will be made in appropriate relationship with details of the well construction, the presence or absence of surface protection, the age of the well relative to the possible condition of the casing, the well log, or other pertinent information or conditions. However, where chlorination is the only treatment proposed, samples with mean coliform densities greater than four (4) per 100 ml shall not exceed 10 percent of the total number analyzed.

c. Evaluation of the survey results shall be made in consideration of potential sources of contamination, well construction and treatment to be provided.

(e) Drilling Samples-A log completion report showing various strata pierced by the well and a detailed drawing of the well construction shall be forwarded by the well contractor to the appropriate local Department office and local water management district within thirty days after the completion of the drilling operation. Cutting samples at regular intervals not greater than 25 feet apart and at every change in formation together with a log and other data as required by the Department and well completion reports shall be

submitted by the driller to the appropriate Water Management District when drilling is complete. Samples must show material in which the casing is seated. Blank well completion report forms shall be secured by written application to the Department of Environmental Regulation, 2600 Blair Stone Road, Twin Towers Office Building, Tallahassee, Florida 32301, or the appropriate Water Management District. Sample bags shall be secured from the samples delivered to the Bureau of Geology of the Department of Natural Resources, 903 West Tennessee Street, Tallahassee, Florida 32304 or appropriate Water Management District.

(f) Abandonment-Wells shall be closed utilizing an acceptable engineering practice approved in advance by the appropriate local Department office. Request for approval and granting of approval may be done by letter exchange. The person requesting approval shall as a minimum contain the following information in the letter requesting approval:

1. Location and size of well
2. Length of casing of well
3. Total depth of well
4. Water level in well
5. Methods and materials used for plugging the well. Capping the casing top is not an approved engineering practice and therefore unapprovable.

(3) TREATMENT PLANTS, STORAGE AND DISTRIBUTION FACILITIES-Water treatment facilities shall be designed, constructed and operated to provide adequate drinking water of a quality that will not adversely affect the health and welfare of the consumer and which will meet secondary standards (for community systems) as described in these regulations. In consideration of water treatment and distribution facilities design, construction and operation, the following criteria shall be complied with:

(a) Water Treatment Plant-In addition to disinfection as required by Section 17-22.106(3)c. below, the water treatment plant shall be designed and located according to acceptable sanitary engineering practices so as to provide drinking water complying with Section 17-22.104, Florida Administrative Code standards.

1. Before a community water system makes any significant modifications to its existing treatment process for the purpose of achieving compliance with trihalomethane MCL's, such system must submit and obtain Department approval of a detailed plan setting forth its proposed modification and those safeguards that it will implement to ensure that the bacteriological quality of the drinking water served by such system will not be adversely affected by such modification. Each system shall comply with the provisions set forth in the Department approved plan. At a minimum, the Department approved plan shall require the system modifying its disinfection practice to:

a. Evaluate the water system for sanitary defects and evaluate the source water for biological quality.

b. Evaluate its existing treatment practices and consider improvements that will minimize disinfectant demand and optimize finished water quality throughout the distribution system.

c. Provide baseline water quality survey data of the distribution system. Such data should include the results from monitoring for coliform bacteria and performing standard plate counts at 35°C and 20°C.

d. Conduct additional monitoring to assure continued maintenance of optimal biological quality of finished water, for example, when chloramines are introduced as disinfectants or when pre-chlorination is being discontinued. Additional monitoring will also be required by the Department for chlorate, chlorite and chlorine dioxide if chlorine dioxide is used as a disinfectant. Standard plate count analyses are required by the Department, as appropriate, before and after any modification.

e. Demonstrate an active disinfectant residual throughout the distribution system at all times during and after the modification.

(b) Treatment, Coating and Appurtenance Chemicals-Chemicals needed for the treatment of drinking water or that are contained in coatings or are otherwise on equipment surfaces that come into contact with the water shall have been demonstrated through extensive toxicological studies or through some other procedure acceptable to the Department, that no immediate or cumulative adverse physiological effects to the consumer will occur.

(c) Disinfection-All public water systems shall continually have effective disinfection measures employed on the water which the system distributes. The necessary apparatus shall be designed according to acceptable engineering practices based on substantive data regarding, but not limited to, the proposed disinfection measure, the source water and a sanitary survey, so as to maintain throughout the distribution system a minimum continuous and effective free chlorine residual of 0.2 mg/l or its equivalent if other than chlorination is used as the disinfection measure. When utilizing chlorine in combination with ammonia, a minimum combined residual of 0.6 mg/l shall be maintained.

(d) Dual Chlorination Facilities.

1. Gas chlorination-A single gas chlorinator may be provided on systems with an equivalent gas chlorine demand of less than ten pounds per 24 hours. When raw water quality warrants, as determined by the Department, a chlorine residual recorder may be required. All gas chlorination facilities shall be installed in a separate above grade room provided with floor level cross ventilation along with adequate weighing devices and safety equipment. Dual gas chlorination facilities including but not limited to one standby chlorinator and booster pump for every five (5) chlorinators or fraction thereof, repair parts for chlorinators, and automatic cylinder switchover devices shall be provided on all water supply systems with an equivalent gas chlorine demand equal to or exceeding ten pounds per 24 hours. In all cases, upon the loss of chlorination capability a signal to sound an alarm installed on the outside of the chlorine room or in the office or laboratory of the plant shall be provided. Possible exceptions to dual gas chlorination facility requirements will be considered by the Department for a water system provided that both of the following conditions are met:

a. There is supervision on a 24 hour per day, 7 day per week basis or, in the absence of such supervision, there is installed a system which will sound an alarm indicating the loss of chlorine capability or chlorine residual at the police or fire station or other facilities maintained on a 24 hour, 7 day per week basis.

b. Sufficient spare parts are retained to allow expeditious repair in case of failure.

2. Hypochlorination-Hypochlorination facilities may be installed on public water systems with equivalent gas chlorine demands of less than 10 pounds per day and when used on multiple supplies they shall be installed on each source. Average daily system demand shall be used to determine if the amount of chlorine needed is equal to or exceeds 10 lbs/day requiring the use of gas chlorination. Maximum hourly system demand shall be used to determine the chlorinator capacity, whether gas or hypochlorite.

(e) Auxiliary power-All community systems serving 350 or more persons shall be equipped with sufficient finished water storage in combination with standby pumping capability to provide one-half maximum daily system demand or with a source of adequate auxiliary power (equipped with an automatic start up device, except where 24 hour per day, 7 day per week operation is provided) to allow operation of the water treatment units and provide pumping capability of approximately one half maximum daily system demand. The auxiliary power source shall be operated briefly at least once per month for 4 hours under load to insure dependability. For demineralization type systems such as reverse osmosis, electrodialysis, etc., source, distribution, pumping and disinfection capability requirement only applies.

(f) High Service Pumps-High service pumping and distribution facilities shall be designed to provide maximum hourly system demand without development of distribution pressure lower than 20 psi or other health hazards. Elevated storage with appropriate hydraulic characteristics may be combined with service pumping units or distribution components in meeting this system demand.

(g) Meters-All community water systems shall be equipped with a metering device that accurately indicates pumpage of finished water to distribution. Non-community systems shall be equipped with at least an elapsed time clock or other device in conjunction with field calibration of the pump, that will permit determination of flow.

(h) Piping-All pump intake lines located outside of water treatment plant building shall be located above grade or otherwise be protected from infiltration by demonstration that the lines will have a positive head greater than the pump inlets at their volutes under all operating conditions.

(i) Fluoridation-Inasmuch as present evidence indicates that fluoridation of public water supplies, under adequate control, will result in a significant reduction in tooth decay among children in communities utilizing this water treatment process, and that no harmful effects from this treatment have been demonstrated, the Department approves the application of fluoride to public water supplies deficient in this element, provided that the following requirements shall be complied with:

1. Conditions-Prior to the installation and placing into service of the treatment facilities which apply fluoride compounds to a public water system, an expression in writing shall be provided to the Department by the owner of the system or designated official requesting permission to apply fluorides to the system under supervision of the Department and in compliance with Section 17-22.108. Fluoride compounds as used herein may include NaF, Na_2SiF_6 and H_2SiF_6.

2. Fluoride levels in drinking water shall not exceed those as set forth in 17-22.104(1)(a). The optimum fluoride level should be maintained at approximately 1.0 mg/l.

3. Equipment and Installation

a. Fluoridation equipment for use with hydrofluosilicic acid shall be housed in an adequately ventilated separate structure or room provided with floor level cross ventilation.

b. A Department-approved means to determine daily fluoride chemical dosage shall be provided. When weighing scales are used to determine the amount of chemical fed, in order to facilitiate loading and to avoid unnecessary lifting of large containers, the scales should be installed flush with the loading platform at floor level.

c. Solution feed lines shall be installed as close to floor level as practical.

d. At the discretion of the Department, chemicals in powdered or granular form used for fluoridation shall be color-coded when required to distinguish from other water treatment chemicals.

e. Analytical equipment capable of accurate determination of the flouride ion concentration in the treated water is required at each plant utilizing fluoridation equipment. Analysis of the plant effluent (treated water) for fluoride content shall be performed daily and reported to the Department monthly, along with fluoride dosage and quantity of chemical fed, on a daily basis.

4. Quality Assurance.

a. At monthly intervals, each plant practicing fluoridation shall collect a raw, an effluent and four distribution system samples, and "split" them with a laboratory of DHRS or other certified laboratory for analysis. The results of analysis by the plant and the other laboratory shall be submitted to the Department, on the form used for daily reporting of dosage. Comparisons of the split sample results shall be used in the Department's assessment of the adequacy of dosing and monitoring the process by the plant.

b. Each plant practicing fluoride treatment shall be inspected twice a year, with the emphasis on adequacy, safety and consistency with the operation of the fluoride aspects of the facility.

c. If the Department finds that fluoridation is not being carried out in compliance with these rules, it may order corrective action.

(4) ENGINEERING REFERENCES-In addition to the above requirements the technical standards and criteria contained in the following standard water works manuals and technical publications and those referenced throughout this chapter are hereby incorporated by reference and shall be applied in determining whether applications to construct or alter a public water supply system shall be issued or denied.

Technical Volume	Author, Publisher and Address
"Manual for Evaluating Public Drinking Water Supplies" 1971 Edition	U.S. Environmental Protection Agency, Published by: Superintendent of Documents, U.S. Governmental Printing Office, Washington, D.C. 20402
"Water Treatment Plant Design" 3rd Edition, 1971	American Society of Civil Engineers, American Water Works Assoc., and Conference of State Sanitary Engineers, Published by: American Water Works Assoc., Inc., 6666 W. Quincy Ave., Denver, Colorado 80235
"Recommended Standards for Water Works" 1976 Edition	Great Lakes - Upper Mississippi River Board of State Sanitary Engineers, Published by: Health Education Service, P.O. Box 7283, Albany, N.Y. 12224
"Water Quality Treatment" American 3rd Edition, 1971	Prepared and Published: by American Water Works Association, 6666 W. Quincy Avenue, Denver, Colorado 80235
Standards of the American Water Works Association, in effect on September 6, 1977	American Water Works Association, 6666 W. Quincy Avenue, Denver, Col. 80235
"Manual of Treatment Techniques for Meeting the Interim Primary Drinking Water Regulations" EPA	U.S. Environmental Protection Agency, Office of Research and Development, Municipal Environmental Research 600/8-77-005, Published May, 1977 Laboratory Water Supply Division, Cincinnati, Ohio

Members of the public may request and obtain copies of the technical volume by contacting the appropriate publisher at the address indicated.
Specific Authority: 403.861(8)(9), F.S.
Law Implemented: 381.272(6), 403.852(12)(13), 403.853(1)(2)(3)(4)(5), F.S.
History: New 11-9-77, Amended 1-13-81, 3-30-82, 12-13-83, 10-1-85.

17-22.107 Operation and Maintenance.

(1) CLEANING AND DISINFECTION-No supplier of water shall put into service any new plant, pumping station, main standpipe, reservoir, tank or other pipe or structure through which water is delivered to consumers for drinking and household purposes, nor resume the use of any such structure, facilities, or main after it has been cleaned, until such structure, facilities or main has been effectively disinfected. Provided, that this may not necessarily apply to mains, reservoirs, tanks, or other structures, the waters from which are subsequently treated and/or disinfected.

(2) CERTIFICATION LETTER AND CLEARANCE-Upon completion of construction, the engineer of record shall submit a certification of completion letter to the Department or designated county health unit. When a letter of certification and a copy of satisfactory bacteriological results (with a coliform density of less than one in two consecutive daily water samples) are received, a letter of clearance from placing of facilities into service will be issued.

(3) OPERATION AND MAINTENANCE OF EQUIPMENT-

(a) Operation of public water systems according to regulations and approved plans-Upon construction of the public water system the supplier of water shall maintain in good operating condition and keep in operation all equipment designed for the purification of the water supply, or its protection from contamination. The supplier shall maintain a minimum free chlorine residual of 0.2 mg/l or its equivalent, as determined by the Department, throughout the distribution system at all times. The capacity of treatment plant and distribution facilities including pumps and pipes shall be increased commensurately with system demand, and a minimum pressure of 20 psi shall be maintained continuously throughout the distribution system except in extenuating circumstances. The system shall be maintained and operated in accordance with the regulations of the Department and approved plans.

(b) Operation personnel-The supplier of water shall provide responsible operation personnel so that the public water system will comply with Chapter 17-16, Florida Administrative Code. Compliance with Chapter 17-16, Florida Administrative Code, is a requirement of this rule Chapter.

(c) Water samples for laboratory test-Suppliers of water have to comply with 17-22.105, Florida Administrative Code, and therefore suppliers of water are responsible for the collection and delivery of water samples to a Department of Health and Rehabilitative Services laboratory or other certified analytical laboratory. Local county health units may routinely collect and deliver water samples for analysis. However, the supplier of water remains responsible for collecting and delivering the difference between the required number of samples and the number collected and delivered by the local health unit, and for collecting and delivering the required number of samples should

the local health unit fail to collect samples in any month. Should there be a failure to comply with Sections 17-22.104 or 17-22.105, Florida Administrative Code, the supplier of water will have to go through the public notification process, Section 17-22.112, Florida Administrative Code.

(d) Abnormal occurrences-No new source of water supply shall be introduced into the system, and no purification process or protection provision shall be altered or discontinued, except where the treatment plant operator notifies the Department and secures written approval therefrom. In case of a breakdown in purification or protective works, breaks in main transmission lines causing major interruptions in service or where any suspicious circumstances or abnormal taste or odor occurs in connection with a public water supply, it shall be the duty of the person responsible for the operation of the works or the treatment plant operator to notify within 24 hours the Department by wire or telephone. It shall be the duty of the Department to notify the appropriate local health unit(s). Provided, however, that where there is a designated local health unit the local health officer shall be notified and it shall be his duty to notify the Department.

(e) Maintenance logs-An on-site maintenance log of all water plant equipment which directly affects the quality of treatment shall be maintained by the plant's lead operator and available at all times at all water treatment plants that treat water for a community water system. Log information shall include, as a minimum, all maintenance performed, date performed, and problems encountered with equipment.

(4) CROSS CONNECTION CONTROL

(a) Cross-connection, which is the physical connection of a water system or other substances of unknown, questionable or unsafe water quality to a public water system, is prohibited. However, a person owning or managing a public water system may inter-connect to the public water system another water system if such other system is regularly examined as to its quality by those persons owning or managing the public water system and the other water system meets all requirements contained in Chapter 17-22, Florida Administrative Code. This provision shall apply to all water distribution systems which are either inside or outside of any building or buildings.

(b) Control program and required action after detection-Community Water systems are required to establish a routine cross-connection control program for the purpose of detecting and preventing cross-connections that create or have the potential to create an imminent and substantial danger to public health by and from contamination due to cross-connection. Upon detection of a prohibited cross-connection, both community and non-community water systems shall either eliminate the cross-connection by installation of an appropriate backflow prevention device acceptable to the Department or discontinue service until the contaminant source is eliminated. Such program shall be developed utilizing accepted practices of the American Water Works Association guidelines as set forth in AWWA manuals m14, "Backflow Prevention and Cross Connection Control," and "Cross Connections and Backflow Prevention", 2nd Edition.

(c) Backflow prevention-Only the following are considered to be backflow prevention devices. They shall be installed in agreement with and under the

supervision of the supplier of water or his designated representative (plumbing inspector, etc.) at the consumer's meter, at the property line of the consumer when a meter is not used, or at a location designated by the supplier of water or the Department. The devices are:

1. Air gap separation-A physical separation between the free-flowing discharge end of a potable water supply pipeline and an open or non-pressure receiving vessel. An "approved airgap separation" shall be at least double the diameter of the supply pipe measured vertically above the top of the rim of the vessel-in no case less than 1 inch.

2. Reduced pressure backflow preventer-A device containing within its structure a minimum of two independently acting approved check valves, together with an automatically operating pressure differential relief valve located between the two check valves. The first check valve reduces the supply pressure a predetermined amount so that during normal flow and at cessation of normal flow the pressure between the checks shall be less than the supply pressure. In case of leakage of either check valve, the differential relief valve, by discharging to atmosphere, shall operate to maintain the pressure between the checks less than the supply pressure. The unit shall include tightly closing shutoff valves located at each end of the device, and each device shall be fitted with properly located test cocks.

3. Atmospheric vacuum breaker-A backflow prevention device which is operated by atmospheric pressure in combination with the force of gravity. The unit is designed to work on a vertical plane only. The one moving part consists of a poppet valve which must be carefully sized to slide in a guided chamber and effectively shut off the reverse flow of water when a negative pressure exists.

4. Pressure vacuum breaker-A pressure vacuum breaker is similar to an atmospheric vacuum breaker except that the checking unit "poppet valve" is activated by a spring. This type of vacuum breaker does not require a negative pressure to react and can be used on a pressure side of a valve.

5. Double check valve assembly-An assembly composed of two single, independently acting, check valves*, including tightly closing shutoff valves located at each end of the assembly and suitable connections for testing the water tightness of each check valve. *A valve that is drip-tight in the normal direction of flow when the inlet pressure is one p.s.i. and the outlet pressure is zero. The check valve shall permit no leakage in a direction reverse to the normal flow. The closure element (e.g. clapper) shall be internally weighted or otherwise internally loaded to promote rapid and positive closure.

(5) Reporting-See Section 17-22.111 which follows.

Specific Authority: 403.861(8)(9), F.S. Law Implemented: 403.852(12)(13), 403.853(1)(3), F.S. History: New 11-9-77, Amended 1-13-81.

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PART IV
PERMITTING, VARIANCES, EXEMPTIONS, WAIVERS

17-22.108 Permitting.

(1) APPLICATIONS-This subsection sets forth the various type drinking water permit applications as well as the minimum information and fee which must be supplied to the Department as a permit application. Information must be submitted on each item.

(a) Public Water Supply Well Construction Permit.

1. Prohibition-It is prohibited to construct a public water supply well without a signed and validated permit issued by the department or the appropriate water management district created under Chapter 373, Florida Statutes, by the following water management districts:

a. Northwest Florida Water Management District

b. Suwannee River Water Management District

c. St. Johns River Water Management District

d. Southwest Florida Water Management District

e. In the area encompassed by the South Florida Water Management District, permits to construct public water supply wells are issued pursuant to Part III, Chapter 373, Florida Statutes, by the appropriate department, district or subdistrict office.

2. Application-Prior to commencing construction of a public water supply well, the licensed water well contractor should apply to the department or the appropriate water management district listed above for a permit to construct the well in accordance with Chapter 17-21, Florida Administrative Code, Part III, Chapter 373, Florida Statutes, and Section 17-22.106(2), Florida Administrative Code.

3. Prohibition-It is prohibited to construct or use a water supply well until a signed, validated permit is obtained from the Department or the appropriate water management district, and received by the licensed water well drilling contractor and the owner of the well.

4. Application-Before commencing the construction of a well, the licensed well drilling contractor shall make application to the Department or the appropriate water management district for a water supply well drilling permit. The application form may be obtained from any of the offices of the appropriate water management district or the Department's offices. The application shall be signed by the licensed well drilling contractor as well as the person, or authorized agent of the person, who will own the well. Application shall be made in triplicate to the appropriate local office of the Department or appropriate water management district.

5. Information-The permit application form sets forth the minimum information which is to be supplied. Additional information may be required for any given permit application. The information which is required by the permit application is as follows:

a. Type of construction, casing material, proposed depth and diameter, proposed type of casing seat, required yield, and nature of the place to be supplied by the well water.

b. A plat showing the location of the proposed well relative to existing physical features. The location of known possible sources of contamination must be shown as well as proposed physical features and proposed sources of contamination.

(b) Drinking Water System Plant Permit.

1. Prohibition-No person shall construct a new or alter an existing drinking water system plant without having first applied for and obtained a signed validated permit from the Department or designated County Health Unit.

2. Coverage-A drinking water system plant includes jointly and severally the collection, treatment, storage and distribution segments of a public water system. Construction or alteration of any one or more segments will require application for and obtaining of a permit approving the construction or alteration. Those persons who create a consecutive public water system by adding a water conditioning device to a public water system are not required to obtain permits, but must submit a sketch of the consecutive public water system and a complete technical description of the water conditioning device to the appropriate department or designated county health unit. A decision concerning monitoring will be made in accordance with 17-22.105(5), Florida Administrative Code, and said decision will be made known by written notice to the person who had the water conditioning device installed.

3. Application-Before commencing construction or alteration, a person or authorized agent of the person shall make application to the Department using DER Form 17-1.122(9) [Application for Construction Permit--Public Drinking Water System] or, for distribution system extensions pursuant to the General Permit provisions of Fla. Admin. Code Rule 17-4.63 using DER Form 17-1.122(43). The application shall be executed in full and made in quadruplicate to the appropriate local office of the Department or the Local County Health Unit if designated by Rule 17-22.108.

4. Engineer of record-All drawings, specifications and data required with the application shall be prepared by an engineer licensed in the state under the provision of Chapter 471, Florida Statutes, and shall fulfill the requirements of Section 471.30, Florida Statutes. The engineer of record or other qualified professional engineer shall be retained to observe project construction and to assure conformance with approved engineering plans and specifications, and to perform the subsequent certification as to completion and conformance of project construction.

5. Information-The permit application form sets forth the minimum information which is to be supplied to the Department or designated County Health Unit. Additional information may be required by the Department for any given permit application. The information which is required by the application is as follows:

a. Certificate that the plans for the project have been approved by the governing body of the applicant (city commissioners, corporation, board, etc.)

b. Comprehensive engineer's report describing the project, basis of design, including design data and such pertinent data within the scope of the project and requirements of Chapter 17-22 to give an accurate understanding of work to be undertaken and reasons therefore.

c. Prints of drawings of the work project which contain sufficient detail to clearly appraise the Department of the work to be undertaken. All prints shall be minimum 18 x 24 inch size, and a maximum size of 36 x 42 inches, and the scale of details contained shall be satisfactory for microfilm reproduction. (Reduced size photographic reproduction of drawings for submission may be authorized.)

d. Complete specifications of the project necessary to supplement the prints submitted.

e. A certificate authorizing the applicant to provide service if such certificate is required by Chapter 367, Florida Statutes.

f. Such additional data as may be requested by the Department after initial application for purpose of clarification, anticipated use, or to support any changes in the scope of the project, actual or anticipated.

6. Designated Local Health Units-Those County Health Units with a qualified engineering staff shall be designated to do the following:

a. Review and evaluate each application for the construction, modification, or expansion of a public water system to determine compliance with federal, state, and local requirements.

b. Review, evaluate, and approve or disapprove applications for the expansion of distribution systems and drinking water system plants for non-community systems. The Department's District and Subdistrict offices should be contacted for the names of those County Health Units which have been designated to approve or disapprove.

(c) Fees-A non-refundable fee of twenty (20) dollars payable to the order of the agency taking final action must accompany each application. However, no processing fee will be required for applications filed with the Department pursuant to the General Permit provisions of Fla. Admin. Code Rule 17-4.63.

(2) APPROVAL-This subsection sets forth the evaluation criteria the Department uses, the showing an applicant must make on each of the evaluation criteria, and the manner of decision on the application, duration, suspension and revocation of permits. For applications to construct an extension to a public water supply distribution system under the provisions of the General Permit, the procedures, general conditions, and specific conditions of Fla. Admin. Code Rules 17-4.53, 17-4.54 and 17-4.63 shall also apply.

(a) Showing-The applicant must provide the Department with reasonable assurance that no aspects of the design and proposed and completed construction create or have the potential to create an imminent and substantial danger to health and that all applicable primary and secondary drinking water regulations will be complied with.

(b) Evaluation Criteria for Water Supply Well Drilling Permit-the appropriate water management district or the Department will evaluate each application for a water supply well drilling permit for compliance with 17-22.106(2), Florida Administrative Code.

(c) Evaluation Criteria for Public Water Supply Permits-The Department will evaluate each application for the following:

1. Compliance with each and every quality standard contained in 17-22.104, Florida Administrative Code.

2. Adequate engineering design complying with acceptable engineering principles as established in 17-22.106, Florida Administrative Code.

3. Any additional criteria not previously named, if used, will be made known to the applicant when a decision on the application is made known to the applicant.

(d) Decisions-The Department's appropriate local office will either grant or deny a permit within the time prescribed by Chapter 120, Florida Statutes. Should an adverse decision be reached, the applicant will be informed of that decision and the reasons therefor. Additionally, if a favorable decision is reached, a complete set of the approved plans, specifications, application, and other data shall be returned to the applicant. Provided, the Department may at its discretion return such complete set of approved plans and related material to the registered professional engineer or licensed well drilling contractor authorized to represent the applicant. Any and all construction, alteration or extension of public water supply systems shall be in accordance with such Department approved plans. Provided, appropriate changes in a specific project may be made only on prior written approval and consent of the Department.

(e) Duration, Suspension, Revocation-Unless stated differently on the face of the permit, the permit shall be valid for one year from the date of issuance. Reapproval of expired permits will be considered by the Department upon written request accompanied by a 20 dollar renewal fee to the office that issued the original permit. Suspensions and revocation will be done as stated in Section 17-4.110, Florida Administrative Code and Section 28-6.09, Florida Administrative Code.

Specific Authority: 373.016(3), 373.046, 373.309(2), 403.861(2)(6)(8), F.S.
Law Implemented: 367.031, 373.016(3), 373.046, 373.309(2), 403.852(12), 403.853(1)(3), 403.861(2)(6)(8)(9), F.S.
History: New 11-9-77, Amended 5-25-78, 1-13-81, 3-30-82, 7-8-82.

17-22.109 Variances, Exemptions and Waivers.

(1) APPLICATION-This sub-section sets forth the information which must be contained in an application for a variance, or exemption or waiver. Information must be submitted on each item. Until information on each item is received, the Department has not received a completed application for either a variance, exemption or waiver. If adequate information is submitted on each item, the Department will process the application on its merits. Applications shall be submitted in quadruplicate to the local Department office which shall forward a single copy to the Department's office in Tallahassee.

(a) Variance Request-A supplier of water may request the granting of a variance for a public water system by submitting a request for a variance in writing to the Department. Suppliers of water may submit a joint request for variance when they seek similar variance or variances under similar circumstances. Any written request for a variance shall include the following information:

1. The nature and duration of variance requested.

2. Relevant analytical results of water quality sampling of the system, including results of relevant tests conducted pursuant to the requirements of the state primary drinking water regulations.

3. For any request for variance from a maximum contaminant level:

a. Explanation in full and evidence of the best available treatment technology and techniques.

b. Economic and legal factors relevant to ability to comply.

c. Analytical results of raw water quality relevant to the variance request.

d. A proposed compliance schedule, including the date each step toward compliance will be achieved. Such schedule shall include as a minimum the following dates:

(i) Date by which arrangement for alternative raw water source or improvement of existing raw water source will be completed.

(ii) Date of initiation of the connection of the alternative raw water source or improvement of existing raw water source.

(iii) Date by which final compliance is to be achieved.

e. A plan for the provision of safe drinking water in the case of an excessive rise in the contaminant level for which the variance is requested.

f. A plan for interim control measures during the effective period of variance.

4. For any request for variance from a treatment technique, statement that the system will perform monitoring and other reasonable requirements prescribed by the Department as a condition to the variance.

5. Other information, if any, believed to be pertinent by the applicant.

6. Such other information as the Department may require.

(b) Exemption Request-A supplier of water may request the granting of an exemption for a public water system by submitting a request for exemption in writing to the Department. Suppliers of water may submit a joint request for exemption when they seek similar exemptions under similar circumstances. Any written request for an exemption or exemptions shall include the following information:

1. The nature and duration of exemption requested.

2. Relevant analytical results of water quality sampling of the system, including results of relevant tests conducted pursuant to the requirements of the state primary drinking water regulations.

3. Explanation of the compelling factors such as time or economic factors which prevent such system from achieving compliance.

4. Other information, if any, believed by the applicant to be pertinent to the application.

5. A proposed compliance schedule, including the date when each step toward compliance will be achieved.

6. Such other information as the Department may require.

(c) Request for waiver of chlorination requirement-A supplier of water may request the waiver of any chlorination requirement for a non-community water system in existence on July 18, 1980 by submitting a request for a waiver in writing to the Department. Any written request shall include the following information:

1. Documentation of the history of the quality of water provided by the system and monitoring tests for bacteriological contamination for at least the three years preceding the request.

2. A detailed description of the well and the site on which it is located, including geology, depth of well, casing, grouting and other relevant factors which have an impact on the quality of water supplied. The supplier of water shall provide plans, drawings or test data in support of the description or otherwise establish the reliability of the description.

3. The number of connections and size of the distribution system, its age and the materials of which it is constructed.

(d) Request for waiver of certified operator requirement-A supplier of water may request the waiver of any certified operator requirement for a non-community water system having design flow of less than 10,000 gallons per day by submitting a request for a waiver in writing to the Department. Any request shall include the following information:

1. Operation and maintenance records for the year preceding an application for waiver, including bacteriological monitoring test results.

2. A description of and results of monitoring procedures for maximum contaminant levels included in Primary Drinking Water Regulations.

3. An explanation of why it is not feasible for the supplier of water to become a certified operator or to retain the services of a certified operator.

4. Provisions that will be made for inspection of the water system from time to time for defects or to assess the condition and need for repair of the water system.

(2) APPROVAL-This subsection sets forth the evaluation criteria the Department uses, the showing an applicant must make, and the manner of decision on the application. Variances or exemptions cannot be obtained from operation, maintenance, monitoring and reporting requirements.

(a) Showing-The applicant must provide the Department with the information that will enable the Department to make the following findings:

1. Variance from maximum contaminant level-find that granting a variance will not result in an unreasonable risk to health, the application to the raw water source of the best technology and treatment techniques, which are generally available to a larger water system at reasonable cost, has not resulted in compliance with an MCL, all other reasonable technological, economic and legal efforts have been made.

2. Variance from a treatment technique-such treatment technique is not necessary to protect the health of persons because of the nature of the raw water source of such system.

3. Exemptions from maximum contaminant level or treatment technique-find that due to compelling factors the public system is unable to comply, the public water system was in operation on the effective date of the contaminant level or treatment technique, or both from which exemption is sought, and granting will not result in an unreasonable risk to health.

4. Waiver of chlorination requirement-find that no hazard to health will result.

5. Waiver of certified operator requirement-find that the system can be properly maintained without a certified operator and that no hazard to public health will result from non-attendance of the system by a certified operator.

(b) Evaluation Criteria-The Department will evaluate the submitted information as well as any other available information for each item required for application.

1. In its consideration of whether the public water system is unable to comply with a contaminant level required by the primary drinking water regulations because of the nature of the raw water source, the Department shall consider such factors as, but not limited to:

a. The availability and effectiveness of treatment methods for the contaminant for which the variance is requested.

b. Cost and other economic considerations such as implementing treatment, improving the quality of the source water or using an alternate source.

2. In its consideration of whether a public water system should be granted a variance to a required treatment technique because such treatment is unnecessary to protect the public health, the Department shall consider such factors as, but not limited to:

a. Quality of the water source including water quality data and pertinent sources of pollution.

b. Source protection measures employed by the public water system.

3. In its consideration of whether the public water system is unable to comply due to compelling factors, the Department shall consider such factors as, but not limited to:

a. Construction, installation, or modification of treatment equipment or systems.

b. The time needed to put into operation a new treatment facility to replace an existing system which is not in compliance.

c. Economic feasibility of compliance.

4. In consideration of whether a non-community water system should be granted a waiver of the chlorination requirement, the Department shall consider the results of a sanitary survey. The supplier of water for any non-community water system granted a waiver of the chlorination requirement shall monitor for microbiological contamination on at least a monthly basis or as otherwise specified by the Department and shall report the results to the Department. A sanitary survey is not mandatory before a waiver of the certified operator requirement but may be performed and considered by the Department.

(c) Manner of Decision-Within 90 days of receipt of a completed application or a timely request for additional information in connection with the application, the Department will make a decision on the application. The applicant will be notified of the Department's intended decision by a written notice which states with particularity the grounds for the decision. The notice will also contain an intended schedule for compliance with that from which a variance or exemption is sought. A hearing may be requested on the Department's intended decision in accordance with Chapter 120, Florida Statutes. Whenever the Department issues a letter of intent to grant or deny a variance or exemption, the Department will give all affected persons

constructive notice of the compliance schedule by publication in the Florida Administrative Weekly and a newspaper of general circulation in the area affected by the variance or exemption. Should any person wish a public hearing, the person must submit a request for a public hearing within thirty (30) days of publication of the notice. The Department will only act upon hearing requests from persons whose substantial interests are affected. Should a hearing not be requested within the allotted time, the right to an administrative hearing will be deemed waived and the Department's intended decision will be final.

(d) Times-A variance or exemption cannot extend the time for compliance with a treatment technique or MCL requirement prescribed by Section 17-22.104 in excess of the following limitations:

1. variance-compliance as expeditiously as practicable.

2. exemption-compliance as expeditiously as practicable, but not later than January 1, 1984, for an MCL or treatment technique, which is denoted as an interim national primary drinking water regulation under the Federal Act, and not later than seven years after an MCL or treatment technique, which is denoted as a revised national primary drinking water regulation under the Federal Act, comes into effect; provided, however, if a public water system has entered into an enforceable agreement to become a part of a regional public water system the times shall be for an interim or revised requirement, respectively, January 1, 1986, and nine years.

(e) Duration of waiver-A waiver shall be granted for a period of three years and shall be renewable upon application to the Department pursuant to Section 403.854, F.S. and Section 17-22.109, Florida Administrative Code.

(f) Revocation of waiver-The Department may revoke any waiver to protect the public health, provided that such revocation is necessary to achieve compliance with state quality standards for safe drinking water, or the supplier of water fails to comply with any conditions of the waiver.

Specific Authority: 403.861(8), F.S.
Law Implemented: 403.852(12)(13), 403.853(1)(3), 403.854(1)(2)(3)(4)(5), F.S.
History: New 11-9-77, Amended 12-22-77, 1-18-81, 3-30-82.

PART V
SURVEILLANCE, RECORDS AND REPORTING

General-The Department is charged with the duty to create and implement a drinking water program. Federal and State laws require the State to report to EPA as well as collect and periodically verify reports, etc. from suppliers of water.

17-22.110 Surveillance. The legislature has conferred upon the Department and the Department of Health and Rehabilitative Services and their authorized employees the authority and power to enter and inspect and sample public water systems. All employees of the Department and the Department of Health and Rehabilitative Services whose job responsibilities call for them to enter and sample and/or inspect a public water system are authorized to enter and sample and/or inspect, and conduct sanitary surveys upon identification.
Specific Authority: 403.861(8), F.S.
Law Implemented: 403.852(12)(13), 403.853(3), 403.855, 403.858, F.S.
History: New 11-9-77.

17-22.111 Records and Reporting.

(1) RECORD MAINTENANCE-Any supplier of water shall retain on the premises of the public water system treatment plant or at a convenient location near the 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 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 processed 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 violation 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 cross connection control programs or 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 and exemption.

(e) Water plant operation reports shall be kept for a period of not less than 5 years.

(2) REPORTING REQUIREMENTS-Suppliers of Water shall report as follows:

(a) Except where a shorter reporting period is specified in this Rule, the suppliers of water shall report to the district or sub-district offices of the Department or appropriate County Health Unit the results of the test, measurement or analysis required by this Rule within the first ten days following the end of the required monitoring period as designated by the Department, or the first ten days following the month in which the sample results were received, whichever time is shortest.

(b) The monthly operation reports for a public water system shall be submitted by the plant's certified lead operator to the appropriate office of the Department and the appropriate designated County Health Unit within 15 days after the month of operation.

(c) The suppliers of water shall report to the appropriate district or subdistrict office of the Department within 48 hours the failure to comply with any drinking water regulation contained in Section 17-22.104 or 17-22.105. When the last measure is accomplished, the measures taken to correct the non-compliance shall be reported to that office.

(d) The supplier of water is not required to report analytical results to the Department in cases where a Department of Health and Rehabilitative Services laboratory performs the analysis and reports the results to the Department.

(e) 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 or Federal agency, shall be submitted to the Department's district or sub-district office and the appropriate designated County Health Department within 15 days of receipt by the supplier of water of the information.

(f) The supplier of water, within ten days of completion of each public notification requirement pursuant to 17-22.112, shall submit to the Department a representative copy of each type of notice distributed, published, posted, and made available to the persons served by the system and the media.

(g) Upon request, the supplier of water shall submit to the Department within the time stated in the request, copies of any records required to be maintained under 17-22.111(1) or copies of any document which the Department is entitled to inspect.

(3) LOCATION OF RECORDS-Pursuant to the Public Records statute, Chapter 119, Florida Statutes, the above records and the records of enforcement cases, permit, variance and exemption applications shall be maintained on file by the department as follows:

(a) All results of chemical analyses shall be retained by the district, sub-district and central offices of the Department.

(b) All results of bacteriological analyses shall be retained by the district and sub-district offices of the Department.

(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 on file at the district, sub-district and central offices of the Department.

(d) Records concerning a variance exemption, or permit granted to the system and enforcement actions instituted against the system shall be kept on file at the district, subdistrict, and central offices of the Department.

(e) Water plant operation reports shall be kept on file at the plant site and at the district and sub-district office.
Specific Authority: 403.961(8)(15)(16), F.S.
Law Implemented: 403.853(3)(4), 403.101, F.S.
History: New 11-9-77, Amended 1-13-81, 3-30-82.

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PART VI
PUBLIC NOTIFICATION, IMMINENT HAZARDS, VIOLATIONS

General-In order to carry out the duties of the Department as well as to assure adequate protection of the public, requirements and procedures are needed to systematize and standardize response and actions in such situations.

17-22.112 Public Notification. This section shall apply to primary contaminants only.

(1) If a community water system fails to comply with an applicable maximum contaminant level established in 17-22.104, fails to comply with an applicable testing procedure established in 17-22.105, 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 in 17-22.105, the supplier of water shall notify persons served by the system of such failure or granting of an exemption or variance by giving notice of such fact in the first set of water bills of the system issued after the failure or variance or exemption 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.

(2) 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 (1) of this section, as follows:

(a) By publication on not less than three consecutive days in a newspaper 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.

(b) 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.

(3) The requirements of subsection (2) may be waived by the Department if it determines that the violation has been corrected promptly after discovery, the cause of the violation has been eliminated, and there is no longer a risk to public health.

(4) 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 (2) 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.

(5) If a non-community water system fails to comply with an applicable maximum contaminant level established in 17-22.104, fails to comply with an

applicable testing procedure established in 17-22.105, is granted a variance or 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 in 17-22.105, the supplier of water shall give notice of such failure or variance or exemption grant to the persons served by the system by fixed sign located at all potable water outlets or connections.

(6) 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 drinking water regulation contained in Section 17-22.104 and/or 17-22.105, Florida Administrative Code has been violated and any preventive measures that should be taken by the public. Where appropriate, or where designated by the the Department, bilingual notice shall be given. Notice 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.

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

(8) In any instance in which notification by mail is required by paragraph (1) of this section but notification by newspaper or to radio or television stations is not required by paragraph (2) of this section, the Department 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.

Specific Authority: 403.861(8), F.S. Law Implemented: 403.857, F.S. History: New 11-9-77, Amended 1-13-81, 3-30-82.

17-22.113 Imminent Hazards. Before the Department can invoke the powers conferred upon it by Section 403.855, Florida Statutes, the Department will as a minimum need the following information:

(1) Name and address of the responsible person;

(2) Identification of the contaminant which is present in or likely to enter a public water system;

(3) An explanation of how and why the contaminant presents an imminent and substantial danger; and

(4) The name and location of the public water system and its owner, if different from Number 1. Upon receipt of sufficient information and after investigation of that information the Department will take action which is appropriate to the situation. Taking action pursuant to Section 17-22.113, Florida Administrative Code, and Section 403.855 does not exclude taking simultaneous action pursuant to Section 403.856, Florida Statutes.

Specific Authority: 403.861(8), F.S.
Law Implemented: 403.855, F.S.
History: New 11-9-77.

17-22.114 Violations.

(1) Prohibited acts-The following acts and the causing thereof are prohibited and are violations of the Act:

(a) Failure by a supplier of water to comply with the requirements of Section 403.857, or dissemination by such supplier of any false or misleading information with respect to notices required pursuant to Section 403.857 or with respect to remedial actions being undertaken to achieve compliance with state primary and secondary drinking water regulations.

(b) Failure by a supplier of water to comply with regulations adopted pursuant to Section 403.853, or any rule adopted by the Department pursuant to the Act, or with conditions for variances or exemptions authorized under Section 403.854.

(c) Failure by any person to comply with any order issued by the Department pursuant to Florida Safe Drinking Water Act (the Act).

(d) Failure by a supplier of water to allow any duly authorized representative of the Department or of the Department of Health and Rehabilitative Services to conduct inspections pursuant to Section 403.858.

(e) Submission by any person of any false statement or representation in any application, record, report, plan or other document filed, or required to be filed by this act, or rules adopted by the Department pursuant to its lawful authority.

(f) Failure by a supplier of water to comply with any approval or condition to the approval of plans and specifications issued by the Department pursuant to this act.

(g) No owner or supplier of a public water system treatment plant shall knowingly allow or encourage any operator in his employ to violate any rule, regulation, or law related to treatment plant operation.

(2) Penalties

(a) A fine, not to exceed $5,000 for each day in which such violation occurs or failure to comply continues, may be imposed by a court of competent jurisdiction upon any person who violates, or fails or refuses to comply with any order issued by the Department pursuant to this act.

(b) A fine, not to exceed $5,000 for each day in which a violation occurs, may be imposed by a court of competent jurisdiction on any person who violates sections (a), (b), (d), (e) and (f) above.

Specific Authority: 403.861, F.S.
Law Implemented: 403.850, 403.864, F.S.
History: New 11-9-77.

17-22.115 Fee Schedule. A fee shall be paid to the Department of Health and Rehabilitative Services for its analysis of a water sample taken from a public water supply system for the contaminants listed below in the performance of the monitoring functions required of the Department pursuant to the Florida Safe Drinking Water Act. The tests offered by the Office of Laboratory Services and the fee which is to be paid in advance are as follows:

(1) Chemistry:
(a) Herbicides (2,4-D and 2,4-5 TP Silvex).....$60.00

(b) Pesticides (Endrin, Lindane, Methoxychlor, Toxaphene)..... 30.00
(c) Trihalomethanes..... 30.00
(d) Arsenic..... 4.50
(e) Barium..... 4.50
(f) Cadmium..... 4.50
(g) Chromium..... 4.50
(h) Lead..... 4.50
(i) Mercury..... 4.50
(j) Selenium..... 4.50
(k) Silver..... 4.50
(l) Turbidity..... 2.00
(m) Chloride..... 2.00
(n) Copper..... 2.00
(o) Foaming Agents..... 2.00
(p) H_2S..... 2.00
(q) Iron..... 2.00
(r) Manganese..... 2.00
(s) Odor..... 2.00
(t) pH..... 2.00
(u) Sulfate..... 2.00
(v) Total Dissolved Solids..... 2.00
(w) Zinc..... 2.00
(x) Total Alkalinity..... 2.00
(y) Calcium..... 2.00
(z) Magnesium..... 2.00
(za) Sodium..... 2.00
(2) Radiochemistry:
(a) Gross Alpha..... $20.00
(b) Gross Beta..... 20.00
(c) Radium 226..... 110.00
(d) Radium 228..... 110.00
(e) Iodine 131..... 110.00
(f) Strontium 89 and 90..... 95.00
(g) Tritium..... 25.00
(h) Uranium..... 110.00
(i) Other Radionuclides (photon emitters)..... 30.00

Fees shall be paid to the appropriate state laboratory(ies) except when it is stated in writing by the county health department, the Department of Health and Rehabilitative Services or the Department of Environmental Regulation district, sub-district or branch office manager that a suspected imminent and substantial danger to public health requires that the analysis be performed at once.
Specific Authority: 403.861(8)(14), F.S.
Law Implemented: 403.861(14), 403.862(1)(a)(e), F.S.
History: New 9-10-79.

PART VII
FORMS

Amended and Transferred to 17-1.1221; 2-18-79.

APPENDIX III

Safe Drinking Water Act

SAFE DRINKING WATER ACT

(Enacted by PL 93–523, December 16, 1974, 88 Stat. 1660; 42 U.S.C. 300f *et seq.*; Amended by PL 94–317, June 23, 1976; PL 94–484, October 12, 1976; PL 95–190, November 16, 1977; PL 96–63, September 6, 1979; PL 96–502, December 5, 1980; PL 98–620, November 11, 1984; PL 99–339, June 19, 1986)

Short Title

Section 1. This Act may be cited as the "Safe Drinking Water Act".

Public Water Systems

Sec. 2. [Omitted]

"TITLE XIV — SAFETY OF PUBLIC WATER SYSTEMS

"PART A — DEFINITIONS

"Definitions

"Sec. 1401. For purposes of this title:

"(1) The term 'primary drinking water regulation' means a regulation which —

"(A) applies to public water systems;

"(B) specifies contaminants which, in the judgment of the Administrator, may have any adverse effect on the health of persons:

"(C) specifies for each such contaminant either —

"(i) a maximum contaminant level, if, in the judgment of the Administrator, it is economically and technologically feasible to ascertain the level of such contaminant in water in public water systems, or

"(ii) if, in the judgment of the Administrator, it is not economically or technologically feasible to so ascertain the level of such contaminant, each treatment technique known to the Administrator which leads to a reduction in the level of such contaminant sufficient to satisfy the requirements of section 1412; and

"(D) contains criteria and procedures to assure a supply of drinking water which dependably complies with such maximum contaminant levels; including quality control and testing procedures to insure compliance with such levels and to insure proper operation and maintenance of the system, and requirements as to (i) the minimum quality of water which may be taken into the system and (ii) siting for new facilities for public water systems.

"(2) The term 'secondary drinking water regulation' means a regulation which applies to public water systems and which specifies the maximum contaminant levels which, in the judgment of the Administrator, are requisite to protect the public welfare. Such regulations may apply to any contaminant in drinking water (A) which may adversely affect the odor or appearance of such water and consequently may cause a substantial number of the persons served by the public water system providing such water to discontinue its use, or (B) which may otherwise adversely affect the public welfare. Such regulations may vary according to geographic and other circumstances.

"(3) The term 'maximum contaminant level' means the maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

"(4) The term '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. Such term includes (A) any collection, treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system, and (B) any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system.

"(5) The term 'supplier of water' means any person who owns or operates a public water system.

"(6) The term 'contaminant' means any physical, chemical, biological, or radiological substance or matter in water.

"(7) The term 'Administrator' means the Administrator of the Environmental Protection Agency.

"(8) The term 'Agency' means the Environmental Protection Agency.

"(9) The term 'Council' means the National Drinking Water Advisory Council established under section 1446.

"(10) The term 'municipality' means a city, town, or other public body created by or pursuant to State law, or an Indian Tribe.

[1401(10) amended by PL 99–339]

"(11) The term 'Federal agency' means any department agency, or instrumentality of the United States.

"(12) The term 'person' means an individual, corporation, company, association, partnership, State, municipality, or Federal agency (and includes officers, employees, and agents of any corporation, company, association, State, municipality, or Federal agency).

[1401(12) amended by PL 95-190]

"(13) The term 'State' includes, in addition to the several States, only the District of Columbia, Guam, and Commonwealth of Puerto Rico, the Northern Mariana Islands, the Virgin Islands, American Samoa, and the Trust Territory of the Pacific Islands.

[1401(13) added by PL 94-317; amended by PL 94-484]

"(14) The term 'Indian Tribe' means any Indian tribe having a Federally recognized governing body carrying out substantial governmental duties and powers over any area.

[1401(14) added by PL 99-339]

"PART B — PUBLIC WATER SYSTEMS

"Coverage

"Sec. 1411. Subject to sections 1415 and 1416, national primary drinking water regulations under this part shall apply to each public water system in each State; except that such regulations shall not apply to a public water system —

"(1) which consists only of distribution and storage facilities (and does not have any collection and treatment facilities);

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

"(3) which does not sell water to any person; and

"(4) which is not a carrier which conveys passengers in interstate commerce.

"National Drinking Water Regulations

"Sec. 1412. "(a)(1) Effective on the enactment of the Safe Drinking Water Act Amendments of 1986, each national interim or revised primary drinking water regulation promulgated under this section before such enactment shall be deemed to be a national primary drinking water regulation under subsection (b). No such regulation shall be required to comply with the standards set forth in subsection (b)(4) unless such regulation is amended to establish a different maximum contaminant level after the enactment of such amendments.

"(2) After the enactment of the Safe Drinking Water Act Amendments of 1986 each recommended maximum contaminant level published before the enactment of such amendments shall be treated as a maximum contaminant level goal.

"(3) Whenever a national primary drinking water regulation is proposed under paragraph (1), (2), or (3) of subsection (b) for any contaminant, the maximum contaminant level goal for such contaminant shall be proposed simultaneously. Whenever a national primary drinking water regulation is promulgated under paragraph (1), (2), or (3) of subsection (b) for any contaminant, the maximum contaminant level goal for such contaminant shall be published simultaneously.

"(4) Paragraph (3) shall not apply to any recommended maximum contaminant level published before the enactment of the Safe Drinking Water Act Amendments of 1986.

[1412(a) revised by PL 99-339]

[1412(b)(1) — (3) revised by PL 99-339]

"(b)(1) In the case of those contaminants listed in the Advance Notice of Proposed Rulemaking published in volume 47, Federal Register, page 9352, and in volume 48, Federal Register, page 45502, the Administrator shall publish maximum contaminant level goals and promulgate national primary drinking water regulations —

"(A) not later than 12 months after the enactment of the Safe Drinking Water Act Amendments of 1986 for not less than 9 of those listed contaminants;

"(B) not later than 24 months after such enactment for not less than 40 of those listed contaminants; and

"(C) not later than 36 months after such enactment for the remainder of such listed contaminants.

"(2)(A) If the Administrator identifies a drinking water contaminant the regulation of which, in the judgment of the Administrator, is more likely to be protective of public health (taking into account the schedule for regulation under paragraph (1)) than a contaminant referred to in paragraph (1), the Administrator may publish a maximum contaminant level goal and promulgate a national primary drinking water regulation for such identified contaminant in lieu of regulating the contaminant referred to in such paragraph. There may be no more than 7 contaminants in paragraph (1) for which substitutions may be made. Regulation of a contaminant identified under this paragraph shall be in accordance with the schedule applicable to the contaminant for which the substitution is made.

"(B) If the Administrator identifies one or more contaminants for substitution under this paragraph, the Administrator shall publish in the Federal Register not later than one year after the enactment of the Safe Drinking Water Act Amendments of 1986 a list of contaminants proposed for substitution, the contaminants referred to in paragraph (1) for which substitutions are to be made, and the basis for the judgment that regulation of such proposed substitute contaminants is more likely to be protective of public health (taking into account the schedule for regulation under such paragraph). Following a period of 60 days for public comment, the Administrator shall publish in the Federal Register a final list of contaminants to be substituted and contaminants referred to in paragraph (1) for which substitutions are to be made, together with responses to significant comments.

"(C) Any contaminant referred to in paragraph (1) for which a substitution is made, pursuant to subparagraph (A) of this paragraph, shall be included on the priority list to be published by the Administrator not later than January 1, 1988, pursuant to paragraph (3)(A).

"(D) The Administrator's decision to regulate a contaminant identified pursuant to this paragraph in lieu of a contaminant referred to in paragraph (1) shall not be subject to judicial review.

"(3)(A) The Administrator shall publish maximum contaminant level goals and promulgate national primary drinking water regulations for each contaminant (other than a contaminant referred to in paragraph (1) or (2) for which a national primary drinking water regulation was promulgated) which, in the judgment of the Administrator, may have any adverse effect on the health of persons and which is known or anticipated to occur in public

water systems. Not later than January 1, 1988, and at 3 year intervals thereafter, the Administrator shall publish a list of contaminants which are known or anticipated to occur in public water systems and which may require regulation under this Act.

"(B) For the purpose of establishing the list under subparagraph (A), the Administrator shall form an advisory working group including members from the National Toxicology Program and the Environmental Protection Agency's Offices of Drinking Water, Pesticides, Toxic Substances, Ground Water, Solid Waste and Emergency Response and any others the Administrator deems appropriate. The Administrator's consideration of priorities shall include, but not be limited to, substances referred to in section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, and substances registered as pesticides under the Federal Insecticide, Fungicide, and Rodenticide Act.

"(C) Not later than 24 months after the listing of contaminants under subparagraph (A), the Administrator shall publish proposed maximum contaminant level goals and national primary drinking water regulations for not less than 25 contaminants from the list established under subparagraph (A).

"(D) Not later than 36 months after the listing of contaminants under subparagraph (A), the Administrator shall publish a maximum contaminant goal and promulgate a national primary drinking water regulation for those contaminants for which proposed maximum contaminant level goals and proposed national primary drinking water regulations were published under subparagraph (C).

[New 1412(b)(4) — (8) added by PL 99-339]

"(4) Each maximum contaminant level goal established under this subsection shall be set at the level at which no known or anticipated adverse effects on the health of persons occur and which allows an adequate margin of safety. Each national primary drinking water regulation for a contaminant for which a maximum contaminant level goal is established under this subsection shall specify a maximum level for such contaminant which is as close to the maximum contaminant level goal as is feasible.

"(5) For the purposes of this subsection, the term 'feasible' means feasible with the use of the best technology, treatment techniques and other means which the Administrator finds, after examination for efficacy under field conditions and not solely under laboratory conditions, are available (taking cost into consideration). For the purpose of paragraph (4), granular activated carbon is feasible for the control of synthetic organic chemicals, and any technology, treatment technique, or other means found to be the best available for the control of synthetic organic chemicals must be at least as effective in controlling synthetic organic chemicals as granular activated carbon.

"(6) Each national primary drinking water regulation which establishes a maximum contaminant level shall list the technology, treatment techniques, and other means which the Administrator finds to be feasible for purposes of meeting such maximum contaminant level, but a regulation under this paragraph shall not require that any specified technology, treatment technique, or other means be used for purposes of meeting such maximum contaminant level.

"(7)(A) The Administrator is authorized to promulgate a national primary drinking water regulation that requires the use of a treatment technique in lieu of establishing a maximum contaminant level, if the Administrator makes a finding that it is not economically or technologically feasible to ascertain the level of the contaminant. In such case, the Administrator shall identify those treatment techniques which, in the Administrator's judgment, would prevent known or anticipated adverse effects on the health of persons to the extent feasible. Such regulations shall specify each treatment technique known to the Administrator which meets the requirements of this paragraph, but the Administrator may grant a variance from any specified treatment technique in accordance with section 1415(a)(3).

"(B) Any schedule referred to in this subsection for the promulgation of a national primary drinking water regulation for any contaminant shall apply in the same manner if the regulation requires a treatment technique in lieu of establishing a maximum contaminant level.

"(C)(i) Not later than 18 months after the enactment of the Safe Drinking Water Act Amendments of 1986, the Administrator shall propose and promulgate national primary drinking water regulations specifying criteria under which filtration (including coagulation and sedimentation as appropriate) is required as a treatment technique for public water systems supplied by surface water sources. In promulgating such rules, the Administrator shall consider the quality of source waters, protection afforded by watershed management, treatment practices (such as disinfection and length of water storage) and other factors relevant to protection of health.

"(ii) In lieu of the provisions of section 1415 the Administrator shall specify procedures by which the State determines which public water systems within its jurisdiction shall adopt filtration under the criteria of clause (i). The State may require the public water system to provide studies or other information to assist in this determination. The procedures shall provide notice and opportunity for public hearing on this determination. If the State determines that filtration is required, the State shall prescribe a schedule for compliance by the public water system with the filtration requirement. A schedule shall require compliance within 18 months of a determination made under clause (iii).

"(iii) Within 18 months from the time that the Administrator establishes the criteria and procedures under this subparagraph, a State with primary enforcement responsibility shall adopt any necessary regulations to implement this subparagraph. Within 12 months of adoption of such regulations the State shall make determinations regarding filtration for all the public water systems within its jurisdiction supplied by surface waters.

"(iv) If a State does not have primary enforcement responsibility for public water systems, the Administrator shall have the same authority to make the determination in clause (ii) in such State as the State would have under that clause. Any filtration requirement or schedule under this subparagraph shall be treated as if it were a requirement of a national primary drinking water regulation.

"(8) Not later than 36 months after the enactment of the Safe Drinking Water Act Amendments of 1986, the Adminis-

trator shall propose and promulgate national primary drinking water regulations requiring disinfection as a treatment technique for all public water systems. The Administrator shall simultaneously promulgate a rule specifying criteria that will be used by the Administrator (or delegated State authorities) to grant variances from this requirement according to the provisions of sections 1415(a)(1)(B) and 1415(a)(3). In implementing section 1442(g) the Administrator or the delegated State authority shall, where appropriate, give special consideration to providing technical assistance to small public water systems in complying with the regulations promulgated under this paragraph.

"(9) National primary drinking water regulations shall be amended whenever changes in technology, treatment techniques, and other means permit greater protection of the health of persons, but in any event such regulations shall be reviewed at least once every 3 years. Such review shall include an analysis of innovations or changes in technology, treatment techniques or other activities that have occurred over the previous 3-year period and that may provide for greater protection of the health of persons. The findings of such review shall be published in the Federal Register. If, after opportunity for public comment, the Administrator concludes that the technology, treatment techniques, or other means resulting from such innovations or changes are not feasible within the meaning of paragraph (5), an explanation of such conclusion shall be published in the Federal Register.

[Former 1412(b)(4) and (5) amended and redesignated as (9) and (10) by PL 99-339]

"(10) National primary drinking water regulations promulgated under this subsection (and amendments thereto) shall take effect eighteen months after the date of their promulgation. Regulations under subsection (a) shall be superseded by regulations under this subsection to the extent provided by the regulations under this subsection.

"(11) No national primary drinking water regulation may require the addition of any substance for preventive health care purposes unrelated to contamination of drinking water.

[Former 1412(b)(6) redesignated as (11) by PL 99-339]

"(c) The Administrator shall publish proposed national secondary drinking water regulations within 270 days after the date of enactment of this title. Within 90 days after publication of any such regulation, he shall promulgate such regulation with such modifications as he deems appropriate. Regulations under this subsection may be amended from time to time.

"(d) Regulations under this section shall be prescribed in accordance with section 553 of title 5, United States Code (relating to rulemaking), except that the Administrator shall provide opportunity for public hearing prior to promulgation of such regulations. In proposing and promulgating regulations under this section, the Administrator shall consult with the Secretary and the National Drinking Water Advisory Council.

"(e) The Administrator shall request comments from the Science Advisory Board (established under the Environmental Research, Development, and Demonstration Act of 1978) prior to proposal of a maximum contaminant level goal and national primary drinking water regulation. The Board shall respond, as it deems appropriate, within the time period applicable for promulgation of the national primary drinking water standard concerned. This subsection shall, under no circumstances, be used to delay final promulgation of any national primary drinking water standard.

[1412(e) revised by PL 99-339]

"State Primary Enforcement Responsibility

"Sec. 1413. (a) For purposes of this title, a State has primary enforcement responsibility for public water systems during any period for which the Administrator determines (pursuant to regulations prescribed under subsection (b) that such State —

"(1) has adopted drinking water regulations which are no less stringent than the national primary drinking water regulations in effect under sections 1412(a) and 1412(b);

[1413(a)(1) revised by PL 99-339]

"(2) has adopted and is implementing adequate procedures for the enforcement of such State regulations, including conducting such monitoring and making such inspections as the Administrator may require by regulation;

"(3) will keep such records and make such reports with respect to its activities under paragraphs (1) and (2) as the Administrator may require by regulation;

"(4) if it permits variances or exemptions, or both, from the requirements of its drinking water regulations which meet the requirements of paragraph (1), permits such variances and exemptions under conditions and in a manner which is not less stringent than the conditions under, and the manner in, which variances and exemptions may be granted under sections 1415 and 1416; and

"(5) has adopted and can implement an adequate plan for the provision of safe drinking water under emergency circumstances.

"(b)(1) The Administrator shall, by regulation (proposed within 180 days of the date of the enactment of this title), prescribe the manner in which a State may apply to the Administrator for a determination that the requirements of paragraphs (1), (2), (3), and (4) of subsection (a) are satisfied with respect to the State, the manner in which the determination is made, the period for which the determination will be effective, and the manner in which the Administrator may determine that such requirements are no longer met. Such regulations shall require that before a determination of the Administrator that such requirements are met are no longer met with respect to a State may become effective, the Administrator shall notify such State of the determination and the reasons therefor and shall provide an opportunity for public hearing on the determination. Such regulations shall be promulgated (with such modifications as the Administrator deems appropriate) within 90 days of the publication of the proposed regulations in the Federal Register. The Administrator shall promptly notify in writing the chief executive officer of each State of the promulgation of regulations under this paragraph. Such notice shall contain a copy of the regulations and shall specify a State's authority under this title when it is determined to have primary enforcement responsibility for public water systems.

"(2) When an application is submitted in accordance with the Administrator's regulations under paragraph (1), the Administrator shall within 90 days of the date on which such application is submit-

ted (A) make the determination applied for, or (B) deny the application and notify the applicant in writing of the reasons for his denial.

Enforcement of Drinking Water Regulations

[1414 head amended by PL 99-339]

Sec. 1414. (a)(1)(A) Whenever the Administrator finds during a period during which a State has primary enforcement responsibility for public water systems (within the meaning of section 1413(a)) that any public water system —

"(i) for which a variance under section 1415 or an exemption under section 1416 is not in effect, does not comply with any national primary drinking water regulation in effect under section 1412, or

"(ii) for which a variance under section 1415 or an exemption under section 1416 is in effect, does not comply with any schedule, or other requirement imposed pursuant thereto,

he shall so notify the State and such public water system and provide such advice and technical assistance to such State and public water system as may be appropriate to bring the system into compliance with such regulation or requirement by the earliest feasible time.

[1414(a)(1)(A) revised by PL 99-339]

"(B) If, beyond the thirtieth day after the Administrator's notification under subparagraph (A), the State has not commenced appropriate enforcement action, the Administrator shall issue an order under subsection (g) requiring the public water system to comply with such regulation or requirement or the Administrator shall commence a civil action under subsection (b).

[1414(a)(1)(B) revised by PL 99-339]

"(2) Whenever, on the basis of information available to him, the Administrator finds during a period during which a State does not have primary enforcement responsibility for public water systems that a public water system in such State —

"(A) for which a variance under section 1415(a)(2) or an exemption under section 1416(f) is not in effect, does not comply with any national primary drinking water regulation in effect under section 1412, or

"(B) for which a variance under section 1415(a)(2) or an exemption under section 1416(f) is in effect, does not comply with any schedule or other requirement imposed pursuant thereto,

the Administrator shall issue an order under subsection (g) requiring the public water system to comply with such regulation or requirement or the Administrator shall commence a civil action under subsection (b).

[1414(a)(2) amended by PL 99-339]

"(b) The Administrator may bring a civil action in the appropriate United States district court to require compliance with a national primary drinking water regulation, with an order issued under subsection (g), or with any schedule or other requirement imposed pursuant to a variance or exemption granted under section 1415 or 1416 if —

"(1) authorized under paragraph (1) or (2) of subsection (a), or

"(2) if requested by (A) the chief executive officer of the State in which is located the public water system which is not in compliance with such regulation or requirement, or (B) the agency of such State which has jurisdiction over compliance by public water systems in the State with national primary drinking water regulations or State drinking water regulations.

The court may enter, in an action brought under this subsection, such judgment as protection of public health may require, taking into consideration the time necessary to comply and the availability of alternative water supplies; and, if the court determines that there has been a violation of the regulation or schedule or other requirement with respect which the action was brought, the court may, taking into account the seriousness of the violation, the population at risk, and other appropriate factors, impose on the violator a civil penalty of not to exceed $25,000 for each day in which such violation occurs.

[1414(b) amended by PL 99-339]

"(c) Each owner or operator of a public water system shall give notice to the persons served by it —

"(1) of any failure on the part of the public water system to —

"(A) comply with an applicable maximum contaminant level or treatment technique requirement of, or a testing procedure prescribed by, a national primary drinking water regulation, or

"(B) perform monitoring required by section 1445(a), and

"(2) if the public water system is subject to a variance granted under section 1415(a)(1)(A) or 1415(a)(2) for an inability to meet a maximum contaminant level requirement or is subject to an exemption granted under section 1416, of —

"(A) the existence of such variance or exemption, and

"(B) any failure to comply with the requirements of any schedule prescribed pursuant to the variance or exemption.

The Administrator shall by regulation prescribe the form, manner, and frequency for giving notice under this subsection. Within 15 months after the enactment of the Safe Drinking Water Act Amendments of 1986, the Administrator shall amend such regulations to provide for different types and frequencies of notice based on the differences between violations which are intermittent or infrequent and violations which are continuous or frequent. Such regulations shall also take into account the seriousness of any potential adverse health effects which may be involved. Notice of any violation of a maximum contaminant level or any other violation designated by the Administrator as posing a serious potential adverse health effect shall be given as soon as possible, but in no case later than 14 days after the violation. Notice of a continuous violation of a regulation other than a maximum contaminant level shall be given no less frequently than every 3 months. Notice of violations judged to be less serious shall be given no less frequently than annually. The Administrator shall specify the types of notice to be used to provide information as promptly and effectively as possible taking into account both the seriousness of any potential adverse health effects and the likelihood of reaching all affected persons. Notification of violations shall include notice by general circulation newspaper serving the area and, whenever appropriate, shall also include a press release to electronic media and individual mailings. Notice under this subsection shall provide a clear and readily understandable explanation of the violation, any potential adverse health effects, the steps that the system is taking to correct such violation, and the necessity for seeking alternative water supplies, if any, until the violation is corrected. Until such amended regulations are promulgated, the regulations in effect on the date of the enact-

ment of the Safe Drinking Water Act Amendments of 1986 shall remain in effect. The Administrator may also require the owner or operator of a public water system to give notice to the persons served by it of contaminant levels of any unregulated contaminant required to be monitored under section 1445(a). Any person who violates this subsection or regulations issued under this subsection shall be subject to a civil penalty of not to exceed $25,000.

[1414(c) amended by PL 95-190; PL 99-339]

"(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.

"(e) Nothing in this title shall diminish any authority of a State or political subdivision to adopt or enforce any law or regulation respecting drinking water regulations or public water systems, but no such law or regulation shall relieve any person of any requirement otherwise applicable under this title.

"(f) If the Administrator makes a finding of noncompliance (described in subparagraph (A) or (B) of subsection (a)(1)) with respect to a public water system in a State which has primary enforcement responsibility, the Administrator may, for the purpose of assisting that State in carrying out such responsibility and upon the petition of such State or public water system or persons served by such system, hold, after appropriate notice, public hearings for the purpose of gathering information from technical or other experts, Federal, State, or other public officials, representatives of such public water system, persons served by such system, and other interested persons on —

"(1) the ways in which such system can within the earliest feasible time be brought into compliance with the regulation or requirement with respect to which such finding was made, and

"(2) the means for the maximum feasible protection of the public health during any period in which such system is not in compliance with a national primary drinking water regulation or requirement applicable to a variance or exemption.

On the basis of such hearings the Administrator shall issue recommendations which shall be sent to such State and public water system and shall be made available to the public and communications media.

[1414(g) added by PL 99-339]

"(g)(1) In any case in which the Administrator is authorized to bring a civil action under this section or under section 1445 with respect to any regulation, schedule, or other requirement, the Administrator also may issue an order to require compliance with such regulation, schedule, or other requirement.

"(2) An order issued under this subsection shall not take effect until after notice and opportunity for public hearing and, in the case of a State having primary enforcement responsibility for public water systems in that State, until after the Administrator has provided the State with an opportunity to confer with the Administrator regarding the proposed order. A copy of any order proposed to be issued under this subsection shall be sent to the appropriate State agency of the State involved if the State has primary enforcement responsibility for public water systems in that State. Any order issued under this subsection shall state with reasonable specificity the nature of the violation. In any case in which an order under this subsection is issued to a corporation, a copy of such order shall be issued to appropriate corporate officers.

"(3)(A) Any person who violates, or fails or refuses to comply with, an order under this subsection shall be liable to the United States for a civil penalty of not more than $25,000 per day of violation.

"(B) Whenever any civil penalty sought by the Administrator under this paragraph does not exceed a total of $5,000, the penalty shall be assessed by the Administrator after notice and opportunity for a hearing on the record in accordance with section 554 of title 5 of the United States Code.

"(C) Whenever any civil penalty sought by the Administrator under this paragraph exceeds $5,000, the penalty shall be assessed by a civil action brought by the Administrator in the appropriate United States district court (as determined under the provisions of title 28 of the United States Code).

"(D) If any person fails to pay an assessment of a civil penalty after it has become a final and unappealable order, or after the appropriate court of appeals has entered final judgment in favor of the Administrator, the Attorney General shall recover the amount for which such person is liable in any appropriate district court of the United States. In any such action, the validity and appropriateness of the final order imposing the civil penalty shall not be subject to review.

"Variances

[*Note*: PL 96-502 again added the head "Variances" to this section]

"Sec. 1415. (a) Notwithstanding any other provision of this part, variances from national primary drinking water regulations may be granted as follows:

"(1)(A) A State which has primary enforcement responsibility for public water systems may grant one or more variances from an applicable national primary drinking water regulation to one or more public water systems within its jurisdiction which, because of characteristics of the raw water sources which are reasonably available to the systems, cannot meet the requirements respecting the maximum contaminant levels of such drinking water regulation. A variance may only be issued to system after the system's application of the best technology, treatment techniques, or other means, which the Administrator finds are available (taking costs into consideration). The Administrator shall propose and promulgate his finding of the best available technology, treatment techniques or other means available for each contaminant for purposes of this subsection at the time he proposes and promulgates a maximum contaminant level for each such contaminant. The Administrator's finding of best available technology, treatment techniques or other means for purposes of this subsection may vary depending on the number of persons served by the system or for other physical conditions related to engineering feasibility and costs of compliance with maximum contaminant levels as considered appropriate by the Administrator. Before a State may grant a variance under this subparagraph, the State must find that the variance will not result in an unreasonable risk to health. If a State grants a public water

system a variance under this subparagraph, the State shall prescribe at the time the variance is granted, a schedule for —

"(i) compliance (including increments of progress) by the public water system with each contaminant level requirement with respect to which the variance was granted, and

"(ii) implementation by the public water system of such additional control measures as the State may require for each contaminant, subject to such contaminant level requirement, during the period ending on the date compliance with such requirement is required.

Before a schedule prescribed by a State pursuant to this subparagraph may take effect, the State shall provide notice and opportunity for a public hearing on the schedule. A notice given pursuant to the preceding sentence may cover the prescribing of more than one such schedule and a hearing held pursuant to such notice shall include each of the schedules covered by the notice. A schedule prescribed pursuant to this subparagraph for a public water system granted a variance shall require compliance by the system with each contaminant level requirement with respect to which the variance was granted as expeditiously as practicable (as the State may reasonably determine).

[1415(a)(1)(A) amended by PL 99-339]

"(B) A State which has primary enforcement responsibility for public water systems may grant to one or more public water systems within its jurisdiction one or more variances from any provision of a national primary drinking water regulation which requires the use of a specified treatment technique with respect to a contaminant if the public water system applying for the variance demonstrates to the satisfaction of the State that such treatment technique is not necessary to protect the health of persons because of the nature of the raw water source of such system. A variance granted under this subparagraph shall be conditioned on such monitoring and other requirements as the Administrator may prescribe.

"(C) Before a variance proposed to be granted by a State under subparagraph (A) or (B) may take effect, such State shall provide notice and opportunity for public hearing on the proposed variance. A notice given pursuant to the preceding sentence may cover the granting of more than one variance and a hearing held pursuant to such notice shall include each of the variances covered by the notice. The State shall promptly notify the Administrator of all variances granted by it. Such notification shall contain the reason for the variance (and in the case of a variance under subparagraph (A), the basis for the finding required by that subparagraph before the granting of the variance) and documentation of the need for the variance.

"(D) Each public water system's variance granted by a State under subparagraph (A) shall be conditioned by the State upon compliance by the public water system with the schedule prescribed by the State pursuant to that subparagraph. The requirements of each schedule prescribed by a State pursuant to that subparagraph shall be enforceable by the State under its laws. Any requirement of a schedule on which a variance granted under that subparagraph is conditioned may be enforced under section 1414 as if such requirement was part of a national primary drinking water regulation.

"(E) Each schedule prescribed by a State pursuant to subparagraph (A) shall be deemed approved by the Administrator unless the variance for which it was prescribed is revoked by the Administrator under subparagraph (G) or the schedule is revised by the Administrator under such subparagraph.

"(F) Not later than 18 months after the effective date of the interim national primary drinking water regulations the Administrator shall complete a comprehensive review of the variances granted under subparagraph (A) (and schedules prescribed pursuant thereto) and under subparagraph (B) by the States during the one-year period beginning on such effective date. The Administrator shall conduct such subsequent reviews of variances and schedules as he deems necessary to carry out the purposes of this title, but each subsequent review shall be completed within each 3-year period following the completion of the first review under this subparagraph. Before conducting any review under this subparagraph, the Administrator shall publish notice of the proposed review in the Federal Register. Such notice shall (i) provide information respecting the location of data and other information respecting the variances to be reviewed (including data and other information concerning new scientific matters bearing on such variances), and (ii) advise of the opportunity to submit comments on the variances reviewed and on the need for continuing them. Upon completion of any such review, the Administrator shall publish in the Federal Register the results of his review together with findings responsive to comments submitted in connection with such review.

"(G)(i) If the Administrator finds that a State has, in a substantial number of instances, abused its discretion in granting variances under subparagraph (A) or (B) or that in a substantial number of cases the State has failed to prescribe schedules in accordance with subparagraph (A), the Administrator shall notify the State of his findings. In determining if a State has abused its discretion in granting variances in a substantial number of instances, the Administrator shall consider the number of persons who are affected by the variances and if the requirements applicable to the granting of the variances were complied with. A notice under this clause shall—

"(I) identify each public water system with respect to which the finding was made,

"(II) specify the reasons for the finding, and

"(III) as appropriate, propose revocations of specific variances or propose revised schedules or other requirements for specific public water systems granted variances, or both.

"(ii) The Administrator shall provide reasonable notice and public hearing on the provisions of each notice given pursuant to clause (i) of this subparagraph. After a hearing on a notice pursuant to such clause, the Administrator shall (I) rescind the finding for which the notice was given and promptly notify the State of such rescission, or (II) promulgate (with such modifications as he deems appropriate) such variance revocations and revised schedules or other requirements proposed in such notice as he deems appropriate. Not later than 180 days after the date a notice is given pursuant to clause (i) of this subparagraph, the Administrator shall complete the hearing on the notice and take the action required by the preceding sentence.

"(iii) If a State is notified under clause (i) of this subparagraph of a finding of the Administrator made with respect to a variance granted a public water system within

that State or to a schedule or other requirement for a variance and if, before a revocation of such variance or a revision of such schedule or other requirement promulgated by the Administrator takes effect, the State takes corrective action with respect to such variance or schedule or other requirement which the Administrator determines makes his finding inapplicable to such variance or schedule or other requirement, the Administrator shall rescind the application of his finding to that variance or schedule or other requirement. No variance revocation or revised schedule or other requirement may take effect before the expiration of 90 days following the date of the notice in which the revocation or revised schedule or other requirement was proposed.

"(2) If a State does not have primary enforcement responsibility for public water systems, the Administrator shall have the same authority to grant variances in such State as the State would have under paragraph (1) if it had primary enforcement responsibility.

"(3) The Administrator may grant a variance from any treatment technique requirement of a national primary drinking water regulation upon a showing by any person that an alternative treatment technique not included in such requirement is at least as efficient in lowering the level of the contaminant with respect to which such requirement was prescribed. A variance under this paragraph shall be conditioned on the use of the alternative treatment technique which is the basis of the variance.

"(b) Any schedule or other requirement on which a variance granted under paragraph (1)(B) or (2) of subsection (a) is conditioned may be enforced under section 1414 as if such schedule or other requirement was part of a national primary drinking water regulation.

"(c) If an application for a variance under subsection (a) is made, the State receiving the application or the Administrator, as the case may be, shall act upon such application within a reasonable period (as determined under regulations prescribed by the Administrator) after the date of its submission.

"(d) For purposes of this section, the term 'treatment technique requirement' means requirement in a national primary drinking water regulation which specifies for a contaminant (in accordance with section 1401 (1)(C)(ii)) each treatment technique known to the Administrator which leads to a reduction in the level of such contaminant sufficient to satisfy the requirements of section 1412(b)(3).

"Exemptions

"Sec. 1416. (a) A State which has primary enforcement responsibility may exempt any public water system within the State's jurisdiction from any requirement respecting a maximum contaminant level or any treatment technique requirement, or from both, of an applicable national primary drinking water regulation upon a finding that —

"(1) due to compelling factors (which may include economic factors), the public water system is unable to comply with such contaminant level or treatment technique requirement,

"(2) the public water system was in operation on the effective date of such contaminant level or treatment technique requirement, or, for a system that was not in operation by that date, only if no reasonable alternative source of drinking water is available to such new system, and
[1416(a)(2) amended by PL 96-502]

"(3) the granting of the exemption will not result in an unreasonable risk to health.

"(b)(1) If a State grants a public water system an exemption under subsection (a), the State shall prescribe, at the time the exemption is granted, a schedule for —

"(A) compliance (including increments of progress) by the public water system with each contaminant level requirement and treatment technique requirement with respect to which the exemption was granted, and

"(B) implementation by the public water system of such control measures as the State may require for each contaminant, subject to such contaminant level requirement or treatment technique requirement, during the period ending on the date compliance with such requirement is required.

Before a schedule prescribed by a State pursuant to this subsection may take effect, the State shall provide notice and opportunity for a public hearing on the schedule. A notice given pursuant to the preceding sentence may cover the prescribing of more than one such schedule and a hearing held pursuant to such notice shall include each of the schedules covered by the notice.

[1416(b)(1) amended by PL 95-190; PL 99-339]

"(2)(A) A schedule prescribed pursuant to this subsection for a public water system granted an exemption under subsection (a) shall require compliance by the system with each contaminant level and treatment technique requirement with respect to which the exemption was granted as expeditiously as practicable (as the State may reasonably determine) but (except as provided in subparagraph (B)) —

"(i) in the case of an exemption granted with respect to a contaminant level or treatment technique requirement prescribed by the national primary drinking water regulations promulgated under section 1412(a), not later than 12 months after enactment of the Safe Drinking Water Act Amendments of 1986; and
[1416(b)(2)(A)(i) amended by PL 96-502; PL 99-339].

"(ii) in the case of an exemption granted with respect to a contaminant level or treatment technique requirement prescribed by national primary drinking water regulations, other than a regulation referred to in section 1412(a), 12 months after the date of the issuance of the exemption.

"(B) The final date for compliance provided in any schedule in the case of any exemption may be extended by the State (in the case of a State which has primary enforcement responsibility) or by the Administrator (in any other case) for a period not to exceed 3 years after the date of the issuance of the exemption if the public water system establishes that —

"(i) the system cannot meet the standard without capital improvements which cannot be completed within the period of such exemption;

"(ii) in the case of a system which needs financial assistance for the necessary improvements, the system has entered into an agreement to obtain such financial assistance; or

"(iii) the system has entered into an enforceable agreement to become a part of a regional public water system; and
the system is taking all practicable steps to meet the standard.
[1416(b)(2)(B) amended by PL 96-502; revised by PL 99-339]

"(C) In the case of a system which does not serve more than 500 service connections and which needs financial assistance for the necessary improvements, an exemption granted under clause (i) or (ii) of subparagraph (B) may be renewed for one or more additional 2-year periods if the system establishes that it is taking all practicable steps to meet the requirements of subparagraph (B).

[1416(b)(2)(C) added by PL 99-339]

"(3) Each public water system's exemption granted by a State under subsection (a) shall be conditioned by the State upon compliance by the public water system with the schedule prescribed by the State pursuant to this subsection. The requirements of each schedule prescribed by a State pursuant to this subsection shall be enforceable by the State under its laws. Any requirement of a schedule on which an exemption granted under this section is conditioned may be enforced under section 1414 as if such requirement was part of a national primary drinking water regulation.

"(4) Each schedule prescribed by a State pursuant to this subsection shall be deemed approved by the Administrator unless the exemption for which it was prescribed is revoked by the Administrator under subsection (d)(2) or the schedule is revised by the Administrator under such subsection.

"(c) Each State which grants an exemption under subsection (a) shall promptly notify the Administrator of the granting of such exemption. Such notification shall contain the reasons for the exemption (including the basis of the finding required by subsection (a)(3) before the exemption may be granted) and document the need for the exemption.

"(d)(1) Not later than 18 months after the effective date of the interim national primary drinking water regulations the Administrator shall complete a comprehensive review of the exemptions granted (and schedules prescribed pursuant thereto) by the States during the one-year period beginning on such effective date. The Administrator shall conduct such subsequent reviews of exemptions and schedules as he deems necessary to carry out the purposes of this title, but each subsequent review shall be completed within each 3-year period following the completion of the first review under this subparagraph. Before conducting any review under this subparagraph, the Administrator shall publish notice of the proposed review in the Federal Register. Such notice shall (A) provide information respecting the location of data and other information respecting the exemptions to be reviewed (including data and other information concerning new scientific matters bearing on such exemptions), and (B) advise of the opportunity to submit comments on the exemptions reviewed and on the need for continuing them. Upon completion of any such review, the Administrator shall publish in the Federal Register the results of his review together with findings responsive to comments submitted in connection with such review.

"(2)(A) If the Administrator finds that a State has, in a substantial number of instances, abused its discretion in granting exemptions under subsection (a) or failed to prescribe schedules in accordance with subsection (b), the Administrator shall notify the State of his finding. In determining if a State has abused its discretion in granting exemptions in a substantial number of instances, the Administrator shall consider the number of persons who are affected by the exemptions and if the requirements applicable to the granting of the exemptions were complied with. A notice under this subparagraph shall —

"(i) identify each exempt public water system with respect to which the finding was made,

"(ii) specify the reasons for the finding, and

"(iii) as appropriate, propose revocations of specific exemptions or propose revised schedules for specific exempt public water systems, or both.

"(B) The Administrator shall provide reasonable notice and public hearing on the provisions of each notice given pursuant to subparagraph (A). After a hearing on a notice pursuant to subparagraph (A), the Administrator shall (i) rescind the finding for which the notice was given and promptly notify the State of such rescission, or (ii) promulgate (with such modifications as he deems appropriate) such exemption revocations and revised schedules proposed in such notice as he deems appropriate. Not later than 180 days after the date a notice is given pursuant to subparagraph (A), the Administrator shall complete the hearing on the notice and take the action required by the preceding sentence.

"(C) If a State is notified under subparagraph (A) of a finding of the Administrator made with respect to an exemption granted a public water system within that State or to a schedule prescribed pursuant to such an exemption and if before a revocation of such exemption or a revision of such schedule promulgated by the Administrator takes effect the State takes corrective action with respect to such exemption or schedule which the Administrator determines makes his finding inapplicable to such exemption or schedule, the Administrator shall rescind the application of his finding to that exemption or schedule. No exemption revocation or revised schedule may take effect before the expiration of 90 days following the date of the notice in which the revocation or revised schedule was proposed.

"(e) For purposes of this section, the term 'treatment technique requirement' means a requirement in a national primary drinking water regulation which specifies for a contaminant (in accordance with section 1401(1)(C)(ii)) each treatment technique known to the Administrator which leads to a reduction in the level of such contaminant sufficient to satisfy the requirements of section 1412(b).

[1416(e) amended by PL 99-339]

"(f) If a State does not have primary enforcement responsibility for public water systems, the Administrator shall have the same authority to exempt public water systems in such state from maximum contaminant level requirements and treatment technique requirements under the same conditions and in the same manner as the State would be authorized to grant exemptions under this section if it had primary enforcement responsibility.

"(g) If an application for an exemption under this section is made, the State receiving the application or the Administrator, as the case may be, shall act upon such application within a reasonable period (as determined under regulations prescribed by the Administrator) after the date of its submission.

"Sec. 1417. Prohibition On Use of Lead Pipes, Solder, and Flux

"(a) IN GENERAL. —

"(1) PROHIBITION. — Any pipe, solder, or flux, which is used after the enact-

ment of the Safe Drinking Water Act Amendments of 1986, in the installation or repair of —

"(A) any public water system, or

"(B) any plumbing in a residential or nonresidential facility providing water for human consumption which is connected to a public water system,

shall be lead free (within the meaning of subsection (d)). This paragraph shall not apply to leaded joints necessary for the repair of cast iron pipes.

"(2) PUBLIC NOTICE REQUIREMENTS.—

"(A) IN GENERAL. — Each public water system shall identify and provide notice to persons that may be affected by lead contamination of their drinking water where such contamination results from either or both of the following:

"(i) The lead content in the construction materials of the public water distribution system.

"(ii) Corrosivity of the water supply sufficient to cause leaching of lead.

The notice shall be provided in such manner and form as may be reasonably required by the Administrator. Notice under this paragraph shall be provided notwithstanding the absence of a violation of any national drinking water standard.

"(B) CONTENTS OF NOTICE. — Notice under this paragraph shall provide a clear and readily understandable explanation of —

"(i) the potential sources of lead in the drinking water,

"(ii) potential adverse health effects,

"(iii) reasonably available methods of mitigating known or potential lead content in drinking water,

"(iv) any steps the system is taking to mitigate lead content in drinking water, and

"(v) the necessity for seeking alternative water supplies, if any.

"(b) STATE ENFORCEMENT. —

"(1) ENFORCEMENT OF PROHIBITION. — The requirements of subsection (a)(1) shall be enforced in all States effective 24 months after the enactment of this section. States shall enforce such requirements through State or local plumbing codes, or such other means of enforcement as the State may determine to be appropriate.

"(2) ENFORCEMENT OF PUBLIC NOTICE REQUIREMENTS. — The requirements of subsection (a)(2) shall apply in all States effective 24 months after the enactment of this section.

"(c) PENALTIES. — If the Administrator determines that a State is not enforcing the requirements of subsection (a) as required pursuant to subsection (b), the Administrator may withhold up to 5 percent of Federal funds available to that State for State program grants under section 1443(a).

"(d) DEFINITION OF LEAD FREE.— For purposes of this section, the term 'lead free'—

"(1) when used with respect to solders and flux refers to solders and flux containing not more than 0.2 percent lead, and

"(2) when used with respect to pipes and pipe fittings refers to pipes and pipe fittings containing not more than 8.0 percent lead.

[*Editor's note:* Section 109(b) and (c) of PL 99-339 provides the following concerning responsibilities of EPA, HUD, and the VA:

"(b) NOTIFICATION TO STATES.— The Administrator of the Environmental Protection Agency shall notify all States with respect to the requirements of section 1417 of the Public Health Service Act within 90 days after the enactment of this Act.

(c) BAN ON LEAD WATER PIPES, SOLDER, AND FLUX IN VA AND HUD INSURED OR ASSISTED PROPERTY. —

(1) PROHIBITION — The Secretary of Housing and Urban Development and the Administrator of the Veterans' Administration may not insure or guarantee a mortgage or furnish assistance with respect to newly constructed residential property which contains a potable water system unless such system uses only lead free pipe, solder, and flux.

(2) DEFINITION OF LEAD FREE.— For purposes of paragraph (1) the term "lead free" —

(A) when used with respect to solders and flux refers to solders and flux containing not more than 0.2 percent lead, and

(B) when used with respect to pipes and pipe fittings refers to pipes and pipe fittings containing not more than 8.0 percent lead.

(3) EFFECTIVE DATE. — Paragraph (1) shall become effective 24 months after the enactment of this Act."]

"PART C — PROTECTION OF UNDERGROUND SOURCES OF DRINKING WATER.

"Regulations For State Programs

"Sec. 1421. (a)(1) The Administrator shall publish proposed regulations for State underground injection control programs within 180 days after the date of enactment of this title. Within 180 days after publication of such proposed regulations, he shall promulgate such regulations with such modifications as he deems appropriate. Any regulation under this subsection may be amended from time to time.

"(2) Any regulation under this section shall be proposed and promulgated in accordance with section 553 of title 5, United States Code (relating to rulemaking), except that the Administrator shall provide opportunity for public hearing prior to promulgation of such regulations. In proposing and promulgating regulations under this section, the Administrator shall consult with the Secretary, the National Drinking Water Advisory Council, and other appropriate Federal entities and with interested State entities.

"(b)(1) Regulations under subsection (a) for State underground injection programs shall contain minimum requirements for effective programs to prevent underground injection which endangers drinking water sources within the meaning of subsection (d)(2). Such regulations shall require that a State program, in order to be approved under section 1422—

"(A) shall prohibit, effective on the date on which the applicable underground injection control program takes effect, any underground injection in such State which is not authorized by a permit issued by the State (except that the regulations may permit a State to authorize underground injection by rule);

[1421(b)(1)(A) amended by PL 96-502]

"(B) shall require (i) in the case of a program which provides for authorization of underground injection by permit, that the applicant for the permit to inject must satisfy the State that the underground injection will not endanger drinking water sources, and (ii) in the case of program which provides for such an authorization by rule, that no rule may be promulgated which authorizes any underground injection which endangers drinking water sources;

"(C) shall include inspection, monitoring, recordkeeping, and reporting requirements; and

"(D) shall apply (i) as prescribed by section 1447(b), to underground injections by Federal agencies, and (ii) to underground injections by any other person whether or not occurring on property owned or leased by the United States.

"(2) Regulations of the Administrator under this section for State underground injection control programs may not prescribe requirements which interfere with or impede —

"(A) the underground injection of brine or other fluids which are brought to the surface in connection with oil or natural gas production or natural gas storage operations, or

[1421(b)(2)(A) amended by PL 99-339]

"(B) any underground injection for the secondary or tertiary recovery of oil or natural gas,

unless such requirements are essential to assure that underground sources of drinking water will not be endangered by such injection.

"(3)(A) The regulations of the Administrator under this section shall permit or provide for consideration of varying geologic, hydrological, or historical conditions in different States and in different areas within a State.

[1421(b)(3) added by PL 95-190]

"(B)(i) In prescribing regulations under this section the Administrator shall, to the extent feasible, avoid promulgation of requirements which would unnecessarily disrupt State underground injection control programs which are in effect and being enforced in a substantial number of States.

"(ii) For the purpose of this subparagraph, a regulation prescribed by the Administrator under this section shall be deemed to disrupt a State underground injection control program only if it would be infeasible to comply with both such regulation and the State underground injection control program.

"(iii) For the purpose of this subparagraph, a regulation prescribed by the Administrator under this section shall be deemed unnecessary only if, without such regulation, underground sources of drinking water will not be endangered by any underground injection.

"(C) Nothing in this section shall be construed to alter or affect the duty to assure that underground sources of drinking water will not be endangered by any underground injection.

"(c)(1) The Administrator may, upon application of the Governor of a State which authorizes underground injection by means of permits, authorize such State to issue (without regard to subsection (b)(1)(B)(i)) temporary permits for underground injection which may be effective until the expiration of four years after the date of enactment of this title, if —

"(A) the Administrator finds that the State has demonstrated that it is unable and could not reasonably have been able to process all permit applications within the time available;

"(B) the Administrator determines the adverse effect on the environment of such temporary permits is not unwarranted;

"(C) such temporary permits will be issued only with respect to injection wells in operation on the date on which such State's permit program approved under this part first takes effect and for which there was inadequate time to process its permit application; and

"(D) the Administrator determines the temporary permits require the use of adequate safeguards established by rules adopted by him.

"(2) The Administrator may, upon application of the Governor of a State which authorizes underground injection by means of permits, authorize such State to issue (without regard to subsection (b)(1)(B)(i)), but after reasonable notice and hearing, one or more temporary permits each of which is applicable to a particular injection well and to the underground injection of a particular fluid and which may be effective until the expiration of four years after the date of enactment of this title, if the State finds, on the record of such hearing —

"(A) that technology (or other means) to permit safe injection of the fluid in accordance with the applicable underground injection control program is not generally available (taking costs into consideration);

"(B) that injection of the fluid would be less harmful to health than the use of other available means of disposing of waste or producing the desired product; and

"(C) that available technology or other means have been employed (and will be employed) to reduce the volume and toxicity of the fluid and to minimize the potentially adverse effect of the injection on the public health.

"(d) For purposes of this part:

"(1) The term 'underground injection' means the subsurface emplacement of fluids by well injection. Such term does not include the underground injection of natural gas for purposes of storage.

[1421(d)(1) amended by PL 96-502]

"(2) Underground injection endangers drinking water sources if such injection may result in the presence in underground water which supplies or can reasonably be expected to supply any public water system of any contaminant, and if the presence of such contaminant may result in such system's not complying with any national primary drinking water regulation or may otherwise adversely affect the health of persons.

"State Primary Enforcement Responsibility

"Sec. 1422. (a) Within 180 days after the date of enactment of this title, the Administrator shall list in the Federal Register each State for which in his judgment a State underground injection control program may be necessary to assure that underground injection will not endanger drinking water sources. Such list may be amended from time to time.

"(b)(1)(A) Each State listed under subsection (a) shall within 270 days after the date of promulgation of any regulation under section 1421 (or, if later, within 270 days after such State is first listed under subsection (a)) submit to the Administrator an application which contains a showing satisfactory to the Administrator that the State—

"(i) has adopted after reasonable notice and public hearings, and will implement, an underground injection control program which meets the requirements of regulations in effect under section 1421; and

"(ii) will keep such records and make such report with respect to its activities under its underground injection control program as the Administrator may require by regulation.

The Administrator may, for good cause, extend the date for submission of an application by any State under this subparagraph for a period not to exceed an additional 270 days.

[1422(b)(1)(A) amended by PL 95-190]

"(B) Within 270 days of any amendment of a regulation under section 1421 revising or adding any requirement respecting State underground injection control programs, each State listed under subsection (a) shall submit (in such form and manner as the Administrator may require) a notice to the Administrator containing a showing satisfactory to him that the State underground injection control program meets the revised or added requirement.

"(2) Within ninety days after the State's application under paragraph (1)(A) or notice under paragraph (1)(B) and after reasonable opportunity for presentation of views, the Administrator shall by rule either approve, disapprove, or approve in part and disapprove in part, the State's underground injection control program.

"(3) If the Administrator approves the State's program under paragraph (2), the State shall have primary enforcement responsibility for underground water sources until such time as the Administrator determines, by rule, that such State no longer meets the requirements of clause (i) or (ii) of paragraph (1)(A) of this subsection.

"(4) Before promulgating any rule under paragraph (2) or (3) of this subsection, the Administrator shall provide opportunity for public hearing respecting such rule.

"(c) If the Administrator disapproves a State's program (or part thereof) under subsection (b)(2), if the Administrator determines under subsection (b)(3) that a State no longer meets the requirements of clause (i) or (ii) of subsection (b)(1)(A), or if a State fails to submit an application or notice before the date of expiration of the period specified in subsection (b)(1), the Administrator shall by regulation within 90 days after the date of such disapproval, determination, or expiration (as the case may be) prescribe (and may from time to time by regulation revise) a program applicable to such State meeting the requirements of section 1421(b). Such program may not include requirements which interfere with or impede—

"(1) the underground injection of brine or other fluids which are brought to the surface in connection with oil or natural gas production or natural gas storage operations, or

[1422(c)(1) amended by PL 99-339]

"(2) any underground injection for the secondary or tertiary recovery of oil or natural gas,

unless such requirements are essential to assure that underground sources of drinking water will not be endangered by such injection. Such program shall apply in such State to the extent that a program adopted by such State which the Administrator determines meets such requirements is not in effect. Before promulgating any regulation under this section, the Administrator shall provide opportunity for public hearing respecting such regulation.

"(d) For purposes of this title, the term 'applicable underground injection control program' with respect to a State means the program (or most recent amendment thereof) (1) which has been adopted by the State and which has been approved under subsection (b), or (2) which has been prescribed by the Administrator under subsection (c).

"(e) An Indian Tribe may assume primary enforcement responsibility for underground injection control under this section consistent with such regulations as the Administrator has prescribed pursuant to Part C and section 1451 of this Act. The area over which such Indian Tribe exercises governmental jurisdiction need not have been listed under subsection (a) of this section, and such Tribe need not submit an application to assume primary enforcement responsibility within the 270-day deadline noted in subsection (b)(1)(A) of this section. Until an Indian Tribe assumes primary enforcement responsibility, the currently applicable underground injection control program shall continue to apply. If an applicable underground injection control program does not exist for an Indian Tribe, the Administrator shall prescribe such a program pursuant to subsection (c) of this section, and consistent with section 1421(b), within 270 days after the enactment of the Safe Drinking Water Act Amendments of 1986, unless an Indian Tribe first obtains approval to assume primary enforcement responsibility for underground injection control.

[1422(e) added by PL 99-339]

Enforcement Of Program

[1423 head amended by PL 99-339]

"Sec. 1423. (a)(1) Whenever the Administrator finds during a period during which a State has primary enforcement responsibility for underground water sources (within the meaning of section 1422(b)(3) or section 1425(c)) that any person who is subject to a requirement of an applicable underground injection control program in such State is violating such requirement, he shall so notify the State and the person violating such requirement. If beyond the thirtieth day after the Administrator's notification the State has not commenced appropriate enforcement action, the Administrator shall issue an order under subsection (c) requiring the person to comply with such requirement or the Administrator shall commence a civil action under subsection (b).

[1423(a)(1) amended by PL 96-502; revised by PL 99-339]

"(2) Whenever the Administrator finds during a period during which a State does not have primary enforcement responsibility for underground water sources that any person subject to any requirement of any applicable underground injection control program in such State is violating such requirement, the Administrator shall issue an order under subsection (c) requiring the person to comply with such requirement or the Administrator shall commence a civil action under subsection (b).

[1423(a)(2) amended by PL 99-339]

"(b) CIVIL AND CRIMINAL ACTIONS. — Civil actions referred to in paragraphs (1) and (2) of subsection (a) shall be brought in the appropriate United States district court. Such court shall have jurisdiction to require compliance with any requirement of an applicable underground injection program or with an order issued under subsection (c). The court may enter such judgment as protection of public health may require. Any person who violates any requirement of an applicable underground injection control program or an order requiring compliance under subsection (c) —

"(1) shall be subject to a civil penalty of not more than $25,000 for each day of such violation, and

"(2) if such violation is willful, such person may, in addition to or in lieu of the civil penalty authorized by paragraph (1), be imprisoned for not more than 3 years, or fined in accordance with title 18 of the United States Code, or both.

[1423(b) revised and new (c) added by PL 99-339]

"(c) ADMINISTRATIVE ORDERS.—(1) In any case in which the

Administrator is authorized to bring a civil action under this section with respect to any regulation or other requirement of this part other than those relating to —

"(A) the underground injection of brine or other fluids which are brought to the surface in connection with oil or natural gas production, or

"(B) any underground injection for the secondary or tertiary recovery of oil or natural gas,

the Administrator may also issue an order under this subsection either assessing a civil penalty of not more than $10,000 for each day of violation for any past or current violation, up to a maximum administrative penalty of $125,000, or requiring compliance with such regulation or other requirement, or both.

"(2) In any case in which the Administrator is authorized to bring a civil action under this section with respect to any regulation, or other requirement of this part relating to —

"(A) the underground injection of brine or other fluids which are brought to the surface in connection with oil or natural gas production, or

"(B) any underground injection for the secondary or tertiary recovery of oil or natural gas,

the Administrator may also issue an order under this subsection either assessing a civil penalty of not more than $5,000 for each day of violation for any past or current violation, up to a maximum administrative penalty of $125,000, or requiring compliance with such regulation or other requirement, or both.

"(3)(A) An order under this subsection shall be issued by the Administrator after opportunity (provided in accordance with this subparagraph) for a hearing. Before issuing the order, the Administrator shall give to the person to whom it is directed written notice of the Administrator's proposal to issue such order and the opportunity to request, within 30 days of the date the notice is received by such person, a hearing on the order. Such hearing shall not be subject to section 554 or 556 of title 5, United States Code, but shall provide a reasonable opportunity to be heard and to present evidence.

"(B) The Administrator shall provide public notice of, and reasonable opportunity to comment on, any proposed order.

"(C) Any citizen who comments on any proposed order under subparagraph (B) shall be given notice of any hearing under this subsection and of any order. In any hearing held under subparagraph (A), such citizen shall have a reasonable opportunity to be heard and to present evidence.

"(D) Any order issued under this subsection shall become effective 30 days following its issuance unless an appeal is taken pursuant to paragraph (6).

"(4)(A) Any order issued under this subsection shall state with reasonable specificity the nature of the violation and may specify a reasonable time for compliance.

"(B) In assessing any civil penalty under this subsection, the Administrator shall take into account appropriate factors, including (i) the seriousness of the violation; (ii) the economic benefit (if any) resulting from the violation; (iii) any history of such violations; (iv) any good-faith efforts to comply with the applicable requirements; (v) the economic impact of the penalty on the violator; and (vi) such other matters as justice may require.

"(5) Any violation with respect to which the Administrator has commenced and is diligently prosecuting an action, or has issued an order under this subsection assessing a penalty, shall not be subject to an action under subsection (b) of this section or section 1424(c) or 1449, except that the foregoing limitation on civil actions under section 1449 of this Act shall not apply with respect to any violation for which —

"(A) a civil action under section 1449(a)(1) has been filed prior to commencement of an action under this subsection, or

"(B) a notice of violation under section 1449(b)(1) has been given before commencement of an action under this subsection and an action under section 1449(a)(1) of this Act is filed before 120 days after such notice is given.

"(6) Any person against whom an order is issued or who commented on a proposed order pursuant to paragraph (3) may file an appeal of such order with the United States District Court for the District of Columbia or the district in which the violation is alleged to have occurred. Such an appeal may only be filed within the 30-day period beginning on the date the order is issued. Appellant shall simultaneously send a copy of the appeal by certified mail to the Administrator and to the Attorney General. The Administrator shall promptly file in such court a certified copy of the record on which such order was imposed. The district court shall not set aside or remand such order unless there is not substantial evidence on the record, taken as a whole, to support the finding of a violation or, unless the Administrator's assessment of penalty or requirement for compliance constitutes an abuse of discretion. The district court shall not impose additional civil penalties for the same violation unless the Administrator's assessment of a penalty constitutes an abuse of discretion. Notwithstanding section 1448(a)(2), any order issued under paragraph (3) shall be subject to judicial review exclusively under this paragraph.

"(7) If any person fails to pay an assessment of a civil penalty —

"(A) after the order becomes effective under paragraph (3), or

"(B) after a court, in an action brought under paragraph (6), has entered a final judgment in favor of the Administrator,

the Administrator may request the Attorney General to bring a civil action in an appropriate district court to recover the amount assessed (plus costs, attorneys' fees, and interest at currently prevailing rates from the date the order is effective or the date of such final judgment, as the case may be). In such an action, the validity, amount, and appropriateness of such penalty shall not be subject to review.

"(8) The Administrator may, in connection with administrative proceedings under this subsection, issue subpoenas compelling the attendance and testimony of witnesses and subpoenas duces tecum, and may request the Attorney General to bring an action to enforce any subpoena under this section. The district courts shall have jurisdiction to enforce such subpoenas and impose sanction.

"(d) Nothing in this title shall diminish any authority of a State or political subdivision to adopt or enforce any law or regulation respecting underground injection but no such law or regulation shall relieve any person of any requirement otherwise applicable under this title.

[Former 1423(c) redesignated as (d) by PL 99-339]

"Interim Regulation Of Underground Injections

"Sec. 1424. (a)(1) Any person may petition the Administrator to have an area of a State (or States) designated as an area

in which no new underground injection well may be operated during the period beginning on the date of the designation and ending on the date on which the applicable underground injection control program covering such area takes effect unless a permit for the operation of such well has been issued by the Administrator under subsection (b). The Administrator may so designate an area within a State if he finds that the area has one aquifer which is the sole or principal drinking water source for the area and which, if contaminated, would create a significant hazard to public health.

"(2) Upon receipt of a petition under paragraph (1) of this subsection, the Administrator shall publish it in the Federal Register and shall provide an opportunity to interested persons to submit written data, views, or arguments thereon. Not later than the 30th day following the date of the publication of a petition under this paragraph in the Federal Register, the Administrator shall either make the designation for which the petition is submitted or deny the petition.

"(b)(1) During the period beginning on the date an area is designated under subsection (a) and ending on the date the applicable underground injection control program covering such area takes effect, no new underground injection well may be operated in such area unless the Administrator has issued a permit for such operation.

"(2) Any person may petition the Administrator for the issuance of a permit for the operation of such a well in such an area. A petition submitted under this paragraph shall be submitted in such manner and contain such information as the Administrator may require by regulation. Upon receipt of such a petition, the Administrator shall publish it in the Federal Register. The Administrator shall give notice of any proceeding on a petition and shall provide opportunity for agency hearing. The Administrator shall act upon such petition on the record of any hearing held pursuant to the preceding sentence respecting such petition. Within 120 days of the publication in the Federal Register of a petition submitted under this paragraph, the Administrator shall either issue the permit for which the petition was submitted or shall deny its issuance.

"(3) The Administrator may issue a permit for the operation of a new underground injection well in an area designated under subsection (a) only if he finds that the operation of such well will not cause contamination of the aquifer of such area so as to create a significant hazard to public health. The Administrator may condition the issuance of such a permit upon the use of such control measures in connection with the operation of such well, for which the permit is to be issued, as he deems necessary to assure that the operation of the well will not contaminate the aquifer of the designated area in which the well is located so as to create a significant hazard to public health.

"(c) Any person who operates a new underground injection well in violation of subsection (b), (1) shall be subject to a civil penalty of not more than $5,000 for each day in which such violation occurs, or (2) if such violation is willful, such person may, in lieu of the civil penalty authorized by clause (1) be fined not more than $10,000 for each day in which such violation occurs. If the Administrator has reason to believe that any person is violating or will violate subsection (b), he may petition the United States district court to issue a temporary restraining order or injunction (including a mandatory injunction) to enforce such subsection.

"(d) For purposes of this section, the term 'new underground injection well' means an underground injection well whose operation was not approved by appropriate State and Federal agencies before the date of the enactment of this title.

"(e) If the Administrator determines, on his own initiative or upon petition, that an area has an aquifer which is the sole or principal drinking water source for the area and which, if contaminated, would create a significant hazard to public health, he shall publish notice of that determination in the Federal Register. After the publication of any such notice, no commitment for Federal financial assistance (through a grant, contract, loan guarantee, or otherwise) may be entered into for any project which the Administrator determines may contaminate such aquifer through a recharge zone so as to create a significant hazard to public health, but a commitment for Federal financial assistance may, if authorized under another provision of law, be entered into to plan or design the project to assure that it will not so contaminate the aquifer.

"Optional Demonstration By States Relating To Oil Or Natural Gas

[1425 added by PL 96-502]

"Sec. 1425. (a) For purposes of the Administrator's approval or disapproval under section 1422 of that portion of any State underground injection control program which relates to—

"(1) the underground injection of brine or other fluids which are brought to the surface in connection with oil or natural gas production or natural gas storage operations, or

[1425(a)(1) amended by PL 99-339]

"(2) any underground injection for the secondary or tertiary recovery of oil or natural gas.

in lieu of the showing required under subparagraph (A) of section 1422(b)(1) the State may demonstrate that such portion of the State program meets the requirements of subparagraphs (A) through (D) of section 1421(b)(1) and represents an effective program (including adequate recordkeeping and reporting) to prevent underground injection which endangers drinking water sources.

"(b) If the Administrator revises or amends any requirement of a regulation under section 1421 relating to any aspect of the underground injection referred to in subsection (a), in the case of that portion of a State underground injection control program for which the demonstration referred to in subsection (a) has been made, in lieu of the showing required under section 1422(b)(1)(B) the State may demonstrate that, with respect to that aspect of such underground injection, the State program meets the requirements of subparagraphs (A) through (D) of section 1421(b)(1) and represents an effective program (including adequate recordkeeping and reporting) to prevent underground injection which endangers drinking water sources.

"(c)(1) Section 1422(b)(3) shall not apply to that portion of any State underground injection control program approved by the Administrator pursuant to a demonstration under subsection (a) of this section (and under subsection (b) of this section where applicable).

"(2) If pursuant to such a demonstration, the Administrator approves such portion of the State program, the State shall have primary enforcement responsibility with respect to that portion until such time as the Administrator determines, by rule,

that such demonstration is no longer valid. Following such a determination, the Administrator may exercise the authority of subsection (c) of section 1422 in the same manner as provided in such subsection with respect to a determination described in such subsection.

"(3) Before promulgating any rule under paragraph (2), the Administrator shall provide opportunity for public hearing respecting such rule.

"Sec. 1426. Regulation Of State Programs.

[1426 added by PL 99-339]

"(a) Monitoring Methods. — Not later than 18 months after enactment of the Safe Drinking Water Act Amendments of 1986, the Administrator shall modify regulations issued under this Act for Class I injection wells to identify monitoring methods, in addition to those in effect on November 1, 1985, including groundwater monitoring. In accordance with such regulations, the Administrator, or delegated State authority, shall determine the applicability of such monitoring methods, wherever appropriate, at locations and in such a manner as to provide the earliest possible detection of fluid migration into, or in the direction of, underground sources of drinking water from such wells, based on its assessment of the potential for fluid migration from the injection zone that may be harmful to human health or the environment. For purposes of this subsection, a class I injection well is defined in accordance with 40 CFR 146.05 as in effect on November 1, 1985.

"(b) Report. — The Administrator shall submit a report to Congress, no later than September 1987, summarizing the results of State surveys required by the Administrator under this section. The report shall include each of the following items of information:

"(1) The numbers and categories of class V wells which discharge nonhazardous waste into or above an underground source of drinking water.

"(2) The primary contamination problems associated with different categories of these disposal wells.

"(3) Recommendations for minimum design, construction, installation, and siting requirements that should be applied to protect underground sources of drinking water from such contamination wherever necessary.

"Sec. 1427. Sole Source Aquifer Demonstration Program.

[1427 added by PL 99-339]

"(a) Purpose. — The purpose of this section is to establish procedures for development, implementation, and assessment of demonstration programs designed to protect critical aquifer protection areas located within areas designated as sole or principal source aquifers under section 1424(e) of this Act.

"(b) Definition. — For purposes of this section, the term 'critical aquifer protection area' means either of the following:

"(1) All or part of an area located within an area for which an application or designation as a sole or principal source aquifer pursuant to section 1424(e), has been submitted and approved by the Administrator not later than 24 months after the enactment of the Safe Drinking Water Act Amendments of 1986 and which satisfies the criteria established by the Administrator under subsection (d).

"(2) All or part of an area which is within an aquifer designated as a sole source aquifer as of the enactment of the Safe Drinking Water Act Amendments of 1986 and for which an areawide ground water quality protection plan has been approved under section 208 of the Clean Water Act prior to such enactment.

"(c) Application. — Any State, municipal or local government or political subdivision thereof or any planning entity (including any interstate regional planning entity) that identifies a critical aquifer protection area over which it has authority or jurisdiction may apply to the Administrator for the selection of such area for a demonstration program under this section. Any applicant shall consult with other government or planning entities with authority or jurisdiction in such area prior to application. Applicants, other than the Governor, shall submit the application for a demonstration program jointly with the Governor.

"(d) Criteria. — Not later than 1 year after the enactment of the Safe Drinking Water Act Amendments of 1986, the Administrator shall, by rule, establish criteria for identifying critical aquifer protection areas under this section. In establishing such criteria, the Administrator shall consider each of the following:

"(1) The vulnerability of the aquifer to contamination due to hydrogeologic characteristics.

"(2) The number of persons or the proportion of population using the ground water as a drinking water source.

"(3) The economic, social and environmental benefits that would result to the area from maintenance of ground water of high quality.

"(4) The economic, social and environmental costs that would result from degradation of the quality of the ground water.

"(e) Contents of Application. — An application submitted to the Administrator by any applicant for a demonstration program under this section shall meet each of the following requirements:

"(1) The application shall propose boundaries for the critical aquifer protection area within its jurisdiction.

"(2) The application shall designate or, if necessary, establish a planning entity (which shall be a public agency and which shall include representation of elected local and State governmental officials) to develop a comprehensive management plan (hereinafter in this section referred to as the 'plan') for the critical protection area. Where a local government planning agency exists with adequate authority to carry out this section with respect to any proposed critical protection area, such agency shall be designated as the planning entity.

"(3) The application shall establish procedures for public participation in the development of the plan, for review, approval, and adoption of the plan, and for assistance to municipalities and other public agencies with authority under State law to implement the plan.

"(4) The application shall include a hydrogeologic assessment of surface and ground water resources within the critical protection area.

"(5) The application shall include a comprehensive management plan for the proposed protection area.

"(6) The application shall include the measures and schedule proposed for implementation of such plan.

"(f) Comprehensive Plan. —

"(1) The objective of a comprehensive management plan submitted by an applicant under this section shall be to maintain the quality of the ground water in the critical protection area in a manner reasonably expected to protect human health, the environment and ground water resources. In order to achieve such objective, the plan may be designed to maintain, to

the maximum extent possible, the natural vegetative and hydrogeological conditions. Each of the following elements shall be included in such a protection plan:

"(A) A map showing the detailed boundary of the critical protection area.

"(B) An identification of existing and potential point and nonpoint sources of ground water degradation.

"(C) An assessment of the relationship between activities on the land surface and ground water quality.

"(D) Specific actions and management practices to be implemented in the critical protection area to prevent adverse impacts on ground water quality.

"(E) Identification of authority adequate to implement the plan, estimates of program costs, and sources of State matching funds.

"(2) Such plan may also include the following:

"(A) A determination of the quality of the existing ground water recharged through the special protection area and the natural recharge capabilities of the special protection area watershed.

"(B) Requirements designed to maintain existing underground drinking water quality or improve underground drinking water quality if prevailing conditions fail to meet drinking water standards, pursuant to this Act and State law.

"(C) Limits on Federal, State, and local government, financially assisted activities and projects which may contribute to degradation of such ground water or any loss of natural surface and subsurface infiltration of purification capability of the special protection watershed.

"(D) A comprehensive statement of land use management including emergency contingency planning as it pertains to the maintenance of the quality of underground sources of drinking water or to the improvement of such sources if necessary to meet drinking water standards pursuant to this Act and State law.

"(E) Actions in the special protection area which would avoid adverse impacts on water quality, recharge capabilities, or both.

"(F) Consideration of specific techniques, which may include clustering, transfer of development rights, and other innovative measures sufficient to achieve the objectives of this section.

"(G) Consideration of the establishment of a State institution to facilitate and assist funding a development transfer credit system.

"(H) A program for State and local implementation of the plan described in this subsection in a manner that will insure the continued, uniform, consistent protection of the critical protection area in accord with the purposes of this section.

"(I) Pollution abatement measures, if appropriate.

"(g) Plans Under Section 208 of the Clean Water Act. — A plan approved before the enactment of the Safe Drinking Water Act Amendments of 1986 under section 208 of the Clean Water Act to protect a sole source aquifer designated under section 1424(e) of this Act shall be considered a comprehensive management plan for the purposes of this section.

"(h) Consultation and Hearings. — During the development of a comprehensive management plan under this section, the planning entity shall consult with, and consider the comments of, appropriate officials of any municipality and State or Federal agency which has jurisdiction over lands and waters within the special protection area, other concerned organizations and technical and citizen advisory committees. The planning entity shall conduct public hearings at places within the special protection area for the purpose of providing the opportunity to comment on any aspect of the plan.

"(i) Approval or Disapproval. — Within 120 days after receipt of an application under this section, the Administrator shall approve or disapprove the application. The approval or disapproval shall be based on a determination that the critical protection area satisfies the criteria established under subsection (d) and that a demonstration program for the area would provide protection for ground water quality consistent with the objectives stated in subsection (f). The Administrator shall provide to the Governor a written explanation of the reasons for the disapproval of any such application. Any petitioner may modify and resubmit any application which is not approved. Upon approval of an application, the Administrator may enter into a cooperative agreement with the applicant to establish a demonstration program under this section.

"(j) Grants and Reimbursement. — Upon entering a cooperative agreement under subsection (i), the Administrator may provide to the applicant, on a matching basis, a grant of 50 per centum of the costs of implementing the plan established under this section. The Administrator may also reimburse the applicant of an approved plan up to 50 per centum of the costs of developing such plan, except for plans approved under section 208 of the Clean Water Act. The total amount of grants under this section for any one aquifer, designated under section 1424(e), shall not exceed $4,000,000 in any one fiscal year.

"(k) Activities Funded Under Other Law. — No funds authorized under this subsection may be used to fund activities funded under other sections of this Act or the Clean Water Act, the Solid Waste Disposal Act, the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 or other environmental laws.

"(l) Report. — Not later than December 31, 1989, each State shall submit to the Administrator a report assessing the impact of the program on ground water quality and identifying those measures found to be effective in protecting ground water resources. No later than September 30, 1990, the Administrator shall submit to Congress a report summarizing the State reports, and assessing the accomplishments of the sole source aquifer demonstration program including an identification of protection methods found to be most effective and recommendations for their application to protect ground water resources from contamination whenever necessary.

"(m) Savings Provision. — Nothing under this section shall be construed to amend, supersede or abrogate rights to quantities of water which have been established by interstate water compacts, Supreme Court decrees, or State water laws; or any requirement imposed or right provided under any Federal or State environmental or public health statute.

"(n) Authorization. — There are authorized to be appropriated to carry out this section not more than the following amounts:

"Fiscal year:	Amount
1987	$10,000,000
1988	15,000,000
1989	17,500,000
1990	17,500,000
1991	17,500,000

Matching grants under this section may also be used to implement or update any water quality management plan for a sole or principal source aquifer approved (before the date of the enactment of this section) by the Administrator under section 208 of the Federal Water Pollution Control Act.

"Sec. 1428. State Programs To Establish Wellhead Protection Areas.

[1428 added by PL 99-339]

"(a) State Programs. — The Governor or Governor's designee of each State shall, within 3 years of the date of enactment of the Safe Drinking Water Act Amendments of 1986, adopt and submit to the Administrator a State program to protect wellhead areas within their jurisdiction from contaminants which may have any adverse effect on the health of persons. Each State program under this section shall, at a minimum —

"(1) specify the duties of State agencies, local governmental entities, and public water supply systems with respect to the development and implementation of programs required by this section;

"(2) for each wellhead, determine the wellhead protection area as defined in subsection (e) based on all reasonably available hydrogeologic information on ground water flow, recharge and discharge and other information the State deems necessary to adequately determine the wellhead protection area;

"(3) identify within each wellhead protection area all potential anthropogenic sources of contaminants which may have any adverse effect on the health of persons;

"(4) describe a program that contains, as appropriate, technical assistance, financial assistance, implementation of control measures, education, training, and demonstration projects to protect the water supply within wellhead protection areas from such contaminants;

"(5) include contingency plans for the location and provision of alternate drinking water supplies for each public water system in the event of well or wellfield contamination by such contaminants; and

"(6) include a requirement that consideration be given to all potential sources of such contaminants within the expected wellhead area of a new water well which serves a public water supply system.

"(b) Public Participation. — To the maximum extent possible, each State shall establish procedures, including but not limited to the establishment of technical and citizens' advisory committees, to encourage the public to participate in developing the protection program for wellhead areas. Such procedures shall include notice and opportunity for public hearing on the State program before it is submitted to the Administrator.

"(c) Disapproval. —

"(1) In General. — If, in the judgment of the Administrator a State program (or portion thereof, including the definition of a wellhead protection area), is not adequate to protect public water systems as required by this section, the Administrator shall disapprove such program (or portion thereof). A State program developed pursuant to subsection (a) shall be deemed to be adequate unless the Administrator determines, within 9 months of the receipt of a State program, that such program (or portion thereof) is inadequate for the purpose of protecting public water systems as required by this section from contaminants that may have any adverse effect on the health of persons. If the Administrator determines that a proposed State program (or any portion thereof) is inadequate, the Administrator shall submit a written statement of the reasons for such determination to the Governor of the State.

"(2) Modification and Resubmission. — Within 6 months after receipt of the Administrator's written notice under paragraph (1) that any proposed State program (or portion thereof) is inadequate, the Governor or Governor's designee, shall modify the program based upon the recommendations of the Administrator and resubmit the modified program to the Administrator.

"(d) Federal Assistance. — After the date 3 years after the enactment of this section, no State shall receive funds authorized to be appropriated under this section except for the purpose of implementing the program and requirements of paragraphs (4) and (6) of subsection (a).

"(e) Definition of Wellhead Protection Area. — As used in this section, the term 'wellhead protection area' means the surface and subsurface area surrounding a water well or wellfield, supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield. The extent of a wellhead protection area, within a State, necessary to provide protection from contaminants which may have any adverse effect on the health of persons is to be determined by the State in the program submitted under subsection (a). Not later than one year after the enactment of the Safe Drinking Water Act Amendments of 1986, the Administrator shall issue technical guidance which States may use in making such determinations. Such guidance may reflect such factors as the radius of influence around a well or wellfield, the depth of drawdown of the water table by such well or wellfield at any given point, the time or rate of travel of various contaminants in various hydrologic conditions, distance from the well or wellfield, or other factors affecting the likelihood of contaminants reaching the well or wellfield, taking into account available engineering pump tests or comparable data, field reconnaissance, topographic information, and the geology of the formation in which the well or wellfield is located.

"(f) Prohibitions.—

"(1) Activities under other laws. — No funds authorized to be appropriated under this section may be used to support activities authorized by the Federal Water Pollution Control Act, the Solid Waste Disposal Act, the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, or other sections of this Act.

"(2) Individual sources. — No funds authorized to be appropriated under this section may be used to bring individual sources of contamination into compliance.

"(g) Implementation — Each State shall make every reasonable effort to implement the State wellhead area protection program under this section within 2 years of submitting the program to the Administrator. Each State shall submit to the Administrator a biennial status report describing the State's progress in implementing the program. Such report shall include amendments to the State program for water wells sited during the biennial period.

"(h) Federal Agencies. — Each department, agency, and instrumentality of the executive, legislative, and judicial branches of the Federal Government having jurisdiction over any potential source

of contaminants identified by a State program pursuant to the provisions of subsection (a)(3) shall be subject to and comply with all requirements of the State program developed according to subsection (a)(4) applicable to such potential source of contaminants, both substantive and procedural, in the same manner and to the same extent, as any other person is subject to such requirements, including payment of reasonable charges and fees. The President may exempt any potential source under the jurisdiction of any department, agency, or instrumentality in the executive branch if the President determines it to be in the paramount interest of the United States to do so. No such exemption shall be granted due to the lack of an appropriation unless the President shall have specifically requested such appropriation as part of the budgetary process and the Congress shall have failed to make available such requested appropriations.

"(i) Additional Requirement. —

"(1) In General. — In addition to the provisions of subsection (a) of this section, States in which there are more than 2,500 active wells at which annular injection is used as of January 1, 1986, shall include in their State program a certification that a State program exists and is being adequately enforced that provides protection from contaminants which may have any adverse effect on the health of persons and which are associated with the annual injection or surface disposal of brines associated with oil and gas production.

"(2) Definition. — For purposes of this subsection, the term 'annular injection' means the reinjection of brines associated with the production of oil or gas between the production and surface casings of a conventional oil or gas producing well.

"(3) Review. — The Administrator shall conduct a review of each program certified under this subsection.

"(4) Disapproval. — If a State fails to include the certification required by this subsection or if in the judgment of the Administrator the State program certified under this subsection is not being adequately enforced, the Administrator shall disapprove the State program submitted under subsection (a) of this section.

"(j) Coordination With Other Laws. — Nothing in this section shall authorize or require any department, agency, or other instrumentality of the Federal Government or State or local government to apportion, allocate or otherwise regulate the withdrawal or beneficial use of ground or surface waters, so as to abrogate or modify any existing rights to water established pursuant to State or Federal law, including interstate compacts.

"(k) Authorization of Appropriations. — Unless the State program is disapproved under this section, the Administrator shall make grants to the State for not less than 50 or more than 90 percent of the costs incurred by a State (as determined by the Administrator) in developing and implementing each State program under this section. For purposes of making such grants there is authorized to be appropriated not more than the following amounts:

"Fiscal year:	*Amount*
1987	$20,000,000
1988	20,000,000
1989	35,000,000
1990	35,000,000
1991	35,000,000

"PART D — EMERGENCY POWERS

"Emergency Powers

"Sec. 1431. (a) Notwithstanding any other provision of this title, the Administrator, upon receipt of information that a contaminant which is present in or is likely to enter a public water system or an underground source of drinking water may present an imminent and substantial endangerment to the health of persons, and that appropriate State and local authorities have not acted to protect the health of such persons, may take such actions as he may deem necessary in order to protect the health of such persons. To the extent he determines it to be practicable in light of such imminent endangerment, he shall consult with the State and local authorities in order to confirm the correctness of the information on which action proposed to be taken under this subsection is based and to ascertain the action which such authorities are or will be taking. The action which the Administrator may take may include (but shall not be limited to) (1) issuing such orders as may be necessary to protect the health of persons who are or may be users of such system (including travelers), including orders requiring the provision of alternative water supplies by persons who caused or contributed to the endangerment, and (2) commencing a civil action for appropriate relief, including a restraining order or permanent or temporary injunction.

[1431(a) amended by PL 99-339]

"(b) Any person who violates or fails or refuses to comply with any order issued by the Administrator under subsection (a)(1) may, in an action brought in the appropriate United States district court to enforce such order, be subject to a civil penalty of not to exceed $5,000 for each day in which such violation occurs or failure to comply continues.

[1431(b) amended by PL 99-339]

"Sec. 1432. Tampering With Public Water Systems.

[1432 added by PL 99-339]

"(a) Tampering. — Any person who tampers with a public water system shall be imprisoned for not more than 5 years, or fined in accordance with title 18 of the United States Code, or both.

"(b) Attempt or Threat. — Any person who attempts to tamper, or makes a threat to tamper, with a public drinking water system be imprisoned for not more than 3 years, or fined in accordance with title 18 of the United States Code, or both.

"(c) Civil Penalty. — The Administrator may bring a civil action in the appropriate United States district court (as determined under the provisions of title 28 of the United States Code) against any person who tampers, attempts to tamper, or makes a threat to tamper with a public water system. The court may impose on such person a civil penalty of not more than $50,000 for such tampering or not more than $20,000 for such attempt or threat.

"(d) Definition of 'Tamper'. — For purposes of this section, the term 'tamper' means —

"(1) to introduce a contaminant into a public water system with the intention of harming persons; or

"(2) to otherwise interfere with the operation of a public water system with the intention of harming persons.

"PART E — GENERAL PROVISIONS

"Assurance of Availability of Adequate Supplies of Chemicals Necessary for Treatment of Water.

"Sec. 1441. (a) If any person who uses chlorine, activated carbon, lime, ammonia,

soda ash, potassium permanganate, caustic soda, or other chemical or substance for the purpose of treating water in any public water system or in any public treatment works determines that the amount of such chemical or substance necessary to effectively treat such water is not reasonably available to him or will not be so available to him when required for the effective treatment of such water, such person may apply to the Administrator for a certification (hereinafter in this section referred to as a 'certification of need') that the amount of such chemical or substance which such person requires to effectively treat such water is not reasonably available to him or will not be so available when required for the effective treatment of such water.

"(b)(1) An application for a certification of need shall be in such form and submitted in such manner as the Administrator may require and shall (A) specify the persons the applicant determines are able to provide the chemical or substance with respect to which the application is submitted, (B) specify the persons from whom the applicant has sought such chemical or substance, and (C) contain such other information as the Administrator may require.

"(2) Upon receipt of an application under this section, the Administrator shall (A) publish in the Federal Register a notice of the receipt of the application and a brief summary of it, (B) notify in writing each person whom the President or his delegate (after consultation with the Administrator) determines could be made subject to an order required to be issued upon the issuance of the certification of need applied for in such application, and (C) provide an opportunity for the submission of written comments on such application. The requirements of the preceding sentence of this paragraph shall not apply when the Administrator for good cause finds (and incorporates the finding with a brief statement of reasons therefor in the order issued) that waiver of such requirements is necessary in order to protect the public health.

"(3) Within 30 days after—

"(A) the date a notice is published under paragraph (2) in the Federal Register with respect to an application submitted under this section for the issuance of a certification of need, or

"(B) the date on which such application is received if as authorized by the second sentence of such paragraph no notice is published with respect to such application, the Administrator shall take action either to issue or deny the issuance of a certification of need.

"(c)(1) If the Administrator finds that the amount of a chemical or substance necessary for an applicant under an application submitted under this section to effectively treat water in a public water system or in a public treatment works is not reasonably available to the applicant or will not be so available to him when required for the effective treatment of such water, the Administrator shall issue a certification of need. Not later than seven days following the issuance of such certification, the President or his delegate shall issue an order requiring the provision to such person of such amounts of such chemical or substance as the Administrator deems necessary in the certification of need issued for such person. Such order shall apply to such manufacturers, producers, processors, distributors, and repackagers of such chemical or substance as the President or his delegate deems necessary and appropriate, except that such order may not apply to any manufacturer, producer, or processor of such chemical or substance who manufactures, produces, or processes (as the case may be) such chemical or substance solely for its own use. Persons subject to an order issued under this section shall be given a reasonable opportunity to consult with the President or his delegate with respect to the implementation of the order.

"(2) Orders which are to be issued under paragraph (1) to manufacturers, producers, and processors of a chemical or substance shall be equitably apportioned, as far as practicable, among all manufacturers, producers, and processors of such chemical or substance; and orders which are to be issued under paragraph (1) to distributors and repackagers of a chemical or substance shall be equitably apportioned, as far as practicable, among all distributors and repackagers of such chemical or substance. In apportioning orders issued under paragraph (1) to manufacturers, producers, processors, distributors, and repackagers of chlorine, the President or his delegate shall, in carrying out the requirements of the preceding sentence, consider.—

"(A) the geographical relationships and established commercial relationships between such manufacturers, producers, processors, distributors, and repackagers and the persons for whom the orders are issued;

"(B) in the case of orders to be issued to producers of chlorine, the (i) amount of chlorine historically supplied by each such producer to treat water in public water systems and public treatment works, and (ii) share of each such producer of the total annual production of chlorine in the United States; and

"(C) such other factors as the President or his delegate may determine are relevant to the apportionment of orders in accordance with the requirements of the preceding sentence.

"(3) Subject to subsection (f), any person for whom a certification of need has been issued under this subsection may upon the expiration of the order issued under paragraph (1) upon such certification apply under this section for additional certifications.

"(d) There shall be available as a defense to any action brought for breach of contract in a Federal or State court arising out of delay or failure to provide, sell, or offer for sale or exchange a chemical or substance subject to an order issued pursuant to subsection (c)(1), that such delay or failure was caused solely by compliance with such order.

"(e)(1) Whoever knowingly fails to comply with any order issued pursuant to subsection (c)(1) shall be fined not more than $5,000 for each such failure to comply.

"(2) Whoever fails to comply with any order issued pursuant to subsection (c)(1) shall be subject to a civil penalty of not more than $2,500 for each such failure to comply.

"(3) Whenever the Administrator or the President or his delegate has reason to believe that any person is violating or will violate any order issued pursuant to subsection (c)(1), he may petition a United States district court to issue a temporary restraining order or preliminary or permanent injunction (including a mandatory injunction) to enforce the provision of such order.

"(f) No certification of need or order issued under this section may remain in effect for more than one year.

[1441(f) amended by PL 95-190; PL 96-63; PL 99-339]

Research, Technical Assistance, Information, Training Of Personnel

"Sec. 1442. (a)(1) The Administrator may conduct research, studies, and demonstrations relating to the causes, diagnosis, treatment, control, and prevention of physical and mental diseases and other impairments of man resulting directly or indirectly from contaminants in water, or to the provision of a dependably safe supply of drinking water, including—

"(A) improved methods (i) to identify and measure the existence of contaminants in drinking water (including methods which may be used by State and local health and water officials), and (ii) to identify the source of such contaminants;

"(B) improved methods to identify and measure the health effects of contaminants in drinking water;

"(C) new methods of treating raw water to prepare it for drinking, so as to improve the efficiency of water treatment and to remove contaminants from water;

"(D) improved methods for providing a dependably safe supply of drinking water, including improvements in water purification and distribution, and methods of assessing the health related hazards of drinking water; and

"(E) improved methods of protecting underground water sources of public water systems from contamination.

[*Editor's note:* Section 304(b) of Public Law 99-339 provides:

"(b) Comparative Health Effects Assessment. — The Administrator of the Environmental Protection Agency shall conduct a comparative health effects assessment, using available data, to compare the public health effects (both positive and negative) associated with water treatment chemicals and their byproducts to the public health effects associated with contaminants found in public water supplies. Not later than 18 months after the date of the enactment of this Act, the Administrator shall submit a report to the Congress setting forth the results of such assessment."]

"(2)(A) The Administrator shall, to the maximum extent feasible, provide technical assistance to the States and municipalities in the establishment and administration of public water system supervision programs (as defined in section 1443(c)(1)).

[1442(a)(2)(A) designated and (B) added and amended by PL 95-190]

"(B) The Administrator is authorized to provide technical assistance and to make grants to States, or publicly owned water systems to assist in responding to and alleviating any emergency situation affecting public water systems (including sources of water for such systems) which the Administrator determines to present substantial danger to the public health. Grants provided under this subparagraph shall be used only to support those actions which (i) are necessary for preventing, limiting or mitigating danger to the public health in such emergency situation and (ii) would not, in the judgment of the Administrator, be taken without such emergency assistance. The Administrator may carry out the program authorized under this subparagraph as part of, and in accordance with the terms and conditions of, any other program of assistance for environmental emergencies which the Administrator is authorized to carry out under any other provision of law. No limitation on appropriations for any such other program shall apply to amounts appropriated under this subparagraph.

"(3)(A) The Administrator shall conduct studies, and make periodic reports to Congress, on the costs of carrying out regulations prescribed under section 1412.

[1442(a)(3)(A) designated and (B) added by PL 95-190]

(B) Not later than eighteen months after the date of enactment of this subparagraph, the Administrator shall submit a report to Congress which identifies and analyzes—

(i) the anticipated costs of compliance with interim and revised national primary drinking water regulations and the anticipated costs to States and units of local governments in implementing such regulations;

(ii) alternative methods of (including alternative treatment techniques for) compliance with such regulations;

(iii) methods of paying the costs of compliance by public water systems with national primary drinking water regulations, including user charges, State or local taxes or subsidies, Federal grants (including planning or construction grants, or both), loans, and loan guarantees, and other methods of assisting in paying the costs of such compliance;

(iv) the advantages and disadvantages of each of the methods referred to in clauses (ii) and (iii);

(v) the sources of revenue presently available (and projected to be available) to public water systems to meet current and future expenses; and

(vi) the costs of drinking water paid by residential and industrial consumers in a sample of large, medium, and small public water systems and of individually owned wells, and the reasons for any differences in such costs.

The report required by this subparagraph shall identify and analyze the items required in clauses (i) through (v) separately with respect to public water systems serving small communities. The report required by this subparagraph shall include such recommendations as the Administrator deems appropriate.

"(4) The Administrator shall conduct a survey and study of—

"(A) disposal of waste (including residential waste) which may endanger underground water which supplies, or can reasonably be expected to supply, any public water systems, and

"(B) means of control of such waste disposal.

Not later than one year after the date of enactment of this title, he shall transmit to the Congress the results of such survey and study, together with such recommendations as he deems appropriate.

"(5) The Administrator shall carry out a study of methods of underground injection which do not result in the degradation of underground drinking water sources.

"(6) The Administrator shall carry out a study of methods of preventing, detecting, and dealing with surface spills of contaminants which may degrade underground water sources for public water systems.

"(7) The Administrator shall carry out a study of virus contamination of drinking water sources and means of control of such contamination.

"(8) The Administrator shall carry out a study of the nature and extent of the impact on underground water which supplies or can reasonably be expected to supply public water systems of (A) abandoned injection or extraction wells; (B) intensive application of pesticides and fertilizers in underground water recharge areas; and (C) ponds, pools, lagoons, pits, or other surface disposal of contaminants in underground water recharge areas.

"(9) The Administrator shall conduct a comprehensive study of public water sup-

plies and drinking water sources to determine the nature, extent, sources of and means of control of contamination by chemicals or other substances suspected of being carcinogenic. Not later than six months after the date of enactment of this title, he shall transmit to the Congress the initial results of such study, together with such recommendations for further review and corrective action as he deems appropriate.

"(10) The Administrator shall carry out a study of the reaction of chlorine and humic acids and the effects of the contaminants which result from such reaction on public health and on the safety of drinking water, including any carcinogenic effect.

[1442(a)(10), (11) added by PL 95-190]

"(11) The Administrator shall carry out a study of polychlorinated biphenyl contamination of actual or potential sources of drinking water, contamination of such sources by other substances known or suspected to be harmful to public health, the effects of such contamination, and means of removing, treating, or otherwise controlling such contamination. To assist in carrying out this paragraph, the Administrator is authorized to make grants to public agencies and private nonprofit institutions.

"(b) In carrying out this title, the Administrator is authorized to —

"(1) collect and make available information pertaining to research, investigations, and demonstrations with respect to providing a dependably safe supply of drinking water together with appropriate recommendations in connection therewith;

"(2) make available research facilities of the Agency to appropriate public authorities, institutions, and individuals engaged in studies and research relating to the purposes of this title;

"(3) make grants to, and enter into contracts with, any public agency, educational institution, and any other organization, in accordance with procedures prescribed by the Administrator, under which he may pay all or a part of the costs (as may be determined by the Administrator) of any project or activity which is designed—

"(A) to develop, expand, or carry out a program (which may combine training education and employment) for training persons for occupations involving the public health aspects of providing safe drinking water;

"(B) to train inspectors and supervisory personnel to train or supervise persons in occupations involving the public health aspects of providing safe drinking water; or

"(C) to develop and expand the capability of programs of States and muncipalities to carry out the purposes of this title (other than by carrying out State programs of public water system supervision or underground water source protection (as defined in section 1443(c))).

[1442(b)(3)(C) amended by PL 95-190]

"(c) Not later than eighteen months after the date of enactment of this subsection, the Administrator shall submit a report to Congress on the present and projected future availability of an adequate and dependable supply of safe drinking water to meet present and projected future need. Such report shall include an analysis of the future demand for drinking water and other competing uses of water, the availability and use of methods to conserve water or reduce demand, the adequacy of present measures to assure adequate and dependable supplies of safe drinking water, and the problems (financial, legal, or other) which need to be resolved in order to assure the availability of such supplies for the future. Existing information and data compiled by the National Water Commission and others shall be utilized to the extent possible.

"(d) The Administrator shall—

"(1) provide training for, and make grants for training (including postgraduate training) of (A) personnel of State agencies which have primary enforcement responsibility and of agencies or units of local government to which enforcement responsibilities have been delegated by the State, and (B) personnel who manage or operate public water systems, and

"(2) make grants for postgraduate training of individuals (including grants to educational institutions for traineeships) for purposes of qualifying such individuals to work as personnel referred to in paragraph (1).

Reasonable fees may be charged for training provided under paragraph (1)(B) to persons other than personnel of State or local agencies but such training shall be provided to personnel of State or local agencies without charge.

[1442(d) added by PL 95-190]

"(e) [Repealed]

[1442(e) added by PL 96-502; repealed by PL 99-339]

"(f) There are authorized to be appropriated to carry out the provisions of this section other than subsection (a)(2)(B) and provisions relating to research $15,000,000 for the fiscal year ending June 30, 1975; $25,000,000 for the fiscal year ending June 30, 1976; $35,000,000 for the fiscal year ending June 30, 1977; $17,000,000 for each of the fiscal years 1978 and 1979; $21,405,000 for the fiscal year ending September 30, 1980; $30,000,000 for the fiscal year ending September 30, 1981; and $35,000,000 for the fiscal year ending September 30, 1982. There are authorized to be appropriated to carry out subsection (a)(2)(B) $8,000,000 for each of the fiscal years 1978 through 1982. There are authorized to be appropriated to carry out subsection (a)(2)(B) not more than the following amounts:

"Fiscal year:	Amount
1987	$7,650,000
1988	7,650,000
1989	8,050,000
1990	8,050,000
1991	8,050,000

There are authorized to be appropriated to carry out the provisions of this section (other than subsection (g), subsection (a)(2)(B), and provisions relating to research), not more than the following amounts:

"Fiscal year:	Amount
1987	$35,600,000
1988	35,600,000
1989	38,020,000
1990	38,020,000
1991	38,020,000

[Former 1442(c) redesignated as (e) by PL 95-190; amended by PL 96-63; redesignated as (f) by PL 96-502; amended by PL 99-339]

"(g) The Administrator is authorized to provide technical assistance to small public water systems to enable such systems to achieve and maintain compliance with national drinking water regulations. Such assistance may include 'circuit-rider' programs, training, and preliminary engineering studies. There are authorized to be appropriated to carry out this subsection $10,000,000 for each of the fiscal years 1987 through 1991. Not less than the greater of —

"(1) 3 percent of the amounts appropriated under this subsection, or

"(2) $280,000

shall be utilized for technical assistance to public water systems owned or operated by Indian tribes.

[1442(g) added and amended by PL 99-339]

Grants For State Programs

"Sec. 1443. (a)(1) From allotments made pursuant to paragraph (4), the Administrator may make grants to States to carry out public water system supervision programs.

"(2) No grant may be made under paragraph (1) unless an application therefor has been submitted to the Administrator in such form and manner as he may require. The Administrator may not approve an application of a State for its first grant under paragraph (1) unless he determines that the State—

"(A) has established or will establish within one year from the date of such grant a public water system supervision program, and

"(B) will, within that one year, assume primary enforcement responsibility for public water systems within the State.

No grant may be made to a State under paragraph (1) for any period beginning more than one year after the date of the State's first grant unless the State has assumed and maintains primary enforcement responsibility for public water systems within the State. The prohibitions contained in the preceding two sentences shall not apply to such grants when made to Indian Tribes.

[1443(a)(2) amended by PL 99-339]

"(3) A grant under paragraph (1) shall be made to cover not more than 75 per centum of the grant recipient's costs (as determined under regulations of the Administrator) in carrying out, during the one-year period beginning on the date the grant is made, a public water system supervision program.

"(4) In each fiscal year the Administrator shall, in accordance with regulations, allot the sums appropriated for such year under paragraph (5) among the States on the basis of population, geographical area, number of public water systems, and other relevant factors.

No State shall receive less than 1 per centum of the annual appropriation for grants under paragraph (1): *Provided*, That the Administrator may, by regulation, reduce such percentage in accordance with the criteria specified in this paragraph: *And provide further*, That such percentage shall not apply to grants allotted to Guam, American Samoa, or the Virgin Islands. "(5) The prohibition contained in the last sentence of paragraph (2) may be waived by the Administrator with respect to a grant to a State through fiscal year 1979 but such prohibition may only be waived if, in the judgment of the Administrator—

"(A) the state is making a diligent effort to assume and maintain primary enforcement responsibility for public water systems within the state;

"(B) the State has made significant progress toward assuming and maintaining such primary enforcement responsibility; and

"(C) there is reason to believe the State will assume such primary enforcement responsibility by October 1, 1979.

The amount of any grant awarded for the fiscal years 1978 and 1979 pursuant to a waiver under this paragraph may not exceed 75 per centum of the allotment which the State would have received for such fiscal year if it had assumed and maintained such primary enforcement responsibility. The remaining 25 per centum of the amount allotted to such State for such fiscal year shall be retained by the Administrator, and the Administrator may award such amount to such State at such time as the State assumes such responsibility before the beginning of fiscal year 1980. At the beginning of each fiscal years 1979 and 1980 the amounts retained by the Administrator for any preceding fiscal year and not awarded by the beginning of fiscal year 1979 or 1980 to the states to which such amounts were originally allotted may be removed from the original allotment and reallotted for fiscal year 1979 or 1980 (as the case may be) to States which have assumed primary enforcement responsibility by the beginning of such fiscal year.

"(6) The Administrator shall notify the State of the approval or disapproval of any application for a grant under this section—

"(A) within ninety days after receipt of such application, or

"(B) not later than the first day of the fiscal year for which the grant application is made, whichever is later.

"(7) For purposes of making grants under paragraph (1) there are authorized to be appropriated $15,000,000 for the fiscal year ending June 30, 1976, $25,000,000 for the fiscal year ending June 30, 1977, $35,000,000 for fiscal year 1978, $45,000,000 for fiscal year 1979; $29,450,000 for the fiscal year ending September 30, 1980, $32,000,000 for the fiscal year ending September 30, 1981, and $34,000,000 for the fiscal year ending September 30, 1982. For the purposes of making grants under paragraph (1) there are authorized to be appropriated not more than the following amounts:

"Fiscal year:	Amount
1987	$37,200,000
1988	37,200,000
1989	40,150,000
1990	40,150,000
1991	40,150,000

[1443(a)(7) amended by PL 96-63; PL 99-339]

"(b)(1) From allotments made pursuant to paragraph (4), the Administrator may make grants to States to carry out underground water source protection programs.

"(2) No grant may be made under paragraph (1) unless an application therefor has been submitted to the Administrator in such form and manner as he may require. No grant may be made to any State under paragraph (1) unless the State has assumed primary enforcement responsibility within two years after the date the Administrator promulgates regulations for State underground injection control programs under section 1421. The prohibition contained in the preceding sentence shall not apply to such grants when made to Indian Tribes.

[1443(b)(2) revised by PL 96-502; amended by PL 99-339]

"(3) A grant under paragraph (1) shall be made to cover not more than 75 per centum of the grant recipient's costs (as determined under regulations of the Administrator) in carrying out, during the one-year period beginning on the date the grant is made, an underground water source protection program.

"(4) In each fiscal year the Administrator shall, in accordance with

regulations, allot the sums appropriated for such year under paragraph (5) among the States on the basis of population, geographical area, and other relevant factors.

"(5) For purposes of making grants under paragraph (1) there are authorized to be appropriated $5,000,000 for the fiscal year ending June 30, 1976, $7,500,000 for the fiscal year ending June 30, 1977, $10,000,000 for each of the fiscal years 1978 and 1979, $7,795,000 for the fiscal year ending September 30, 1980, $18,000,000 for the fiscal year ending September 30, 1981, and $21,000,000 for the fiscal year ending September 30, 1982. For the purpose of making grants under paragraph (1) there are authorized to be appropriated not more than the following amounts:

"Fiscal year	Amount
1987	$19,700,000
1988	19,700,000
1989	20,850,000
1990	20,850,000
1991	20,850,000

[1443(b)(5) amended by PL 95-63; PL 99-339]

"(c) For purposes of this section:

"(1) The term 'public water system supervision program' means a program for the adoption and enforcement of drinking water regulations (with such variances and exemptions from such regulations under conditions and in a manner which is not less stringent than the conditions under, and the manner in, which variances and exemptions may be granted under sections 1415 and 1416) which are no less stringent than the national primary drinking water regulations under section 1412, and for keeping records and making reports required by section 1413(a)(3).

"(2) The term 'underground water source protection program' means a program for the adoption and enforcement of a program which meets the requirements of regulations under section 1421 and for keeping records and making reports required by section 1422(b)(1)(A)(ii). Such term includes, where applicable, a program which meets the requirements of section 1425.

[1443(c)(2) amended by PL 96-502]

Special Study And Demonstration Project Grants; Guaranteed Loans

"Sec. 1444. (a) The Administrator may make grants to any person for the purposes of—

"(1) assisting in the development and demonstration (including construction) of any project which will demonstrate a new or improved method, approach, or technology for providing a dependably safe supply of drinking water to the public; and

"(2) assisting in the development and demonstration (including construction) of any project which will investigate and demonstrate health implications involved in the reclamation, recycling, and reuse of waste waters for drinking and the processes and methods for the preparation of safe and acceptable drinking water.

"(b) Grants made by the Administrator under this section shall be subject to the following limitations:

"(1) Grants under this section shall not exceed 66⅔ per centum of the total cost of construction of any facility and 75 per centum of any other costs, as determined by the Administrator.

"(2) Grants under this section shall not be made for any project involving the construction or modification of any facilities for any public water system in a State unless such project has been approved by the State agency charged with the responsibility for safety of drinking water (or if there is no such agency in a State, by the State health authority).

"(3) Grants under this section shall not be made for any project unless the Administrator determines, after consulting the National Drinking Water Advisory Council, that such project will serve a useful purpose relating to the development and demonstration of new or improved techniques, methods, or technologies for the provision of safe water to the public for drinking.

"(4) Priority for grants under this section shall be given where there are known or potential public health hazards which require advanced technology for the removal of particles which are too small to be removed by ordinary treatment technology.

"(c) For the purposes of making grants under subsections (a) and (b) of this section there are authorized to be appropriated $7,500,000 for the fiscal year ending June 30, 1975; and $7,500,000 for the fiscal year ending June 30, 1976; and $10,000,000 for the fiscal year ending June 30, 1977.

"(d) The Administrator during the fiscal years ending June 30, 1975, and June 30, 1976, shall carry out a program of guaranteeing loans made by private lenders to small public water systems for the purpose of enabling such systems to meet national primary drinking water regulations prescribed under section 1412. No such guarantee may be made with respect to a system unless (1) such system cannot reasonably obtain financial assistance necessary to comply with such regulations from any other source, and (2) the Administrator determines that any facilities constructed with a loan guaranteed under this subsection is not likely to be made obsolete by subsequent changes in primary regulations. The aggregate amount of indebtedness guaranteed with respect to any system may not exceed $50,000. The aggregate amount of indebtedness guaranteed under this subsection may not exceed $50,000,000. The Administrator shall prescribe regulations to carry out this subsection.

[1444(d) amended by PL 99-339]

Records And Inspections

"Sec. 1445. (a)(1) Every person who is a supplier of water, who is or may be otherwise subject to a primary drinking water regulation prescribed under section 1412 or to an applicable underground injection control program (as defined in section 1422(c)), who is or may be subject to the permit requirement of section 1424 or to an order issued under section 1441, or who is a grantee, shall establish and maintain such records, make such reports, conduct such monitoring, and provide such information as the Administrator may reasonably require by regulation to assist him in establishing regulations under this title, in determining whether such person has acted or is acting in compliance with this title, in administering any program of financial assistance under this title in evaluating the health risks of unregulated contaminants, or in advising the public of such risks. In requiring a public water system to monitor under this subsection, the Administrator may take into consideration the system size and the contami-

nants likely to be found in the system's drinking water.

[1445(a) amended by PL 95-190; (a)(1) designated and amended by PL 99-339]

"(2) Not later than 18 months after enactment of the Safe Drinking Water Act Amendments of 1986, the Administrator shall promulgate regulations requiring every public water system to conduct a monitoring program for unregulated contaminants. The regulations shall require monitoring of drinking water supplied by the system and shall vary the frequency and schedule of monitoring requirements for systems based on the number of persons served by the system, the source of supply, and the contaminants likely to be found. Each system shall be required to monitor at least once every 5 years after the effective date of the Administrator's regulations unless the Administrator requires more frequent monitoring.

[1445(a)(2)—(8) added by PL 99-339]

"(3) Regulations under paragraph (2) shall list unregulated contaminants for which systems may be required to monitor, and shall include criteria by which the primary enforcement authority in each State could show cause for addition or deletion of contaminants from the designated list. The primary State enforcement authority may delete contaminants for an individual system, in accordance with these criteria, after obtaining approval of assessment of the contaminants potentially to be found in the system. The Administrator shall approve or disapprove such an assessment submitted by a State within 60 days. A State may add contaminants, in accordance with these criteria, without making an assessment, but in no event shall such additions increase Federal expenditures authorized by this section.

"(4) Public water systems conducting monitoring of unregulated contaminants pursuant to this section shall provide the results of such monitoring to the primary enforcement authority.

"(5) Notification of the availability of the results of the monitoring programs required under paragraph (2), and notification of the availability of the results of the monitoring program referred to in paragraph (6), shall be given to the persons served by the system and the Administrator.

"(6) The Administrator may waive the monitoring requirement under paragraph (2) for a system which has conducted a monitoring program after January 1, 1983, if the Administrator determines the program to have been consistent with the regulations promulgated under this section.

"(7) Any system supplying less than 150 service connections shall be treated as complying with this subsection if such system provides water samples or the opportunity for sampling according to rules established by the Administrator.

"(8) There are authorized to be appropriated $30,000,000 in the the fiscal year ending September 30, 1987 to remain available until expended to carry out the provisions of this subsection.

"(b)(1) Except as provided in paragraph (2), the Administrator, or representatives of the Administrator duly designated by him, upon presenting appropriate credentials and a written notice to any supplier of water or other person subject to (A) a national primary drinking water regulation prescribed under section 1412(B), an applicable underground injection control program or (C) any requirement to monitor an unregulated contaminant pursuant to subsection (a), or person in charge of any of the property of such supplier or other person referred to in clause (A), (B), or (C), is authorized to enter any establishment, facility, or other property of such supplier or other person in order to determine whether such supplier or other person has acted or is acting in compliance with this title, including for this purpose, inspection, at reasonable times, of records, files, papers, processes, controls, and facilities, or in order to test any feature of a public water system, including its raw water source. The Administrator or the Comptroller General (or any representative designated by either) shall have access for the purpose of audit and examination to any records, reports, or information of a grantee which are required to be maintained under subsection (a) or which are pertinent to any financial assistance under this title.

[1445(b)(1) amended by PL 95-190]

"(2) No entry may be made under the first sentence of paragraph (1) in an establishment, facility, or other property of a supplier of water or other person subject to a national primary drinking water regulation if the establishment, facility, or other property is located in a State which has primary enforcement responsibility for public water systems unless, before written notice of such entry is made, the Administrator (or his representative) notifies the State agency charged with responsibility for safe drinking water of the reasons for such entry. The Administrator shall, upon a showing by the State agency that such an entry will be detrimental to the administration of the State's program of primary enforcement responsibility, take such showing into consideration in determining whether to make such entry. No State agency which receives notice under this paragraph of an entry proposed to be made under paragraph (1) may use the information contained in the notice to inform the person whose property is proposed to be entered of the proposed entry; and if a State agency so uses such information, notice to the agency under this paragraph is not required until such time as the Administrator determines the agency has provided him satisfactory assurances that it will no longer so use information contained in a notice under this paragraph.

"(c) Whoever fails or refuses to comply with any requirement of subsection (a) or to allow the Administrator, the Comptroller General, or representatives of either, to enter and conduct any audit or inspection authorized by subsection (b) shall be subject to a civil penalty of not to exceed $25,000.

[1445(c) amended by PL 99-339]

"(d)(1) Subject to paragraph (2), upon a showing satisfactory to the Administrator by any person that any information required under this section from such person, if made public, would divulge trade secrets or secret processes of such person, the Administrator shall consider such information confidential in accordance with the purposes of section 1905 of title 18 of the United States Code. If the applicant fails to make a showing satisfactory to the Administrator, the Administrator shall give such applicant thirty days' notice before releasing the information to which the application relates (unless the public health or safety requires an earlier release of such information).

"(2) Any information required under this section (A) may be disclosed to other

officers, employees, or authorized representatives of the United States concerned with carrying out this title or to committees of the Congress, or when relevant in any proceeding under this title, and (B) shall be disclosed to the extent it deals with the level of contaminants in drinking water. For purposes of this subsection the term 'information required under this section' means any papers, books, documents, or information, or any particular part thereof, reported to or otherwise obtained by the Administrator under this section.

"(e) For purposes of this section, (1) the term 'grantee' means any person who applies for or receives financial assistance, by grant, contract, or loan guarantee under this title, and (2) the term 'person' includes a Federal agency.

"National Drinking Water Advisory Council

"Sec. 1446. (a) There is established a National Drinking Water Advisory Council which shall consist of fifteen members appointed by the Administrator after consultation with the Secretary. Five members shall be appointed from the general public: five members shall be appointed from appropriate State and local agencies concerned with water hygiene and public water supply; and five members shall be appointed from representatives of private organizations or groups demonstrating an active interest in the field of water hygiene and public water supply. Each member of the Council shall hold office for a term of three years, except that—

"(1) any member appointed to fill a vacancy occurring prior to the expiration of the term for which his predecessor was appointed shall be appointed for the remainder of such term; and

"(2) the terms of the members first taking office shall expire as follows: Five shall expire three years after the date of enactment of this title, five shall expire two years after such date, and five shall expire one year after such date, as designated by the Administrator at the time of appointment.

The members of the Council shall be eligible for reappointment.

"(b) The Council shall advise, consult with, and make recommendations to, the Administrator on matters relating to activities, functions, and policies of the Agency under this title.

"(c) Members of the Council appointed under this section shall, while attending meetings or conferences of the Council or otherwise engaged in business of the Council, receive compensation and allowances at a rate to be fixed by the Administrator, but not exceeding the daily equivalent of the annual rate of basic pay in effect for grade GS-18 of the General Schedule for each day (including travel-time) during which they are engaged in the actual performance of duties vested in the Council. While away from their homes or regular places of business in the performance of services for the Council, members of the Council shall be allowed travel expenses, including per diem in lieu of subsistence, in the same manner as persons employed intermittently in the Government service are allowed expenses under sections 5703(b) of title 5 of the United States Code.

"(d) Section 14(a) of the Federal Advisory Committee Act (relating to termination) shall not apply to the Council.

"Federal Agencies

"Sec. 1447. (a) Each Federal agency (1) having jurisdiction over any federally owned or maintained public water system or (2) engaged in any activity resulting, or which my result in, underground injection which endangers drinking water (within the meaning of section 1421(d)(2) shall be subject to and comply with, all Federal, State, and local requirements, administrative authorities, and process and sanctions respecting the provision of safe drinking water and respecting any underground injection program in the same manner, and to the same extent, as any nongovernmental entity. The preceding sentence shall apply (A) to any requirement whether substantive or procedural (including any recordkeeping or reporting requirement, any requirement respecting permits, and any other requirement whatsoever), (B) to the exercise of any Federal, State, or local administrative authority, and (C) to any process or sanction, whether enforced in Federal, State, or local courts or in any other manner. This subsection shall apply, not withstanding any immunity of such agencies, under any law or rule of law. No officer, agent, or employee of the United States shall be personally liable for any civil penalty under this title with respect to any act or omission within the scope of his official duties.

[1447(a) amended by PL 95-190]

"(b) The Administrator shall waive compliance with subsection (a) upon request of the Secretary of Defense and upon a determination by the President that the requested waiver is necessary in the interest of national security. The Administrator shall maintain a written record of the basis upon which such waiver was granted and make such record available for in camera examination when relevant in a judicial proceeding under this title. Upon the issuance of such a waiver, the Administrator shall publish in the Federal Register a notice that the waiver was granted for national security purposes, unless, upon the request of the Secretary of Defense, the Administrator determines to omit such publication because the publication itself would be contrary to the interests of national security, in which event the Administrator shall submit notice to the Armed Services Committee of the Senate and House of Representatives.

"(c)(1) Nothing in the Safe Drinking Water Amendments of 1977 shall be construed to alter or affect the status of American Indian lands or water rights nor to waive any sovereignty over Indian lands guaranteed by treaty or statute.

"(2) For the purposes of this Act, the term 'Federal agency' shall not be construed to refer to or include any American Indian tribe, nor to the Secretary of the Interior in his capacity as trustee of Indian lands.

"Judicial Review

"Sec. 1448.(a) A petition for review of— "(1) actions pertaining to the establishment of national primary drinking water regulations (including maximum contaminant level goals) may be filed only in the United States Court of Appeals for the District of Columbia circuit; and

[1448(a)(1), (2) revised by PL 99-339]

"(2) any other action of the Administrator under this Act may be filed in the circuit in which the petitioner resides or transacts business which is directly affected by the action.

Any such petition shall be filed within the 45-day period beginning on the date of the promulgation of the regulation or issuance of the order with respect to which

review is sought or on the date of the determination with respect to which review is sought, and may be filed after the expiration of such 45-day period if the petition is based solely on grounds arising after the expiration of such period. Action of the Administrator with respect to which review could have been obtained under this subsection shall not be subject to judicial review in any civil or criminal proceeding for enforcement or in any civil action to enjoin enforcement.

"(b) The United States district courts shall have jurisdiction of actions brought to review (1) the granting of, or the refusing to grant, a variance or exemption under section 1415 or 1416 or (2) the requirements of any schedule prescribed for a variance or exemption under such section or the failure to prescribe such a schedule. Such an action may only be brought upon a petition for review filed with the court within the 45-day period beginning on the date the action sought to be reviewed is taken or, in the case of a petition to review the refusal to grant a variance or exemption or the failure to prescribe a schedule, within the 45-day period beginning on the date action is required to be taken on the variance, exemption, or schedule, as the case may be. A petition for such review may be filed after the expiration of such period if the petition is based solely on grounds arising after the expiration of such period. Action with respect to which review could have been obtained under this subsection shall not be subject to judicial review in any civil or criminal proceeding for enforcement or in any civil action to enjoin enforcement.

"(c) In any judicial proceeding in which review is sought of a determination under this title required to be made on the record after notice and opportunity for hearing, if any party applies to the court for leave to adduce additional evidence and shows to the satisfaction of the court that such additional evidence is material and that there were reasonable grounds for the failure to adduce such evidence in the proceeding before the Administrator, the court may order such additional evidence (and evidence in rebuttal thereof) to be taken before the Administrator, in such manner and upon such terms and conditions as to the court may deem proper. The Administrator may modify his findings as to the facts, or make new findings, by reason of the additional evidence so taken, and he shall file such modified or new findings, and his recommendation, if any, for the modification or setting aside of his original determination, with the return of such additional evidence.

"Citizen's Civil Action

"Sec. 1449. (a) Except as provided in subsection (b) of this section, any person may commence a civil action on his own behalf —

"(1) against any person (including (A) the United States, and (B) any other governmental instrumentality or agency to the extent permitted by the eleventh amendment to the Constitution) who is alleged to be in violation of any requirement prescribed by or under this title, or

"(2) against the Administrator where there is alleged a failure of the Administrator to perform any act or duty under this title which is not discretionary with the Administrator.

No action may be brought under paragraph (1) against a public water system for a violation of a requirement prescribed by or under this title which occurred within the 27-month period beginning on the first day of the month in which this title is enacted. The United States district courts shall have jurisdiction, without regard to the amount in controversy or the citizenship of the parties, to enforce in an action brought under this subsection any requirement prescribed by or under this title or to order the Administrator to perform an act or duty described in paragraph (2), as the case may be.

"(b) No civil action may be commenced—

"(1) under subsection (a)(1) of this section respecting violation of a requirement prescribed by or under this title —

"(A) prior to sixty days after the plaintiff has given notice of such violation (i) to the Administrator, (ii) to any alleged violator of such requirement and (iii) to the State in which the violation occurs, or

"(B) if the Administrator, the Attorney General, or the State has commenced and is diligently prosecuting a civil action in a court of the United States to require compliance with such requirement, but in any such action in a court of the United States any person may intervene as a matter of right; or

"(2) under subsection (a)(2) of this section prior to sixty days after the plaintiff has given notice of such action to the Administrator.

Notice required by this subsection shall be given in such manner as the Administrator shall prescribe by regulation. No person may commence a civil action under subsection (a) to require a State to prescribe a schedule under section 1415 or 1416 for a variance or exemption, unless such person shows to the satisfaction of the court that the State has in a substantial number of cases failed to prescribe such schedules.

"(c) In any action under this section, the Administrator or the Attorney General, if not a party, may intervene as a matter of right.

"(d) The court, in issuing any final order in any action brought under subsection (a) of this section, may award costs of litigation (including reasonable attorney and expert witness fees) to any party whenever the court determines such an award is appropriate. The court may, if a temporary restraining order or preliminary injunction is sought, require the filing of a bond or equivalent security in accordance with the Federal Rules of Civil Procedure.

"(e) Nothing in this section shall restrict any right which any person (or class of persons) may have under any statute or common law to seek enforcement of any requirement prescribed by or under this title or to seek any other relief. Nothing in this section or in any other law of the United States shall be construed to prohibit, exclude, or restrict any State or local government from —

(1) bringing any action or obtaining any remedy or sanction in any State or local court, or

(2) bringing any administrative action or obtaining any administrative remedy or sanction,

against any agency of the United States under State or local law to enforce any requirement respecting the provision of safe drinking water or respecting any underground injection control program. Nothing in this section shall be construed to authorize judicial review of regulations or orders of the Administrator under this title, except as provided in section 1448. For provisions providing for application of certain requirements to such agencies in the same manner as to nongovernmental entities, see section 1447.

[1449(e) amended by PL 95-190]

"General Provisions

"Sec. 1450. (a)(1) The Administrator is authorized to prescribe such regulations as are necessary or appropriate to carry out his functions under this title.

"(2) The Administrator may delegate any of his functions under this title (other than prescribing regulations) to any officer or employee of the Agency.

"(b) The Administrator, with the consent of the head of any other agency of the United States, may utilize such officers and employees of such agency as he deems necessary to assist him in carrying out the purposes of this title.

"(c) Upon the request of a State or interstate agency, the Administrator may assign personnel of the Agency to such State or interstate agency for the purposes of carrying out the provisions of this title.

"(d)(1) The Administrator may make payments of grants under this title (after necessary adjustment on account of previously made underpayments or overpayments) in advance or by way of reimbursement, and in such installments and on such conditions as he may determine.

"(2) Financial assistance may be made available in the form of grants only to individuals and nonprofit agencies or institutions. For purposes of this paragraph, the term 'nonprofit agency or institution' means an agency or institution no part of the net earnings of which inure, or may lawfully inure, to the benefit of any private shareholder or individual.

"(e) The Administrator shall take such action as may be necessary to assure compliance with provisions of the Act of March 3, 1931 (known as the Davis-Bacon Act; 40 U.S.C. 276a-276a(5)). The Secretary of Labor shall have, with respect to the labor standards specified in this subsection, the authority and functions set forth in Reorganization Plan Numbered 14 of 1950 (15 F.R. 3176; 64 Stat. 1267) and section 2 of the Act of June 13, 1934 (40 U.S.C. 276c).

"(f) The Administrator shall request the Attorney General to appear and represent him in any civil action instituted under this title to which the Administrator is a party. Unless, within a reasonable time, the Attorney General notifies the Administrator that he will appear in such action, attorneys appointed by the Administrator shall appear and represent him.

"(g) The provisions of this title shall not be construed as affecting any authority of the Administrator under part G of title III of this Act.

"(h) Not later than April 1 of each year, the Administrator shall submit to the Committee on Commerce of the Senate and the Committee on Interstate and Foreign Commerce of the House of Representatives a report respecting the activities of the Agency under this title and containing such recommendations for legislation as he considers necessary. The report of the Administrator under this subsection which is due not later than April 1, 1975, and each subsequent report of the Administrator under this subsection shall include a statement on the actual and anticipated cost to public water systems in each State of compliance with the requirements of this title. The Office of Management and Budget may review any report required by this subsection before its submission to such committees of Congress, but the Office may not revise any such report, require any revision in any such report, or delay its submission beyond the day prescribed for its submission, and may submit to such committees of Congress its comments respecting any such report.

"(i)(1) No employer may discharge any employee or otherwise discriminate against any employee with respect to his compensation, terms, conditions, or privileges of employment because the employee (or any person acting pursuant to a request of the employee) has —

"(A) commenced, caused to be commenced, or is about to commence or cause to be commenced a proceeding under this title or a proceeding for the administration or enforcement of drinking water regulations or underground injection control programs of a State,

"(B) testified or is about to testify in any such proceeding, or

"(C) assisted or participated or is about to assist or participate in any manner in such a proceeding or in any other action to carry out the purposes of this title.

"(2)(A) Any employee who believes that he has been discharged or otherwise discriminated against by any person in violation of paragraph (1) may, within 30 days after such violation occurs, file (or have any person file on his behalf) a complaint with the Secretary of Labor (hereinafter in this subsection referred to as the 'Secretary') alleging such discharge or discrimination. Upon receipt of such a complaint, the Secretary shall notify the person named in the complaint of the filing of the complaint.

"(B)(i) Upon receipt of a complaint filed under subparagraph (A), the Secretary shall conduct an investigation of the violation alleged in the complaint. Within 30 days of the receipt of such complaint, the Secretary shall complete such investigation and shall notify in writing the complainant (any any person acting in his behalf) and the person alleged to have committed such violation of the results of the investigation conducted pursuant to this subparagraph. Within 90 days of the receipt of such complaint the Secretary shall, unless the proceeding on the complaint is terminated by the Secretary on the basis of a settlement entered into by the Secretary and the person alleged to have committed such violation, issue an order either providing the relief prescribed by clause (ii) or denying the complaint. An order of the Secretary shall be made on the record after notice and opportunity for agency hearing. The Secretary may not enter into a settlement terminating a proceeding on a complaint without the participation and consent of the complainant.

(ii) If in response to a complaint filed under subparagraph (A) the Secretary determines that a violation of paragraph (1) has occurred, the Secretary shall order (I) the person who committed such violation to take the affirmative action to abate the violation, (II) such person to reinstate the complainant to his former position together with the compensation (including back pay), terms, conditions, and privileges of his employment, (III) compensatory damages, and (IV) where appropriate, exemplary damages. If such an order is issued, the Secretary, at the request of the complainant, shall assess against the person against whom the order is issued a sum equal to the aggregate amount of all costs and expenses (including attorneys' fees) reasonably incurred, as determined by the Secretary, by the complainant for, or in connection with, the bringing of the complaint upon which the order was issued.

"(3)(A) Any person adversely affected or aggrieved by an order issued under paragraph (2) may obtain review of the order in the United States Court of Appeals for the circuit in which the violation, with respect to which the order was issued, allegedly occurred. The petition for review must be filed within sixty days from the

issuance of the Secretary's order. Review shall conform to chapter 7 of title 5 of the United States Code. The commencement of proceedings under this subparagraph shall not, unless ordered by the court, operate as a stay of the Secretary's order.

"(B) An order of the Secretary with respect to which review could have been obtained under subparagraph (A) shall not be subject to judicial review in any criminal or other civil proceeding.

"(4) Whenever a person has failed to comply with an order issued under paragraph (2)(B), the Secretary shall file a civil action in the United States District Court for the district in which the violation was found to occur to enforce such order. In actions brought under this paragraph, the district courts shall have jurisdiction to grant all appropriate relief including, but not limited to, injunctive relief, compensatory, and exemplary damages.

[1450(i)(4) amended by PL 98-620]

"(5) Any nondiscretionary duty imposed by this section is enforceable in mandamus proceeding brought under section 1361 of title 28 of the United States Code.

"(6) Paragraph (1) shall not apply with respect to any employee who, acting without direction from his employer (or the employer's agent), deliberately causes a violation of any requirement of this title.

"Sec. 1451. Indian Tribes.

[1451 added by PL 99-339]

"(a) IN GENERAL. — Subject to the provisions of subsection (b), the Administrator —

"(1) is authorized to treat Indian Tribes as States under this title,

"(2) may delegate to such Tribes primary enforcement responsibility for public water systems and for underground injection control, and

"(3) may provide such Tribes grant and contract assistance to carry out functions provided by this title.

[*Editor's note:* Section 304(e) of PL 99-339 provides:

"(e) STUDY. — The Administrator of the Environmental Protection Agency, in cooperation with the Director of the Indian Health Service, shall, within 12 months after the enactment of this Act, conduct a survey of drinking water on Indian reservations, identifying drinking water problems and the need, if any, for alternative drinking water supplies."]

"(b) EPA REGULATIONS. —

"(1) Specific Provisions. — The Administrator shall, within 18 months after the enactment of the Safe Drinking Water Act Amendments of 1986, promulgate final regulations specifying those provisions of this title for which it is appropriate to treat Indian Tribes as States. Such treatment shall be authorized only if:

"(A) the Indian Tribe is recognized by the Secretary of the Interior and has a governing body carrying out substantial governmental duties and powers;

"(B) the functions to be exercised by the Indian Tribe are within the area of the Tribal Government's jurisdiction; and

"(C) the Indian Tribe is reasonably expected to be capable, in the Administrator's judgment, of carrying out the functions to be exercised in a manner consistent with the terms and purposes of this title and of all applicable regulations.

"(2) Provisions where treatment as state inappropriate. — For any provision of this title where treatment of Indian Tribes as identical to States is inappropriate, administratively infeasible or otherwise inconsistent with the purposes of this title, the Administrator may include in the regulations promulgated under this section, other means for administering such provision in a manner that will achieve the purpose of the provision. Nothing in this section shall be construed to allow Indian Tribes to assume or maintain primary enforcement responsibility for public water systems or for underground injection control in a manner less protective of the health of persons than such responsibility may be assumed or maintained by a State. An Indian tribe shall not be required to exercise criminal enforcement jurisdiction for purposes of complying with the preceding sentence."

RURAL WATER SURVEY

Sec. 3. (a) The Administrator of the Environmental Protection Agency shall (after consultation with the Secretary of Agriculture and the several States) enter into arrangements with public or private entities as may be appropriate to conduct a survey of the quantity, quality, and availability of rural drinking water supplies. Such survey shall include, but not be limited to, the consideration of the number of residents in each rural area —

(1) presently being inadequately served by a public or private drinking water supply system, or by an individual home drinking water supply system;

(2) presently having limited or otherwise inadequate access to drinking water;

(3) who, due to the absence or inadequacy of a drinking water supply system, are exposed to an increased health hazard; and

(4) who have experienced incidents of chronic or acute illness, which may be attributed to the absence or inadequacy of a drinking water supply system.

(b) Such survey shall be completed within eighteen months of the date of enactment of this Act and a final report thereon submitted, not later than six months after the completion of such survey, to the President and to the Congress. Such report shall include recommendations for improving rural water supplies.

[Sec. 3(b) and (c) amended by PL 95-190]

(c) There are authorized to be appropriated to carry out the provisions of this section $1,000,000 for the fiscal year ending June 30, 1975; $2,000,000 for the fiscal year ending June 30, 1976; $1,000,000 for the fiscal year ending June 30, 1977; and $1,000,000 for each of fiscal years 1978 and 1979.

BOTTLED DRINKING WATER

Sec. 4. Chapter IV of the Federal Food, Drug, and Cosmetic Act is amended by adding after section 409 the following new section:

"BOTTLED DRINKING WATER STANDARDS

"Sec. 410. Whenever the Administrator of the Environmental Protection Agency prescribes interim or revised national primary drinking water regulations under section 1412 of the Public Health Service Act, the Secretary shall consult with the Administrator and within 180 days after the promulgation of such drinking water regulations either promulgate amendments to regulations under this chapter applicable to bottled drinking water or publish in the Federal Register his reasons for not making such amendments."

[**Editor's note:** Sec. 2(e) of the Safe Drinking Water Amendments of 1977 (PL 95-190) states: "Nothing in this Act shall be construed to authorize the appropriation of any amount for research under title XIV of the Public Health Service Act (relating to safe drinking water)."

Sec. 3(e)(2) of the 1977 amendments states: "Nothing in this Act shall be construed to alter or affect the Administrator's authority or duty under title 14 of the Public Health Service Act to promulgate regulations or take other action with respect to any contaminant."

Sec. 11(b) of PL 95-190 Provides:

"(b) To the extent that the Administrator of the Environmental Protection Agency deems such action necessary to the discharge of his functions under title XIV of the Public Health Service Act (relating to safe drinking water) and under other provisions of law, he may appointment personnel to fill not more than thirty scientific, engineering, professional, legal, and administrative positions within the Environmental Protection Agency without regard to the civil service laws and may fix the compensation of such personnel not in excess of the maximum rate payable for GS-18 of the General Schedule under section 5332 of title 5, United States Code."]

[See also editor's note at 1442(a)(1)]

APPENDIX IV

National Primary Drinking Water Regulations

National Primary Drinking Water Regulations

ENVIRONMENTAL PROTECTION AGENCY NATIONAL PRIMARY DRINKING WATER REGULATIONS

(40 CFR 141; 40 FR 59565, December 24, 1975; Amended by 41 FR 28402, July 9, 1976; 44 FR 68641, November 29, 1979; Corrected by 45 FR 15542, March 11, 1980; Amended by 45 FR 57342, August 27, 1980; 47 FR 8998, March 3, 1982; Corrected by 47 FR 10998, March 12, 1982; Amended by 50 FR 46900, November 13, 1985; 50 FR 47155, November 14, 1985; 51 FR 11410, April 2, 1986; Corrected by 51 FR 24328, July 3, 1986; Amended by 52 FR 20674, June 2, 1987; 52 FR 25712, July 8, 1987)

Title 40—Protection of Environment
CHAPTER I—ENVIRONMENTAL PROTECTION AGENCY

SUBCHAPTER D—WATER PROGRAMS

PART 141—NATIONAL PRIMARY DRINKING WATER REGULATIONS

[Title amended by 50 FR 46900, November 13, 1985]

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(Authority: 42 U.S.C. 300g-1, 300g-3, 300j-4, and 300j-9.)

[Amended by 50 FR 46900, November 13, 1985; 52 FR 20674, June 2, 1987; 52 FR 25712, July 8, 1987]

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:

"Act" means the Public Health Service Act, as amended by the Safe Drinking Water Act, Pub. L. 93-523.

"Best available technology" or "BAT" means the best technology, treatment techniques, or other means which the Administrator finds, after examination for efficacy under field conditions and not solely under laboratory conditions, are available (taking cost into consideration). For the purposes of setting MCLs for synthetic organic chemicals, any BAT must be at least as effective as granular activated carbon.

[Added by 52 FR 25712, July 8, 1987]

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

"Disinfectant" means any oxidant, including but not limited to chlorine, chlorine, chlorine dioxide, chloramines, and ozone added to water in any part of the treatment or distribution process, that is intended to kill or inactivate pathogenic microorganisms.

"Dose equivalent" means the product of the absorbed dose from ionizing radiation and such factors as account for differences in biological effectiveness due to the type of radiation and its distribution in the body as specified by the International Commission on Radiological Units and Measurements (ICRU).

"Gross alpha particle activity" means the total radioactivity due to alpha particle emission as inferred from measurements on a dry sample.

"Gross beat particle activity" means the total radioactivity due to beta particle emission as inferred from measurements on a dry sample.

"Halogen" means one of the chemical elements chlorine, bromine or iodine.

"Man-made beta particle and photon emitters" means all radionuclides emitting beta particles and/or photons listed in Maximum Permissible Body Burdens and Maximum Permission Concentration of Radionuclides in Air or Water for Occupational Exposure, NBS Handbook 69, except the daughter products of thorium-232, uranium-235 and uranium-238.

"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.

"Maximum contaminant level goal" or "MCLG" means the maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health or persons would occur, and which allows an adequate margin of safety. Maximum contaminant level goals are nonenforceable health goals.

[141.2(u) added by 50 FR 46900, November 13, 1985; revised by 52 FR 20674, June 2, 1987]

"Maximum Total Trihalomethane Potential (MTP)" means the maximum concentration of total trihalomethanes produced in a given water containing a disinfectant residual after 7 days at a temperature of 25° C or above.

"Non-transient non-community water system or "NTNCWS" means a public water system that is not a community water system and that regularly serves at least 25 of the same persons over 6 months per year.

[Added by 52 FR 25712, July 8, 1987]

"Performance evaluation sample" means a reference sample provided to a laboratory for the purpose of demonstrating that the laboratory can successfully analyze the sample within limits of performance specified by the Agency. The true value of the concentration of the reference material is unknown to the laboratory at the time of the analysis.

[Added by 51 FR 11410, April 2, 1986]

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

"Picocurie (pCi)" means the quantity of radioactive material producing 2.22 nuclear transformations per minute.

"Point-of-entry treatment device" is a treatment device applied to the drinking water entering a house or building for the purpose of reducing contaminants in the drinking water distributed throughout the house or building.

[Added by 52 FR 25712, July 8, 1987]

"Point-of-use treatment device" is a treatment device applied to a single tap used for the purpose of reducing contaminants in drinking water at that one tap.

[Added by 52 FR 25712, July 8, 1987]

"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 "noncommunity 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.

"Sanitary survey" means an onsite 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.

"Rem" means the unit of dose equivalent from ionizing radiation to the total body or any internal organ or organ system. A "millirem (mrem)" is 1/1000 of a rem.

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

"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.

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

"Total trihalomethanes" (TTHM) means the sum of the concentration in milligrams per liter of the trihalomethane compounds (trichloromethane [chloroform], dibromochloromethane, bromodichloromethane and tribromomethane [bromoform]), rounded to two significant figures.

"Trihalomethane" (THM) means one of the family of organic compounds, named as derivatives of methane, wherein three of the four hydrogen atoms in methane are each substituted by a halogen atom in the molecular structure.

§ 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 dates.

(a) Except as provided in paragraph (b) of this section, the regulations set forth in this part shall take effect on June 24, 1977.

(b) The regulations for total trihalomethanes set forth in § 141.12(c) shall take effect 2 years after the date of promulgation of these regulations for community water systems serving 75,000 or more individuals, and 4 years after the date of promulgation for communities serving 10,000 to 74,999 individuals.

[141.6(c) corrected by 47 FR 10998, March 12, 1982]

(c) The regulations set forth in 141.11(a), (d) and (e); 141.14(a)(1); 141.14(b)(1)(i); 141.14(b)(2)(i); 141.14 (d); 141.21(a),(c) and (i); 141.22(a) and (e); 141.23(a)(3) and (a)(4); 141.23(f); 141.24(a)(3); 141.24(e) and (f); 141.25 (e); 141.27(a); 141.28(a) and (b); 141.31(a), (d) and (e); 141.32(b)(3); and 141.32(d)--shall take effect immediately upon promulgation.

(d) The regulations set forth in 141.41 shall take effect 18 months from the date of promulgation. Suppliers must complete the first round of sampling and reporting within 12 months following the effective date.

(e) The regulations set forth in 141.42 shall take effect 18 months from the date of promulgation. All requirements in 141.42 must be completed within 12 months following the effective date.

(f) The regulations set forth in § 141.11(c) and § 141.23(g) are effective May 2, 1986. Section 141.23(g)(4) is effective October 2, 1987.

[141.6(f) added by 51 FR 11410, April 2, 1986]

Subpart B—Maximum Contaminant Levels

§ 141.11 Maximum contaminant levels for inorganic chemicals.

(a) The MCL for nitrate is applicable to both community water systems and non-community water systems except as provided by in paragraph (d). The levels for the other inorganic chemicals apply only to community water systems. Compliance with MCLs for inorganic chemicals is calculated pursuant to § 141.23.

[141.11(a) amended by 45 FR 57342, August 27, 1980; corrected by 47 FR 10998, March 12, 1982]

(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) The Maximum Contaminant Level for fluoride is 4.0 mg/l. See 40 CFR 143.3, which establishes a Secondary Maximum Contaminant Level at 2.0 mg/l.

[141.11(c) corrected by 47 FR 10998, March 12, 1982; revised by 51 FR 11410, April 2, 1986]

(d) At the discretion of the State, nitrate levels not to exceed 20 mg/l may be allowed in a non-community water system if the supplier of water demonstrates to the satisfaction of the State that:

(1) Such water will not be available to children under 6 months of age; and

(2) There will be continuous posting of the fact that nitrate levels exceed 10 mg/l and the potential health effects of exposure; and

(3) Local and State public health authorities will be notified annually of nitrate levels that exceed 10 mg/l; and

(4) No adverse health effects shall result.

§ 141.12 Maximum contaminant levels for organic chemicals.

The following are the maximum contaminant levels for organic chemicals. The maximum contaminant levels for organic chemicals in paragraphs (a) and (b) of this section apply to all community water systems. Compliance with the maximum contaminant levels in paragraphs (a) and (b) is calculated pursuant to § 141.24. The maximum comtaminant level for total trihalomethanes in paragraph (c) of this section applies only to community water systems which serve a population of 10,000 or more individuals and which add a disinfectant (oxidant) to the water in any part of the drinking water treatment process. Compliance with the maximum contaminant level for total trihalomethanes is calculated pursuant to § 141.30.

	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

(c) Total trihalomethanes (the sum of the concentrations of bromodichloromethane, dibromochloromethane, tribromomethane (bromoform) and trichloromethane (chloroform) 0.10 mg/l.

§ 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:

[141.14(a)(1) revised by 45 FR 57342, August 27, 1980]

(1) One per 100 milliliters as the arithmetic mean of all samples examined per compliance period pursuant to § 141.21(b) or (c), except that, at the primacy Agency's discretion systems required to take 10 or fewer samples per month may be authorized to exclude one positive routine sample per month from the monthly calculation if: (i) as approved on a case-by-case basis the State determines and indicates in writing to the public water system that no unreasonable risk to health existed under the conditions of this modification. This determination should be based upon a number of factors not limited to the following: (A) the system provided and had maintained an active disinfectant residual in the distribution system, (B) the potential for contamination as indicated by a sanitary survey, and (C) the history of the water quality at the public water system (e.g. MCL or monitoring violations); (ii) the supplier initiates a check sample on each of two consecutive days from the same sampling point within 24 hours after notification that the routine sample is positive, and each of these check samples is negative; and (iii) the original postive routine sample is reported and recorded by the supplier pursuant to § 141.31(a) and § 141.33(a). The supplier shall report to the State its compliance with the conditions specified in this paragraph and a summary of the corrective action taken to resolve the prior positive sample result. If a positive routine sample is not used for the monthly calculation, another routine sample must be analyzed for compliance purposes. This provision may be used only once during two consecutive compliance periods.

(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:

[141.14(b)(1)(i) revised by 45 FR 57342, August 27, 1980]

(i) More than 10 percent of the portions (tubes) in any one month pursuant to § 141.21 (b) or (c) except that, at the State's discretion, systems required to take 10 or fewer samples per month may be authorized to exclude one positive routine sample resulting in one or more positive tubes per month from the monthly calculation if: (A) as approved on a case-by-case basis the State determines and indicates in writing to the public water system that no unreasonable risk to health existed under the conditions of this modification. This determination should be based upon a number of factors not limited to the following: (1) the system provided and had maintained an active disinfectant residual in the distribution system, (2) the potential for contamination as indicated by a sanitary survey, and (3) the history of the water quality at the public water system (e.g. MCL or monitoring violations); (B) the supplier initiates a check sample on each of two consecutive days from the sampling point within 24 hours after notification that the routine sample is positive, and each of these check samples is negative; and (C) the original positive routine sample is reported and recorded by the supplier pursuant to § 141.31(a) and § 141.33(a). The supplier shall report to the State its compliance with the conditions specified in this paragraph and report the action taken to resolve the prior positive sample result. If a positive routine sample is not used for the monthly calculation, another routine sample must be analyzed for compliance purposes. This provision may be used only once during two consecutive compliance periods.

(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:

[141.14(b)(2)(i) revised by 45 FR 57342, August 27, 1980]

(i) More than 60 percent of the portions (tubes) in any month pursuant to § 141.21 (b) or (c), except that, State discretion, systems required to take 10 or fewer samples per month may be authorized to exclude one positive routine sample resulting in one or more positive tubes per month from the monthly calculation if: (A) as approved on a case-by-case basis the State determines and indicates in writing to the public water system that no unreasonable risk to health existed under the conditions of this modification. This determination should be based upon a number of factors not limited to the following: (1) the system provided and had maintained an active disinfectant residual in the distribution system, (2) the potential for contamination as indicated by a sanitary survey, and (iii) the history of the water quality at the public water system (e.g. MCL or monitoring violations); (B) the supplier initiates two consecutive daily check samples from the same sampling point within 24 hours after notification that the routine sample

is positive, and each of these check samples is negative; and (C) the original positive routine sample is reported and recorded by the supplier pursuant to § 141.31(a) and § 141.33(a). The supplier shall report to the State its compliance with the conditions specified in this paragraph and a summary of the corrective action taken to resolve the prior positive sample result. If a positive routine sample is not used for the monthly calculation, another routine sample must be analyzed for compliance purposes. This provision may be used only once during two consecutive compliance periods.

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

(iii) five portions in more than 20 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.

(d) If an average MCL violation is caused by a single sample MCL violation, then the case shall be treated as one violation with respect to the public notification requirements of § 141.32.

[141.14(d) added by 45 FR 57342, August 27, 1980]

§ 141.15 Maximum contaminant levels for radium-226, radium-228, and gross alpha particle radioactivity in community water systems.

The following are the maximum contaminant levels for radium-226, radium-228, and gross alpha particle radioactivity:

(a) Combined radium-226 and radium-228—5pCi/l.

(b) Gross alpha particle activity (including radium-226 but excluding radon and uranium)—15pCi/l.

§ 141.16 Maximum contaminant levels for beta particle and photon radioactivity from man-made radionuclides in community water systems.

(a) The average annual concentration of beta particle and photon radioactivity from man-made radionuclides in drinking water shall not produce an annual dose equivalent to the total body or any internal organ greater than 4 millirem/year.

(b) Except for the radionuclides listed in Table A, the concentration of man-made radionuclides causing 4 mrem total body or organ dose equivalents shall be calculated on the basis of a 2 liter per day drinking water intake using the 168 hour data listed in "*Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure*," NBS Handbook 69 as amended August 1963, U.S. Department of Commerce. If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed 4 millirem/year.

TABLE A.—*Average annual concentrations assumed to produce a total body or organ dose of 4 mrem/yr*

Radionuclide	Critical organ	pCi per liter
Tritium	Total body	20,000
Strontium-90	Bone marrow	8

Subpart C—Monitoring and Analytical Requirements

§ 141.21 Microbiological contaminant sampling and analytical requirements.

(a) Suppliers of water for community and non-community water systems shall analyze or use the services of an approved laboratory for coliform bacteria to determine 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, 14th Edition, Method 908A, Paragraphs 1, 2 and 3—pp. 916–918; Method 908D, Table 908: I—p. 923; Method 909A, pp. 928–935, or "Microbiological Methods for Monitoring the Environment, Water and Wastes," U.S. EPA, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268—EPA–600/8–78–017, December 1978. Available from ORD Publications, CERI, U.S. EPA, Cincinnati, Ohio 45268. Part III, Section B 1.0 through 2.8.2, pp. 108–112; 2.7 through 2.7.2(c), pp. 112–113; Part III, Section B 4.0 through 4.6.4(c), pp. 114–118, 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.

[141.21(a) revised by 45 FR 57342, August 27, 1980]

(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 33,000	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 460,000	200
460,001 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

Population served:	Minimum number of samples per month
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 2,080,000	400
2,080,001 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 be responsible for sampling coliform bacteria in each calendar quarter that the system provides water to the public. Such sampling shall begin within two years after promulgation. The State can adjust the monitoring frequency on the basis of a sanitary survey, the existence of additional safeguards such as a protective and enforced well code, or accumulated analytical data. Such frequency shall be confirmed or modified on the basis of subsequent surveys or data. The frequency shall not be reduced until the non-community water system has performed at least one coliform analysis of its drinking water and shown to be in compliance with § 141.14.

[141.21(c) revised by 45 FR 57342, August 27, 1980]

(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 established 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.

(i) The State has the authority to determine compliance or initiate enforcement action based upon analytical results or other information compiled by their sanctioned representatives and agencies.

[141.21(i) added by 45 FR 57342, August 27, 1980]

§ 141.22 Turbidity sampling and analytical requirements.

(a) Samples shall be taken by suppliers of water for both community and non-community water systems at a representative entry point(s) to the water distribution system at least once per day, for the purposes of making turbidity measurements to determine compliance with §141.13. If the State determines that a reduced sampling frequency in a non-community will not pose a risk to public health, it can reduce the required sampling frequency. The option of reducing the turbidity frequency shall be permitted only in those public water systems that practice disinfection and which maintain

an active residual disinfectant in the distribution system, and in those cases where the State has indicated in writing that no unreasonable risk to health existed under the circumstances of this option. The turbidity measurements shall be made by the Nephelometric Method in accordance with the recommendations set forth in "Standard Methods for Examination of Water and Wastewater," American Public Health Association, 14th Edition, pp. 132–134; or "Methods of Chemical Analysis of Water and Wastes," EPA Environmental Monitoring and Support Laboratory, March 1979, Method 180.1—Nephelometric Method. Calibration of the turbidimeter shall be made either by the use of a formazin standard as specified in the cited references or a styrene divinylbenzene polymer standard (Amco-AEPA-1 Polymer) commercially available from Amco Standards International, Inc., 230 Polaris Avenue, No. C, Mountain View, California 94043.

[141.22(a) revised by 45 FR 57342, August 27, 1980; 47 FR 8998, March 3, 1982; corrected by 47 FR 10998, March 12, 1982]

(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.

(e) The State has the authority to determine compliance or initiate enforcement action based upon analytical results or other information compiled by their sanctioned representatives and agencies.

[141.22(e) added by 45 FR 57342, August 27, 1980]

§ 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 sources, analyses for nitrate shall be completed by December 24, 1980. These analyses shall be repeated at intervals determined by the State.

[141.23(a) amended by 45 FR 57342, August 27, 1980]

(4) The State has the authority to determine compliance or initiate enforcement action based upon analytical results and other information compiled by their sanctioned representatives and agencies.

[141.23(a)(4) added by 45 FR 57342, August 27, 1980]

(b) If the result of an analysis made under paragraph (a) of (g) of this section indicates that the level of any contaminant listed in § 141.11 or § 141.62 exceeds the maximum contaminant level, the supplier of the water shall report to the State within 7 days and initiate three additional analyses at the same sampling point within one month.

[141.23(b) amended by 51 FR 11410, April 2, 1986]

(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:

[141.23(f)(1)(9) revised by 45 FR 57342, August 27, 1980]

(1) Arsenic—Method [1] 206.2, Atomic Absorption Furnace Technique; or Method [1] 206.3, or Method [4] D2972-78B, or Method [2] 301.A VII, pp. 159–162, or Method [3] I-1062-78, pp. 61–63, Atomic Absorption—Gaseous Hydride; or Method [1] 206.4, or Method [4] D-2972-78A, or Method [2] 404-A and 404-B(4), Spectrophotometric, Silver Diethyldithiocarbamate.

[141.23(f)(1) corrected by 47 FR 10998, March 12, 1982]

(2) Barium—Method [1] 208.1, or Method [2] 301-A IV, pp. 152–155, Atomic Absorption—Direct Aspiration; or Method [1] 208.2, Atomic Absorption Furnace Technique.

(3) Cadmium—Method [1] 213.1, or Method [4] D-3557-78A or B, or Method [2] 301-A II or III, pp. 148–152, Atomic Absorption—Direct Aspiration; or Method [1] 213.2, Atomic Absorption Furnace Technique.

[141.23(f)(3) corrected by 47 FR 10998, March 12, 1982]

(4) Chromium—Method [1] 218.1, or Method [4] D-1687-77D, or Method [2] 301-A II or III, pp. 148–152, Atomic Absorption—Direct Aspiration; or Chromium—Method [1] 213.2, Atomic Absorption Furnace Technique.

(5) Lead—Method [1] 239.1, or Method [4] D-3559-78A or B, or Method [2] 301-A II or III, pp. 148–152, Atomic Absorption—Direct Aspiration; or Method [1] 239.2, Atomic Absorption Furnace Technique.

(6) Mercury—Method [1] 245.1, or Method [4] D-3223-79, or Method [2] 301-A VI, pp. 156–159, Manual Cold Vapor Technique; or Method [1] 245.2, Automated Cold Vapor Technique.

(7) Nitrate—Method [1] 352.1, or Method [4] D-992-71, or Method [2] 419-D, pp. 427-429, Colorimetric Brucine; or Method [1] 353.3, or Method [4] D-3867-79B, or Method [2] 419-C, pp. 423-427, Spectrometric, Cadmium Reduction; Method [1] 353.1, Automated Hydrazine Reduction; or Method [1] 353.2, or Method [4] D-3867-79A, or Method [2] 605, pp. 620-624, Automated Cadmium Reduction.

(8) Selenium—Method [1] 270.2, Atomic Absorption Furnace Technique; or Method [1] 270.3; or Method [3] I-1667-78, pp. 237-239, or Method [4] D-3859-79, or Method [2] 301-A VII, pp. 159-162, Hydride Generation—Atomic Absorption Spectrophotometry.

[141.23(f)(8) corrected by 47 FR 10998, March 12, 1982]

(9) Silver—Method [1] 272.1, or Method [2] 301-A II, pp. 148-151, Atomic Absorption—Direct Aspiration; or Method [1] 272.2, Atomic Absorption Furnace Technique.

[141.23(f)(9) corrected by 47 FR 10998, March 12, 1982]

(10) *Fluoride:*

Methodology	Reference (method number)			
	EPA [1]	ASTM [4]	SM [5]	Other
Colorimetric SPADNS; with distillation	340.1	D1179-72A	43 A and C	
Potentiometric ion selective electrode	340.2	D1179-72B	413 B	
Automated Alizarin fluoride blue; with distillation (complexone)	340.3		413 E	129-71W[6]
Automated ion selective electrode				380-75WE[7]

[141.23(f)(10) revised by 51 FR 11410, April 2, 1986]

[1] "Methods of Chemical Analysis of Water and Wastes," EPA Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268 (EPA-600/4-79-020), March 1979. Available from ORD Publications, CERI, EPA, Cincinnati, Ohio 45268. For approved analytical procedures for metals, the technique applicable to total metals must be used.

[2] [Reserved]

[3] [Reserved]

[4] Annual Book of ASTM Standards, part 31 Water, American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

[5] "Standard Methods for the Examination of Water and Wastewater," 16th Edition, American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1985.

[6] "Fluoride in Water and Wastewater, Industrial Method #129-71W," Technicon Industrial Systems, Tarrytown, New York 10591, December 1972.

[7] "Fluoride in Water and Wastewater," Technicon Industrial Systems, Tarrytown, New York 10591, February 1976.

[Footnotes 1—4 republished and 5—7 added by 51 FR 11410, April 2, 1986; footnotes 2 and 3 removed and reserved by 51 FR 24328, July 3, 1986]

[141.23(g) added by 51 FR 11410, April 2, 1986]

(g) *Fluoride.* In addition to complying with paragraphs (a) through (f) of this section, systems monitoring for fluoride must comply with the requirements of this paragraphs.

(1)(i) Where the system draws water from one source, the system shall take one sample at the entry point to the distribution system.

(ii) Where the system draws water from more than one source, the system must sample each source at the entry points to the distribution system.

(iii) If the system draws water from more than one source and sources are combined before distribution, the system must sample at an entry point to the distribution system during periods representative of the maximum fluoride levels occurring under normal operating conditions.

(2) The state may alter the frequencies for fluoride monitoring as set out in paragraph (a) of this section to increase or decrease such frequency considering the following factors:

(i) Reported concentrations from previously required monitoring.

(ii) The degree of variation in reported concentrations and.

(iii) Other factors which may affect fluoride concentrations such as changes in pumping rates in ground water supplies or significant changes in the system's configuration, operating procedures, source of water, and changes in stream flows.

(3) Monitoring may be decreased from the frequencies specified in paragraph (a) of this section upon application in writing by water systems if the state determines that the system is unlikely to exceed the MCL, considering the factors listed in paragraph (g)(2) of this section. Such determination shall be made in writing and set forth the basis for the determination. A copy of the determination shall be provided to the Administrator. In no case shall monitoring be reduced to less than one sample every 10 years. For systems monitoring once every 10 years, the state shall review the monitoring results every ten years to determine whether more frequent monitoring is necessary.

(4) Analyses for fluoride under this section shall only be used for determining compliance if conducted by laboratories that have analyzed Performance Evaluation samples to within ± 10% of the reference value at fluoride concentrations from 1.0 mg/l to 10.0 mg/l, within the last 12 months.

(5) Compliance with the MCL shall be determined based on each sampling point. If any sampling point is determined to be out of compliance, the system is deemed to be out of compliance.

§141.24 Organic chemicals other than total trihalomethanes, sampling and analytical requirements.

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

[141.24(a) amended by 44 FR 68641, November 29, 1979]

(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.

(3) The State has the authority to determine compliance or initiate enforcement action based upon analytical results and other information compiled by their sanctioned representatives and agencies.

(b) If the result of an analysis made pursuant to paragraph (a) of this section indicates that the level of any contaminant listed in § 141.24 (a) and (b) 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 paragraphs (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) Analysis made to determine compliance with § 141.12(a) shall be made in accordance with "Methods for Organochlorine Pesticides and Chlorophenoxy Acid Herbicides in Drinking Water and Raw Source Water," available from ORD Publications, CERI, EPA, Cincinnati, Ohio 45268; or "Organochlorine Pesticides in Water," Annual Book of ASTM Standards, part 31, Water, Method D-3088-79; or Method 509-A, pp. 555-565;[2] or Gas Chromatographic Methods for Analysis of Organic Substances in Water,[3] USGS, Book 5, Chapter A-3, pp. 24-39.

(f) Analysis made to determine compliance with § 141.12(b) shall be conducted in accordance with "Methods for Organochlorine Pesticides and Chlorophenoxy Acid Herbicides in Drinking Water and Raw Source Water," available from ORD Publications, CERI, EPA, Cincinnati, Ohio 45268; or "Chlorinated Phenoxy Acid Herbicides in Water," Annual Book of ASTM Standards, part 31, Method D-3478-79; or Method 509-B, pp. 565-569;[2] or Gas Chromatographic Methods for Analysis of Organic Substances in Water,[3] USGS, Book 5, Chapter A-3, pp. 24-39.

[141.24(g) added by 52 FR 25712, July 8, 1987]

(g) Analysis of the contaminants listed in § 141.61(a) for purposes of determining compliance with the maximum contaminant levels shall be conducted as follows:

(1) Ground-water systems shall sample at points of entry to the distribution system representative of each well. Sampling must be conducted at the same location or a more representative location each quarter. Ground-water systems must sample every three months for each entry point to the distribution system except as provided in paragraph (g)(8)(i) of this section.

(2) Surface water systems shall sample at points in the distribution system representative of each source or at entry points to the distribution system after any application of treatment. Surface water systems must sample each source every three months except as provided in paragraph (g)(8)(ii) of this section. Sampling must be conducted at the same location or a more representative location each quarter.

(3) If the system draws water from more than one source and sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions.

(4) All community water systems and non-transient, non-community water systems serving more than 10,000 people shall analyze all distribution or entry-point samples, as appropriate, representing all source waters beginning no later than January 1, 1988. All community water systems and non-transient non-community water systems serving from 3,300 to 10,000 people shall analyze all distribution or entry-point samples, as required in this paragraph (g), representing source waters no later than January 1, 1989. All other community and non-transient, non-community water systems shall analyze distribution or entry-point samples, as required in this paragraph (g), representing all source waters beginning no later than January 1, 1991.

(5) The State or EPA may require confirmation samples for positive or negative results. If a confirmation sample(s) is required by EPA or the State, then the sample result(s) should be averaged with the first sampling result and used for compliance determination in accordance with (g)(9) of this section. States have discretion to delete results of obvious sampling errors from this calculation.

(6) Analysis for vinyl chloride is required only for ground water systems that have detected one or more of the following two-carbon organic compounds: Trichloroethylene, tetrachloroethylene, 1,2-dichloroethane, 1,1,1-trichloroethane, cis-1,2-dichloroethylene, trans-1,2-dichloroethylene, or 1,1-dichloroethylene. The analysis for vinyl chloride is required at each distribution or entry point at which one or more of the two-carbon organic compounds were found. If the first analysis does not detect vinyl chloride, the State may

[2] "Standard Methods for the Examination of Water and Wastewater," 14th Edition, American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1976.

[3] Techniques of Water—Resources Investigation of the United States Geological Survey, Chapter A-3, "Methods for Analysis of Organic Substances in Water," Book 5, 1972, Stock #2401-1227. Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

reduce the frequency of vinyl chloride monitoring to once every three years for that sample location or other sample locations which are more representative of the same source. Surface water systems may be required to analyze for vinyl chloride at the discretion of the State.

(7) A State or individual public water systems may choose to composite up to five samples from one or more public water systems. Compositing of samples is to be done in the laboratory by the procedures listed below. Samples should be analyzed within fourteen days of collection. If any organic contaminant listed in § 141.61(a) VOC is detected in the original composite sample, a sample from each source that made up the composite sample must be reanalyzed individually within fourteen days from sampling. The sample for reanalysis cannot be the original sample but can be a duplicate sample. If duplicates of the original samples are not available, new samples must be taken from each source used in the original composite and analyzed for VOCs. Reanalysis must be accomplished within fourteen days of the second sample. To composite samples, the following procedure must be followed:

(i) Compositing samples prior to GC analysis.

(A) Add 5 ml or equal larger amounts of each sample (up to 5 samples are allowed) to a 25 ml glass syringe. Special precautions must be made to maintain zero headspace in the syringe.

(B) The samples must be cooled at 4° C during this step to minimize volatilization losses.

(C) Mix well and draw out a 5-ml aliquot for analysis.

(D) Follow sample introduction, purging, and desorption steps described in the method.

(E) If less than five samples are used for compositing, a proportionately smaller syringe may be used.

(ii) Compositing samples prior to GC/MS analysis.

(A) Inject 5-ml or equal larger amounts of each aqueous sample (up to 5 samples are allowed) into a 25-ml purging device using the sample introduction technique described in the method.

(B) The total volume of the sample in the purging device must be 25 ml.

(C) Purge and desorb as described in the method.

(8) The State may reduce the monitoring frequency specified in paragraphs (g) (1) and (2) of this section, as explained in this paragraph as follows:

(i) The monitoring frequency for ground-water systems is as follows:

(A) When VOCs are not detected in the first sample (or any subsequent samples that may be taken) and the system is not vulnerable as defined in paragraph (g)(8)(iv) of this section, monitoring must be repeated every 5 years.

(B) When VOCs are not detected in the first sample (or any subsequent sample that may be taken) and the system is vulnerable as defined in paragraph (g)(8)(iv) of this section.

(1) Monitoring must be repeated every 3 years for systems >500 connections.

(2) Monitoring must be repeated every 5 years for system <500 connections.

(C) If VOCs are detected in the first sample (or any subsequent sample that may be taken), regardless of vulnerability, monitoring must be repeated every 3 months, as required under paragraph (g)(1) of this section.

(ii) The repeat monitoring frequency for surface water systems is as follows:

(A) When VOCs are not detected in the first year of quarterly sampling (or any other subsequent sample that may be taken) and the system is not vulnerable as defined in paragraph g(8)(iv), monitoring is only required at state discretion.

(B) When VOCs are not detected in the first year of quarterly sampling (or any other subsequent sample that may be taken) and the system is vulnerable as defined in paragraph (g)(8)(iv) of this section.

(1) Monitoring must be repeated in three years (for systems >500 connections.)

(2) Monitoring must be repeated every five years (for systems <500 connections.)

(C) When VOCs are detected in the first year of quarterly sampling (or any other subsequent sample that may be taken), regardless of vulnerability, monitoring must be repeated every 3 months, as required under paragraph (g)(2) of this section.

(iii) States may reduce the frequency of monitoring to once per year for a ground-water system or surface water system detecting VOCs at levels consistently less than the MCL for three consecutive years.

(iv) Vulnerability of each public water system shall be determined by the State based upon an assessment of the following factors:

(A) Previous monitoring results.

(B) Number of persons served by public water system.

(C) Proximity of a smaller system to a larger system.

(D) Proximity to commercial or industrial use, disposal, or storage of Volatile Synthetic Organic Chemicals.

(E) Protection of the water source.

(v) A system is deemed to be vulnerable for a period of three years after any positive measurement of one or more contaminants listed in either § 141.61(a) or § 141.40(e) except for trihalomethanes or other demonstrated disinfection by-products.

(9) Compliance with § 141.61(a) shall be determined based on the results of running annual average of quarterly sampling for each sampling location. If one location's average is greater than the MCL, then the system shall be deemed to be out of compliance. If a public water system has a distribution system separable from other parts of the distribution system with no interconnections, only that part of the system that exceeds any MCL as specified in Section 141.61(a) will be deemed out of compliance. States may reduce the public notice requirement to that portion of the system which is out of compliance. If any one sample result would cause the annual average to be exceeded, then the system shall be deemed to be out of compliance immediately. For systems that only take one sample per location because no VOCs were detected, compliance shall be based on that one sample.

(10) Analysis under this paragraph shall be conducted using the following EPA methods or their equivalent as approved by EPA. These methods are contained in "Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water," September 1986, available from Environmental and Support Laboratory (EMSL), EPA, Cincinnati, OH 45268 or the State.

(i) Method 502.1, "Volatile Halogenated Organic Chemicals in Water by Purge and Trap Gas Chromatography."

(ii) Method 503.1, "Volatile Aromatic and Unsaturated Organic Compounds in Water by Purge and Trap Gas Chromatography."

(iii) Method 524.1, "Volatile Organic Compounds in Water by Purge and Trap Gas Chromatography/Mass Spectrometry."

(iv) Method 524.2, "Volatile Organic Compounds in Water by Purge and Trap Capillary Column Gas Chromatography/Mass Spectrometry."

(v) Method 502.2, "Volatile Organic Compounds in Water by Purge and Trap Capillary Gas Chromatography with Photoionization and Electrolytic Conductivity Detectors in Series."

(11) Analysis under this section shall only be conducted by laboratories that have received conditional approval by EPA or the State according to the following conditions:

(i) To receive conditional approval to conduct analyses for benzene, vinyl chloride, carbon tetrachloride, 1,2-dichloroethane, trichloroethylene, 1,1-dichloroethylene, 1,1,1-trichloroethane, and paradichlorobenzene the laboratory must:

(A) analyze Performance Evaluation samples which include these substances provided by EPA Environmental Monitoring and Support Laboratory or equivalent samples provided by the State.

(B) achieve the quantitative acceptance limits under paragraphs (g)(11)(i)(C) and (g)(11)(i)(D) of this section for at least six of the seven subject organic chemicals. States may allow fewer than six of the seven.

(C) achieve quantitative results on the analyses performed under (g)(11)(i)(A) that are within ±20 percent of the actual amount of the substances in the Performance Evaluation sample when the actual amount is greater than or equal to 0.010 mg/l.

(D) achieve quantitative results on the analyses performed under (g)((11)(i)(A) of this section that are within ±40 percent of the actual amount of the substances in the Performance Evaluation sample when the active amount is less than 0.010 mg/l.

(E) achieve a method detection limit of 0.0005 mg/l, according to the procedures in Appendix B of Part 136.

(F) be currently approved by EPA or the State for the analyses of trihalomethanes under § 141.30.

(ii) To receive conditional approval for vinyl chloride, the laboratory must:

(A) Analyze Performance Evaluation samples provided by EPA Envionmental Monitoring and Support Laboratory or equivalent samples provided by the State.

(B) Achieve quantitative results on the analyses performed under (g)(11)(ii)(A) of this section that are within ±40 percent of the actual amount of vinyl chloride in the Performance Evaluation sample.

(C) Achieve a method detection limit of 0.0005 mg/l, according to the procedures in Appendix B of Part 136.

(D) Receive approval or be currently approved by EPA or the State under (g)(11)(i) of this section.

(12) States have the authority to allow the use of monitoring data collected after January 1, 1983, for purposes of monitoring compliance. If the data is consistent with the other requirements in this paragraph, States may use that data to represent the initial monitoring if the system is determined by the State not to be vulnerable under the requirements of this section. In addition, the results of EPA's Ground Water Supply Survey can be used in a similar manner for systems supplied by a single well.

(13) States may increase required monitoring where necessary to detect variations within the system.

(14) The State has the authority to determine compliance or initiate enforcement action based upon analytical results and other information compiled by their sanctioned representatives and agencies.

(15) A public water system supplying fewer than 150 service connections shall be treated as complying with the monitoring requirements if the owner or operator sends a letter to the State specifying that their system is available for sampling. No samples may be sent to the State unless so requested. This letter must be sent to the State no later than January 1, 1991.

(16) States may exempt a public water system that obtains treated water from another public water system serving more than 10,000 persons from conducting compliance monitoring for the organic chemicals under § 141.61(a), provided that the system from which the water is obtained has conducted the analyses required under § 141.61(a).

(17) Public water systems exempted by the State under (g)(16) and which disinfect are required to monitor under § 141.40.

(18) Each approved laboratory must determine the method detection limit (MDL), as defined in Appendix B to Part 136, at which it is capable of detecting VOCs. The acceptable MDL is 0.0005 mg/l. This concentration is the detection level for purposes of paragraphs (g) (5), (6), (7), and (8) of this section.

§ 141.25 Analytical Methods for Radioactivity.

(a) The methods specified in *Interim Radiochemical Methodology for Drinking Water*, Environmental Monitoring and Support Laboratory, EPA-600/4-75-008, USEPA, Cincinnati, Ohio 45268, or those listed below, are to be used to determine compliance with §§141.15 and 141.16 (radioactivity) except in cases where alternative methods have been approved in accordance with §141.27.

(1) Gross Alpha and Beta—Method 302 "Gross Alpha and Beta Radioactivity in Water" *Standard Methods for the Examination of Water and Wastewater*, 13th Edition, American Public Health Association, New York, N.Y., 1971.

(2) Total Radium—Method 304 "Radium in Water by Precipitation" Ibid.

(3) Radium-226—Method 305 "Radium-226 by Radon in Water" Ibid.

(4) Strontium-89,90 — Method 303 "Total Strontium and Strontium-90 in Water" Ibid.

(5) Tritium—Method 306 "Tritium in Water" Ibid.

(6) Cesium-134 — ASTM D-2459 "Gamma Spectrometry in Water," *1975 Annual Book of ASTM Standards, Water and Atmospheric Analysis*, Part 31, American Society for Testing and Materials, Philadelphia, PA. (1975).

(7) Uranium—ASTM D-2907 "Microquantities of Uranium in Water by Fluorometry," Ibid.

(b) When the identification and measurement of radionuclides other than those listed in paragraph (a) is required, the following references are to be used, except in cases where alternative methods have been approved in accordance with § 141.27.

(1) *Procedures for Radiochemical Analysis of Nuclear Reactor Aqueous Solutions*, H. L. Krieger and S. Gold, EPA-

R4-73-014. USEPA, Cincinnati, Ohio, May 1973.

(2) *HASL Procedure Manual*, Edited by John H. Harley. HASL 300, ERDA Health and Safety Laboratory, New York, N.Y., 1973.

(c) For the purpose of monitoring radioactivity concentrations in drinking water, the required sensitivity of the radioanalysis is defined in terms of a detection limit. The detection limit shall be that concentration which can be counted with a precision of plus or minus 100 percent at the 95 percent confidence level (1.96σ where σ is the standard deviation of the net counting rate of the sample).

(1) To determine compliance with § 141.15 (a) the detection limit shall not exceed 1 pCi/l. To determine compliance with § 141.15(b) the detection limit shall not exceed 3 pCi/l.

(2) To determine compliance with § 141.16 the detection limits shall not exceed the concentrations listed in Table B.

TABLE B.—DETECTION LIMITS FOR MAN-MADE BETA PARTICLE AND PHOTON EMITTERS

Radionuclide	*Detection limit*
Tritium	1,000 pCi/l.
Strontium-89	10 pCi/l.
Strontium-90	2 pCi/l.
Iodine-131	1 pCi/l.
Cesium-134	10 pCi/l.
Gross beta	4 pCi/l.
Other radionuclides	1/10 of the applicable limit.

(d) To judge compliance with the maximum contaminant levels listed in sections 141.15 and 141.16, averages of data shall be used and shall be rounded to the same number of significant figures as the maximum contaminant level for the substance in question.

(e) The State has the authority to determine compliance or initiate enforcement action based upon analytical results or other information compiled by their sanctioned representatives and agencies.

[141.25(e) added by 45 FR 57342. August 27, 1980]

§ 141.26 Monitoring Frequency for Radioactivity in Community Water Systems.

(a) Monitoring requirements for gross alpha particle activity, radium-226 and radium-228.

(1) Initial sampling to determine compliance with § 141.15 shall begin within two years of the effective date of these regulations and the analysis shall be completed within three years of the effective date of these regulations. Compliance shall be based on the analysis of an annual composite of four consecutive quarterly samples or the average of the analyses of four samples obtained at quarterly intervals.

(i) A gross alpha particle activity measurement may be substituted for the required radium-226 and radium-228 analysis *Provided*, That the measured gross alpha particle activity does not exceed 5 pCi/l at a confidence level of 95 percent (1.65σ where σ is the standard deviation of the net counting rate of the sample). In localities where radium-228 may be present in drinking water, it is recommended that the State require radium-226 and/or radium-228 analyses when the gross alpha particle activity exceeds 2 pCi/l.

(ii) When the gross alpha particle activity exceeds 5 pCi/l, the same or an equivalent sample shall be analyzed for radium-226. If the concentration of radium-226 exceeds 3 pCi/l the same or an equivalent sample shall be analyzed for radium-228.

(2) For the initial analysis required by paragraph (a)(1), data acquired within one year prior to the effective date of this part may be substituted at the discretion of the State.

(3) Suppliers of water shall monitor at least once every four years following the procedure required by paragraph (a)(1). At the discretion of the State, when an annual record taken in conformance with paragraph (a)(1) has established that the average annual concentration is less than half the maximum contaminant levels established by § 141.15, analysis of a single sample may be substituted for the quarterly sampling procedure required by paragraph (a)(1).

(i) More frequent monitoring shall be conducted when ordered by the State in the vicinity of mining or other operations which may contribute alpha particle radioactivity to either surface or ground water sources of drinking water.

(ii) A supplier of water shall monitor in conformance with paragraph (a)(1) within one year of the introduction of a new water source for a community water system. More frequent monitoring shall be conducted when ordered by the State in the event of possible contamination or when changes in the distribution system or treatment processing occur which may increase the concentration of radioactivity in finished water.

(iii) A community water system using two or more sources having different concentrations of radioactivity shall monitor source water, in addition to water from a free-flowing tap, when ordered by the State.

(iv) Monitoring for compliance with § 141.15 after the initial period need not include radium-228 *except when* required by the State. *Provided*. That the average annual concentration of radium-228 has been assayed at least once using the quarterly sampling procedure required by paragraph (a)(1).

(v) Suppliers of water shall conduct annual monitoring of any community water system in which the radium-226 concentration exceeds 3 pCi/l, when ordered by the State.

(4) If the average annual maximum contaminant level for gross alpha particle activity or total radium as set forth in § 141.15 is exceeded, the supplier of a community water system shall give notice to the State pursuant to § 141.31 and notify the public as required by § 141.32. Monitoring at quarterly intervals shall be continued until the annual average concentration no longer exceeds the maximum contaminant level or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

(b) Monitoring requirements for man-made radioactivity in community water systems.

(1) Within two years of the effective date of this part, systems using surface water sources and serving more than 100,000 persons and such other community water systems as are designated by the State shall be monitored for compliance with § 141.16 by analysis of a composite of four consecutive quarterly samples or analysis of four quarterly samples. Compliance with § 141.16 may be assumed without further analysis if the average annual concentration of gross beta particle activity is less than 50 pCi/l and if the average annual concentrations of tritium and strontium-90 are less than those listed in Table A, *Provided*, That if both radionuclides are present the sum of their annual dose equivalents to bone marrow shall not exceed 4 millirem/year.

(i) If the gross beta particle activity exceeds 50 pCi/l, an analysis of the sample must be performed to identify the major radioactive constituents present and the appropriate organ and total body doses shall be calculated to determine compliance with § 141.16.

(ii) Suppliers of water shall conduct additional monitoring, as ordered by the State, to determine the concentration of man-made radioactivity in principal watersheds designated by the State.

(iii) At the discretion of the State, suppliers of water utilizing only ground waters may be required to monitor for man-made radioactivity.

(2) For the initial analysis required by paragraph (b)(1) data acquired within one year prior to the effective date of this part may be substituted at the discretion of the State.

(3) After the initial analysis required by paragraph (b)(1) suppliers of water shall monitor at least every four years

following the procedure given in paragraph (b)(1).

(4) Within two years of the effective date of these regulations the supplier of any community water system designated by the State as utilizing waters contaminated by effluents from nuclear facilities shall initiate quarterly monitoring for gross beta particle and iodine-131 radioactivity and annual monitoring for strontium-90 and tritium.

(i) Quarterly monitoring for gross beta particle activity shall be based on the analysis of monthly samples or the analysis of a composite of three monthly samples. The former is recommended. If the gross beta particle activity in a sample exceeds 15 pCi/l. the same or an equivalent sample shall be analyzed for strontium-89 and cesium-134. If the gross beta particle activity exceeds 50 pCi/l. an analysis of the sample must be performed to identify the major radioactive constituents present and the appropriate organ and total body doses shall be calculated to determine compliance with § 141.16.

(ii) For iodine-131, a composite of five consecutive daily samples shall be analyzed once each quarter. As ordered by the State, more frequent monitoring shall be conducted when iodine-131 is identified in the finished water.

(iii) Annual monitoring for strontium-90 and tritium shall be conducted by means of the analysis of a composite of four consecutive quarterly samples or analysis of four quarterly samples. The latter procedure is recommended.

(iv) The State may allow the substitution of environmental surveillance data taken in conjunction with a nuclear facility for direct monitoring of man-made radioactivity by the supplier of water where the State determines such data is applicable to a particular community water system.

(5) If the average annual maximum contaminant level for man-made radioactivity set forth in § 141.16 is exceeded, the operator of a community water system shall give notice to the State pursuant to § 141.31 and to the public as required by § 141.32. Monitoring at monthly intervals shall be continued until the concentration no longer exceeds the maximum contaminant level or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

§ 141.27 Alternative analytical techniques.

(a) With the written permission of the State, concurred in by the Administrator of the U.S. EPA, an alternate analytical technique may be employed. An alternate technique shall be accepted 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 MCL. The use of the alternate analytical technique shall not decrease the frequency of monitoring required by this part.

§ 141.28 Approved laboratories.

(a) For the purpose of determining compliance with § 141.21 through § 141.27, §§ 141.41 and 141.42 samples may be considered only if they have been analyzed by a laboratory approved by the State except that measurements for turbidity, free chlorine residual, temperature and pH may be performed by any person acceptable to the State.

[141.28(a) corrected by 47 FR 10998, March 12, 1982]

(b) Nothing in this Part shall be construed to preclude the State or any duly designated representative of the State from taking samples or from using the results from such samples to determine compliance by a supplier of water with the applicable requirements of this Part.

§ 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 systems justifies 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.

§ 141.30 Total trihalomethanes sampling, analytical and other requirements.

(a) Community water system which serve a population of 10,000 or more individuals and which add a disinfectant (oxidant) to the water in any part of the drinking water treatment process shall analyze for total trihalomethanes in accordance with this section. For systems serving 75,000 or more individuals, sampling and analyses shall begin not later than 1 year after the date of promulgation of this regulation. For systems serving 10,000 to 74,999 individuals, sampling and analyses shall begin not later than 3 years after the date of promulgation of this regulation. For the purpose of this section, the minimum number of samples required to be taken by the system shall be based on the number of treatment plants used by the system, except that multiple wells drawing raw water from a single aquifer may, with the State approval, be considered one treatment plant for determining the minimum number of samples. All samples taken within an established frequency shall be collected within a 24-hour period.

(b)(1) For all community water systems utilizing surface water sources in whole or in part, and for all community water systems utilizing only ground water sources that have not been determined by the State to qualify for the monitoring requirements of paragraph (c) of this section, analyses for total trihalomethanes shall be performed at quarterly intervals on at least four water samples for each treatment plant used by the system. At least 25 percent of the samples shall be taken at locations within the distribution system reflecting the maximum residence time of the water in the system. The remaining 75 percent shall be taken at representative locations in the distribution system, taking into account number of persons served, different sources of water and different treatment methods employed. The results of all analyses per quarter shall be arithmetically averaged and reported to the State within 30 days of the system's receipt of such results. Results shall also be reported to EPA until such monitoring requirements have been adopted by the State. All samples collected shall be used in the computation of the average, unless the analytical results are invalidated for technical reasons. Sampling and analyses shall be conducted in accordance with the methods listed in paragraph (e) of this section.

(2) Upon the written request of a community water system, the monitoring frequency required by paragraph (b)(1) of this section may be reduced by the State to a minimum of one sample analyzed for TTHMs per quarter taken at a point in the distribution system reflecting the maximum residence time of the water in the system, upon a written determination by the State that the data from at least 1 year of monitoring in accordance with paragraph (b)(1) of this section and local conditions demonstrate that total trihalomethane concentrations will be consistently below the maximum contaminant level.

(3) If at any time during which the reduced monitoring frequency prescribed under this paragraph applies, the results from any analysis exceed 0.10 mg/l of TTHMs and such results are confirmed by at least one check sample taken promptly after such results are received, or if the system makes any significant change to its source of water or treatment program, the system shall immediately begin monitoring in accordance with the requirements of paragraph (b)(1) of this section, which monitoring shall continue for at least 1 year before the frequency may be reduced again. At the option of the State, a system's monitoring frequency may and should be increased above the minimum in those cases where it is necessary to detect variations of TTHM levels within the distribution system.

(c)(1) Upon written request to the State, a community water system utilizing only ground water sources may seek to have the monitoring frequency required by subparagraph (1) of paragraph (b) of this section reduced to a minimum of one sample for maximum TTHM potential per year for each treatment plant used by the system taken at a point in the distribution system reflecting maximum residence time of the water in the system. The system shall submit to the State the results of at least one sample analyzed for maximum TTHM potential for each treatment plant used by the system taken at a point in the distribution system reflecting the maximum residence time of the water in the system. The system's monitoring frequency may only be reduced upon a written determination by the State that, based upon the data submitted by the system, the system has a maximum TTHM potential of less than 0.10 mg/l and that, based upon an assessment of the local conditions of the system, the system is not likely to approach or exceed the maximum contaminant level for total TTHMs. The results of all analyses shall be reported to the State within 30 days of the system's receipt of such results. Results shall also be reported to EPA until such monitoring requirements have been adopted by the State. All samples collected shall be used for determining whether the system must comply with the monitoring requirements of paragraph (b) of this section, unless the analytical results are invalidated for technical reasons. Sampling and analyses shall be conducted in accordance with the methods listed in paragraph (e) of this section.

(2) If at any time during which the reduced monitoring frequency prescribed under paragraph (c)(1) of this

section applies, the results from any analysis taken by the system for maximum TTHM potential are equal to or greater than 0.10 mg/l, and such results are confirmed by at least one check sample taken promptly after such results are received, the system shall immediately begin monitoring in accordance with the requirements of paragraph (b) of this section and such monitoring shall continue for at least one year before the frequency may be reduced again. In the event of any significant change to the system's raw water or treatment program, the system shall immediately analyze an additional sample for maximum TTHM potential taken at a point in the distribution system reflecting maximum residence time of the water in the system for the purpose of determining whether the system must comply with the monitoring requirements of paragraph (b) of this section. At the option of the State, monitoring frequencies may and should be increased above the minimum in those cases where this is necessary to detect variation of TTHM levels within the distribution system.

(d) Compliance with § 141.12(c) shall be determined based on a running annual average of quarterly samples collected by the system as prescribed in subparagraphs (1) or (2) of paragraph (b) of this section. If the average of samples covering any 12 month period exceeds the Maximum Contaminant Level, the supplier of water shall report to the State pursuant to § 141.31 and notify the public pursuant to § 141.32. Monitoring after public notification shall be at a frequency designated by the State and shall continue until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

(e) Sampling and analyses made pursuant to this section shall be conducted by one of the following EPA approved methods:

(1) "The Analysis of Trihalomethanes in Drinking Waters by the Purge and Trap Method." Method 501.1, EMSL, EPA Cincinnati, Ohio.

(2) "The Analysis of Trihalomethanes in Drinking Water by Liquid/Liquid Extraction."Method 501.2, EMSL, EPA Cincinnati, Ohio.

Samples for TTHM shall be dechlorinated upon collection to prevent further production of Trihalomethanes, according to the procedures described in the above two methods. Samples for maximum TTHM potential should not be dechlorinated, and should be held for seven days at 25° C or above prior to analysis, according to the procedures described in the above two methods.

(f) Before a community water system makes any significant modifications to its existing treatment process for the purposes of achieving compliance with § 141.12(c), such system must submit and obtain State approval of a detailed plan setting forth its proposed modification and those safeguards that it will implement to ensure that the bacteriological quality of the drinking water served by such system will not be adversely affected by such modification. Each system shall comply with the provisions set forth in the State-approved plan. At a minimum, A State approved plan shall require the system modifying its disinfection practice to:

(1) Evaluate the water system for sanitary defects and evaluate the source water for biological quality;

(2) Evaluate its existing treatment practices and consider improvements that will minimize disinfectant demand and optimize finished water quality throughout the distribution system;

(3) Provide baseline water quality survey data of the distribution system. Such data should include the results from monitoring for coliform and fecal coliform bacteria, fecal streptococci, standard plate counts at 35° C and 20° C, phosphate, ammonia nitrogen and total organic carbon. Virus studies should be required where source waters are heavily contaminated with sewage effluent;

(4) Conduct additional monitoring to assure continued maintenance of optimal biological quality in finished water, for example, when chloramines are introduced as disinfectants or when pre-chlorination is being discontinued. Additional monitoring should also be required by the State for chlorate, chlorite and chlorine dioxide when chlorine dioxide is used. Standard plate count analyses should also be required by the State as appropriate before and after any modifications;

(5) Consider inclusion in the plan of provisions to maintain an active disinfectant residual throughout the distribution system at all times during and after the modification.

Appendix A—Summary of Public Comments and EPA Responses on Proposed Amendments to the National Interim Primary Drinking Water Regulations for Control of Trihalomethanes in Drinking Water

[Omitted]

Appendix B—Summary of Major Comments (for responses, see Appendix A)

[Omitted]

[*Editor's note*: Appendices A and B were comments published in the Federal Register on November 29, 1979 (44 FR 68642).]

Appendix C—Analysis of Trihalomethanes

Part I: The Analysis of Trihalomethanes in Drinking Water by the Purge and Trap Method

1. *Scope*

1.1 This method (1) is applicable in the determination of four trihalomethanes, i.e. chloroform, dichlorobromomethane, dibromochloromethane, and bromoform in finished drinking water, raw source water, or drinking water in any stage of treatment. The concentration of these four compounds is totaled to determine total trihalomethanes (TTHM).

1.2 For compounds other than the above-mentioned trihalomethanes, or for other sample sources, the analyst must demonstrate the usefulness of the method by collecting precision and accuracy data on actual samples as described (2).

1.3 Although the actual detection limits are highly dependent upon the gas chromatographic column and detector employed, the method can be used over a concentration range of approximately 0.5 to 1500 micrograms per liter.

1.4 Well in excess of 100 different water supplies have been analyzed using this method. Supplementary analyses using gas chromatography mass spectrometry (GC/MS) have shown that there is no evidence of interference in the determination of trihalomethanes (3). For this reason, it is not necessary to analyze the raw source water as is required with the Liquid/Liquid Extraction Method (4).

2. *Summary*

2.2 Trihalomethanes are extracted by an inert gas which is bubbled through the aqueous sample. The trihalomethanes, along with other organic constituents which exhibit low water solubility and a vapor pressure significantly greater than water, are efficiently transferred from the aqueous

phase to the gaseous phase. These compounds are swept from the purging device and are trapped in a short column containing a suitable sorbent. After a predetermined period of time, the trapped components are thermally desorbed and backflushed onto the head of a gas chromatographic column and separated under programmed conditions. Measurement is accomplished with a halogen specific detector such as electrolytic conductivity or microcoulometric titration.

2.3 Confirmatory analyses are performed using dissimilar columns, or by mass spectrometry (5).

2.4 Aqueous standards and unknowns are extracted and analyzed under identical conditions in order to compensate for extraction losses.

2.5 The total analysis time, assuming the absence of other organohalides, is approximately 35 minutes per sample.

3. *Interferences*

3.1 Impurities contained in the purge gas and organic compounds outgasing from the plumbing ahead of the trap usually account for the majority of contamination problems. The presence of such inteferences are easily monitored as a part of the quality control program. Sample blanks are normally run between each set of samples. When a positive trihalomethane response is noted in the sample blank, the analyst should analyze a method blank. Method blanks are run by charging the purging device with organic-free water and analyzing in the normal manner.

If any trihalomethane is noted in the method blank in excess of 0.4 μg/l, the analyst should change the purge gas source and regenerate the molecular sieve purge gas filter. *Subtracting the blank values is not recommended.* The use of non-TFE plastic tubing, non-TFE thread sealants, or flow controllers with rubber components should be avoided since such materials generally out-gas organic compounds which will be concentrated in the trap during the purge operation. Such out-gasing problems are common whenever new equipment is put into service: as time progresses, minor outgasing problems generally cure themselves.

3.2 Several instances of accidental sample contamination have been noted and attributed to diffusion of volatile organics through the septum seal and into the sample during shipment and storage. The sample blank is used as a monitor for this problem.

3.3 For compounds that are not efficiently purged, such as bromoform, small variations in sample volume, purge time, purge flow rate, or purge temperature can affect the analytical result. Therefore, samples and standards must be analyzed under identical conditions.

3.4 Cross-contamination can occur whenever high-level and low-level samples are sequentially analyzed. To reduce this likelihood, the purging device and sample syringe should be rinsed twice between samples with organic-free water. Whenever an unusually concentrated sample is encountered, it is highly recommended that it be followed by a sample blank analysis to ensure that sample cross contamination does not occur. For samples containing large amounts of water soluble materials, it may be necessary to wash out the purging device with a soap solution, rinse with distilled water, and then dry in a 105°C oven between analyses.

3.5 Qualitative misidentifications are a problem in using gas chromatographic analysis. Whenever samples whose qualitative nature is unknown are analyzed, the following precautionary measures should be incorporated into the analysis.

3.5.1 Perform duplicate analyses using the two recommended columns (4.2.1 and 4.2.2) which provide different retention order and retention times for the trihalomethanes and other organohalides.

3.5.2 Whenever possible, use GC/MS techniques which provide unequivocal qualitative identifications (5).

4. *Apparatus*

4.1 The purge and trap equipment consists of three separate pieces of apparatus: the purging device, trap, and desorber. Construction details for a purging device and an easily automated trap-desorber hybrid which has proven to be exceptionally efficient and reproducible are shown in Figures 1 through 4 and described in 4.1.1. through 4.1.3. An earlier acceptable version of the above-mentioned equipment is described in (1).

4.1.1 Purging Device—Construction details are given in Figure 1 for an all-glass 5 ml purging device. The glass frit installed at the base of the sample chamber allows finely divided gas bubbles to pass through the sample while the sample is restrained above the frit. Gaseous volumes above the sample are kept to a minimum to eliminate dead volume effects, yet allowing sufficient space for most foams to disperse. The inlet and exit ports are constructed from heavy-walled ¼-inch glass tubing so that leak-free removable connections can be made using "finger-tight" compression fittings containing Teflon ferrules. The removable foam trap is used to control samples that foam.

4.1.2 Trapping Device—The trap (Figure 2) is a short gas chromatographic column which at <35 C retards the flow of the compounds of interest while venting the purge gas and, depending on which sorbent is used, much of the water vapor. The trap should be constructed with a low thermal mass so that it can be heated to 180° C in less than 1 minute for efficient desorption, then rapidly cooled to room temperature for recycling. Variations in the trap ID, wall thickness, sorbents, sorbent packing order, and sorbent mass could adversely affect the trapping and desorption efficiencies for compounds discussed in this text. For this reason, it is important to faithfully reproduce the trap configurations recommended in Figure 2. Traps containing Tenax only, or combinations of Tenax and other sorbents are acceptable for this analysis.

4.1.3 Desorber assembly—Details for the desorber are shown in Figures 3, and 4. With the 6-port valve in the Purge Sorb position (Figure 3), the effluent from the purging device passes through the trap where the flow rate of the organics is retarded. The GC carrier gas also passes through the 6-port valve and is returned to the GC. With the 6-port valve in the Purge-Sorb position, the operation of the GC is in no way impaired: therefore, routine liquid injection analyses can be performed using the gas chromatograph. After the sample has been purged, the 6-port valve is turned to the desorb position (Figure 4). In this configuration the trap is coupled in series with the gas chromatographic column allowing the carrier gas to backflush the trapped materials into the analytical column. Just as the valve is actuated, the power is turned on to the resistance wire wrapped around the trap. The power is supplied by an electronic temperature controller. Using this device, the trap is rapidly heated to 180° C and then maintained at 180° C with minimal temperature overshoot. The trapped compounds are released as a "plug" to the gas chromatograph. Normally, packed columns with theoretical efficiencies near 500 plates/foot under programmed temperature conditions can accept such desorb injections without altering peak geometry. Substituting a non-controlled power supply, such as a manually-operated variable transformer, will provide nonreproductible retention times and poor quantitative data unless Injection Procedure (8.9.2) is used.

4.1.4 Several Purge and Trap Devices are now commercially available. It is recommended that the following be taken into consideration if a unit is to be purchased:

a. Be sure that the unit is completely compatible with the gas chromatograph to be used for the analysis.

b. Use a 5-ml purging device similar to that shown in Figure 1.

c. Be sure the Tenax portion of the trap meets or exceeds the dimensions shown in Figure 2.

d. With the exception of sample introduction, select a unit that has as many of the purge trap functions automated as possible.

4.2 Gas chromatograph—The chromatograph must be temperature programmable and equipped with a halide specific detector.

4.2.1 Column I is an unusually efficient column which provides outstanding separations for a wide variety of organic compounds. Because of its ability to resolve trihalomethanes from other organochlorine compounds, column I should be used as the primary analytical column (see Table 1 for retention data using this column).

4.2.1.1 Column I parameters: Dimensions—8 feet long x 0.1 inch ID stainless steel or glass tubing. Packing—1% SP-1000 on Carbopack-B (60/80) mesh. Carrier Gas—helium at 40 ml/minute. Temperature program sequence: 45° C isothermal for 3 minutes, program at 8° C/minute to 220° C then hold for 15 minutes or until all compounds have eluted.

NOTE: It has been found that during handling, packing, and programming, active sites are exposed on the Carbopack-B packing. This results in tailing peak geometry

and poor resolution of many constituents. To correct this, pack the first 5 cm of the column with 3% SP-1000 on Chromosorb-W 60/80 followed by the Carbopack-B packing. Condition the precolumn and the Carbopack columns with carrier gas flow at 220° C overnight. Pneumatic shocks and rough treatment of packed columns will cause excessive fracturing of the Carbopack. If pressure in excess of 60 psi is required to obtain 40 ml/minute carrier flow, then the column should be repacked.

4.2.1.2 Acceptable column equivalent to Column I: Dimensions—8 feet long x 0.1 inch ID stainless steel or glass tubing. Packing—0.2% Carbowax 1500 on Carbopack-C (80/100) mesh. Carrier Gas—helium at 40 ml/minute. Temperature program sequence—60° C isothermal for 3 minutes, program at 8° C /minute to 160° C, then hold for 2 minutes or until all compounds have eluted.

NOTE: It has been found that during handling, packing, and programming, active sites are exposed on the Carbopack-C packing. This results in poor resolution of constituents and poor peak geometry. To correct this, place a 1 ft. 0.125 in. OD x 0.1 in. ID stainless steel column packed with 3% Carbowax 1500 on Chromosorb-W 60/80 mesh in series before the Carbopack-C column. Condition the precolumn and the Carbopack columns with carrier gas flow at 190° C overnight. The two columns may be retained in series for routine analyses. Trihalomethane retention times are listed in Table 1.

4.2.2 Column II provides unique organohalide-trihalomethane separations when compared to those obtained from Column I (see Figures 5 and 6). However, since the resolution between various compounds is generally not as good as those with Column I, it is recommended that Column II be used as a qualitative confirmatory column for unknown samples when GC/MS confirmation is not possible.

4.2.2.1 Column II parameters: Dimensions—8 feet long x 0.1 inch ID stainless steel or glass. Packing—n-octane on Porisil-C (100/120 mesh). Carrier Gas—helium at 40 cc/minute. Temperature program sequence—50° C isothermal for 3 minutes, program at 8°/minute to 170° C, then hold for 4 minutes or until all compounds have eluted. Trihalomethane retention times are listed in Table 1.

5.8 Organic-free water is defined as water free of interference when employed in the purge and trap analysis.

5.8.1 Organic-free water is generated by passing tap water through a carbon filter bed containing about 1 lb. of activated carbon. Change the activated carbon bed whenever the concentration of any trihalomethane exceeds 0.4 µg/l.

5.8.2 A Millipore Super-Q Water System or its equivalent may be used to generate organic-free water.

5.8.3 Organic-free water may also be prepared by boiling water for 15 minutes. Subsequently, while maintaining the temperature at 90° C, bubble a contaminant-free inert gas through the water for one hour. While still hot, transfer the water to a narrow-mouth screw-cap bottle with a Teflon seal.

5.8.4 Test organic free water each day it is used by analyzing according to Section 8.

5.9 Standards.*

5.9.1 Bromoform—96%—available from Aldrich Chemical Company.

5.9.2 Bromodichloromethane 97%—available from Aldrich Chemical Company.

5.9.3 Chlorodibromomethane—available from Columbia Chemical Inc., Columbia, S.C.

5.9.4 Chloroform—99%—available from Aldrich Chemical Company.

5.10 Standard Stock Solutions

5.10.1 Place about 9.8 ml of methyl alcohol into a ground glass stoppered 10 ml volumetric flask.

5.10.2 Allow the flask to stand unstoppered about 10 minutes or until all alcohol wetted surfaces have dried.

5.10.3 Weigh the flask to the nearest 0.1 mg.

5.10.4 Using a 100 µl syringe, immediately add 2 drops of the reference standard to the flask, then reweigh. *Be sure that the 2 drops fall directly into the alcohol without contacting the neck of the flask.*

5.10.5 Dilute to volume, stopper, then mix by inverting the flask several times.

5.10.6 Transfer the solution to a dated and labeled 15 ml screw cap bottle with a Teflon cap liner.

NOTE: Because of the toxicity of trihalomethanes, it is necessary to prepare primary dilutions in a hood. It is further recommended that a NIOSH/MESA approved toxic gas respirator be used when the analyst handles high concentrations of such materials.

5.10.7 Calculate the concentration in micrograms per microliter from the net gain in weight.

5.10.8 Store the solution at 4° C.

NOTE: All standard solutions prepared in methyl alcohol are stable up to 4 weeks when stored under these conditions. They should be discarded after that time has elapsed.

5.11 Aqueous Calibration Standard Precautions.

5.11.1 In order to prepare accurate aqueous standard solutions, the following precautions must be observed.

a. Do not inject more than 20 µl of alcoholic standards into 100 ml of organic-free water.

b. Use of 25 µl Hamilton 702N microsyringe or equivalent. (Variations in needle geometry will adversely affect the ability to deliver reproducible volumes of methanolic standards into water.)

c. Rapidly inject the alcoholic standard into the expanded area of the filled volumetric flask. Remove the needle as fast as possible after injection.

d. Mix aqueous standards by inverting the flask three times only.

e. Discard the contents contained in the neck of the flask. Fill the sample syringe from the standard solution contained in the expanded area of the flask as directed in Section 8.5.

f. Never use pipets to dilute or transfer samples or aqueous standards.

g. Aqueous standards when stored with a headspace are not stable and should be discarded after one hour.

h. Aqueous standards can be stored according to Sections 6.4 and 8.6.

5.11.2 Prepare, from the standard stock solutions, secondary dilution mixtures in methyl alcohol so that a 20 µl injection into 100 ml or organic-free water will generate a calibration standard which produces a response close (±10%) to that of the sample (See 9.1).

5.11.3 Purge and analyze the aqueous calibration standards in the same manner as the samples.

5.11.4 Other calibration procedures (3) which require the delivery of less than 20 µl of a methanolic standard into a 5.0 ml volume of water already contained in the sample syringe are acceptable only if the methanolic standard is delivered by the solvent flush technique (6).

5.12 Quality Check Standard (2.0 µg/l)

5.12.1 From the standard stock solutions, prepare a secondary dilution in methyl alcohol containing 10 ng/µl of each trihalomethane (See Section 5.10.8 Note).

5.12.2 Daily, inject 20.0 µl of this mixture into 100.0 ml of organic-free water and analyze according to Section 8.

6. *Sample Collection and Handling*

6.1. The sample containers should have a total volume of at least 25 ml.

6.1.1 Narrow mouth screw cap bottles with the TFE fluorocarbon face silicone septa cap liners are strongly recommended.

6.2 Sample Bottle Preparation

6.2.1 Wash all sample bottles and TFE seals in detergent. Rinse with tap water and finally with distilled water.

6.2.2 Allow the bottles and seals to air dry at room temperature, then place in a 105° C oven for one hour, then allow to cool in a area known to be free of organics.

NOTE: Do not heat the TFE seals for extended period of time (>1 hour) because the silicone layer slowly degrades at 105° C.

6.2.3 When cool, seal the bottles using the TFE seals that will be used for sealing the samples.

6.3 Sample Stabilization—A chemical reducing agent (Section 5.6) is added to the sample in order to arrest the formation of trihalo-methanes after sample collection (3, 7). *Do not add the reducing agent to samples when data on maximum trihalomethane formation is desired.* If chemical stabilization is employed, the reagent is also added to the blanks. The chemical agent (2.5 to 3 mg/40 ml) is added to the empty sample bottles just prior to shipping to the sampling site.

6.4 Sample Collection

6.4.1 Collect all samples in duplicate.

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*As a precautionary measure, all standards must be checked for purity by boiling point determinations or GC/MS assays (5).

6.4.2 Fill the sample bottles in such a manner that no air bubbles pass through the sample as the bottle is filled.

6.4.3 Seal the bottles so that no air bubbles are entrapped in it.

6.4.4 Maintain the hermetic seal on the sample bottle until analysis.

6.4.5 Sampling from a water tap.

6.4.5.1 Turn on water and allow the system to flush until the temperature of the water has stabilized. Adjust the flow to about 500 ml/minute and collect duplicate samples from the flowing stream.

6.4.6 Sampling from an open body of water.

6.4.6.1 Fill a 1-quart wide-mouth bottle with sample from a representative area. Carefully fill duplicate sample bottles from the 1-quart bottle as noted in 6.4.2.

6.4.7 If a chemical reducing agent has been added to the sample bottles, fill with sample just to overflowing, seal the bottle, and shake vigorously for 1 minute.

6.4.8 Sealing practice for septum seal screw cap bottles.

6.4.8.1 Open the bottle and fill to overflowing, place on a level surface, position the TFE side of the septum seal upon the convex sample meniscus and seal the bottle by screwing the cap on tightly.

6.4.8.2 Invert the sample and lightly tap the cap on a solid surface. The absence of entrapped air indicates a successful seal. If bubbles are present, open the bottle, add a few additional drops of sample and reseal the bottle as above.

6.4.9 Blanks.

6.4.9.1 Prepare blanks in duplicate at the laboratory by filling and sealing sample bottles with organic-free water just prior to shipping the sample bottles to the sampling site.

6.4.9.2 If the sample is to be stabilized, add an identical amount of stabilization reagent to the blanks.

6.4.9.3 Ship the blanks to and from the sampling site along with the sample bottles.

6.4.9.4 Store the blanks and the samples collected at a given site (sample set) together. A sample set is defined as all the samples collected at a given site (i.e., at a water treatment plant, the duplicate raw source waters, the duplicate finished waters and the duplicate blank samples comprise the sample set).

6.5 When samples have been collected according to Section 6, no measurable loss of trihalomethanes has been detected over extended periods of storage time (3). It is recommended that all samples be analyzed within 14 days of collection.

7. *Conditioning Traps*

7.1 Condition newly packed traps overnight at 180° C with an inert gas flow of at least 20 ml/min.

7.1.1 Vent the trap effluent to the room, not to the analytical column.

7.2 Prior to daily use, condition traps 10 minutes while backflushing at 180° C. It may be beneficial to routinely condition traps overnight while backflushing at 180° C.

7.2.1 The trap may be vented to the analytical column; however, after conditioning, the column must be programmed prior to use.

8. *Extraction and Analysis*

8.1 Adjust the purge gas (nitrogen or helium) flow rate to 40 ml/min.

8.2 Attach the trap inlet to the purging device. Turn the valve to the purge-sorb position (Figure 3).

8.3 Open the syringe valve located on the purging device sample introduction needle.*

8.4 Remove the plungers from two 5 ml syringes and attach a closed syringe valve to each.

8.5 Open the sample bottle and carefully pour the sample into one of the syringe barrels until it overflows. Replace the syringe plunger and compress the sample. Open the syringe valve and vent any residual air while adjusting the sample volume to 5.0 ml. Close the valve.

8.6 Fill the second syringe in an identical manner from the same sample bottle. This second syringe is reserved for a duplicate analysis, if necessary (See Sections 9.3 and 9.4).

8.7 Attach the syringe-valve assembly to the syringe valve on the purging device.

8.8 Open the syringe valve and inject the sample into the purging chamber. Close both valves. Purge the sample for 11.0±.05 minutes.

8.9 After the 11-minute purge time, attach the trap to the chromatograph (turn the valve to the desorb position) and introduce the trapped materials to the GC column by rapidly heating the trap to 180°C while backflushing the trap with an inert gas between 20 and 60 ml/min for 4 minutes.

8.9.1 If the trap can be rapidly heated to 180°C and maintained at this temperature, the GC analysis can begin as the sample is desorbed, i.e., the column is at the initial 45°C operating temperature. The equipment described in Figure 4 will perform accordingly.

8.9.2 With other types of equipment (see Section 4.1.4 and Reference 1) where the trap is not rapidly heated or is not heated in a reproducible manner, it may be necessary to transfer the contents of the trap into the analytical column at <30°C where it is once again trapped. Once the transfer is complete (4 minutes), the column is rapidly heated to the initial operating temperature for analysis.

8.9.3 If injection procedure 8.9.1 is used and the early eluting peaks in the resulting chromatogram have poor geometry or variable retention times, then Section 8.9.2 should be used.

8.10 After the extracted sample is introduced into the gas chromatograph, empty the gas purging device using the sample introduction syringe, followed by two 5-ml flushes of organic-free water. When the purging device is emptied, leave the syringe valve open allowing the purge gas to vent through the sample introduction needle.

8.11 Analyze each sample and sample blank from the sample set in an identical manner (see Section 6.4.9.4) on the same day.

8.12 Prepare calibration standards from the standard stock solutions (Section 5.10) in organic-free water that are close to the unknown in trihalomethane composition and concentration (Section 9.1). The concentrations should be such that only 20 µl or less of the secondary dilution need be added to 100 ml of organic-free water to produce a standard at the same level as the unknown.

8.13 As an alternative to Section 8.12, prepare a calibration curve for each trihalomethane containing at least 3 points, two of which must bracket the unknown.

9. *Analytical Quality Control*

9.1 Analyze the 2 µg/l check sample daily before any samples are analyzed. Instrument status checks and lower limit of detection estimations based upon response factor calculations at five times the noise level are obtained from these data. In addition, response factor data obtained from the 2 µg/l check standard can be used to estimate the concentration of the unknowns. From this information, the appropriate standard dilutions can be determined.

9.2 Analyze the sample blank to monitor for potential interferences as described in Sections 3.1, 3.2, and 3.4.

9.3 Spiked Samples

9.3.1 For laboratories analyzing more than 10 samples a day, each 10th sample should be a laboratory generated spike which closely duplicates the average finished drinking water in trihalomethane composition and concentration. Prepare the spiked sample in organic-free water as described in Section 5.11.

9.3.2 For laboratories analyzing less than 10 samples daily, each time the analysis is performed, analyze at least 1 laboratory generated spike sample which closely duplicates the average finished drinking water in trihalomethane composition and concentration. Prepare the spiked sample in organic-free water as described in Section 5.11.

9.4 Randomly select and analyze 10% of all samples in duplicate.

9.4.1 Analyze all samples in duplicate which appear to deviate more than 30% from any established norm.

9.5 Maintain an up-to-date log on the accuracy and precision data collected in Sections 9.3 and 9.4. If results are significantly different than those cited in Section 11.1, the analyst should check out the entire analyses scheme to determine why the laboratory's precision and accuracy limits are greater.

9.6 Quarterly, spike an EMSL-Cincinnati trihalomethane quality control sample into organic-free water and analyze.

9.6.1 The results of the EMSL trihalomethane quality control sample should agree within 20% of the true value for each trihalomethane. If they do not then the analyst must check each step in the standard generation procedure to solve the problem (Section 5.9, 5.10, and 5.11).

9.7 Maintain a record of the retention times for each trihalomethane using data gathered from spiked samples and standards.

9.7.1 Daily calculate the average retention time for each trihalomethane and the variance encountered for the analyses.

9.7.2 If individual trihalomethane retention time varies by more than 10% over an eight hour period or does not fall with 10% of an established norm, the system is "out of control." The source of retention data variation must be corrected before acceptable data can be generated.

10. *Calculations*

10.1 Locate each trihalomethane in the sample chromatogram by comparing the retention time of the suspect peak to the data gathered in 9.7.1. The retention time of the suspect peak must fall within the limits established in 9.7.1 for single column identification.

10.2 Calculate the concentration of the samples by comparing the peak height or peak areas of the samples to the standard peak height (8.12). Round off the data to the nearest µg/l or two significant figures.

$$\mu g/l = \frac{\text{peak height sample}}{\text{peak height standard}} \times (\text{conc. std. } \mu g/l)$$

10.3 Report the results obtained from the lower limit of detection estimates along with the data for the samples.

10.4 Calculate the total trihalomethane concentration (TTHM) by summing the 4 individual trihalomethane concentrations in µg/L. TTHM (µg/l)=(Conc. $CHCl_3$)+(Conc. $CHBrCl_2$)+(Conc. $CHBr_2Cl$)+(Conc. $CHBr_3$).

10.5 Calculate the limit of detection (LOD) for each trithalomethane not detected using the following criteria:

$$LOD\ (\mu g/l) = \frac{A \times ATT}{B \times ATT}\ (2\ \mu g/l)$$

where B=peak height (mm) of 2 µg/l quality check standard

A=5 times the noise level in (mm) at the exact retention time of the trihalomethane or the baseline displacement in (mm) from the theoretical zero at the exact retention time of the trihalomethane.

ATT=Attenuation factor

11. *Accuracy and Precision*

11.1 One liter of organic-free water was spiked with the trihalomethanes and used to fill septum seal vials which were stored under ambient conditions. The spiked samples were randomly analyzed over a 2-week period of time. The single laboratory data listed in Table II reflect the errors due to the analytical procedure and storage.

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2. "Handbook for Analytical Quality Control in Water and Wastewater Laboratories," Analytical Quality Control Laboratory, National Environmental Research Center, Cincinnati, Ohio, June 1972.

3. Brass, H. J., et al., "National Organic Monitoring Survey: Sampling and Purgeable Organic Compounds, Drinking Water Quality Through Source Protection," R. B. Pojasek, Editor, Ann Arbor Science, p. 398, 1977.

4. "The Analysis of Trihalomethanes in Finished Water by the Liquid/Liquid Extraction Method, Method 501.2" Environmental Monitoring and Support Labortory, Environmental Research Center, Cincinnati, Ohio, 45268, May 15, 1979.

5. Budde, W. L. and J. W. Eichelberger, "Organics Analysis Using Gas Chromatography-Mass Spectrometry," Ann Arbor Science, Ann Arbor, Michigan, 1979.

6. White, L. D. et al., "Convenient Optimized Method for the Analysis of Selected Solvent Vapors in the Industrial Atmosphere," AIHA Journal, Vol. 31, p. 225, 1970.

7. Kopfler, F. C., et al. "GC/MS Determination of Volatiles for the National Organics Reconnaissance Survey (NORS) or Drinking Water, Identification and Analysis of Organic Pollutants in Water," L. H. Keith, Editor, Ann Arbor Science, p. 87, 1978.

TABLE I—*Retention Data for Trihalomethanes*

Trihalomethane	Retention time minutes: Column I 1% sp1000 Carbopack B	Acceptable Alternative to column I 0.4% Carbowax Carbopack	Column II n-octane Porasil-C
Chloroform	10.7	8.2	12.2
Bromodichloromethane	13.7	10.8	14.7

TABLE I—*Retention Data for Trihalomethanes*

Trihalomethane	Retention time minutes: Column I 1% sp1000 Carbopack B	Acceptable Alternative to column I 0.4% Carbowax Carbopack	Column II n-octane Porasil-C
Chlorodibromomethane (Dibromochloromethane)	16.5	13.2	18.6
Bromoform	19.2	15.7	19.2

TABLE II—*Single Laboratory Accuracy and Precision for Trihalomethanes*

Spike µg/l	Number samples	Mean µg/l	Precision standard deviation	Accuracy percent recovery
Chloroform				
1.2	12	1.2	0.14	100
12.0	8	11.	0.16	92
119.0	11	105	7.9	88
Bromodichloromethane				
1.6	12	1.5	0.05	94
16.0	8	15.	0.39	94
160.0	11	145.	10.2	91
Chlorodibromomethane				
2.0	12	1.9	0.09	95
20.0	8	19.	0.70	95
196.0	11	185	10.6	94
Bromoform				
2.3	12	2.3	0.16	100
23.0	8	23.	1.39	100
231.0	11	223	16.3	97

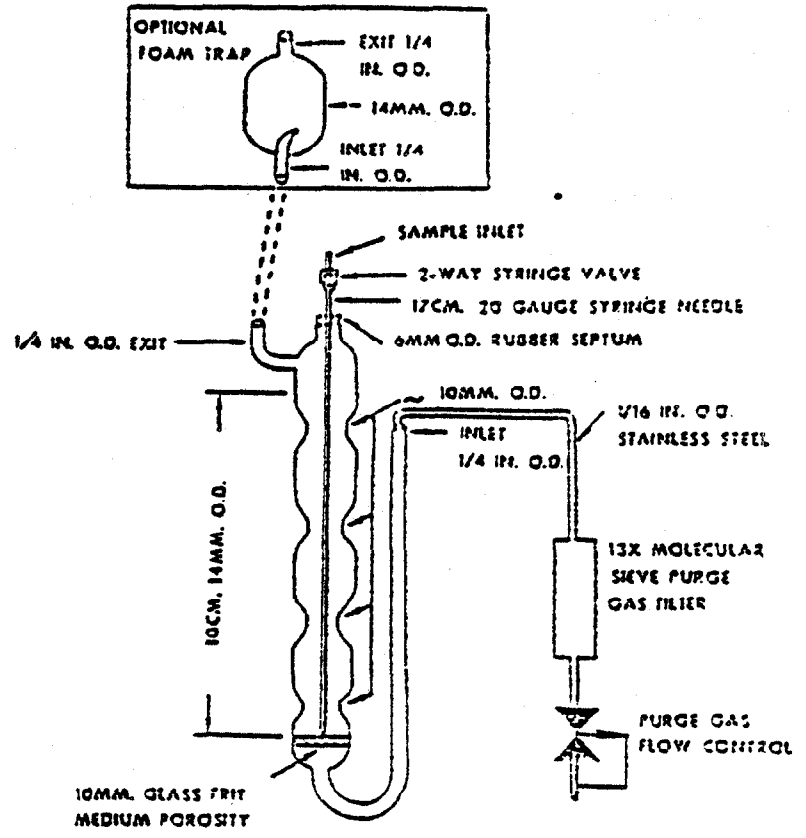

FIGURE 1. PURGING DEVICE

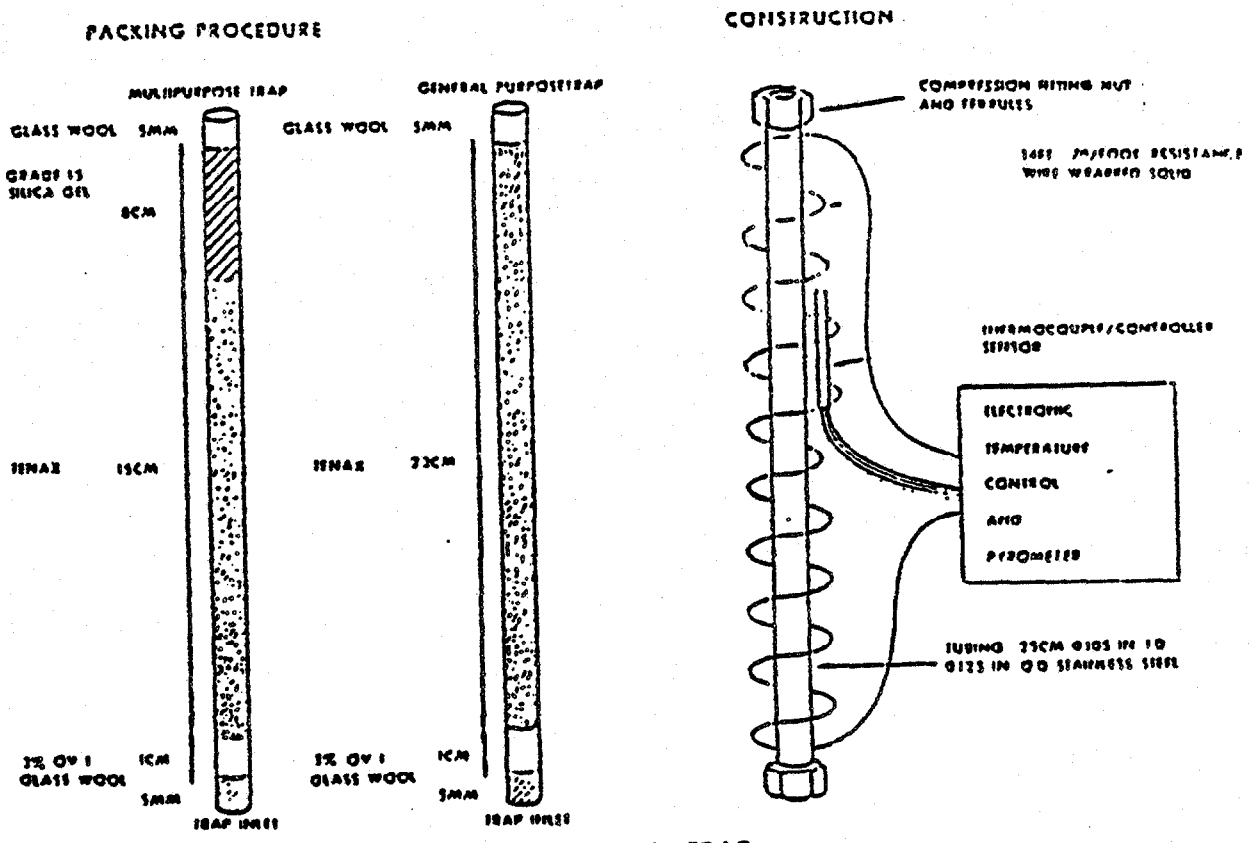

FIGURE 2 TRAP

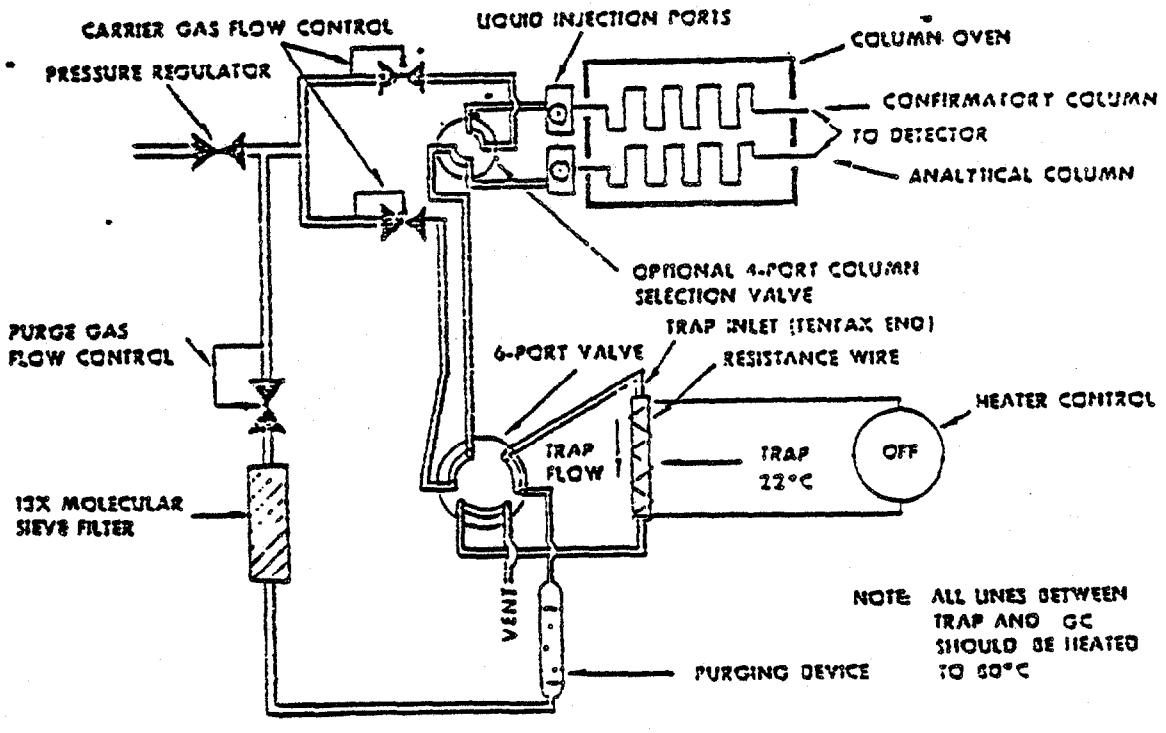

FIGURE 3 PURGE-TRAP SYSTEM (PURGE-SORB MODE)

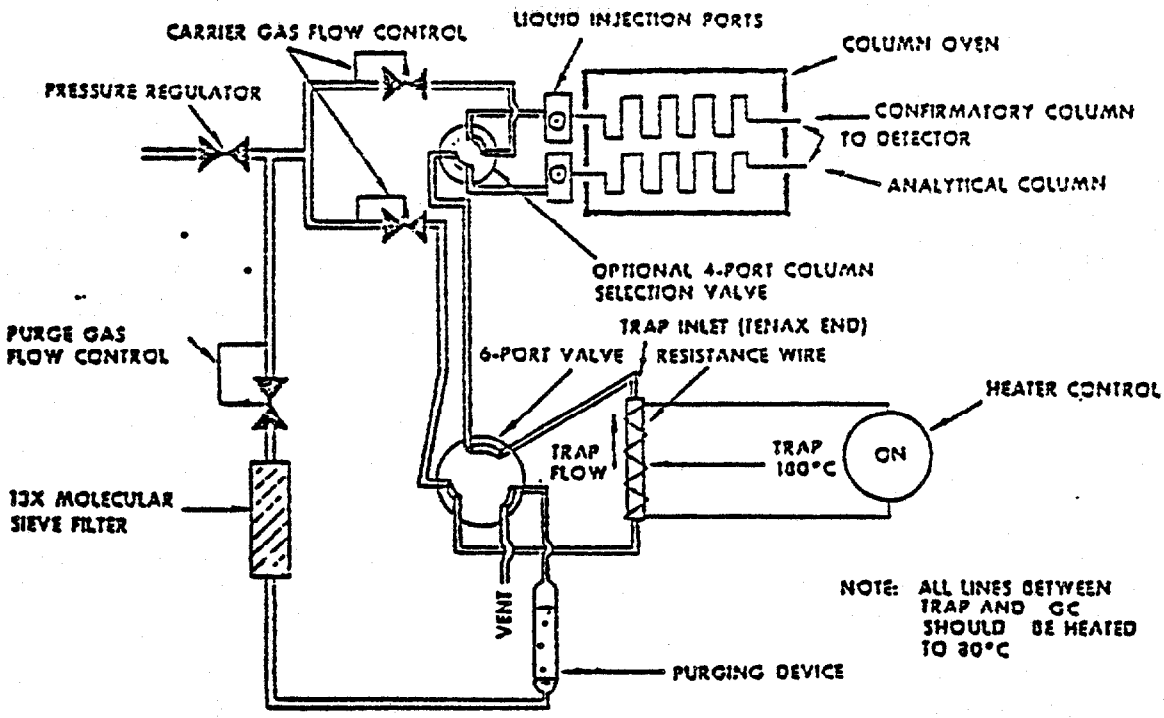

FIGURE 4 PURGE-TRAP SYSTEM (DESORB MODE)

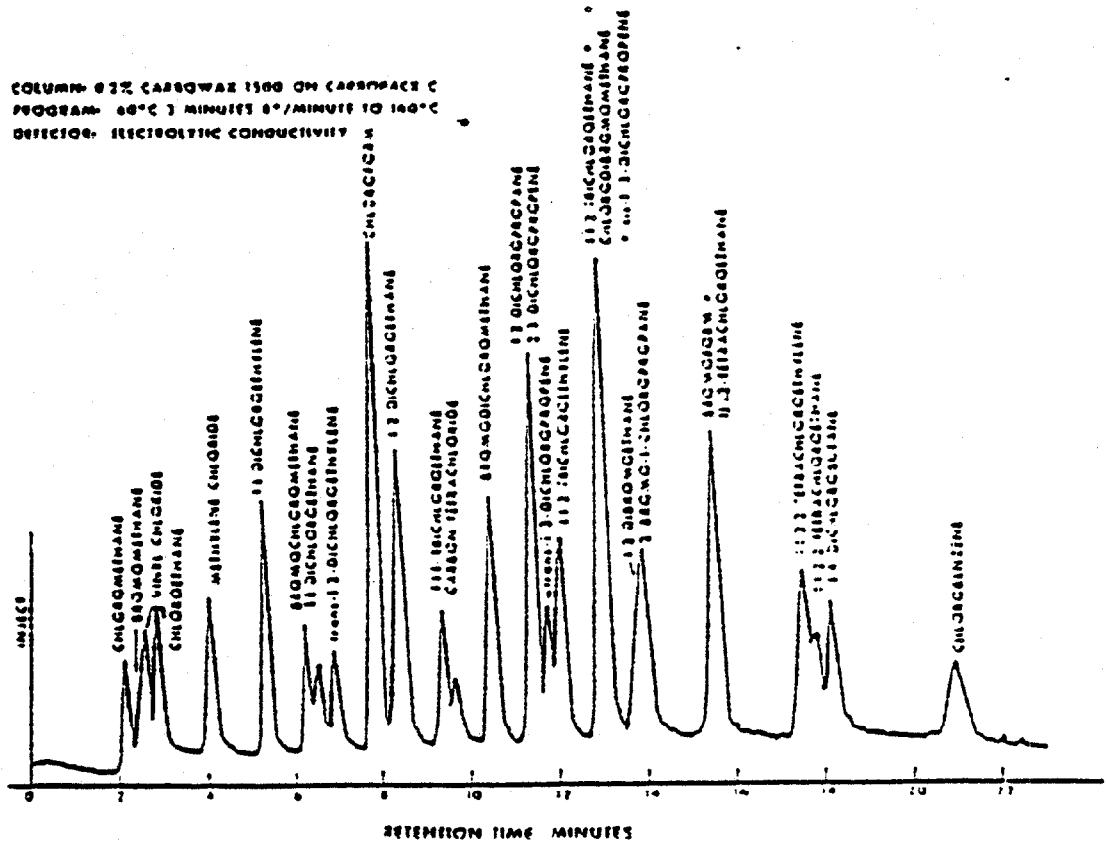

FIGURE 5 CHROMATOGRAM OF ORGANOHALIDES

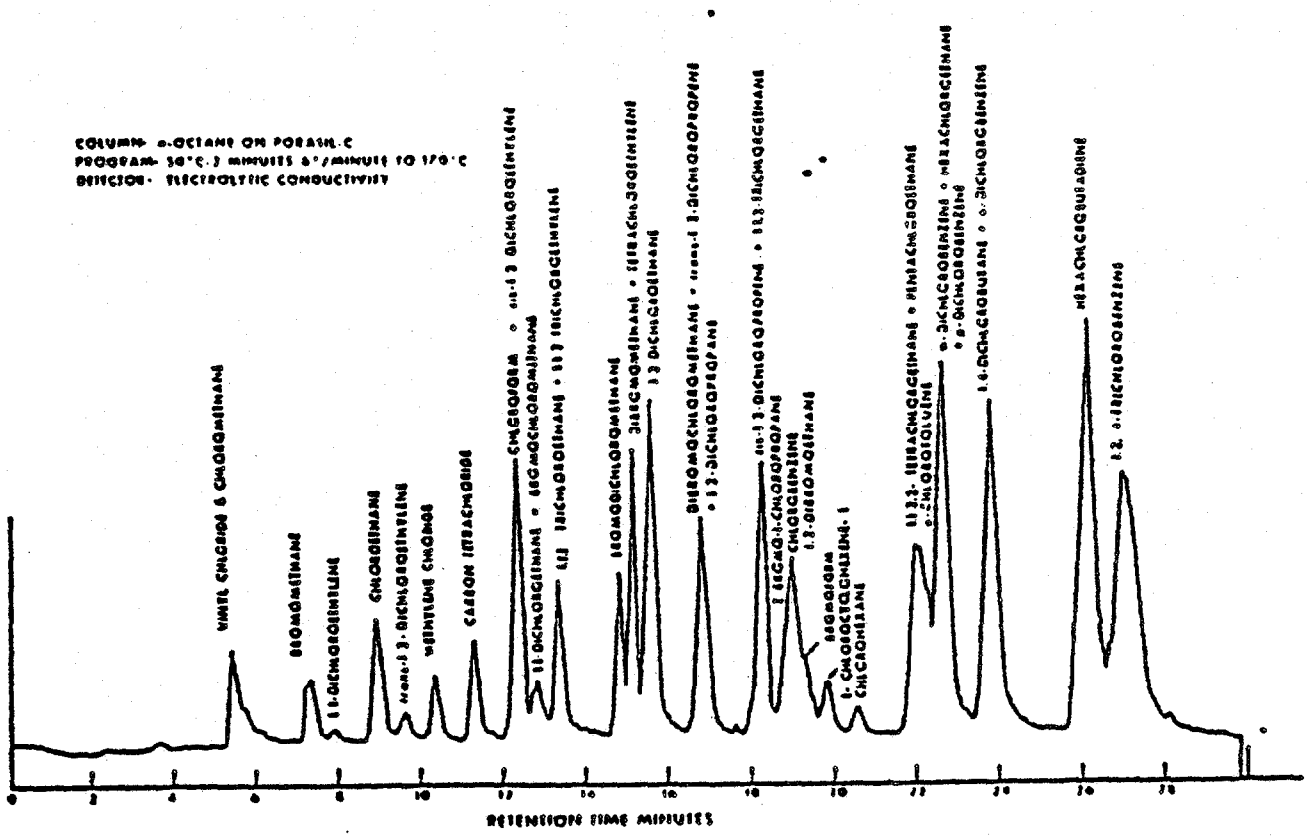

FIGURE 6 CHROMATOGRAM OF ORGANOHALIDES

PART II: ANALYSIS OF TRIHALOMETHANES IN DRINKING WATER BY LIQUID/LIQUID EXTRACTION

1. *Scope.*

1.1 This method (1,2) is applicable only to the determination of four trihalomethanes, i.e., chloroform, bromodichloromethane, chlorodibromomethane, and bromoform in finished drinking water, drinking water during intermediate stages of treatment, and the raw source water.

1.2 For compounds other than the above-mentioned trihalomethanes, or for other sample sources, the analyst must demonstrate the usefulness of the method by collecting precision and accuracy data on actual samples as described in (3) and provide qualitative confirmation of results by Gas Chromatography/Mass Spectrometry (GC/MS) (4).

1.3 Qualitative analyses using GC/MS or the purge and trap method (5) must be performed to characterize each raw source water if peaks appear as interferences in the raw source analysis.

1.4 The method has been shown to be useful for the trihalomethanes over a concentration range from approximately 0.5 to 200 μg/l. Actual detection limits are highly dependent upon the characteristics of the gas chromatographic system used.

2. *Summary*

2.1 Ten milliliters of sample are extracted one time with 2 ml of solvent. Three μl of the extract are then injected into a gas chromatograph equipped with a linearized electron capture detector for separation and analysis.

2.2 The extraction and analysis time is 10 to 50 minutes per sample depending upon the analytical conditions chosen. (See Table 1 and Figures 1, 2, and 3.)

2.3 Confirmatory evidence is obtained using dissimilar columns and temperature programming. When component concentrations are sufficiently high (>50 μg/l), halogen specific detectors may be employed for improved specificity.

2.4 Unequivocal confirmatory analyses at high levels (>50 μg/l) can be performed using GC/MS in place of the electron capture detector. At levels below 50 μg/l, unequivocal confirmation can only be performed by the purge and trap technique using GC/MS (4, 5).

2.5 Standards dosed into organic free water and the samples are extracted and analyzed in an identical manner in order to compensate for possible extraction losses.

2.6 The concentration of each trihalomethane is summed and reported as total trihalomethanes in μg/l.

3. *Interferences*

3.1 Impurities contained in the extracting solvent usually account for the majority of the analytical problems. Solvent blanks should be analyzed before a new bottle of solvent is used to extract samples. Indirect daily checks on the extracting solvent are obtained by monitoring the sample blanks (6.4.10). Whenever an interference is noted in the sample blank, the analyst should reanalyze the extracting solvent. The extraction solvent should be discarded whenever a high level (>10 μg/l) of interfering compounds are traced to it. Low level interferences generally can be removed by distillation or column chromatography (6); however, it is generally more economical to obtain a new source of solvent or select one of the approved alternative solvents listed in Section 5.1. Interference free solvent is defined as a solvent containing less than 0.4

µg/l individual trihalomethane interference. Protect interference-free solvents by storing in a non-laboratory area known to be free of organochlorine solvents. *Subtracting blank values is not recommended.*

3.2 Several instances of accidental sample contamination have been attributed to diffusion of volatile organics through the septum seal on the sample bottle during shipment and storage. The sample blank (6.4.10) is used to monitor for this problem.

3.3 This liquid/liquid extraction technique efficiently extracts a wide boiling range of non-polar organic compounds and, in addition, extracts the polar organic components of the sample with varying efficiencies. In order to perform the trihalomethane analysis as rapidly as possible with sensitivities in the low µg/l range, it is necessary to use the semi-specific electron capture detector and chromatographic columns which have relatively poor resolving power. Because of these concessions, the probability of experiencing chromatographic interferences is high. Trihalomethanes are primarily products of the chlorination process and generally do not appear in the raw source water. The absence of peaks in the raw source water analysis with retention times similar to the trihalomethanes is generally adequate evidence of an interference-free finished drinking water analysis. Because of these possible interferences, in addition to each finished drinking water analysis, a representative raw source water (6.4.5) must be analyzed. When potential interferences are noted in the raw source water analysis, the alternate chromatographic columns must be used to reanalyze the sample set. If interferences are still noted, qualitative identifications should be performed according to Sections 2.3 and 2.4. If the peaks are confirmed to be other than trihalomethanes and add significantly to the total trihalomethane value in the finished drinking water analysis, then the sample set must be analyzed by the purge and trap method (5).

4. *Apparatus*

4.1 Extraction vessel—A 15 ml total volume glass vessel with a Teflon lined screw-cap is required to efficiently extract the samples.

4.1.1 For samples that do not form emulsions 10 ml screw-cap flasks with a Teflon faced septum (total volume is ml) are recommended. Flasks and caps—Pierce—#13310 or equivalent. Septa—Teflon silicone—Pierce #12718 or equivalent.

4.1.2 For samples that form emulsions (turbid source water) 15 ml screw cap centrifuge tubes with a Teflon cap liner are recommended. Centrifuge tube—Corning 8062-15 or equivalent.

4.2 Sampling containers—40 ml screw cap sealed with Teflon faced silicone septa. Vials and caps—Pierce #13075 or equivalent. Septa—Pierce #12722 or equivalent.

4.3 Micro syringes—10, 100 µl.

4.4 Micro syringe—25 µl with a 2-inch by 0.006-inch needle—Hamilton 702N or equivalent.

4.5 Syringes—10 ml glass hypodermic with luerlok tip (2 each).

4.6 Syringe valve—2-way with luer ends (2 each)—Hamilton #86570—1FM1 or equivalent.

4.7 Pipette—2.0 ml transfer.

4.8 Glass stoppered volumetric flasks—10 and 100 ml.

4.9 Gas chromatograph with linearized electron capture detector. (Recommended option—temperature programmable. See Section 4.12.)

4.10 Column A—4 mm ID x 2m long glass packed with 3% SP-1000 on Supelcoport (100/120 mesh) operated at 50°C with 60 ml/min flow. (See Figure 1 for a sample chromatogram and Table 1 for retention data.)

4.11 Column B—2 mm ID x 2m long glass packed with 10% squalane on Chromosorb WAW (80/100 mesh) operated at 67°C with 25 ml/min flow. This column is recommended as the primary analytical column. Trichloroethylene, a common raw source water contaminate, coelutes with bromodichloromethane. (See Figure 2 for a sample chromatogram and Table 1 for retention data.)

4.12 Column C—2 mm ID x 3m long glass packed with 6% OV-11/4% SP-2100 on Supelcoport (100/120 mesh) temperature program 45°C for 12 minutes, then program at 1°/minute to 70°C with a 25 ml/min flow. (See Figure 3 for a sample chromatogram and Table I for retention data.)

4.13 Standard storage containers—15 ml amber screw-cap septum bottles with Teflon faced silicone septa. Bottles and caps—Pierce #19830 or equivalent. Septa—Pierce #12718 or equivalent.

5. *Reagents*

5.1 Extraction solvent—(See 3.1). Recommended—Pentane*. Alternative—hexane, methylcyclohexane or 2,2,4-trimethylpentane.

5.2 Methyl alcohol—ACS Reagent Grade.

5.3 Free and combined chlorine reducing agents—Sodium thiosulfate ACS Reagent Grade—sodium sulfite ACS Reagent Grade.

5.4 Activated carbon—Filtrasorb—200, available from Calgon Corporation, Pittsburgh, PA, or equivalent.

5.5 Standards.*

5.5.1 Bromoform 96%—available from Aldrich Chemical Company.

5.5.2 Bromodichloromethane 97%—available from Aldrich Chemical Company.

5.5.3 Chlorodibromomethane—available from Columbia Chemical, Incorporated, Columbia, S.C.

5.5.4 Chloroform 99%—available from Aldrich Chemical Company.

5.6 Organic-free water—Organic-free water is defined as water free of interference when employed in the procedure described herein.

5.6.1 Organic-free water is generated by passing tap water through a carbon filter bed containing carbon. Change the activated carbon whenever the concentration of any trihalomethane exceeds 0.4 µg/l.

5.6.2 A Millipore Super-Q Water System or its equivalent may be used to generate organic-free deionized water.

5.6.3 Organic-free water may also be prepared by boiling water for 15 minutes. Subsequently, while maintaining the temperature at 90° C, bubble a contaminant free inert gas through the water at 100 ml/minute for one hour. While still hot, transfer the water to a narrow mouth screw cap bottle with a Teflon seal.

5.6.4 Test organic free water each day it is used by analyzing it according to Section 7.

5.7 Standard stock solutions.

5.7.1 Fill a 10.0 ml ground glass stoppered volumetric flask with approximately 9.8 ml of methyl alcohol.

5.7.2 Allow the flask to stand unstoppered about 10 minutes or until all alcohol wetted surfaces dry.

5.7.3 Weigh the unstoppered flask to the nearest 0.1 mg.

5.7.4 Using a 100 µl syringe, immediately add 2 to 3 drops of the reference standard to the flask, then reweigh. *Be sure that the reference standard falls directly into the alcohol without contacting the neck of the flask.*

5.7.5 Dilute to volume, stopper, then mix by inverting the flask several times.

5.7.6 Transfer the standard solution to a dated and labeled 15 ml screw-cap bottle with a Teflon cap liner.

NOTE: Because of the toxicity of trihalomethanes, it is necessary to prepare primary dilutions in a hood. It is further recommended that a NIOSH/MESA-approved toxic gas respirator be used when the analyst handles high concentrations of such materials.

5.7.7 Calculate the concentration in micrograms per microliter from the net gain in weight.

5.7.8 Store the solution at 4° C.

NOTE: All standard solutions prepared in methyl alcohol are stable up to 4 weeks when stored under these conditions. They should be discarded after that time has elapsed.

5.8 Aqueous calibration standard precautions.

5.8.1 In order to prepare accurate aqueous standard solutions, the following precautions must be observed:

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* Pentane has been selected as the best solvent for this analysis because it elutes, on all of the columns, well before any of the trihalomethanes. High altitudes or laboratory temperatures in excess of 75°F may make the use of this solvent impractical. For these reasons, alternative solvents are acceptable; however, the analyst may experience baseline variances in the elution areas of the trihalomethanes due to coelution of these solvents. The degree of difficulty appears to be dependent upon the design and condition of the electron capture detector. Such problems should be insignificant when concentrations of the coeluting trihalomethane are in excess of 5 µg/l.

* As a precautionary measure, all standards must be checked for purity by boiling point determinations or GC/MS assays.

a. Do not inject more than 20 µl of alcoholic standards into 100 ml of organic-free water.

b. Use a 25 µl Hamilton 702N microsyringe or equivalent. (Variations in needle geometry will adversely affect the ability to deliver reproducible volumes of methanolic standards into water.)

c. Rapidly inject the aloholic standard into the expanded area of the filled volumetric flask. Remove the needle as fast as possible after injection.

d. Mix aqueous standards by inverting the flask three times only.

e. Discard the contents contained in the neck of the flask. Fill the sample syringe from the standard solution contained in the expanded area of the flask as directed in Section 7.

f. Never use pipets to dilute or transfer samples and aqueous standards.

g. Aqueous standards, when stored with a headspace, are not stable and should be discarded after one hour. Aqueous standards can be stored according to Sections 6.4.9 and 7.2.

5.9 Calibration standards.

5.9.1 Prepare, from the standard stock solutions, a multicomponent secondary dilution mixture in methyl alcohol so that a 20 µl injection into 100 ml of organic-free water will generate a calibration standard which produces a response close (± 25%) to that of the unknown. (See 8.1.)

5.9.2 Alternative calibration procedure.

5.9.2.1 Construct a calibration curve for each trihalomethane containing a minimum of 3 different concentrations. Two of the concentrations must bracket each unknown.

5.9.3 Extract and analyze the aqueous calibration standards in the same manner as the unknowns.

5.9.4 Other calibration procedures (7) which require the delivery of less than 20 µl of methanolic standards to 10.0 ml volumes of water contained in the sample syringe are acceptable only if the methanolic standard is delivered by the solvent flush technique (8).

5.10 Quality Check Standard Mixture.

5.10.1 Prepare, from the standard stock solutions, a secondary dilution mixture in methyl alcohol that contains 10.0 ng/µl of each compound. (See 5.7.6 and 5.7.8.)

5.10.2 Daily, prepare and analyze a 2.0 µg/l aqueous dilution from this mixture by dosing 20.0 µl into 100 ml of organic-free water (See Section 8.1).

6. *Sample Collection and Handling.*

6.1 The sample containers should have a total volume of at least 25 ml.

6.1.1 Narrow-mouth screw-cap bottles with the TFE fluorocarbon faced silicone septa cap liners are strongly recommended.

6.2 Glassware Preparation.

6.2.1 Wash all sample bottles, TFE seals, and extraction flasks in detergent. Rinse with tap water and finally with distilled water.

6.2.2 Allow the bottles and seals to air dry, then place in an 105° C oven for 1 hour, then allow to cool in an area known to be free of organics.

NOTE: Do not heat the TFE seals for extended periods of time (>1 hour) because the silicone layer slowly degrades at 105° C.

6.2.3 When cool, seal the bottles using the TFE seals that will be used for sealing the samples.

6.3 Sample stabilization—A chemical reducing agent (Section 5.3) is added to all samples in order to arrest the formation of additional trihalomethanes after sample collection (7,9) and to eliminate the possibility of free chlorine reacting with impurities in the extraction solvent to form interfering organohalides. *DO NOT ADD THE REDUCING AGENT TO SAMPLES AT COLLECTION TIME WHEN DATA FOR MAXIMUM TRIHALOMETHANE FORMATION IS DESIRED.* If chemical stabilization is employed, then the reagent is also added to the blanks. The chemical agent (2.5 to 3 mg/40 ml) is added in crystalline form to the empty sample bottle just prior to shipping to the sampling site. If chemical stabilization is not employed at sampling time then the reducing agent is added just before extraction.

6.4 Sample Collection.

6.4.1 Collect all samples in duplicate.

6.4.2 Fill the sample bottles in such a manner that no air bubbles pass through the sample as the bottle is filled.

6.4.3 Seal the bottle so that no air bubbles are entrapped in it.

6.4.4 Maintain the hermetic seal on the sample bottle until analysis.

6.4.5 The raw source water sample history should resemble the finished drinking water. The average retention time of the finished drinking water within the water plant should be taken into account when sampling the raw source water.

6.4.6 Sampling from a water tap.

6.4.6.1 Turn on the water and allow the system to flush until the temperature of the water has stabilized. Adjust the flow to about 500 ml/minute and collect duplicate samples from the flowing stream.

6.4.7 Sampling from an open body of water.

6.4.7.1 Fill a 1-quart wide-mouth bottle with sample from a representative area. Carefully fill duplicate sample bottles from the 1-quart bottle as in 6.4.

6.4.8 If a chemical reducing agent has been added to the sample bottles, fill with sample just to overflowing, seal the bottle, and shake vigorously for 1 minute.

6.4.9 Sealing practice for septum seal screw cap bottles.

6.4.9.1 Open the bottle and fill to overflowing. Place on a level surface. Position the TFE side of the septum seal upon the convex sample meniscus and seal the bottle by screwing the cap on tightly.

6.4.9.2 Invert the sample and lightly tap the cap on a solid surface. The absence of entrapped air indicates a successful seal. If bubbles are present, open the bottle, add a few additional drops of sample, then reseal bottle as above.

6.4.10 Sample blanks.

6.4.10.1 Prepare blanks in duplicate at the laboratory by filling and sealing sample bottles with organic-free water just prior to shipping the sample bottles to the sampling site.

6.4.10.2 If the sample is to be stabilized, add an identical amount of reducing agent to the blanks.

6.4.10.3 Ship the blanks to and from the sampling site along with the sample bottles.

6.4.10.4 Store the blanks and the samples, collected at a given site (sample set), together in a protected area known to be free from contamination. A sample set is defined as all the samples collected at a given site (i.e., at a water treatment plant, duplicate raw source water, duplicate finished water and the duplicate sample blanks comprise the sample set).

6.5 When samples are collected and stored under these conditions, no measurable loss of trihalomethanes has been detected over extended periods of time (7). It is recommended that the samples be analyzed within 14 days of collection.

7. *Extraction and Analysis.*

7.1 Remove the plungers from two 10-ml syringes and attach a closed syringe valve to each.

7.2 Open the sample bottle* (or standard) and carefully pour the sample into one of the syringe barrels until it overflows. Replace the plunger and compress the sample. Open the syringe valve and vent any residue air while adjusting the sample volume to 10.0 ml. Close the valve.

7.3 Fill the second syringe in an identical manner from the same sample bottle. This syringe is reserved for a replicate analysis (see 8.3 and 8.4).

7.4 Pipette 2.0 ml of extraction solvent into a clean extraction flask.

7.5 Carefully inject the contents of the syringe into the extraction flask.

7.6 Seal with a Teflon faced septum.

7.7 Shake vigorously for 1 minute.

7.8 Let stand until the phases separate (≥60 seconds).

7.8.1 If the phases do not separate on standing then centrifugation can be used to facilitate separation.

7.9 Analyze the sample by injecting 3.0 µl (solvent flush technique, (8)) of the upper (organic) phase into the gas chromatograph.

8. *Analytical Quality Control.*

8.1 A 2 µg/l quality check standard (See 5.10) should be extracted and analyzed each day before any samples are analyzed. Instrument status checks and lower limit of detection estimations based upon response factor calculations at 5 times the noise level are obtained from these data. In addition, the data obtained from the quality check standard can be used to estimate the concentration of the unknowns. From this information the appropriate standards can be determined.

8.2 Analyze the sample blank and the raw source water to monitor for potential

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* If for any reason the chemical reducing agent has not been added to the sample, then it must be added just prior to analyses at the rate of 2.5 to 3 mg/40 ml or by adding 1 mg directly to the sample in the extraction flask.

interferences as described in Sections 3.1, 3.2, and 3.3.

8.3 Spiked samples.

8.3.1 For those laboratories analyzing more than 10 samples a day, each 10th sample analyzed should be a laboratory-generated spike which closely duplicates the average finished drinking water in trihalomethane composition and concentration. Prepare the spiked sample in organic-free water as described in section 5.9.

8.3.2 In those laboratories analyzing less than 10 samples daily, each time the analysis is performed, analyze at least one laboratory generated spike sample which closely duplicates the average finished drinking water in trihalomethane composition and concentration. Prepare the spiked sample in organic-free water as described in section 5.9.

8.3.3 Maintain an up-to-date log on the accuracy and precision data collected in Sections 8.3 and 8.4. If results are significantly different than those cited in Section 10.1, the analyst should check out the entire analysis scheme to determine why the laboratory's precision and accuracy limits are greater.

8.4 Randomly select and analyze 10% of all samples in duplicate.

8.5 Analyze all samples in duplicate which appear to deviate more than 30% from any established norm.

8.6 Quarterly, spike an EMSL-Cincinnati trihalomethane quality control sample into organic-free water and analyze.

8.6.1 The results of the EMSL trihalomethane quality control sample should agree within 20% of the true value for each trihalomethane. If they do not, the analyst must check each step in the standard generation procedure to solve the problem.

8.7 It is important that the analyst be aware of the linear response characteristics of the electron capture system that is utilized. Calibration curves should be generated and rechecked quarterly for each trihalomethane over the concentration range encountered in the samples in order to confirm the linear response range of the system. Quantitative data cannot be calculated from non-linear responses. Whenever non-linear responses are noted, the analyst must dilute the sample for reanalysis.

8.8 Maintain a record of the retention times for each trihalomethane using data gathered from spiked samples and standards.

8.8.1 Daily calculate the average retention time for each trihalomethane and the variance encountered for the analyses.

8.8.2 If individual trihalomethane retention time varies by more than 10% over an eight hour period or does not fall within 10% of an established norm, the system is "out of control." The source of retention data variation must be corrected before acceptable data can be generated.

9. *Calculations.*

9.1 Locate each trihalomethane in the sample chromatogram by comparing the retention time of the suspect peak to the data gathered in 8.8.1. The retention time of the suspect peak must fall within the limits established in 8.8.1 for a single column identification.

9.2 Calculate the concentration of each trihalomethane by comparing the peak heights or peak areas of the samples to those of the standards. Round off the data to the nearest μg/l or two significant Figures.

Concentration, μg/l = sample peak height/standard peak height × standard concentration, μg/l.

9.3 Calculate the total trihalomethane concentration (TTHM) by summing the 4 individual trihalomethane concentrations in μg/l: TTHM (μg/l) = (conc. $CHCl_3$)+(conc. $CHBrCl_2$)+(conc. $CHBr_2Cl$)+(conc. $CHBr_3$)

9.4 Calculate the limit of detection (LOD) for each trihalomethane not detected using the following criteria:

$$\text{LOD } (\mu g/l) = \frac{(A \times ATT)}{(B \times ATT) \times (2\ \mu g/l)}$$

Where:

B = peak height (mm) of 2 μg/l quality check standard

A = 5 times the noise level in mm at the exact retention time of the trihalomethane or the base line displacement in mm from theoretical zero at the exact retention time for the trihalomethane.

ATT = attenuation factor.

9.5 Report the results obtained from the lower limit of detection estimates along with the data for the samples.

10. *Precision and Accuracy*

10.1 Single lab precision and accuracy. The data in Table II were generated by spiking organic-free water with trihalomethanes as described in 5.9. The mixtures were analyzed by the analyst as true unknowns.

TABLE 1—*Retention Times for Trihalomethanes*

Trihalomethane	Retention time minutes		
	Column A	Column B	Column C
Chloroform	1.0	1.3	4.9
Bromodichloromethane	1.5	[a]2.5	11.0
Chlorodibromomethane (Dibromochloromethane)	2.6	5.6	23.1
bromoform	5.5	10.9	39.4

[a] On this column, methylene, a common raw source water contaminate, coelutes with bromodichloromethane

Table II—*Single Laboratory Accuracy and Precision*

	Dose level μg/l	Number of samples	Mean μg/l	Precision relative standard deviation, percent	Accuracy percent recovery
Compound:					
$CHCl_3$	9.1	5	10	11	140
$CHCl_3$	69	3	73	5.3	106
$CHBrCl_2$	1.2	5	1.3	9.8	108
$CHBrCl_2$	12	2	15	1.4	125
$CHBr_2Cl$	2.7	5	2.0	17	74
$CHBr_2Cl$	17	3	16	9.9	94
$CHBr_3$	2.9	5	2.2	10	76
$CHBr_3$	14	3	16	12	114

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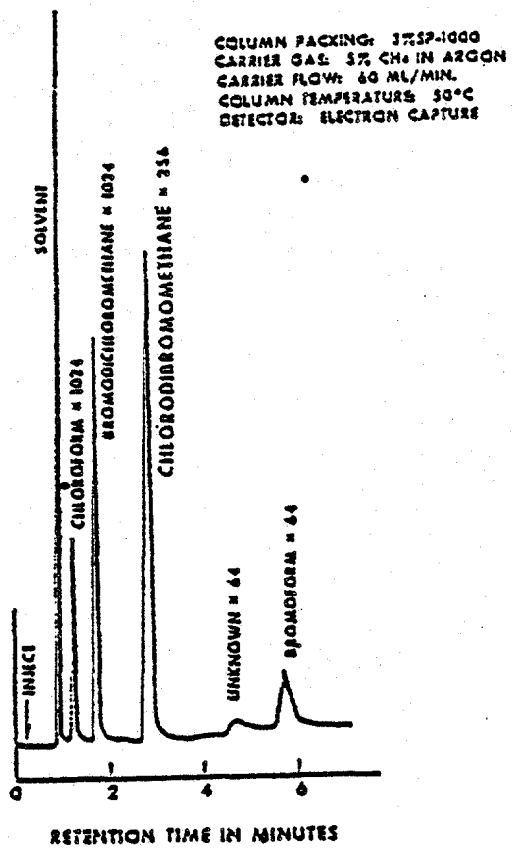

FIGURE 1. FINISHED WATER EXTRACT

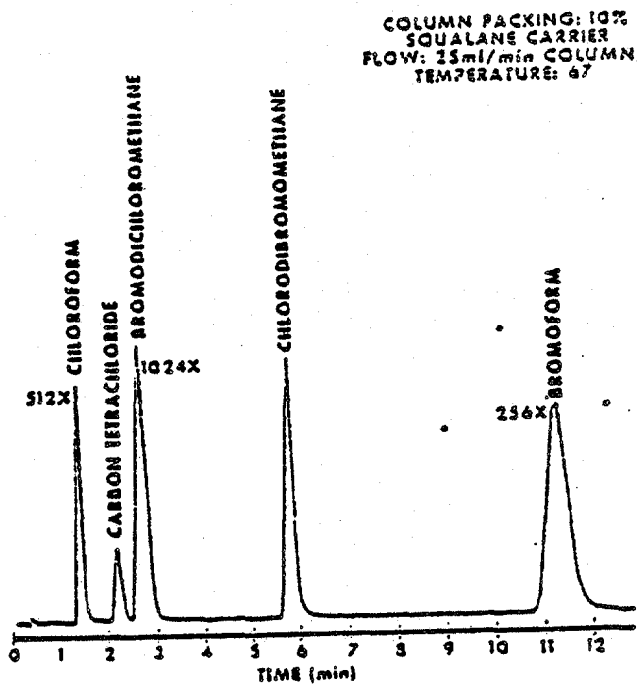

FIGURE 2. EXTRACT OF STANDARD

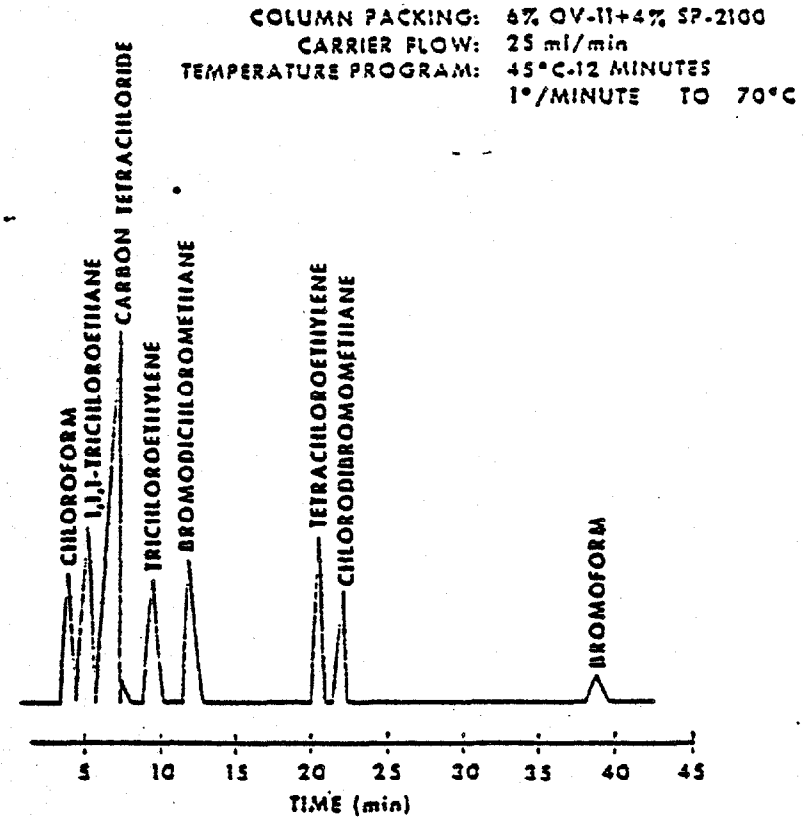

FIGURE 3. EXTRACT OF STANDARD

PART III—DETERMINATION OF MAXIMUM TOTAL TRIHALOMETHANE POTENTIAL (MTP)

The water sample used for this determination is taken from a point in the distribution system that reflects maximum residence time. Procedures for sample collection and handling are given in EMSL Methods 501.1 and 501.2. No reducing agent is added to "quench" the chemical reaction producing THMs at the time of sample collection. The intent is to permit the level of THM precursors to be depleted and the concentration of the THMs to be maximized for the supply being tested.

Four experimental parameters affecting maximum THM production are pH, temperature, reaction time and the presence of a disinfectant residual. These parameters are dealt with as follows:

Measure the disinfectant residual at the selected sampling point. Proceed only if a measurable disinfectant residual is present. Collect triplicate 40 ml water samples at the pH prevailing at the time of sampling, and prepare a method blank according to the EMSL methods. Seal and store these samples together for 7 days at 25°C or above. After this time period, open one of the sample containers and check for disinfectant residual. Absence of a disinfectant residual invalidates the sample for further analyses. Once a disinfectant residual has been demonstrated, open another of the sealed samples and determine total THM concentration using either of the EMSL analytical methods.

Subpart D—Reporting, Public Notification and Record Keeping

§ 141.31 Reporting requirements.

(a) Except where a shorter period is specified in this part, the supplier of water shall report to the State the results of any test measurement or analysis required by this part within (A) the first ten days following the month in which the result is received or (B) the first ten days following the end of the required monitoring period as stipulated by the State, whichever of these is shortest.

(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.

[*Editor's note:* EPA August 27, 1980, amended 141.31(c), however, the text of the amendment was not published (45 FR 57345).]

(d) The water supply system, within ten days of completion of each public notification required pursuant to § 141.32, shall submit to the State a representative copy of each type of notice distributed, published, posted, and/or made available to the persons served by the system and/or to the media.

(e) The water supply system shall submit to the State within the time stated in the request copies of any records required to be maintained under § 141.33 hereof or copies of any documents then in existence which the State or the Administrator is entitled to inspect pursuant to the authority of § 1445 of the Safe Drinking Water Act or the equivalent provisions of State law.

§ 141.32 Public notification.

(a) If a community water system or non-transient non-community water system fails to comply with an applicable maximum contaminant level established in Subpart B or G, 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 monitor-

ing pursuant to section 1445(a) of the Act, the supplier of water shall notify persons served by the water 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.

[141.32(a) amended by 51 FR 11410, April 2, 1986; 52 FR 25712, July 8, 1987]

(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.

(3) Except that the requirements of this paragraph (b) may be waived by the State if it determines that the violation has been corrected promptly after discovery, the cause of the violation has been eliminated, and there is no longer a risk to public health.

(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 MCL 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 MCL, fails to comply with the requirements of any schedule prescribed pursuant to a variance or exemption, or fails to perform any monitoring requirement pursuant to section 1445(a) of the Act, the supplier of water shall give notices by continuous posting of such failure or granting of a variance or exemption to the persons served by the system as long as the failure or granting of a variance or exemption continues. The form and manner for such notices shall be prescribed by the State and shall ensure that the public using the system is adequately informed of the failure or granting of the variance or exemption.

(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.

§ 141.35 Reporting and public notification for certain unregulated contaminants.

[141.35 added by 52 FR 25712, July 8, 1987]

(a) The requirements of this section only apply to the contaminants listed in § 141.40.

(b) The owner or operator of a community water system or non-transient, non-community water system who is required to monitor under § 141.40 shall send a copy of the results of such monitoring within 30 days of receipt and any public notice under paragraph (d) of this section to the State.

(c) The State, or the community water system or non-transient, non-community water system if the State has not adopted regulations equivalent to § 141.40, shall furnish the following information to the Administrator for each sample analyzed under § 141.40:

(1) Results of all analytical methods, including negatives:

(2) Name and address of the system that supplied the sample:

(3) Contaminant(s):

(4) Analytical method(s) used:

(5) Date of sample:

(6) Date of analysis.

(d) The owner or operator shall notify persons served by the system of the availability of the results of sampling conducted under § 141.40 by including a notice in the first set of water bills issued by the system after the receipt of the results or written notice within three months. The notice shall identify a person and supply the telephone number to contact for information on the monitoring results.

Subpart E — Special Regulations, Including Monitoring Regulations and Prohibition on Lead Use.

[Subpart E title amended by 52 FR 20674, June 2, 1987]

§ 141.40 Special monitoring for organic chemicals.

[141.40 revised by 52 FR 25712, July 8, 1987]

(a) All community and non-transient, non-community water systems shall monitor for the contaminants listed in paragraph (e) in this section by date specified in Table 1:

TABLE 1.—MONITORING COMPLETION DATE BY SYSTEM SIZE

Number of persons served	Monitoring to begin no later than—
Over 10,000	Jan. 1, 1988
3,300 to 10,000	Jan. 1, 1989.
Less than 3,300	Jan. 1, 1991.

(b) Surface water systems shall sample in the distribution system representative of each water source or at entry points to the distribution system. The minimum number of samples is one year of quarterly samples per water source.

(c) Ground water systems shall sample at points of entry to the distribution system representative of each well. The minimum number of samples is one sample per entry point to the distribution system.

(d) The State may require confirmation samples for positive or negative results.

(e) Community water systems and non-transient, non-community water systems shall monitor for the following contaminants except as provided in paragraph (f) of this section:

(1) Chloroform
(2) Bromodichloromethane
(3) Chlorodibromomethane
(4) Bromoform
(5) trans-1,2-Dichloroethylene
(6) Chlorobenzene
(7) m-Dichlorobenzene
(8) Dichloromethane
(9) cis-1,2-Dichloroethylene
(10) o-Dichlorobenzene
(11) Dibromomethane
(12) 1,1-Dichloropropene
(13) Tetrachloroethylene
(14) Toluene
(15) p-Xylene
(16) o-Xylene
(17) m-Xylene
(18) 1,1-Dichloroethane
(19) 1,2-Dichloropropane
(20) 1,1,2,2-Tetrachloroethane
(21) Ethylbenzene
(22) 1,3-Dichloropropane
(23) Styrene
(24) Chloromethane
(25) Bromomethane
(26) 1,2,3-Trichloropropane
(27) 1,1,1,2-Tetrachloroethane
(28) Chloroethane
(29) 1,1,2-Trichloroethane
(30) 2,2-Dichloropropane
(31) o-Chlorotoluene
(32) p-Chlorotoluene
(33) Bromobenzene
(34) 1,3-Dichloropropene
(35) Ethylene dibromide (EDB)
(36) 1,2-Dibromo-3-chloropropane (DBCP)

(f) Community water systems and non-transient non-community water systems must monitor for EDB and DBCP only if the State determines they are vulnerable to contamination by either or both of these substances. For the purpose of this paragraph, a vulnerable system is defined as a system which is potentially contaminated by EDB and DBCP, including surface water systems where these two compounds are applied, manufactured, stored, disposed of, or shipped upstream, and for ground-water systems in areas where the compounds are applied, manufactured, stored, disposed of, or shipped in the ground-water recharge basin, or for ground-water systems that are in proximity to underground storage tanks that contain leaded gasoline.

(g) Analysis under this section shall be conducted using the recommended EPA methods as follows, or their equivalent as determined by EPA: 502.1, "Volatile Halogenated Organic Compounds in Water by Purge and Trap Gas Chromatography," 503.1, "Volatile Aromatic and Unsaturated Organic Compounds in Water by Purge and Trap Gas Chromatography," 524.1, "Volatile Organic Compounds in Water by Purge and Trap Gas Chromatography/Mass Spectrometry," 524.2, "Volatile Organic Compounds in Water by Purge and Trap Capillary Column Gas Chromatography/Mass Spectrometry, or 502.2, "Volatile Organic Compounds in Water by Purge and Trap Gas Chromatography with Photoionization and Electrolytic Conductivity Detectors in Series." These methods are contained in "Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water," September 1986, available from Environmental Monitoring and Support Laboratory (EMSL), EPA, Cincinnati, Ohio 45268. Analysis of 1,2-dibromo-3-chloropropane (DBCP) and 1,2-dibromoethane (EDB) shall be conducted by Method 504, "Measurement of 1,2-Dibromoethane (EDB) and 1,2-Dibromo-3-chloropropane (DBCP) in Drinking Water by Microextraction and Gas Chromatography," September 1986, available from EMSL, Cincinnati, Ohio 45268 or the State.

(h) Analysis under this section shall only be conducted by laboratories approved under § 141.24(g)(11). In addition to the requirements of § 141.24(g)(11), each laboratory analyzing for EDB and DBCP must achieve a method detection limit for EDB and DBCP of 0.00002 mg/l, according to the procedures in Appendix B of Part 136.

(i) Public water systems may use monitoring data collected any time after January 1, 1983 to meet the requirements

for unregulated monitoring, provided that the monitoring program was consistent with the requirements of this section.

(j) Monitoring for the following compounds is required at the discretion of the State:

(1) 1,2,4-Trimethylbenzene
(2) 1,2,4-Trichlorobenzene
(3) 1,2,3-Trichlorobenzene
(4) n-Propylbenzene
(5) n-Butylbenzene
(6) Naphthalene
(7) Hexachlorobutadiene
(8) 1,3,5-Trimethylbenzene
(9) p-Isopropyltoluene
(10) Isopropylbenzene
(11) Tert-butylbenzene
(12) Sec-butylbenzene
(13) Fluorotrichloromethane
(14) Dichlorodifluoromethane
(15) Bromochloromethane

(k) Instead of performing the monitoring required by this section, a community water system or non-transient, non-community water system serving fewer than 150 service connections may send a letter stating that its system is available for sampling.

(l) All community and non-transient, non-community water systems shall repeat the monitoring required in § 141.40 no less frequently than every five years from the dates specified in § 141.40(a).

§ 141.41 Special monitoring for sodium.

(a) Suppliers of water for community public water systems shall collect and analyze one sample per plant at the entry point of the distribution system for the determination of sodium concentration levels; samples must be collected and analyzed annually for systems utilizing surface water sources in whole or in part, and at least every three years for systems utilizing solely ground water sources. The minimum number of samples required to be taken by the system shall be based on the number of treatment plants used by the system, except that multiple wells drawing raw water from a single aquifer may, with the State approval, be considered one treatment plant for determining the minimum number of samples. The supplier of water may be required by the State to collect and analyze water samples for sodium more frequently in locations where the sodium content is variable.

(b) The supplier of water shall report to EPA and/or the State the results of the analyses for sodium within the first 10 days of the month following the month in which the sample results were received or within the first 10 days following the end of the required monitoring period as stipulated by the State, whichever of these is first. If more than annual sampling is required the supplier shall report the average sodium concentration within 10 days of the month following the month in which the analytical results of the last sample used for the annual average was received. The supplier of water shall not be required to report the results to EPA where the State has adopted this regulation and results are reported to the State. The supplier shall report the results to EPA where the State has not adopted this regulation.

(c) The supplier of water shall notify appropriate local and State public health officials of the sodium levels by written notice by direct mail within three months. A copy of each notice required to be provided by this paragraph shall be sent to EPA and/or the State within 10 days of its issuance. The supplier of water is not required to notify appropriate local and State public health officials of the sodium levels where the State provides such notices in lieu of the supplier.

(d) Analyses for sodium shall be performed by the flame photometric method in accordance with the procedures described in "Standard Methods for the Examination of Water and Wastewater," 14th Edition, pp. 250-253; or by Method 273.1, Atomic Absorption—Direct Aspiration or Method 273.2, Atomic Absorption—Graphite Furnace, in "Methods for Chemical Analysis of Water and Waste," EMSL, Cincinnati, EPA, 1979; or by Method D 1428-64(a) in Annual Book of ASTM Standards, Part 31, Water.

§ 141.42 Special monitoring for corrosivity characteristics.

(a) Suppliers of water for community public water systems shall collect samples from a representative entry point to the water distribution system for the purpose of analysis to determine the corrosivity characteristics of the water.

(1) The supplier shall collect two samples per plant for analysis for each plant using surface water sources wholly or in part or more if required by the State; one during mid-winter and one during mid-summer. The supplier of the water shall collect one sample per plant for analysis for each plant using grou.d water sources or more if required by the State. The minimum number of samples required to be taken by the system shall be based on the number of treatment plants used by the system, except that multiple wells drawing raw water from a single aquifer may, with the State approval, be considered one treatment plant for determining the minimum number of samples.

(2) Determination of the corrosivity characteristics of the water shall include measurement of pH, calcium hardness, alkalinity, temperature, total dissolved solids (total filterable residue), and calculation of the Langelier Index in accordance with paragraph (c) of this section. The determination of corrosivity characteristics shall only include one round of sampling (two samples per plant for surface water and one sample per plant for ground water sources) However, States may require more frequent monitoring as appropriate. In addition, States have the discretion to require monitoring for additional parameters which may indicate corrosivity characteristics, such as sulfates and chlorides. In certain cases, the Aggressive Index, as described in paragraph (c), can be used instead of the Langelier Index; the supplier shall request in writing to the State and the State will make this determination.

(b) The supplier of water shall report to EPA and/or the State the results of the analyses for the corrosivity characteristics within the first 10 days of the month following the month in which the sample results were received. If more frequent sampling is required by the State, the supplier can accumulate the data and shall report each value within 10 days of the month following the month in which the analytical results of the last sample was received. The supplier of water shall not be required to report the results to EPA where the State has adopted this regulation and results are reported to the State.

(c) Analyses conducted to determine the corrosivity of the water shall be made in accordance to the following methods:

(1) Langelier Index—"Standard Methods for the Examination of Water and Wastewater," 14th Edition, Method 203, pp. 61-63.

(2) Aggressive Index—"AWWA Standard for Asbestos-Cement Pipe, 4 in. through 24 in. for Water and Other Liquids," AWWA C400-77, Revision of C400-75, AWWA, Denver, Colorado.

(3) Total Filtrable Residue—"Standard Methods for the Examination of Water and Wastewater," 14th Edition, Method 208B, pp. 92-93; or "Methods for Chemical Analysis of Water and Wastes," Method 160.1.

(4) Temperature—"Standard Methods for the Examination of Water and Wastewater," 14th Edition, Method 212, pp. 125-126.

(5) Calcium—EDTA titrimetric method "Standard Methods for the Examination of Water and Wastewater," 14th Edition, Method 306C, pp. 189-191; or "Annual Book of ASTM Standards," Method D-1126-67B; "Methods for Chemical Analysis of Water and Wastes," Method 215.2.

(6) Alkalinity—Methyl Orange end point pH 4.5. "Standard Methods for the Examination of Water and Wastewater," 14th Edition, Method 403, pp. 278-281; or "Annual Book of ASTM Standards," Method D1067-70B; or "Methods for Chemical Analysis of Water and Wastes," Method 310.1.

(7) pH—"Standard Methods for the Examination of Water and Wastewater," 14th Edition, Method 424, pp. 460-465; or "Methods for Chemical Analysis of Water and Wastes," Method 150.1; or "Annual Book of ASTM Standards," Method D-1293-78A or B.

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

(9) Sulfate—Turbidimetric Method, "Methods for Chemical Analysis of Water and Wastes," pp. 277-278, EPA, Office of Technology Transfer, Washington, DC. 20460, 1974, or "Standard Methods for the Examination of Water and Wastewater," 14th Edition, pp. 496-498.

(d) Community water supply systems shall identify whether the following construction materials are present in their distribution system and report to the State:

Lead from piping, solder, caulking, interior lining of distribution mains, alloys and home plumbing.
Copper from piping and alloys, service lines, and home plumbing.
Galvanized piping, service lines, and home plumbing.
Ferrous piping materials such as cast iron and steel.
Asbestos cement pipe.

In addition, States may require identification and reporting of other materials of construction present in distribution systems that may contribute contaminants to the drinking water, such as:

Vinyl lined asbestos cement pipe.
Coal tar lined pipes and tanks.

§ 141.43 Prohibition on use of lead pipes, solder, and flux.

[141.43 added by 52 FR 20674, June 2, 1987]

(a) *In general* — (1) *Prohibition.* Any pipe, solder, or flux, which is used after June 19, 1986, in the installation or repair of—

(i) Any public water system, or

(ii) Any plumbing in a residential or nonresidential facility providing water for human consumption which is connected to a public water system shall be lead free as defined by paragraph (d) of this section. This paragraph (a)(1) shall not apply to leaded joints necessary for the repair of cast iron pipes.

(2) Each public water system shall identify and provide notice to persons that may be affected by lead contamination of their drinking water where such contamination results from either or both of the following:

(i) The lead content in the construction materials of the public water distribution system,

(ii) Corrosivity of the water supply sufficient to cause leaching of lead.

Notice shall be provided notwithstanding the absence of a violation of any national drinking water standard. The manner and form of notice are specified in §141.34 of this part.

(b) *State enforcement* — (1) *Enforcement of prohibition.* The requirements of paragraph (a)(1) of this section shall be enforced in all States effective June 19, 1988. States shall enforce such requirements through State or local plumbing codes, or such other means of enforcement as the State may determine to be appropriate.

(2) *Enforcement of public notice requirements.* The requirements of paragraph (a)(2) of this section, shall apply in all States effective June 19, 1988.

(c) *Penalties.* If the Administrator determines that a State is not enforcing the requirements of paragraph (a) of this section, as required pursuant to paragraph (b) of this section, the Administrator may withhold up to 5 percent of Federal funds available to that State for State program grants under section 1443(a) of the Act.

(d) *Definition of lead free.* For purposes of this section, the term "lead free"

(1) When used with respect to solders and flux refers to solders and flux containing not more than 0.2 percent lead, and

(2) When used with respect to pipes and pipe fittings refers to pipes and pipe fittings containing not more than 8.0 percent lead.

4. In addition to the amendments set forth above, in 40 CFR Part 141 remove the words "recommended maximum contaminant level(s)" and add, in their place, the words "maximum contaminant level goal(s)", and remove the term "RMCL" and add, in its place, the term "MCLG".

Subpart F—Recommended Maximum Contaminant Levels

§ 141.50 Recommended maximum contaminant levels for organic contaminants.

(a) RMCLs are zero for the following contaminants:

(1) Benzene
(2) Vinyl chloride
(3) Carbon tetrachloride
(4) 1,2-dichloroethane
(5) Trichloroethylene

(b) MCLGs for the following contaminants are as indicated:

Contaminant	MCLG in mg/l
(1) 1,1-Dichloroethylene	0.007
(2) 1,1,1-Trichloroethane	0.20
(3) para-Dichlorobenzene	0.075

[141.50(b) amended by 52 FR 25712, July 8, 1987]

§ 141.51 Recommended Maximum contaminant levels for inorganic contaminants.

(a) [Reserved]

(b) RMCLs for the following contaminants are as indicated:

Contaminant	RMCL in mg/L
(1) Fluoride	4.0
(2) [Reserved]	

Subpart G—National Revised Primary Drinking Water Regulations: Maximum Contaminant Levels

§ 141.60 Effective dates.

[141.60 revised by 52 FR 25712, July 8, 1987]

(a) The effective date for § 141.61 is January 9, 1989.

(b) The effective date for § 141.62(b)(2) is October 2, 1987.

§ 141.61 Maximum contaminant levels for organic contaminants.

[141.61 added by 52 FR 25712, July 8, 1987]

(a) The following maximum contaminant levels for organic contaminants apply to community water systems and non-transient non-community water systems.

CAS No.	Contaminant	Maximum contaminant level in mg/l
71-43-2	Benzene	0.005
75-01-4	Vinyl chloride	0.002
56-23-5	Carbon tetrachloride	0.005
107-06-2	1,2-Dichloroethane	0.005
79-01-6	Trichloroethylene	0.005
75-35-4	1,1-Dichloroethylene	0.007
71-55-6	1,1,1-Trichloroethane	0.20
106-46-7	para-Dichlorobenzene	0.075

(b) The Administrator, pursuant to section 1412 of the Act, hereby identifies the following as the best technology, treatment techniques, or other means generally available for achieving compliance with the maximum contaminant level for synthetic organic chemicals (§ 141.61(a)): Central treatment using packed tower aeration; central treatment using granular activated carbon for all these chemicals except vinyl chloride.

§ 141.62 Maximum Contaminant Levels for Inorganic Contaminants.

(a) [Reserved]

(b) The following Maximum Contaminant Levels for inorganic contaminants apply to community water systems.

Contaminant	Maximum contaminant level in mg/l
(1) Fluoride	4.0
(2) [Reserved]	

Subparts H — I [Reserved]

Subpart J — Use of Non-Centralized Treatment Devices

[Subpart J added by 52 FR 25712, July 8, 1987]

§ 141.100 Criteria and procedures for public water systems using point-of-entry devices.

(a) Public water systems may use point-of-entry devices to comply with maximum contaminant levels only if they meet the requirements of this section.

(b) It is the responsibility of the public water system to operate and maintain the point-of-entry treatment system.

(c) The public water system must develop and obtain State approval for a monitoring plan before point-of-entry devices are installed for compliance. Under the plan approved by the State, point-of-entry devices must provide health protection equivalent to central water treatment. "Equivalent" means that the water would meet all Primary and Secondary Drinking Water Standards and would be of acceptable quality similar to water distributed by a well-operated central treatment plant. In addition to the VOCs, monitoring must include physical measurements and observations such as total flow treated and mechanical condition of the treatment equipment.

(d) Effective technology must be properly applied under a plan approved by the State and the microbiological safety of the water must be maintained.

(1) The State must require adequate certification of performance, field testing, and, if not included in the certification process, a rigorous engineering design review of the point-of-entry devices.

(2) The design and application of the point-of-entry devices must consider the tendency for increase in heterotrophic bacteria concentrations in water treated with activated carbon. It may be necessary to use frequent backwashing, post-contractor disinfection, and Heterotrophic Plate Count monitoring to ensure that the microbiological safety of the water is not compromised.

(e) All consumers shall be protected. Every building connected to the system must have a point-of-entry device installed, maintained, and adequately monitored. The State must be assured that every building is subject to treatment and monitoring, and that the rights and responsibilities of the public water system customer convey with title upon sale of property.

§ 141.101 Use of other non-centralized treatment devices.

Public water systems shall not use bottled water or point-of-use devices to achieve compliance with an MCL. Bottled water or point-of-use devices may be used on a temporary basis to avoid an unreasonable risk to health.

National Primary Drinking Water

Implementation Regulations

ENVIRONMENTAL PROTECTION AGENCY
NATIONAL PRIMARY DRINKING WATER IMPLEMENTATION REGULATIONS

(40 CFR 142; 41 FR 2916, January 20, 1976; Amended as shown in Code of Federal Regulations, Volume 40, Revised as of July 1, 1982; Amended by 48 FR 8413, February 28, 1983; 51 FR 11410, April 2, 1986; 52 FR 20674, June 2, 1987; 52 FR 25712, July 8, 1987)

Title 40—Protection of Environment

CHAPTER I—ENVIRONMENTAL PROTECTION AGENCY

PART 142—NATIONAL PRIMARY DRINKING WATER REGULATIONS IMPLEMENTATION

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142.62 Variances from the maximum contaminant levels for synthetic organic chemicals.

Authority: 42 U.S.C. 300g-2, 300g-3, 300g-4, 300g-5, 300j-4, and 300j-9.

[Revised by 51 FR 11410, April 2, 1986; 52 FR 20674, June 2, 1987; 52 FR 25712, July 8, 1987]

Subpart A—General Provisions

§ 142.1 Applicability.

This part sets forth, pursuant to sections 1413 through 1416, 1445, and 1450 of the Public Health Service Act, as amended by the Safe Drinking Water Act, Pub. L. 93-523, regulations for the implementation and enforcement of the national primary drinking water regulations contained in Part 141 of this chapter.

§ 142.2 Definitions.

As used in this part, and except as otherwise specifically provided:

(a) "Act" means the Public Health Service Act.

(b) "Administrator" means the Administrator of the United States Environmental Protection Agency or his authorized representative.

(c) "Agency" means the United States Environmental Protection Agency.

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

(e) "Federal agency" means any department, agency, or instrumentality of the United States.

(f) "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 for those resulting from corrosion of piping and plumbing caused by water quality are excluded from this definition.

(g) "Municipality" means a city, town or other public body created by or pursuant to State law, or an Indian tribal organization authorized by law.

(h) "National primary drinking water regulation" means any primary drinking water regulation contained in Part 141 of this chapter.

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

(j) "Primary enforcement responsibility" means the primary responsibility for administration and enforcement of primary drinking water regulations and related requirements applicable to public water systems within a State.

(k) "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.

(l) "Sanitary survey" means an onsite 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.

(m) "State" means one of the States of the United States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, or the Trust Territory of the Pacific Islands.

(n) "State primary drinking water regulation" means a drinking water regulation of a State which is comparable to a national primary drinking water regulation.

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

(p) "Treatment technique requirement" means a requirement of the national primary drinking water regulations which specifies for a contaminant a specific treatment technique(s) known to the Administrator which leads to a reduction in the level of such contaminant sufficient to comply with the requirements of Part 141 of this chapter.

§ 142.3 Scope.

(a) Except where otherwise provided, this part applies to each public water system in each State; except that this part shall not apply to a public water system which meets all of the following conditions:

(1) Which consists only of distribution and storage facilities (and does not have any collection and treatment facilities);

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

(3) Which does not sell water to any person; and

(4) Which is not a carrier which conveys passengers in interstate commerce.

(b) In order to qualify for primary enforcement responsibility, a State's program for enforcement of primary drinking water regulations must apply to all other public water systems in the State, except for:

(1) Public water systems on carriers which convey passengers in interstate commerce;

(2) Public water systems on Indian land with respect to which the State does not have the necessary jurisdiction or its jurisdiction is in question; or

(3) Public water systems owned or maintained by a Federal agency where the Administrator has waived compliance with national primary drinking water regulations pursuant to section 1447(b) of the Act.

§ 142.4 State and local authority.

Nothing in this part shall diminish any authority of a State or political subdivision to adopt or enforce any law or regulation respecting drinking water regulations or public water systems, but no such law or regulation shall relieve any person of any requirements otherwise applicable under this part.

Subpart B—Primary Enforcement Responsibility

§ 142.10 Requirements for a determination of primary enforcement responsibility.

A State has primary enforcement responsibility for public water systems in the State during any period for which the Administrator determines, based upon a submission made pursuant to § 142.11, that such State, pursuant to appropriate State legal authority:

(a) Has adopted drinking water regulations which are no less stringent than the national primary drinking water regulations in effect under sections 1412(a) and 1412(b) of the Safe Drinking Water Act;

[142.10(a) revised by 52 FR 20674, June 2, 1987]

(b) Has adopted and is implementing adequate procedures for the enforcement of such State regulations, such procedures to include:

(1) Maintenance of an inventory of public water systems.

(2) A systematic program for conducting sanitary surveys of public water systems in the State, with priority given to sanitary surveys of public water systems not in compliance with State primary drinking water regulations.

(3) The establishment and maintenance of a State program for the certification of laboratories conducting analytical measurements of drinking water contaminants pursuant to the requirements of the State primary drinking water regulations including the designation by the State of a laboratory officer, or officers, certified by the Administrator, as the official(s) responsible for the State's certification program. The requirements of this paragraph may be waived by the Administrator for any State where all analytical measurements required by the State's primary drinking water regulations are conducted at laboratories operated by the State and certified by the Agency. Until such time as the Agency establishes a National quality assurance program for laboratory certification the State shall maintain an interim program for the purpose of approving those laboratories from which the required analytical measurements will be acceptable.

(4) Assurance of the availability to the State of laboratory facilities certified by the Administrator and capable

of performing analytical measurements of all contaminants specified in the State primary drinking water regulations. Until such time as the Agency establishes a National quality assurance program for laboratory certification the Administrator will approve such State laboratories on an interim basis.

(5) The establishment and maintenance of an activity to assure that the design and construction of new or substantially modified public water system facilities will be capable of compliance with the State primary drinking water regulations.

(6) Statutory or regulatory enforcement authority adequate to compel compliance with the State primary drinking water regulations in appropriate cases, such authority to include:

(i) Authority to apply State primary drinking water regulations to all public water systems in the State covered by the national primary drinking water regulations, except for interstate carrier conveyances and systems on Indian land with respect to which the State does not have the necessary jurisdiction or its jurisdiction is in question.

(ii) Authority to sue in courts of competent jurisdiction to enjoin any threatened or continuing violation of the State primary drinking water regulations.

(iii) Right of entry and inspection of public water systems, including the right to take water samples, whether or not the State has evidence that the system is in violation of an applicable legal requirement.

(iv) Authority to require suppliers of water to keep appropriate records and make appropriate reports to the State.

(v) Authority to require public water systems to give public notice of violations of State primary drinking water regulations to the extent set forth in § 142.16, and authority to order additional notification when circumstances make more immediate or broader notice appropriate to protect the public health.

(vi) Authority to assess civil or criminal penalties for violation of the State's primary drinking water regulations and public notification requirements, including the authority to assess daily penalties or multiple penalties when a violation continues;

(c) Has established and will maintain record keeping and reporting of its activities under paragraphs (a), (b) and (d) in compliance with §§ 142.14 and 142.15;

(d) If it permits variances or exemptions, or both, from the requirements of the State primary drinking water regulations, it shall do so under conditions and in a manner which is no less stringent than the conditions under which, and the manner in which, variances and exemptions may be granted under sections 1415 and 1416 of the Act (regulations governing the issuance of variances and exemptions by the Administrator in States that do not have primary enforcement responsibility are set forth in Subparts E and F. States with primary enforcement responsibility may adopt procedures different from those set forth in Subparts E and F: *Provided*, That the State procedures meet the requirements of this paragraph); and

(e) Has adopted and can implement an adequate plan for the provision of safe drinking water under emergency circumstances.

§ 142.11 Request for determination of primary enforcement responsibility.

A State may apply to the Administrator for a determination that the State has primary enforcement responsibility for public water systems in the State pursuant to section 1413 of the Act. The application shall be as concise as possible and describe the State's compliance with each of the five requirements set forth in § 142.10, and include the following information:

(a) The text of the State's primary drinking water regulations, with references to those State regulations that vary from comparable regulations set forth in Part 141 of this chapter, and a demonstration that any different State regulation is at least as stringent as the comparable regulation contained in Part 141.

(b) A description, accompanied by appropriate documentation, of the State's procedures for the enforcement of the State primary drinking water regulations. The submission shall include:

(1) A brief description of the State's program to maintain a current inventory of public water systems.

(2) A brief description of the State's program for conducting sanitary surveys, including an explanation of the priorities given to various classes of public water systems.

(3) A brief description of the State's laboratory approval or certification program, including the name(s) of the responsible State laboratory officer(s) certified by the Administrator.

(4) Identification of laboratory facilities, available to the State, certified or approved by the Administrator and capable of performing analytical measurements of all contaminants specified in the State's primary drinking water regulations.

(5) A brief description of the State's program activity to assure that the design and construction of new or substantially modified public water system facilities will be capable of compliance with the requirements of the State primary drinking water regulations.

(6) Copies of State statutory and regulatory provisions authorizing the adoption and enforcement of State primary drinking water regulations, and a brief description of State procedures for administrative or judicial action with respect to public water systems not in compliance with such regulations.

(c) A statement that the State will make such reports and will keep such records as may be required pursuant to §§ 142.14 and 142.15.

(d) If the State permits variances or exemptions from its primary drinking water regulations, the text of the State's statutory and regulatory provisions concerning variances and exemptions.

(e) A brief description of the State's plan for the provision of safe drinking water under emergency conditions.

§ 142.12 Determination of primary enforcement responsibility.

(a) (1) The administrator shall act on an application submitted pursuant to § 142.11 within 90 days after receiving such application, and shall promptly inform the State in writing of this action. If he denies the application, his written notification to the State shall include a statement of reasons for the denial.

(2) A determination by the Administrator that a State has met the requirements for primary enforcement responsibility shall take effect in accordance with § 142.13.

(3) When the Administrator's determination becomes effective pursuant to § 142.13, it shall continue in effect unless terminated pursuant to paragraph (b) of this section.

(b) (1) The administrator shall annually review, with respect to each State determined to have primary enforcement responsibility, the compliance of

the State with the requirements set forth in § 142.10.

(2) When the Administrator's annual review, or other information available to him, indicate that a State no longer meets the requirements set forth in § 142.10, he shall notify the State in writing of that fact and shall summarize in his notice the information available to him which indicates that the State no longer meets such requirements.

(3) The State notified pursuant to paragraph (b)(2) of this section may, within 30 days of receiving the Administrator's notice, submit to the Administrator evidence demonstrating that the State continues to meet the requirements for primary enforcement responsibility.

(4) After reviewing the submission of the State, if any, made pursuant to paragraph (b)(3) of this section the Administrator shall either determine that the State no longer meets the requirements of § 142.10 or that the State continues to meet those requirements, and shall notify the State of his determination. Any determination that the State no longer meets the requirements of § 142.10 shall not become effective except as provided in § 142.13.

(c) If a State which has primary enforcement responsibility determines to relinquish that authority, it may do so by notifying the Administrator in writing of the State's decision at least 90 days before the effective date of the decision.

§ 142.13 Public hearing.

(a) Before any determination pursuant to § 142.12(a) that a State meets the requirements of § 142.10 for primary enforcement responsibility becomes effective, or any determination pursuant to § 142.12(b) that a State no longer meets the requirements of § 142.10 becomes effective, the Administrator shall provide an opportunity for public hearing on his determination.

(b) The Administrator shall publish notice of any determination specified in paragraph (a) of this section in the FEDERAL REGISTER and in a newspaper or newspapers of general circulation in the State involved within 15 days after making such determination, with a statement of his reasons for the determination. Such notice shall inform interested persons that they may request a public hearing on the Administrator's determination. Such notice shall also indicate one or more locations in the State where information submitted by the State pursuant to § 142.11 is available for inspection by the general public. A public hearing may be requested by any interested person other than a Federal agency. Frivolous or insubstantial requests for hearing may be denied by the Administrator.

(c) Requests for hearing submitted pursuant to paragraph (b) of this section shall be submitted to the Administrator within 30 days after publication of notice of opportunity for hearing in the FEDERAL REGISTER. Such requests shall include the following information:

(1) The name, address and telephone number of the individual, organization or other entity requesting a hearing.

(2) A brief statement of the requesting person's interest in the Administrator's determination and of information that the requesting person intends to submit at such hearing.

(3) The signature of the individual making the request; or, if the request is made on behalf of an organization or other entity, the signature of a responsible official of the organization or other entity.

(d) The Administrator shall give notice in the FEDERAL REGISTER and in a newspaper or newspapers of general circulation in the State involved of any hearing to be held pursuant to a request submitted by an interested person or on his own motion. Notice of the hearing shall also be sent to the person requesting a hearing, if any, and to the State involved. Notice of the hearing shall include a statement of the purpose of the hearing, information regarding the time and location or locations for the hearing and the address and telephone number of an office at which interested persons may obtain further information concerning the hearing. At least one hearing location specified in the public notice shall be within the involved State. Notice of hearing shall be given not less than 15 days prior to the time scheduled for the hearing.

(e) Hearings convened pursuant to paragraph (d) of this section shall be conducted before a hearing officer to be designated by the Administrator. The hearing shall be conducted by the hearing officer in an informal, orderly and expeditious manner. The hearing officer shall have authority to call witnesses, receive oral and written testimony and take such other action as may be necessary to assure the fair and efficient conduct of the hearing. Following the conclusion of the hearing, the hearing officer shall forward the record of the hearing to the Administrator.

(f) After reviewing the record of the hearing, the Administrator shall issue an order affirming the determination referred to in paragraph (a) of this section or rescinding such determination. If the determination is affirmed, it shall become effective as of the date of the Administrator's order.

(g) If no timely request for hearing is received and the Administrator does not determine to hold a hearing on his own motion, the Administrator's determination shall become effective 30 days after notice is issued pursuant to paragraph (b) of this section.

(h) If a determination of the Administrator that a State no longer meets the requirements for primary enforcement responsibility becomes effective, the State may subsequently apply for a determination that it meets such requirements by submitting to the Administrator information demonstrating that it has remedied the deficiencies found by the Administrator without adversely sacrificing other aspects of its program required for primary enforcement responsibility.

§ 142.14 Records kept by States.

(a) Each State which has primary enforcement responsibility shall maintain records of tests, measurements and analyses performed on each public water system to determine compliance with applicable provisions of State primary drinking water regulations.

(1) Records of microbiological analyses shall be retained for not less than 1 year. Actual laboratory reports may be kept or data may be transferred to tabular summaries, provided that the information retained includes:

(i) The analytical method used;

(ii) The number of samples analyzed each month;

(iii) The analytical results, set forth in a form which makes possible comparison with the limits specified in § 141.14 of this chapter.

(2) Records of microbiological analyses of check or special samples shall be retained for not less than 1 year in the form of actual laboratory reports or in an appropriate summary form.

(3) Records of turbidity measurements shall be retained for not less than 1 year and shall include at least the following information:

(i) Date and place of sampling.

(ii) Date and results of analyses.

(4) Records of analyses for other than microbiological contaminants or turbidity shall be retained for not less than 40 years and shall include at least the following information:

(i) Date and place of sampling.

(ii) Date and results of analyses.

Records retained by a State pursuant to this paragraph for at least 10 years, may be transferred to the Agency to satisfy the remainder of the required 40 year retention period.

(b) Records required to be kept pursuant to paragraph (a) of this section must be in a form admissible as evidence in State enforcement proceedings.

(c) Each State which has primary enforcement responsibility shall maintain current inventory information for each public water system in the State and shall retain inventory records of public water systems for not less than 40 years. Records retained by a State pursuant to this paragraph for at least 10 years may be transferred to the Agency to satisfy the remainder of the 40 year retention period.

(d) Each State which has primary enforcement responsibility shall retain, for not less than 10 years, files which shall include for each such public water system in the State:

(1) Reports of sanitary surveys;

(2) Records of any State approvals;

(3) Records of any enforcement actions.

(e) Each State which has primary enforcement responsibility shall retain records pertaining to each variance and exemption granted by it for a period of not less than 5 years following the expiration of such variance or exemption.

(f) The records required to be kept by this section shall be maintained and made available for public inspection by the State, or, the State at its option may require suppliers of water to make available for public inspection those records maintained in accordance with § 141.33.

§ 142.15 Reports by States.

Each State which has primary enforcement responsibility shall submit to the Administrator the following information:

(a) Additions or corrections to the State's inventory of public water systems, as such additions or corrections are made if feasible, and in any event, by January 1 of each year.

(b) An annual report to be submitted by January 1 of each year, covering the proceding Federal fiscal year ending September 30 of each year, and consisting of:

(1) Summary of violations by public water systems in the State of primary drinking water regulations, except public water systems serving fewer than 25,000 population which will have until June 1, 1978, to report the FY 1977 violations only, and of enforcement actions taken by the State;

(2) A summary of the status of each variance and exemption granted by the State which was in effect during any part of the calendar year.

(c) Prompt notification of the granting of a variance or exemption. The notice shall include a statement of reasons for the granting of the variance or exemption, including support for the need for the variance or exemption and for the finding that the granting of the variance or exemption will not result in an unreasonable risk to health. A single notification statement may be used to report two or more similar variances or exemptions.

(d) The annual report submitted pursuant to paragraph (b) of this section shall be made available by a State to the public for inspection at one or more locations within the State.

§ 142.16 State public notification requirements.

Each State program qualifying for primary enforcement responsibility shall include, at a minimum, the following requirements for public notification by public water systems for violation of State primary drinking water regulations.

(a) Public notification by a supplier of water whenever the supplier's public water system fails to comply with a maximum contaminant level or is granted a variance or exemption from a maximum contaminant level or fails to comply with a schedule for contaminant levels prescribed pursuant to a variance or exemption.

(b) In the case of a community water system (as defined in § 141.2), such notification shall include a notice in the first set of water bills of the system issued after the failure or grant. In the case of a failure to comply with a maximum contaminant level, such written notice shall be repeated not less than once every three months so long as such failure continues; if the system issues water bills less frequently than quarterly, or does not issue water bills, the notice shall be made or supplemented by another form of direct mail. In the case of a failure to comply with a maximum contaminant level which is not corrected promptly after discovery, the supplier of water must give other general public notice of the failure, in addition to notice by direct mail, in a manner required by the State. The additional notice required by the State may consist of notice by newspaper advertisement, by press release or other appropriate means.

(c) If the public water system is a noncommunity water system (as defined in § 141.20, the notice shall be given by conspicuous posting, in a location where it can be seen by consumers, rather than in the manner specified in paragraph (b) of this section.

(d) 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, where 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.

(e) Notices required by this section may be given by the State on behalf of the supplier of water.

Subpart C—Review of State-Issued Variances and Exemptions

§ 142.20 State-issued variances and exemptions.

States with primary enforcement re-

sponsibility may issue variances and exemptions from the requirements of primary drinking water regulations under conditions and in a manner which are not less stringent than the conditions under which, and the manner in which, variances and exemptions may be granted under sections 1415 and 1416 of the Act. In States that do not have primary enforcement responsibility, variances and exemptions from the requirements of applicable national primary drinking water regulations may be granted by the Administrator pursuant to Subparts E and F.

§ 142.21 State consideration of a variance or exemption request.

A State with primary enforcement responsibility shall act on any variance or exemption request submitted to it, within 90 days of receipt of the request.

§ 142.22 Review of State variances, exemptions and schedules.

(a) Not later than 18 months after the effective date of the interim national primary drinking water regulations the Administrator shall complete a comprehensive review of the variances and exemptions granted (and schedules prescribed pursuant thereto) by the States with primary enforcement responsibility during the one-year period beginning on such effective date. The Administrator shall conduct such subsequent reviews of exemptions and schedules as he deems necessary to carry out the purposes of this title, but at least one review shall be completed within each 3-year period following the completion of the first review under this paragraph.

(b) Notice of a proposed review shall be published in the FEDERAL REGISTER. Such notice shall (1) provide information respecting the location of data and other information respecting the variances and exemptions to be reviewed (including data and other information concerning new scientific matters bearing on such variances and exemptions), and (2) advise of the opportunity to submit comments on the variances and exemptions reviewed and on the need for continuing them. Upon completion of any such review, the Administrator shall publish in the FEDERAL REGISTER the results of his review, together with findings responsive to any comments submitted in connection with such review.

§ 142.23 Notice to State.

(a) If the Administrator finds that a State has, in a substantial number of instances, abused its discretion in granting variances or exemptions under section 1415(a) or section 1416(a) of the Act or failed to prescribe schedules in accordance with section 1415(a) or section 1416(b) of the Act, he shall notify the State of his findings. Such notice shall:

(1) Identify each public water system for which the finding was made;

(2) Specify the reasons for the finding; and

(3) As appropriate, propose revocation of specific variances or exemptions, or propose revised schedules for specific public water systems.

(b) The Administrator shall also notify the State of a public hearing to be held on the provisions of the notice required by paragraph (a) of this section. Such notice shall specify the time and location for the hearing. If, upon notification of a finding by the Administrator, the State takes adequate corrective action, the Administrator shall rescind his notice to the State of a public hearing, provided that the Administrator is notified of the corrective action prior to the hearing.

(c) The Administrator shall publish notice of the public hearing in the FEDERAL REGISTER and in a newspaper or newspapers of general circulation in the involved State including a summary of the findings made pursuant to paragraph (a) of this section, a statement of the time and location for the hearing, and the address and telephone number of an office at which interested persons may obtain further information concerning the hearing.

(d) Hearings convened pursuant to paragraphs (b) and (c) of this section shall be conducted before a hearing officer to be designated by the Administrator. The hearing shall be conducted by the hearing officer in an informal, orderly and expeditious manner. The hearing officer shall have authority to call witnesses, receive oral and written testimony and take such other action as may be necessary to assure the fair and efficient conduct of the hearing. Following the conclusion of the hearing, the hearing officer shall forward the record of the hearing to the Administrator.

(e) Within 180 days after the date notice is given pursuant to paragraph (b) of this section, the Administrator shall:

(1) Rescind the finding for which the notice was given and promptly notify the State of such rescission, or

(2) Promulgate with any modifications as appropriate such revocation and revised schedules proposed in such notice and promptly notify the State of such action.

(f) A revocation or revised schedule shall take effect 90 days after the State is notified under paragraph (e)(2) of this section.

§ 142.24 Administrator's rescission.

If, upon notification of a finding by the Administrator under § 142.23, the State takes adequate corrective action before the effective date of the revocation or revised schedule, the Administrator shall rescind the application of his finding to that variance, exemption or schedule.

Subpart D—Federal Enforcement

§ 142.30 Failure by State to assure enforcement.

(a) The Administrator shall notify a State and the appropriate supplier of water whenever he finds during a period in which the State has primary enforcement responsibility for public water systems that a public water system within such State is not in compliance with any primary drinking water regulation contained in Part 141 of this chapter or with any schedule or other requirements imposed pursuant to a variance or exemption granted under section 1415 or 1416 of the Act: *Provided*, That the State will be deemed to have been notified of a violation referred to in a report submitted by the State.

(b) The Administrator shall provide advice and technical assistance to such State and public water system as may be appropriate to bring the system into compliance by the earliest feasible time.

(c) — (e) [Removed]

[142.30(c) — (e) removed by 52 FR 20674, June 2, 1987]

§ 142.31 [Removed and Reserved]

[142.31 removed and reserved by 52 FR 20674, June 2, 1987]

§ 142.32 Petition for public hearing.

(a) If the Administrator makes a finding of noncompliance pursuant to § 142.30 with respect to a public water system in a State which has primary enforcement responsibility, the Administrator may, for the purpose of assisting that State in carrying out such responsibility and upon the petition of such State or public water system or persons served by such system, hold, after appropriate notice, public hearings for the purpose of gathering information as described in § 142.33.

(b) A petition for a public hearing pursuant to paragraph (a) of this section shall be filed with the Administrator and shall include the following information:

(1) The name, address and telephone number of the individual or other entity requesting a hearing.

(2) If the petition is filed by a person other than the State or public water system, a statement that the person is served by the system.

(3) A brief statement of information that the requesting person intends to submit at the requested hearing.

(4) The signature of the individual submitting the petition; or, if the petition is filed on behalf of a State, public water system or other entity, the signature of a responsible official of the State or other entity.

§ 142.33 Public hearing.

(a) If the Administrator grants the petition for public hearing, he shall give appropriate public notice of such hearing. Such notice shall be by publication in the FEDERAL REGISTER and in a newspaper of general circulation or by other appropriate communications media covering the area served by such public water system.

(b) A hearing officer designated by the Administrator shall gather during the public hearing information from technical or other experts, Federal, State, or other public officials, representatives of the public water system, persons served by the system, and other interested persons on:

(1) The ways in which the system can within the earliest feasible time be brought into compliance, and

(2) The means for the maximum feasible protection of the public health during any period in which such system is not in compliance.

(c) On the basis of the hearing and other available information the Administrator shall issue recommendations which shall be sent to the State and public water system and shall be made available to the public and communications media.

§ 142.34 Entry and inspection of public water systems.

(a) Any supplier of water or other person subject to a national primary drinking water regulation shall, at any time, allow the Administrator, or a designated representative of the Administrator, upon presenting appropriate credentials and a written notice of inspection, to enter any establishment, facility or other property of such supplier or other person to determine whether such supplier or other person has acted or is acting in compliance with the requirements of the Act or Subchapter D of this chapter. Such inspection may include inspection, at reasonable times, of records, files, papers, processes, controls and facilities, or testing of any feature of a public water system, including its raw water source.

(b) Prior to entry into any establishment, facility or other property within a State which has primary enforcement responsibility, the Administrator shall notify, in writing, the State agency charged with responsibility for safe drinking water of his intention to make such entry and shall include in his notification a statement of reasons for such entry. The Administrator shall, upon a showing by the State agency that such an entry will be detrimental to the administration of the State's program of primary enforcement responsibility, take such showing into consideration in determining whether to make such entry. The Administrator shall in any event offer the State agency the opportunity of having a representative accompany the Administrator or his representative on such entry.

(c) No State agency which receives notice under paragraph (b) of this section may use the information contained in the notice to inform the person whose property is proposed to be entered of the proposed entry; if a State so uses such information, notice to the agency under paragraph (b) of this section is not required for subsequent inspections of public water systems until such time as the Administrator determines that the agency has provided him satisfactory assurances that it will no longer so use information contained in a notice received under paragraph (b) of this section.

Subpart E—Variances Issued by the Administrator

§ 142.40 Requirements for a variance.

(a) The Administrator may grant one or more variances to any public water system within a State that does not have primary enforcement responsibility from any requirement respecting a maximum contaminant level of an applicable national primary drinking water regulation upon a finding that:

(1) Because of characteristics of the raw water sources which are reasonably available to the system, the system cannot meet the requirements respecting the maximum contaminant levels of such drinking water regulations despite application of the best technology, treatment techniques, or other means, which the Administrator finds are generally available (taking costs into consideration); and

(2) The granting of a variance will not result in an unreasonable risk to the health of persons served by the system.

(b) The Administrator may grant one or more variances to any public water system within a State that does not have primary enforcement responsibility from any requirement of a specified treatment technique of an applicable national primary drinking water regulation upon a finding that the public water system applying for the variance has demonstrated that such treatment technique is not necessary to protect the health of persons because of the nature of the raw water source of such system.

§ 142.41 Variance request.

A supplier of water may request the granting of a variance pursuant to this subpart for a public water system within a State that does not have primary enforcement responsibility by submitting a request for a variance in writing to the Administrator. Suppliers of water may submit a joint request for variances when they seek similar variances under similar circumstances. Any written request for a variance or variances shall include the following information:

(a) The nature and duration of variance requested.

(b) Relevant analytical results of water quality sampling of the system, including results of relevant tests conducted pursuant to the requirements

of the national primary drinking water regulations.

(c) For any request made under § 142.40(a):

(1) Explanation in full and evidence of the best available treatment technology and techniques.

(2) Economic and legal factors relevant to ability to comply.

(3) Analytical results of raw water quality relevant to the variance request.

(4) A proposed compliance schedule, including the date each step toward compliance will be achieved. Such schedule shall include as a minimum the following dates:

(i) Date by which arrangement for alternative raw water source or improvement of existing raw water source will be completed.

(ii) Date of initiation of the connection of the alternative raw water source or improvement of existing raw water source.

(iii) Date by which final compliance is to be achieved.

(5) A plan for the provision of safe drinking water in the case of an excessive rise in the contaminant level for which the variance is requested.

(6) A plan for additional interim control measures during the effective period of variance.

[142.41(c)(6) amended by 52 FR 20674, June 2, 1987]

(d) For any request made under § 142.40(b), a statement that the system will perform monitoring and other reasonable requirements prescribed by the Administrator as a condition to the variance.

(e) Other information, if any, believed to be pertinent by the applicant.

(f) Such other information as the Administrator may require.

§ 142.42 Consideration of a variance request.

(a) The Administrator shall act on any variance request submitted pursuant to § 142.41 within 90 days of receipt of the request.

(b) In his consideration of whether the public water system is unable to comply with a contaminant level required by the national primary drinking water regulations because of the nature of the raw water source, the Administrator shall consider such factors as the following:

(1) The availability and effectiveness of treatment methods for the contaminant for which the variance is requested.

(2) Cost and other economic considerations such as implementing treatment, improving the quality of the source water or using an alternate source.

(c) A variance may only be issued to a system after the system's application of the best technology, treatment techniques, or other means, which the Administrator finds are available (taking costs into consideration).

[New 142.42(c) added and former (c) redesignated as (d) by 52 FR 20674, June 2, 1987]

(d) In his consideration of whether a public water system should be granted a variance to a required treatment technique because such treatment is unnecessary to protect the public health, the Administrator shall consider such factors as the following:

(1) Quality of the water source including water quality data and pertinent sources of pollution.

(2) Source protection measures employed by the public water system.

§ 142.43 Disposition of a variance request.

(a) If the Administrator decides to deny the application for a variance, he shall notify the applicant of his intention to issue a denial. Such notice shall include a statement of reasons for the proposed denial, and shall offer the applicant an opportunity to present, within 30 days of receipt of the notice, additional information or argument to the Administrator. The Administrator shall make a final determination on the request within 30 days after receiving any such additional information or argument. If no additional information or argument is submitted by the applicant the application shall be denied.

(b) If the Administrator proposes to grant a varaince request submitted pursuant to § 142.41, he shall notify the applicant of his decision in writing. Such notice shall identify the variance, the facility covered, and shall specify the period of time for which the variance will be effective.

(1) For the type of variance specified in § 142.40(a) such notice shall provide that the variance will be terminated when the system comes into compliance with the applicable regulation, and may be terminated upon a finding by the Administrator that the system has failed to comply with any requirements of a final schedule issued pursuant to § 142.44.

[142.43(b)(1) amended by 52 FR 20674, June 2, 1987]

(2) For the type of variance specified in § 142.40(b) such notice shall provide that the variance may be terminated at any time upon a finding that the nature of the raw water source is such that the specified treatment technique for which the variance was granted is necessary to protect the health of persons or upon a finding that the public water system has failed to comply with monitoring and other requirements prescribed by the Administrator as a condition to the granting of the variance.

(c) For a variance specified in § 142.40(a)(1) the Administrator shall propose a schedule for:

(1) Compliance (including increments of progress) by the public water system with each contaminant level requirement covered by the variance; and,

(2) Implementation by the public water system of such additional control measures as the Administrator may require for each contaminant covered by the variance.

[142.43(c)(2) amended by 52 FR 20674, June 2, 1987]

(d) The proposed schedule for compliance shall specify dates by which steps towards compliance are to be taken, including at the minimum, where applicable:

(1) Date by which arrangement for an alternative raw water source or improvement of existing raw water source will be completed.

(2) Date of initiation of the connection for the alternative raw water source or improvement of the existing raw water source.

(3) Date by which final compliance is to be achieved.

(e) The proposed schedule may, if the public water system has no access to an alternative raw water source, and can effect or anticipate no adequate improvement of the existing raw water source, specify an indefinite time period for compliance until a new and effective treatment technology is developed at which time a new compliance schedule shall be prescribed by the Administrator.

[142.43(f) and (g) amended by 52 FR 20674, June 2, 1987]

(f) The proposed schedule for implementation of additional interim control measures during the period of variance shall specify interim treatment techniques, methods and equipment, and dates by which steps toward meeting the additional interim control measures are to be met.

(g) The schedule shall be prescribed by the Administrator at the time of granting of the variance, subsequent to provision of opportunity for hearing pursuant to § 142.44.

§ 142.44 Public hearings on variances and schedules.

[142.44(a) and (b) introductory paragraph amended by 52 FR 20674, June 2, 1987]

(a) Before a variance and schedule proposed by the Administrator pursuant to § 142.43 may take effect, the Administrator shall provide notice and opportunity for public hearing on the variance and schedule. A notice given pursuant to the preceding sentence may cover the granting of more than one variance and a hearing held pursuant to such notice shall include each of the variances covered by the notice.

(b) Public notice of an opportunity for hearing on a variance and schedule shall be circulated in a manner designed to inform interested and potentially interested persons of the proposed variance and schedule, and shall include at least the following:

(1) Posting of a notice in the principal post office of each municipality or area served by the public water system, and publishing of a notice in a newspaper or newspapers of general circulation in the area served by the public water system; and

(2) Mailing of a notice to the agency of the State in which the system is located which is responsible for the State's water supply program, and to other appropriate State or local agencies at the Administrator's discretion.

(3) Such notice shall include a summary of the proposed variance and schedule and shall inform interested persons that they may request a public hearing on the proposed variance and schedule.

[142.44(b)(3) amended by 52 FR 20674, June 2, 1987]

(c) Requests for hearing may be submitted by any interested person other than a Federal agency. Frivolous or insubstantial requests for hearing may be denied by the Administrator. Requests must be submitted to the Administrator within 30 days after issuance of the public notices provided for in paragraph (b) of this section. Such requests shall include the following information:

(1) The name, address and telephone number of the individual, organization or other entity requesting a hearing;

(2) A brief statement of the interest of the person making the request in the proposed variance and schedule, and of information that the requester intends to submit at such hearing;

[142.44(c)(2) amended by 52 FR 20674, June 2, 1987]

(3) The signature of the individual making the request, or, if the request is made on behalf of an organization or other entity, the signature of a responsible official of the organization or other entity.

(d) The Administrator shall give notice in the manner set forth in paragraph (b) of this section of any hearing to be held pursuant to a request submitted by an interested person or on his own motion. Notice of the hearing shall also be sent to the persons requesting the hearing, if any. Notice of the hearing shall include a statement of the purpose of the hearing, information regarding the time and location for the hearing, and the address and telephone number of an office at which interested persons may obtain further information concerning the hearing. At least one hearing location specified in the public notice shall be within the involved State. Notice of hearing shall be given not less than 15 days prior to the time scheduled for the hearing.

(e) A hearing convened pursuant to paragraph (d) of this section shall be conducted before a hearing officer to be designated by the Administrator. The hearing shall be conducted by the hearing officer in an informal, orderly and expeditious manner. The hearing officer shall have authority to call witnesses, receive oral and written testimony and take such other action as may be necessary to assure the fair and efficient conduct of the hearing. Following the conclusion of the hearing, the hearing officer shall forward the record of the hearing to the Administrator.

(f) The variance and schedule shall become effective 30 days after notice of opportunity for hearing is given pursuant to paragraph (b) of this section if no timely request for hearing is submitted and the Administrator does not determine to hold a public hearing on his own motion.

[142.44(f) amended by 52 FR 20674, June 2, 1987]

§ 142.45 Action after hearing.

Within 30 days after the termination of the public hearing held pursuant to § 142.44, the Administrator shall, taking into consideration information obtained during such hearing and relevant information, confirm, revise or rescind the proposed variance and schedule.

[142.45 revised by 52 FR 20674, June 2, 1987]

§ 142.46 Alternative treatment techniques.

The Administrator may grant a variance from any treatment technique requirement of a national primary drinking water regulation to a supplier of water, whether or not the public water system for which the variance is requested is located in a State which has primary enforcement responsibility, upon a showing from any person that an alternative treatment technique not included in such requirement is at least as efficient in lowering the level of the contaminant with respect to which such requirements was prescribed. A variance under this paragraph shall be conditioned on the use of the alternative treatment technique which is the basis of the variance.

Subpart F—Exemptions Issued by the Administrator

§ 142.50 Requirements for an exemption.

The Administrator may exempt any public water system within a State that does not have primary enforcement responsibility from any requirement respecting a maximum contaminant level or any treatment technique requirement, or from both, of an applicable national primary drinking water regulation upon a finding that:

(a) Due to compelling factors (which may include economic factors), the public water system is unable to comply with such contaminant level or treatment technique requirement;

(b) The public water system was in operation on the effective date of such contaminant level or treatment technique requirement; and

(c) The granting of the exemption will not result in an unreasonable risk to health.

§ 142.51 Exemption request.

A supplier of water may request the granting of an exemption pursuant to this subpart for a public water system within a State that does not have primary enforcement responsibility by submitting a request for exemption in writing to the Administrator. Suppliers of water may submit a joint request for exemptions when they seek similar exemptions under similar circumstances. Any written request for an exemption or exemptions shall include the following information:

(a) The nature and duration of exemption requested.

(b) Relevant analytical results of water quality sampling of the system, including results of relevant tests conducted pursuant to the requirements of the national primary drinking water regulations.

(c) Explanation of the compelling factors such as time or economic factors which prevent such system from achieving compliance.

(d) Other information, if any, believed by the applicant to be pertinent to the application.

(e) A proposed compliance schedule, including the date when each step toward compliance will be achieved.

(f) Such other information as the Administrator may require.

§ 142.52 Consideration of an exemption request.

(a) The Administrator shall act on any exemption request submitted pursuant to § 142.51 within 90 days of receipt of the request.

(b) In his consideration of whether the public water system is unable to comply due to compelling factors, the Administrator shall consider such factors as the following:

(1) Construction, installation, or modification of the treatment equipment or systems.

(2) The time needed to put into operation a new treatment facility to replace an existing system which is not in compliance.

(3) Economic feasibility of compliance.

§ 142.53 Disposition of an exemption request.

(a) If the Administrator decides to deny the application for an exemption, he shall notify the applicant of his intention to issue a denial. Such notice shall include a statement of reasons for the proposed denial, and shall offer the applicant an opportunity to present, within 30 days of receipt of the notice, additional information or argument to the Administrator. The Administrator shall make a final determination on the request within 30 days after receiving any such additional information or argument. If no additional information or argument is submitted by the applicant, the application shall be denied.

(b) If the Administrator grants an exemption request submitted pursuant to § 142.51, he shall notify the applicant of his decision in writing. Such notice shall identify the facility covered, and shall specify the termination date of the exemption. Such notice shall provide that the exemption will be terminated when the system comes into compliance with the applicable regulation, and may be terminated upon a finding by the Administrator that the system has failed to comply with any requirements of a final schedule issued pursuant to § 142.55.

(c) The Administrator shall propose a schedule for:

(1) Compliance (including increments of progress) by the public water system with each contaminant level requirement and treatment technique requirement covered by the exemption; and

(2) Implementation by the public water system of such control measures as the Administrator may require for each contaminant covered by the exemption.

(d) The schedule shall be prescribed by the Administrator at the time the exemption is granted, subsequent to provision of opportunity for hearing pursuant to § 142.54.

[142.53(d) amended by 52 FR 20674, June 2, 1987]

§ 142.54 Public hearings on exemption schedules.

(a) Before a schedule proposed by the Administrator pursuant to § 142.53 may take effect, the Administrator shall provide notice and opportunity for public hearing on the schedule. A notice given pursuant to the preceding sentence may cover the proposal of more than one such schedule and a hearing held pursuant to such notice shall include each of the schedules covered by the notice.

(b) Public notice of an opportunity for hearing on an exemption schedule shall be circulated in a manner designed to inform interested and potentially interested persons of the proposed schedule, and shall include at least the following:

(1) Posting of a notice in the principal post office of each municipality or area served by the public water system, and publishing of a notice in a newspaper or newspapers of general circulation in the area served by the public water system.

(2) Mailing of a notice to the agency of the State in which the system is located which is responsible for the State's water supply program and to other appropriate State or local agencies at the Administrator's discretion.

(3) Such notices shall include a summary of the proposed schedule and shall inform interested persons that they may request a public hearing on the proposed schedule.

(c) Requests for hearing may be submitted by any interested person other than a Federal agency. Frivolous or insubstantial requests for hearing may be denied by the Administrator. Requests must be submitted to the Administrator within 30 days after issuance of the public notices provided for in paragraph (b) of this section. Such requests shall include the following information:

(1) The name, address and telephone number of the individual, organization or other entity requesting a hearing;

(2) A brief statement of the interest of the person making the request in the proposed schedule and of information that the requesting person intends to submit at such hearing; and

(3) The signature of the individual making the request, or, if the request is made on behalf of an organization or other entity, the signature of a responsible official of the organization or other entity.

(d) The Administrator shall give notice in the manner set forth in paragraph (b) of this section of any hearing to be held pursuant to a request submitted by an interested person or on his own motion. Notice of the hearing shall also be sent to the person requesting the hearing, if any. Notice of the hearing shall include a statement of the purpose of the hearing, information regarding the time and location of the hearing, and the address and telephone number of an office at which interested persons may obtain further information

concerning the hearing. At least one hearing location specified in the public notice shall be within the involved State. Notice of the hearing shall be given not less than 15 days prior to the time scheduled for the hearing.

[142.54(d) amended by 52 FR 20674, June 2, 1987]

(e) A hearing convened pursuant to paragraph (d) of this section shall be conducted before a hearing officer to be designated by the Administrator. The hearing shall be conducted by the hearing officer in an informal, orderly and expeditious manner. The hearing officer shall have authority to call witnesses, receive oral and written testimony and take such action as may be necessary to assure the fair and efficient conduct of the hearing. Following the conclusion of the hearing, the hearing officer shall forward the record of the hearing to the Administrator.

§ 142.55 Final schedule.

(a) Within 30 days after the termination of the public hearing pursuant to § 142.54, the Administrator shall, taking into consideration information obtained during such hearing, revise the proposed schedule as necessary and prescribe the final schedule for compliance and interim measures for the public water system granted an exemption under § 142.52.

(b) Such schedule must require compliance as follows:

(1) In the case of an exemption granted with respect to a contaminant level or treatment technique requirement prescribed by the national primary drinking water regulations promulgated under section 1421(a) of the Safe Drinking Water Act, not later than June 19, 1987, and

(2) In the case of an exemption granted with respect to a contaminant level or treatment technique requirement prescribed by national primary drinking water regulations, other than a regulation referred to in section 1412(a), 12 months after the issuance of the exemption.

[142.55(b) revised by 52 FR 20674, June 2, 1987]

(c) If the public water system has entered into an enforceable agreement to become a part of a regional public water system, as determined by the Administrator, such schedule shall require compliance by the public water system with each contaminant level and treatment technique requirement prescribed by:

(1) Interim national primary drinking water regulations pursuant to Part 141 of this chapter, by no later than January 1, 1983; and

(2) Revised national primary drinking water regulations pursuant to Part 141 of this chapter, by no later than nine years after the effective date of such regulations.

§142.56 Extension of date for compliance.

[142.56 added by 52 FR 20674, June 2, 1987]

(a) The final date for compliance provided in any schedule in the case of any exemption may be extended by the State (in the case of a State which has primary enforcement responsibility) or by the Administrator (in any other case) for a period not to exceed 3 years after the date of the issuance of the exemption if the public waste system establishes that:

(1) The system cannot meet the standard without capital improvements which cannot be completed within the period of such exemption;

(2) In the case of a system which needs financial assistance for the necessary improvements, the system has entered into an agreement to obtain such financial assistance; or

(3) The system has entered into an enforceable agreement to become a part of a regional public water system; and the system is taking all practicable steps to meet the standard.

(b) In the case of a system which does not serve more than 500 service connections and which needs financial assistance for the necessary improvements, an exemption granted under paragraph (a)(1) or (2) may be renewed for one or more additional 2-year periods if the system establishes that it is taking all practicable steps to meet the requirements of paragraph (a) of this section.

§ 142.58 Bottled water and point-of-use devices.

[The second 142.56 was added by 52 FR 25712, July 8, 1887]

(a) A State may require a public water system to use bottled water or point-of-use devices as a condition for granting an exemption from the requirements of § 141.61(a) of this part.

(b) Public water systems that use bottled water as a condition of obtaining an exemption from the requirements of § 141.61(a) must meet the requirements set out in § 142.62(f) of this part.

(c) Public water systems that use point-of-use devices as a condition for receiving an exemption must meet the requirements set out in § 142.62(g) of this part.

Subpart G—Identification of Best Technology, Treatment Techniques or Other Means Generally Available

§ 142.60 Variances from the maximum contaminant level for total trihalomethanes.

(a) The Administrator, pursuant to section 1415(a)(1)(A) of the Act, hereby identifies the following as the best technology, treatment techiques or other means generally available for achieving compliance with the maximum contaminant level for total trihalomethanes (§ 141.12(c)):

(1) Use of chloramines as an alternate or supplemental disinfectant or oxidant.

(2) Use of chlorine dioxide as an alternate or supplemental disinfectant or oxidant.

(3) Improved existing clarification for THM precursor reduction.

(4) Moving the point of chlorination to reduce TTHM formation and, where necessary, substituting for the use of chlorine as a pre-oxidant chloramines, chlorine dioxide or potassium permanganate.

(5) Use of powdered activated carbon for THM precursor or TTHM reduction seasonally or intermittently at dosages not to exceed 10 mg/L on an annual average basis.

(b) The Administrator in a state that does not have primary enforcement responsibility or a state with primary enforcement responsibility (primacy state) that issues variances shall require a community water system to install and/or use any treatment method identified in § 142.60(a) as a condition for granting a variance unless the Administrator or primacy state determines that such treatment method identified in § 142.60(a) is not available and effective for TTHM control for the system. A treatment

method shall not be considered to be "available and effective" for an individual system if the treatment method would not be technically appropriate and technically feasible for that system or would only result in a marginal reduction in TTHM for the system. If, upon application by a system for a variance, the Administrator or primacy state that issues variances determines that none of the treatment methods identified in § 142.60(a) is available and effective for the system, that system shall be entitled to a variance under the provisions of section 1415(a)(1)(A) of the Act. The Administrator's or primacy state's determination as to the availability and effectiveness of such treatment methods shall be based upon studies by the system and other relevant information. If a system submits information intending to demonstrate that a treatment method is not available and effective for TTHM control for that system, the Administrator or primacy state shall make a finding whether this information supports a decision that such treatment method is not available and effective for that system before requiring installation and/or use of such treatment method.

(c) Pursuant to § 142.43 (c) through (g) or corresponding state regulations, the Administrator or primacy state that issues variances shall issue a schedule of compliance that may require the system being granted the variance to examine the following treatment methods (1) to determine the probability that any of these methods will significantly reduce the level of TTHM for that system, and (2) if such probability exists, to determine whether any of these methods are technically feasible and economically reasonable, and that the TTHM reductions obtained will be commensurate with the costs incurred with the installation and use of such treatment methods for that system:

Introduction of off-line water storage for THM precursor reduction.

Aeration for TTHM reduction, where geographically and environmentally appropriate.

Introduction of clarification where not currently practiced.

Consideration of alternative sources of raw water.

Use of ozone as an alternate or supplemental disinfectant or oxidant.

(d) If the Administrator or primacy state that issues variances determines that a treatment method identified in § 142.60(c) is technically feasible, economically reasonable and will achieve TTHM reductions commensurate with the costs incurred with the installation and/or use of such treatment method for the system, the Administrator or primacy state shall require the system to install and/or use that treatment method in connection with a compliance schedule issued under the provisions of section 1415(a)(1)(A) of the Act. The Administrator's or primacy state's determination shall be based upon studies by the system and other relevant information. In no event shall the Administrator require a system to install and/or use a treatment method not described in § 142.60 (a) or (c) to obtain or maintain a variance from the TTHM Rule or in connection with any variance compliance schedule.

§ 142.61 Variances from the maximum contaminant level for fluoride.

[142.61 added by 51 FR 11410, April 2, 1986]

(a) The Administrator, pursuant to section 1415(a)(1)(A) of the Act, hereby identifies the following as the best technology, treatment techniques or other means generally available for achieving compliance with the Maximum Contaminant Level for fluoride.

(1) Activated alumina absorption, centrally applied

(2) Reverse osmosis, centrally applied

(b) The Administrator in a state that does not have primary enforcement responsibility or a state with primary enforcement responsibility (primacy state) that issues variances shall require a community water system to install and/or use any treatment method identified in § 142.61(a) as a condition for granting a variance unless the Administrator or the primacy state determines that such treatment method identified in § 142.61(a) as a condition for granting a variance is not available and effective for fluoride control for the system. A treatment method shall not be considered to be "available and effective" for an individual system if the treatment method would not be technically appropriate and technically feasible for that system. If, upon application by a system for a variance, the Administrator or primacy state that issues variances determines that none of the treatment methods identified in § 142.61(a) are available and effective for the system, that system shall be entitled to a variance under the provisions of section 1415(a)(1)(A) of the Act. The Administrator's or primacy state's determination as to the availability and effectiveness of such treatment methods shall be based upon studies by the system and other relevant information. If a system submits information to demonstrate that a treatment method is not available and effective for fluoride control for that system, the Administrator or primacy state shall make a finding whether this information supports a decision that such treatment method is not available and effective for that system before requiring installation and/or use of such treatment method.

(c) Pursuant to § 142.43(c)-(g) or corresponding state regulations, the Administrator or primacy state that issues variances shall issue a schedule of compliance that may require the system being granted the variance to examine the following treatment methods (1) to determine the probability that any of these methods will significantly reduce the level of fluoride for that system, and (2) if such probability exists, to determine whether any of these methods are technically feasible and economically reasonable, and that the fluoride reductions obtained will be commensurate with the costs incurred with the installation and use of such treatment methods for that system:

(1) Modification of lime softening
(2) Alum coagulation
(3) Electrodialysis
(4) Anion exchange resins
(5) Well field management
(6) Alternate source
(7) Regionalization

(d) If the Administrator or primary state that issues variances determines that a treatment method identified in § 142.61(c) or other treatment method is technically feasible, economically reasonable, and will achieve fluoride reductions commensurate with the costs incurred with the installation and/or use of such treatment method for the system, the Administrator or primacy state shall require the system to install and/or use that treatment method in connection with a compliance schedule issued under the provisions of section 1415(a)(1)(A) of the Act. The Administrator's or primacy

state's determination shall be based upon studies by the system and other relevant information.

§ 142.62 Variances from the maximum contaminant levels for synthetic organic chemicals.

[142.62 added by 52 FR 25712, July 8, 1987]

(a) The Administrator, pursuant to section 1415(a)(1)(A) of the Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for synthetic organic chemicals: Removal using packed tower aeration; removal using granular activated carbon (except for vinyl chloride).

(b) A State shall require community water systems and non-transient, non-community water systems to install and/or use any treatment method identified in § 141.62(a) as a condition for granting a variance except as provided in paragraph (c). If, after the system's installation of the treatment method, the system cannot meet the MCL, that system shall be eligible for a variance under the provisions of section 1415(a)(1)(A) of the Act.

(c) If a system can demonstrate through comprehensive engineering assessments, which may include pilot plant studies, that the treatment methods identified in § 141.62(a) would only achieve a *de minimis* reduction in contaminants, the State may issue a schedule of compliance that requires the system being granted the variance to examine other treatment methods as a condition of obtaining the variance.

(d) If the State determines that a treatment method identified in paragraph (c) of this section is technically feasible, the Administrator or primacy State may require the system to install and/or use that treatment method in connection with a compliance schedule issued under the provisions of section 1415(a)(1)(A) of the Act. The State's determination shall be based upon studies by the system and other relevant information.

(e) The State may require a public water system to use bottled water or point-of-use devices or other means as a condition of granting a variance from the requirements of § 141.61(a), to avoid an unreasonable risk to health.

(f) Public water systems that use bottled water as a condition for receiving a variance from the requirements of § 141.61(a) must meet the following requirements in either paragraph (f)(1) of (f)(2) of this section in addition to requirements in paragraph (f)(3) of this section:

(1) The Administrator or primacy State must require and approve a monitoring program for bottled water. The public water system must develop and put in place a monitoring program that provides reasonable assurances that the bottled water meets all MCLs. The public water system must monitor a representative sample of the bottled water for all contaminants regulated under § 141.61(a) the first quarter that it supplies the bottled water to the public, and annually thereafter. Results of the monitoring program shall be provided to the State annually.

(2) The public water system must receive a certification from the bottled water company that the bottled water supplied has been taken from an "approved source" as defined in 21 CFR 129.3(a); the bottled water company has conducted monitoring in accordance with 21 CFR 129.80(g) (1) through (3); and the bottled water does not exceed any MCLs or quality limits as set out in 21 CFR 103.35, 110, and 129. The public water system shall provide the certification to the State the first quarter after it supplies bottled water and annually thereafter.

(3) The public water system is fully responsible for the provision of sufficient quantities of bottled water to every person supplied by the public water system, via door-to-door bottled water delivery.

(g) Public water systems that use point-of-use devices as a condition for obtaining a variance from NPDWRs for volatile organic compounds must meet the following requirements:

(1) It is the responsibility of the public water system to operate and maintain the point-of-use treatment system.

(2) The public water system must develop a monitoring plan and obtain State approval for the plan before point-of-use devices are installed for compliance. This monitoring plan must provide health protection equivalent to a monitoring plan for central water treatment.

(3) Effective technology must be properly applied under a plan approved by the State and the microbiological safety of the water must be maintained.

(4) The State must require adequate certification of performance, field testing, and, if not included in the certification process, a rigorous engineering design review of the point-of-use devices.

(5) The design and application of the point-of-use devices must consider the tendency for increase in heterotrophic bacteria concentrations in water treated with activated carbon. It may be necessary to use frequent backwashing, post-contractor disinfection, and Heterotrophic Plate Count monitoring to ensure that the microbiological safety of the water is not compromised.

(6) All consumers shall be protected. Every building connected to the system must have a point-of-use device installed, maintained, and adequately monitored. The State must be assured that every building is subject to treatment and monitoring, and that the rights and responsibilities of the public water system customer convey with title upon sale of property.

APPENDIX V

Air Stripping Facility Purchase

for

West Well

Physical Description

of

Air Stripping Facility

Ltr 16 January 1987

6'6" dia x 12' tall fiberglass tower
Delivery: 6-8 Weeks
Installation: 3-5 Days
Installed Cost: $48,000

Phone call from Kiron Senapati 16 March 1987

Blower: 20 HP, 17,000 scfm, 4" Static Pressure
Pump: 30 HP, 700 gpm, 40 psi
Packing: 265 cu.ft.
Change: 2 years Cost: $3,000
Labor: $500
Tank Material: Food Grade Fiber Glass, FDA approved, UV Protection Incorporated

Phone call from Joseph W. Eshelman, Jr., Eshelman Southeastern 16 March 1987

Hypochlorinator System
Capacity: 3 gal/hr. Installed Cost: $900 + $600 = $1,500
NaOCl: $1.50/gallon

RPT10/U3

Estimated Cost

of

Air Stripping Facility

Capital Cost

Stripping Tower	$48,000
Pad, Fence, Electrical and Engineering	15,000
(Based on current unit prices)	
Hypochlorinator	900
Installation of Hypochlorinator	600
Total Capital Cost	$64,500

O & M Costs

Current well pumping time
3264 hrs/yr
Time per year per well with two wells available - Year 1
3264 ÷ 2 = 1632 - 2,000 hrs/year - Year 1

Power for Blower and Repumping
20 HP + 30 HP = 50 HP = 37.3 KW
37.3 KW x 2,000 hrs. x $0.05/KWH = $3,700/year - Year 1
Estimated time per year per well with three wells available - Year 20
365 x 24 x 2/3 = 5,840 - 6,000 hrs/year - Year 20
(Assume 2 pumps running continuously)
37.3 KW x 6,000 hrs x $0.05/KWH = $11,190/yr - Year 20

Pump and Blower O & M
Labor - 500 MH/yr @ $15.00/hr - $7,500/year
Materials and Supplies - $1,000/yr

Hypochlorinator
Time of operation per year - Year 1
2,000 hrs/year ÷ 4 = 500 hrs/year - Year 1
(Average operation at 25% capacity)
Hypochlorite Feed
500 hrs/year at 3 gal/hr = 1,500 gal/yr - Year 1
Cost: 1,500 gal/yr x $1.50/gal = $2,300/year - Year 1
Time of operation per year - Year 20
6,000 hrs/yr ÷ 4 = 1,500 hrs/yr - Year 20
1,500 hrs/year at 3 gal/hr = 4,500 gal/year - Year 20
Cost: 3,800 gal/yr x $1.50/gal = $6,800/year - Year 20
Labor - 100 MH/yr @ $15,00/hr = $1,500/year

Stripping Tower
General Labor - 100 MH/yr @ $15.00/hr = $1,500 year
Media Replacement
Required every 2 years
20 ÷ 2 = 10 times - 1 = 9 replacements
Cost per replacement
$3,000 material + $ 500 - $3,500/replacement
Cost: $3,500 x 9 = $31,500 - Total
$31,500 ÷ 20 = $1,600/year Media Replacement

Chemical Analyses

Trichloroethylene (TCE)

Samples required - Raw water + treated water

Monthly: (1+1) x 12 = 24 samples/year

Cost: $90/sample x 24 = $2,200/year

VOC's plus SOC's

Samples required - Raw water

Quarterly: 1 x 4 = 4 samples/year

Cost: $850/samples x 4 = $3,400/year

O & M Cost Summary

Item	Year 1	Year 20
Power	$ 3,700	$11,200
Pump and Blower O & M		
Labor	7,500	7,500
Materials and Supplies	1,000	1,000
Hypochlorite		
Chemicals	2,300	6,800
Labor	1,500	1,500
Stripping Tower		
General Labor	1,500	1,500
Media Replacement	1,600	1,600
Chemical Analyses		
TCE	2,200	2,200
VOC's and SOC's	3,400	3,400
Total	$24,700	$36,700

APPENDIX VI

Activated Carbon Adsorption Facility Purchase

for

West Well

Physical Description

of

Activated Carbon Adsorption Facility

Ltr 16 March 1987 (Attached)

Installed Cost: $75,000

Phone Call to Ralph Whitesell 16 March 1987

Carbon Replacement Cost: $16,000
Required: Every 2 years

Ltr 11 March 1987 (Attached)

10' Dia x 10' tall carbon steel vessel

Ltr 13 January 1987 to Escambia County Utilities Authority (Attached)

Delivery: 16 Weeks (Can be reduced)
Cost of Carbon Adsorber only: $54,900

CALGON
CALGON CARBON CORPORATION

CALGON CARBON CORPORATION BENCHMARK I BUILDING SUITE 804 13430 NORTHWEST FREEWAY HOUSTON, TX 77040-6071 (713) 690-2000

March 16, 1987

RECEIVED
MAR 17 1987
HENDON ENGR. ASSOC.

Dr. Lloyd Robinson
HENDON ENGINEERING ASSOCIATES
1025 Montgomery Hwy.
Vestavia Hills
Birmingham, Alabama 35216

RE: Budget Estimate
NAS Whiting Field
Milton, Florida (Revised)

Dear Dr. Robinson:

As we discussed, we are revising the cost estimate previously provided in a letter dated March 11, 1987. The estimated cost for a fully installed adsorption system as described in this letter dated March 11 is Seventy-Five Thousand Dollars ($75,000). This estimate has been revised downward after receiving a definitive quotation from our subcontractor located in Pensacola, Florida.

All other information contained in the March 11, 1987 letter remains unchanged. If I may be of further assistance, please do not hesitate to call.

Sincerely,

CALGON CARBON CORPORATION

Ralph Whitesell

Ralph E. Whitesell, P.E.
Technical Sales Representative

REW:lh by LH

CALGON
CALGON CARBON CORPORATION

CALGON CARBON CORPORATION BENCHMARK I BUILDING SUITE 804 13430 NORTHWEST FREEWAY HOUSTON, TX 77040-6071 (713) 690-2000

March 11, 1987

RECEIVED
MAR 13 1987
HENDON ENGR. ASSOC.

Dr. Lloyd Robinson
HENDON ENGINEERING ASSOCIATES
1025 Montgomery Hwy.
Vestavia Hills
Birmingham, Alabama 35216

RE: BUDGET ESTIMATE:NAS WHITING FIELD, MILTON, FL

Dear Dr. Robinson:

As we have discussed by telephone, Calgon is providing Hendon Engineering with a budget estimate for the treatment of a 600 gpm well water supply. The attached Exhibit A details services and equipment which could be provided by Calgon Carbon on a turn key basis. The well water is contaminated with approximately 11 ppb of trichloroethylene. The well is located at NAS Whiting Field in Milton, Florida.

We believe that installation of carbon adsorption equipment is the most cost effective solution for treatment of this well water. As you are aware, carbon has inherent advantages over air stripping technology. The carbon adsorption system will not require repumping of the treated effluent as will air stripping. Additionally, carbon adsorption is a passive treatment technology without the noise created in air stripping. Finally, carbon adsorption technology allows for thermal destruction of the adsorbed contaminants instead of discharge of the contaminants into the atmosphere as is the case with air stripping.

The estimated cost for a fully installed carbon adsorption system as described in Exhibit A is Ninety-five Thousand Dollars ($95,000). Calgon is presently installing similar adsorption equipment for the Escambia County Utilities Authority in Pensacola, Florida.

Attached is a recommended specification (Exhibit B) for your review. Use of this specification will insure that the Navy will receive quotations only from qualified vendors.

If you have any questions, please do not hesitate to call.

Very truly yours,

CALGON CARBON CORPORATION

Ralph E. Whitesell, P.E.
Technical Sales Representative

REW:lh

CALGON

CALGON CARBON CORPORATION P.O. BOX 717 PITTSBURGH, PA 15230-0717 (412) 787-6700 TELEX 671 1837 CCC PGH

Writer's Direct Dial Number
412-787-6738

Ludwig Dyer

January 13, 1987

ESCAMBIA COUNTY UTILITIES AUTHORITY
401 West Government Street
Pensacola, FL 32501

Attn: Mr. Ken Evans

RE: GAC Filter Proj. W-0086-1011

Dear Ken:

In response to your letter dated 1/8/87 to our Mr. V.A. Brunotts concerning treatment facilities for one 500 GPM well, we offer the following:

* One Model 10 adsorber vessel with internal cone; 10' Diam. by 14" straight side identical to vessels previously submitted on our Drawing No. 91-86-0226; complete with inlet deflector, Placite 7156 HAR lining, underdrain nozzles installed and initial charge of 20,000 lbs. of Calgon F-300 carbon. Freight to Pensacola is included.

* Excluded are: off-loading and installation of vessel, all foundation and piping work, all instrumentation and controls, any bonding, insurance or sales tax, and analytical work.

Total Price Delivered: $54,900
Delivery: 16 weeks from drawing approval

I trust this meets your needs and we look forward to being of service. Please call if you have any questions.

Sincerely,

CALGON CARBON CORPORATION

F. X. Stone

Francis X. Stone
Project Manager

RECEIVED
FEB 20 1987
HENDON ENGR. ASSOC.

EXHIBIT A

INSTALLED ADSORPTION SYSTEM

FOR

NAS WHITING FIELD
MILTON, FLORIDA

RESPONSIBILITIES OF CALGON CARBON CORPORATION

Adsorption Vessel

Deliver and install one free-standing 10' Diameter x 10' straight side carbon steel lined adsorption vessel ASME coded for 75 psig capable of treating 600 gpm. Also, included is 6" ductile iron pipe and influent and effluent valves. The adsorption equipment will be tied in to the existing piping. (See Exhibit B for description of the adsorption vessel).

Foundation

Design and pour a 15' x 15' concrete pad for installation of the adsorption vessel.

Fence

Provide and install a 6' high chain link fence around the pad with 7' posts and 3 strands of barbed wire on top. This fence will be tied into the existing chain link fence presently around the pump. The existing 10' gate will be relocated to the front of the adsorption system to allow entry of the Calgon trailer for loading and unloading carbon.

Carbon

Deliver and install 20,000 pounds of Filtrasorb 300 granular activated carbon into the adsorption vessel.

Technical Assistance

Provide operator training, an operating manual, and start-up assistance.

Estimated Cost

of

Activated Carbon Adsorption Facility

Activated Carbon Adsorption Facility
Cost Estimate
NAS Whiting Field, Milton, Florida
17 March 1987

LRR | Project No. 808-15

Capital Cost

10' Dia. Carbon Adsorber Complete	$54,900
Installation, Pad, Fence and Engineering	20,100
(Based on supplier's stated cost for equipment and for total installed cost.)	
Total Capital Cost	$75,000

O & M Costs

Carbon Adsorber O & M
General Labor - 100 MH/yr @ $15.00/hr - $1,500/yr
Media Replacement
Required every 2 years
20 ÷ 2 = 10 times - 1 = 9 replacements
(Supplier's projection)
9 replacements plus ultimate carbon disposal - 9 + 1 = 10
Cost per replacement - $16,000
Cost: $16,000 x 10 = $160,000 - Total
$160,000 ÷ 20 = $8,000/yr Media Replacement
Chemical Analyses
Trichloroethylene (TCE)
Samples required - Raw water + treated water
Monthly: (1 + 1) x 12 = 24 samples/yr
Cost: $90/sample x 24 = $2,200/year
VOC's plus SOC's
Samples required - Raw Water
Quarterly: 1 x 4 = 4 samples/year
Cost $850/sample x 4 = $3,400/year

O & M Summary

Item	Year 1	Year 20
Carbon Adsorber		
General Labor	$ 1,500	$ 1,500
Media Replacement	8,000	8,000
Chemical Analyses		
TCE	2,200	2,200
VOC's and SOC's	3,400	3,400
Total	$15,100	$15,100

R808-FIN.(72)

APPENDIX VII

Estimated Life Cycle Costs

for

West Well

USN Discount Rate

USN Discount Rate

17 March 1987

LRR

Project No. 808-15

Discount Rate Parameters

USN Discount Rate (SouDiv 16 March 1987) - 10.0%
Life Cycle - 20 years

Present Worth Factor

Single Payment: $$PW = \left[\frac{1}{(1+i)^n}\right] = \left[\frac{1}{(1 + 0.10)^{20}}\right] = 0.1486$$

Uniform Series: $$PW = \left[\frac{(1+i)^n-1}{i(1+i)^n}\right] = \left[\frac{(1+0.10)^{20}-1}{0.10(1+0.10)^{20}}\right] = 8.5136$$

Gradient Series: $$PW = \frac{1}{i}\left[\frac{(1+i)^n-1}{i} - n\right]\left[\frac{1}{(1 + i)^n}\right]$$

$$= \frac{1}{0.10}\left[\frac{(1+0.10)^{20}-1}{0.10} - 20\right]\left[\frac{1}{(1+0.10)^{20}}\right] = 55.4069$$

Capital Recovery Factor

Uniform Series: $$CR = \left[\frac{i(1+i)^n}{(1+i)^n-1}\right] = \left[\frac{0.10(1+0.10)^{20}}{(1+0.10)^{20}-1}\right] = 0.1175$$

R808-FIN.(74)

Estimated Life Cycle Cost Comparison

Estimated Life Cycle Cost Comparison
NAS Whiting Field, Milton, Florida
17 March 1987

LRR

Project No. 808-15

CAPITAL COSTS	Air Stripping	Carbon Adsorption
Total Capital Cost	$ 64,500	$ 75,000
Salvage Value	6,500	7,500
Present Worth - Salvage Value	-1,000	-1,100
Present Worth of Facilities	$ 63,500	$ 73,900
Average Annual Capital Cost	$ 7,461	$ 8,683
OPERATION & MAINTENANCE		
Year 1 O & M	$ 24,700	$ 15,100
Present Worth - Year 1 O & M	210,300	128,600
Year 20 O & M	36,700	15,100
Annual Increase	600	0
Present Worth - Annual Increase	33,200	0
Present Worth of O & M	$243,500	$128,600
Average Annual O & M Cost	$ 28,611	$ 15,111
PRESENT WORTH OF ALTERNATIVE	$307,000	$ 202,500
AVERAGE ANNUAL EQUIVALENT COST	$ 36,072	$ 23,794

R808-FIN.(77)

APPENDIX VIII

West Well Testing

Letter From

Florida Department of Environmental Regulation

Officially Notifying NAS of Well Contamination

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

29 PWEP

NORTHWEST DISTRICT

160 GOVERNMENTAL CENTER
PENSACOLA, FLORIDA 32501-5794

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

ROBERT V. KRIEGEL
DISTRICT MANAGER

September 26, 1986

R. A. Kechter
Commander, CEC, USN
Public Works Officer
Naval Air Station
Whiting Field
Milton, Florida 32570

Dear Commander Kechter:

The Department received information by phone on September 25 regarding the recent sampling of the NAS Whiting Field water supply wells done by the Santa Rosa County Health Unit and analyzed by the DHRS Jacksonville Central Lab.

The results showed that benzene was found in the South well at a concentration of 29.6 ug/l and trichloroethylene (PCE)* was found in the West well at a concentration of 7.9 ug/l. The maximum contaminant level (MCL) in Florida Administrative Code Rule 17-22.104(1)(g) for these volatile organics are 3** ug/l for benzene and 3 ug/l for PCE*.

As discussed in our telephone conversation on September 25, the South well shall remain off line and the West well immediately removed from service. These wells shall remain out-of-service until it can be demonstrated that all parameters meet the requirements in Rule 17-22 and/or appropriate treatment is provided.

In our telephone conversation you mentioned your concern regarding adequate water supply for fire protection. I strongly recommend that you immediately develop and implement an extensive water conservation program.

* note: Trichloroethylene is abbreviated TCE.
PCE is Tetrachloroethylene (Perchloroethylene).
** MCL for benzene is actually 1 ug/L. FDR

Protecting Florida and Your Quality of Life

In my letter of August 28, it was requested that you sample each of your potable water wells and take two samples from the distribution system (representative, after blending) for the volatile organics in Rule 17-22.104(1)(g), F.A.C. It was requested that this sampling and analysis be accomplished as soon as possible. In your letter of September 8, it was stated that Southern Division, Naval Facilities Engineering Command, Charleston, South Carolina would be contacting me directly regarding the additional sampling and analysis. I was just contacted by Sonny Chestnut of Southern Division on September 26. It is extremely important that appropriate action be initiated and accomplished in an expeditious and timely manner.

We are extremely interested in the Navy developing plans for an alternate water supply source and/or providing treatment for the existing wells.

If you have any questions on the above, please do not hesitate to call me at 904/436-8380.

Sincerely,

J. A. Kintz, P.E.
Potable Water Engineer

JAK/jkc
cc: Helen Setchfield
Tracey Andreae
D. R. Spell, P.E.
Santa Rosa County Health Unit

Letter From NAS

Requesting Permission to Reactivate the West Well

DEPARTMENT OF THE NAVY
COMMANDING OFFICER
NAVAL AIR STATION
WHITING FIELD
MILTON FLORIDA 32570 5000

11300
Ser 18300/ 0354
Mar 3, 87

Mr. John A. Kintz, P.E.
Potable Water Engineer
State of Florida
Department of Environmental Regulation
Northwest District
160 Governmental Center
Pensacola, Florida 32501-5794

Dear Mr. Kintz:

During a meeting on February 13, 1987 with Mr. Otto Prochaska of DER, Mr. Danny Locklear of NAS Whiting Field, Dr. Lloyd Robinson of Hendon Engineering Associates, Inc., and yourself, we indicated our desire to reactivate the west water well. This well has not been used for water supply since a phone call from your office on 25 September 1986 and a confirming letter dated 26 September 1986 indicated the presence of trichloroethylene in excess of the maximum contaminant level (MCL) of 3 micrograms per liter as specified in the Florida Administrative Code, Chapter 17-22, "Public Drinking Water Systems," Section 17-22.104(1)(g), "Volatile Organics."

Samples taken from the west well on 10 December 1986 after a 20-minute pumping period and on 9 January 1987 after a 45-minute pumping period were analyzed and found to contain only trace amounts of trichloroethylene. It is therefore requested that DER authorize reactivation of this well under the conditions outlined below. Conditional procedures numbers one through four as follows will begin on Monday, March 2, 1987.

1. The well will be pumped to waste daily for a period of 14 days on a pumping schedule approximating the time-of-operation and flow volume during the same time period of the in-service north potable water supply well.

2. At the end of the 14-day period, the west well water will be tested for trichloroethylene.

3. The well will continue pumping to waste for an additional 7 days on the same schedule.

4. The west well water will again be tested for trichloroethylene.

5. If the trichloroethylene concentration of the west well is found to be less than 1 microgram per liter in both samples, and as soon as authorization from DER is received, the well will be reactivated subject to the following conditions:

a. Operate the west well on a regular rotation schedule with the north well.

b. Analyze a sample for trichloroethylene after each 1,000,000 gallons of water is pumped into the water distribution system for a period of 30 days and obtain analytical results within 24 hours. Report findings to DER by phone followed by confirming letter.

c. After 30 days, analyze a sample for trichloroethylene every 2 weeks for a period of 60 days and report as above.

d. After 90 days, analyze a sample for trichloroethylene every 30 days and report as above.

e. Every 90 days, analyze a sample for all regulated organic chemicals and report to DER as soon as the analysis becomes available.

f. Should any sample be found to contain in excess of 2 micrograms per liter of trichloroethylene or exceed any organic chemical MCL, the well will be immediately removed from the distribution system and 1,000,000 gallons pumped to waste.

g. If a sample taken after the above pumping period is found to be within the above limits, the well will be returned to service but the sampling schedule will revert to the sequence described in (b) above.

h. If the sample taken in accordance with (g) above is found to exceed any of the limits set forth in (f), the well will be removed from service until appropriate treatment facilities are installed.

Should you have any questions concerning this request, please contact Mr. Danny Locklear at NAS Whiting Field, (904) 623-7181.

Sincerely,

R. A. KECHTER
Commander, U.S. Navy
By direction of the
Commanding Officer

APPENDIX IX

Technical Specifications

For

Purchase of an Activated Carbon Adsorption System

For

West Well

TECHNICAL SPECIFICATIONS
FOR
DETAILED DESIGN, SUPPLY AND INSTALLATION
OF
AN ACTIVATED CARBON ADSORPTION FILTRATION SYSTEM
FOR
THE WEST WATER SUPPLY WELL
AT
NAVAL AIR STATION WHITING FIELD
MILTON, FLORIDA

POSSIBLE BIDDERS

Arrowhead Industrial Water, Inc.	95 Lower Morrisville Road Fallsington, Pennsylvania 19054
Calgon Carbon Corp.	13430 Northwest Freeway Suite 804 Houston, Texas 77040
CECA, Inc.	4150 South 100th East Avenue Suite 300 Tulsa, Oklahoma 74147
Continental Water Systems	2300 N.W. 71st Place P. O. Box 5038 Gainsville, Florida 32606
Groundwater Technology, Inc.	1514½ 8th Avenue Tampa, Flordia 33605
Hungerford and Terry, Inc.	226 Atlantic Avenue P. O. Box 45 Clayton, New Jersey 08312
ICI Americas, Inc.	Wilmington, Delaware 19897
Met-Pro Corporation	252 Cassell Road P. O. Box 144 Harleysville, Pennsylvania 19438
Westvaco Corporation	Covington, Virginia 24426

SECTION 1 - DESCRIPTION AND GENERAL INFORMATION

1-01. Description

The following specification describes all equipment, materials and services necessary to provide a completely installed Granular Activated Carbon Adsorption System to treat water from the west well at NAS Whiting Field, Milton, Florida and reinject it into the water supply system. The Adsorption System will consist of a single unit and all related appurtenances required for a completely installed and operational system. The total system must be designed for economical carbon usage and ease and completeness of Granular Activated Carbon changeout.

1-02. Scope

(a) The Carbon Adsorption System supplier must take unit responsibility for the completely installed system. The supplier will be responsible for design, fabrication, installation and startup of all mechanical components including, but not limited to, vessels, piping, instrumentation and controls.

(b) The Carbon Adsorption System supplier will also demonstrate the ability to supply, deliver, load and unload, and dispose of the spent carbon by an environmentally approved method. Removal and disposal of the spent carbon must be in accordance with all applicable local, state, and Federal regulations regarding solid waste materials.

(c) The Carbon Adsorption System supplier shall be able to guarantee a supply of virgin grade Granular Activated Carbon and verify the quality of such material with lot analyses of all shipments. This quality shall be in full compliance with the specification herein for Granular Activated Carbon.

(d) The Carbon Adsorption System supplier shall also be able to remove and transport spent Granular Activated Carbon classified as hazardous under RCRA regulations, so that it can be transported to a disposal site or reactivation facility as required.

(e) The Adsorption System will be designed and supplied using materials of construction on the FDA approved list for food grade applications.

1-03. Work Included

(a) The work covered by this specification includes the furnishing and installation of all equipment, materials, carbon and services to comprise a complete Granular Activated Carbon Adsorption System.

(b) System limits for the Granular Activated Carbon Adsorption

System will be defined as beginning at the influent connection for the System and ending with the effluent connection for the System. All equipment between these two points will be provided as part of the complete design by the System supplier.

(c) Specified work items for the Granular Activated Carbon Adsorption System are:

1. One (1) downflow Adsorber including a water collection system and all internals.

2. Influent and effluent piping to the System (8" Ductile Iron) and connecting pipe to tie the adsorption system into the existing water line.

3. Granular activated carbon fill and discharge piping and valves.

4. Integral vent and safety relief piping, water piping and utility connections.

5. 20,000 pounds of Granular Activated Carbon, as specified.

6. Air distribution piping complete with all related appurtenances for properly functioning air system (i.e., filters, drip legs, shut-off valves, etc.), in order to receive air from a compressor and supply it at proper pressure and rate for carbon transfers.

7. Installation within described System limits.

8. Plans and specifications for the System sealed by a professional engineer registered in Florida.

9. Complete set of technical specifications and operating manual.

10. Experienced technical assistance as required.

11. Foundations.

12. Anchor bolts.

13. Temporary air compressor for initial carbon fill.

14. Chain link fence to enclose the Adsorption System.

d. The following work is not covered by this specification and is to be the responsibility of others:

1. Influent supply, effluent disposition and utility water supply.

2. Freeze protection.

3. Clean water for carbon transfer.

4. Flow indicator-totalizer.

SECTION 2 - BID SUBMITTALS

2-01. General Qualification Requirements

In order to insure the supply of a Granular Activated Carbon (GAC) Adsorption System that will be fully effective in meeting effluent requirements for a safe drinking water supply, potential suppliers of said System shall provide the following information with the bid. These submittals shall show the ability to design and supply a GAC Adsorption System in a timely manner, supply GAC media when required, provide safe and legal removal of spent GAC when required and provide ongoing technical support.

2-02. Experience Qualifications

The potential System supplier shall submit the following information on three (3) existing GAC Adsorption Systems which demonstrate the ability to design and supply an effective GAC Adsorption System and meet the qualifications noted above:

(a) Provide GAC Adsortion System description including flow, contact time, System design (flow diagrams of general arrangement), Adsorber sizing.

(b) Provide underdrain design showing ability to remove water across GAC cross-section for effective use of all GAC contained in unit. Water removal shall have a uniform velocity profile across the entire bed.

(c) Provide Adsorption System flow diagram utilizing vessel in Item (a), showing actual flow rates treated.

(d) Provide GAC Adsorption System general arrangement for this site, showing space utilized, influent and effluent locations.

(e) Provide operating weight of GAC Adsorption System for this site.

(f) Provide field tests on Adsorption vessel to verify at least ninety-nine percent (99%) removal of spent GAC so that spent media remaining will not contaminate effluent water. Vessel design shall incorporate the feature to remove carbon without requiring the tank to be opened or cleaned and hosed.

2-04. GAC Adsorption System Process Design

The potential System supplier shall submit the following information with the proposal to exhibit capability for the Adsorption System:

(a) Provide pressure drop information across System.

(b) Provide interpretation of carbon adsorption isotherms to show ability of GAC to remove contaminants and fix dynamic test parameters.

(c) Provide capability to obtain a dynamic pilot simulation of field performance of the proposed System. This dynamic pilot simulation will include a pilot column study conducted on the actual groundwater from the treatment site. The column study will simulate the hydraulic loading rates to be encountered in the full-scale treatment operation. The column study will identify the mass transfer zone for contaminants in this application and identify the carbon utilization rate in a simulation of up to one year's field performance.

(d) Provide analytical procedures used to support Items (b) and (c).

2-05. GAC Supply

The potential System supplier shall demonstrate ability to supply acceptable GAC media, and, therefore, provide the following information with the proposal:

(a) Supply specifications of GAC to be utilized in the System. Show that this GAC is in all respects equivalent to that used in testing (Section 2-04). Provide recent lot analysis that exhibit that GAC supplier is providing media according to published specifications.

(b) Demonstrate ability to supply complete GAC fill in a timely manner upon System completion or notification by client. Demonstrate that inventory of GAC proposed is adequate to meet the initial fill requirements in a timely manner.

(c) Demonstrate ability to transport GAC to site in a reasonable time frame and transfer GAC from delivery units into Adsorber in a safe and timely manner. Provide typical delivery trailer drawings, number of trailers, tractors and drivers currently available. Provide delivery trailer unloading procedures. Provide delivery trailer lining information showing that such lining is on the FDA approved list.

2-06. GAC Reactivation

The potential System supplier shall demonstrate ability to arrange for spent GAC reactivation, so that spent GAC can be removed from the site and reactivated in an enviromentally safe and legally approved manner. Landfill of spent GAC shall not be an approved manner of GAC disposition. The following information shall be required of reactivation capability, and submitted with the proposal:

(a) Provide reactivation testing procedures showing that the spent GAC will be received at the facility and reactivated in an environmentally safe manner.

(b) Spent GAC transportation equipment showing transport of spent GAC is enclosed, DOT approved equipment. Provide transportation equipment drawings and necessary permits to transport hazardous waste.

(c) Ability to transport and receive RCRA manifested material. Provide facility RCRA identification numbers.

(d) The supplier shall submit a health and safety plan for all personnel involved in handling spent carbon.

(e) The supplier shall, to the extent of its negligence, indemnify and hold harmless the owner for any liability that may arise after the spent carbon is loaded into contractor's trailers and signed for by contractor at the owner's facility, provided that the spent carbon contains no PCB, dioxin, DBCP or any other compounds that, due to government regulation, precludes handling the spent carbon in a RCRA approved and permitted facility.

(f) The supplier will provide a certificate of insurance evidencing sudden and accidental pollution liability of insurance in excess of 1 million dollars at the supplier's reactivation site.

2-07. <u>Field Support and Operating Assistance Qualifications</u>

The potential System supplier shall submit the following information exhibiting ability to provide on-going support to the client to insure effective operation of the GAC Adsorption System for the foreseeable future:

(a) Provide resumes of key technical personnel who would be able to consult on process or operational problems, showing their experience on similar applications.

(b) Provide typical analytical programs to assist on-going applications.

(c) Demonstrate ability to provide on-site support to operations. Provide per diem rate for engineering (process) support and technical (operations) support. Provide organization chart showing technical (operations) support groups and resumes of key personnel in this department.

SECTION 3 - FACILITIES TO BE PROVIDED

3-01. Adsorption Vessel

The supplier shall deliver and install one free-standing 10' Diameter x 10' straight side carbon steel lined Adsorption vessel ASME coded for 75 psig capable of treating 600 gpm. Also, included are 8" concrete lined ductile iron pipe and influent and effluent valves. The Adsorption System will be tied in to the existing piping.

3-02. General Layout

A general layout of the proposed Adsorption System is appended to these specifications.

3-03. Foundation

The supplier shall design and pour a 15' x 15' concrete pad or concrete pad and gravel paving for installation of the Adsorption vessel.

3-04. Fence

The supplier shall provide and install a 6' high chain link fence around the pad with 7' posts and 3 strands of barbed wire on top. This fence will be tied into the existing chain link fence presently around the pump. The existing 10' gate will be relocated to the front of the Adsorption System to allow entry of a trailer for loading and unloading carbon.

3-05. Carbon

The suppler shall deliver and install 20,000 pounds of Filtrasorb 300 Granular Activated Carbon, or equal, into the Adsorption vessel.

3-06. Technical Assistance

The supplier shall provide:

(a) Construction plans and specifications for the facilities to be provided. Said plans and specifications shall be sealed by a professional engineer registered in the State of Florida.

(b) Operator training.

(c) An operation and maintenance manual.

(d) Start-up assistance.

(e) Process verification testing.

3-07. Time of Completion

The supplier shall complete installation of all facilities and have them ready for use and testing within eight (8) weeks of contract award.

SECTION 4 - POST AWARD SUBMITTALS

Upon award of the contract, the GAC Adsorption System supplier shall submit the following information in the time and manner specified. Information provided by the supplier that is considered by the supplier to be confidential in nature must be clearly marked and so designated.

4-01. Initial Submittal

(a) Project schedule indicating submittals, equipment delivery, installation and start-up.

(b) Flow schematic drawing indicating line sizes, valving, utility lines sizes and connections.

(c) Vessel shop or fabrication drawings.

(d) Shop inspection procedure and schedule.

(e) Equipment arrangement and weights - detailed drawing(s) and listing of all required anchor bolts and nuts and a dimensional setting plan to conform to the requirements of the furnished equipment.

(f) Piping arrangement drawings and plans and elevations including detail and location of required interface connections sealed by a professional engineer registered in the State of Florida.

(g) Bill of materials for all supplied equipment.

(h) List of any extra materials or supplies supplied with equipment.

(i) List of spare parts to be furnished.

(j) List of any special tools required.

(h) Equipment tagging and identification.

4-02. Intermediate Submittal

Four (4) weeks after return of approved first submittal, the following submittals shall be made:

(a) Operating and maintenance manual incorporating all necessary information from previous submittal. Operating section shall include complete instruction on unloading spent carbon and loading fresh virgin grade carbon, including any auxiliary utilities required.

(b) Names, functional titles, addresses and phone numbers of technical personnel available for on-going technical support.

4-03. Start-up

The facilities shall be ready for start-up and testing eight (8) weeks after contract award.

4-04. Final Submittal

Four (4) weeks after start-up and final system acceptance the following submittals shall be made:

(a) Complete set of reproducible drawings and final bill of materials.

(b) Manufacturer's data sheet for Adsorber vessel.

SECTION 5 - PROCESS DESCRIPTION

5-01. General Description of Process

The Adsorption System utilizes Granular Activated Carbon (GAC) for efficient removal of dissolved organic compounds from water intended for potable use. Adsorption is a physical process in which the compounds adhere to the surface of the carbon particle. The large surface area contained within the internal pore structure of the granular carbon particle provides the Carbon Adsorption System with a substantial capacity for the organic compounds to be removed. The Adsorption System provides effective exposure of the contaminated water to a quantity of Granular Activated Carbon.

5-02. Technical Requirements

The Contractor shall furnish and install one (1) GAC Adsorption System designed and sized with a capacity to continuously provide:

(a) Treatment requirements:

1. Maximum anticipated TCE concentration of raw water - 11 ug/L.

2. Design capability for maximum TCE concentration of raw water - 22 ug/L.

3. Required maximum concentration level (MCL) of water treated by GAC prior to addition of disinfection and stability chemicals - 1 ug/L TCE.

(b) Water flow capacity:

1. 600 gallons per minute (gpm) or 0.864 million gallons per day (MGD).

2. Maximum pressure drop across the entire Adsorption System shall not exceed 10 psig during normal operation.

5-03. Adsorber System Configuration

The Granular Activated Carbon Adsorption System will consist of one (1) process vessel (Adsorber) operated in a downflow mode. The Adsorber will contain twenty thousand pounds (20,000#) of Granular Activated Carbon (GAC). Water will be conveyed to the Adsorption System from the source, will enter the vessel at the top and flow downward through the carbon bed. An internal collector system shall be provided to collect the treated water and retain the granular media in the bed. The treated water will be discharged from the system through the effluent piping.

5-04. Carbon Contact Requirements

The Adsorption System design will provide for a contact time of eight and nine-tenths minutes (8.9) at a flow of 600 gpm through the Adsorber vessel. The contact time is calculated on a "superficial" or "empty bed contact time" basis. The pressure drop across the entire Adsorption System (within System Limits) is limited to 10 psig during normal operation.

5-05. Carbon Replacement

When the carbon vessel becomes saturated with contaminants adsorbed from the water, the vessel will be taken out of service to replace the spent Granular Activated Carbon with virgin grade Granular Activated Carbon. The vessel will be pressurized with compressed air and the spent carbon displaced into a transfer tank or receiving trailer. The bottom of the carbon bed shall be contained in a coned section, so that nearly complete removal of the spent carbon will be possible in a single step. Fresh carbon can be transferred as a slurry from a delivery container to the empty Adsorber utilizing air pressure. Carbon transfer shall be accomplished hydraulically in slurry form and without human contact, in a closed loop piping system, in order to minimize environmental exposure. Supplier must demonstrate that following removal of spent carbon there would be less than five (5) cubic feet of material remaining in the adsorber.

5-06. Disposal of Spent Carbon

Disposal of spent carbon must be performed in an environmentally safe manner. If the carbon is to be reactivated, it must be accomplished in a facility permitted to accept RCRA manifested material. If unsuitable for reacivation and reuse, the Carbon Adsorption System supplier shall assist the owner in the proper disposition. Therefore, a Procedure for Qualification of Materials to RCRA permitted TSDF, should be made available.

SECTION 6 - EQUIPMENT DESCRIPTION

6-01. Adsorber Vessel

(a) Vessel Configuration

The Adsorber shall be a vertical cylindrical pressure vessel with an elliptical top head. The Adsorber shall be designed such that the GAC is contained in a bottom cone (minimum 45°) such that it can be easily discharged when spent. The vessel shall be designed, constructed and stamped in accordance with the ASME Code, Section VIII for a design pressure rating of 75 psig at 150°F. The vessel shall be equipped with two (2) manways, one located on the top head and the other on the straight side. All nozzle connections must be flush on the inside of the shell and provided with 150 pound full face flanges on the outside.

(b) Vessel Surfaces

The Adsorber shall be constructed of carbon steel and shall have all welds and any other sharp edges ground smooth, and all imperfections such as skip welds, delaminations, scabs, slivers and slag corrected prior to abrasive blasting. The Adsorber internal surface shall be blasted to a white metal surface (SSPC-SP5) to provide an anchor pattern in the metal corresponding to approximately 20% to 25% of the film thickness of the coating. The exterior of the Adsorber shall be sandblasted to a commercial blast cleaning (SSPC-SP6).

(c) Vessel Lining

The interior of the Adsorber vessel shall be lined in order to prevent corrosion that will occur when wet GAC is in contact with carbon steel. This lining shall exhibit abrasion-resistant qualities to prevent erosion by movement of the granular media. A coating shall be used which exhibits excellent chemical resistance to a wide range of water solutions, and meets requirements of the U. S. Federal Register, Food and Drug Regulations Title 21, Chapter 1, Paragraph 175.300.

(d) Exterior Finish

Following sandblasting of the exterior, a rust inhibitive primer shall be applied to a dry film thickness of 3.0 mil before any rust can form. The finish exterior painting of an alkyd resin based paint for outside service must be applied to the exterior of the Adsorber before rust can form beneath the primer coat.

6-02. Underdrain Collection System

There shall be a collection system at or near the bottom of the carbon bed to collect treated water across the carbon bed cross section. The water velocity profile across the diameter of the bed shall be uniform in the downward direction at the underdrain location. The collection device(s) shall have slots of a determined width to retain the Granular Activated Carbon and allow free passage of treated water with a minimum of pressure drop. The treated water is to be collected by this system and discharged from the vessel to convey the treated water to the effluent pipe. In no case will material other than Granular Activiated Carbon, i.e., sand or gravel, be installed inside the vessel to assist treated water collection.

6-03. Piping Network

A process piping network shall be provided for the Adsorption System that will enable the following functions to be performed:

(a) Treatment - Under normal operation, the full flow of 600 gpm shall be accepted at the System limits and directed to the unit.

(b) Carbon Exchange - During carbon exchange, the Adsorber being exchanged shall be isolated completely from the potable water system with valving on influent and effluent lines. The process flow shall be discontinued.

6-04. Process and Utility Piping

(a) Pipe Sizes

The process and utility piping to the Adsorption System shall be eight-inch (8") for both influent water to the System and treated water from the System. Adsorber vent lines shall be three inches (3") and Granular Activated Carbon supply and discharge piping shall be four-inch (4). The vessel shall have independent vent, carbon fill and discharge lines.

(b) Pipe Materials

1. In general, all metal pipe 4-inches in diamter and larger shall be ductile iron pipe and all pipe 3½-inches in diameter or smaller shall be galvanized steel pipe.

2. Ductile iron pipe with flanged joings shall conform to the requirements of ANSI Specification A21.15 and shall be suitable for a minimum working pressure of 250 psi. Flanges shall conform to the requirements of ANSI Specification A21.15.

3. Fittings for flanged ductile iron pipe shall be of ductile iron. Flanged fittings shall conform to the requirements of ANSI/AWWA Specifications C110 and shall be suitable for a working pressure of 250 psi. Flanges shall conform to the requirements of ANSI/AWWA Specification C110.

4. All ductile iron pipe and cast and ductile iron fittings shall have a cement-mortar lining of standard thickness conforming to the requirements of ANSI Specification A21.4.

5. Flanged joints on ductile iron pipe shall be joined with bolts and nuts conforming to the chemical and mechanical requirements of ASTM Specification A307, Grade B. Bolts and nuts shall be hexagonal. Bolts and nuts shall be threaded in accordance with American National Standard B1.1 for Screw Threads-Coarse Thread Series, Class 2A, external, and Class 2B, internal. Gaskets shall be full face, of first quality red rubber, 1/8-inch thick.

6. Steel pipe shall have screwed joints and shall be standard strength unless otherwise shown on the plans. Steel pipe shall be hot-dipped galvanized and shall conform to the requiremnts of ASTM Specification A120. Fittings for steel pipe shall be banded standard screwed fittings made of malleable iron or cast steel and shall be galvanized. Fittings shall conform to current ANSI specifiations for 150 psi pressure.

7. GAC discharge piping to and including the shut-off valve and fittings shall be polypropylene lined steel per Dow Chemical Company's MORAF PPL brand, rated at 150 psig to 225°F. Piping shall be Schedule 40, ASTM A53 steel pipe with 125 pound ASTM A126, Class A cast iron flanges and fittings.

8. Compressed air piping (1½") shall be threaded, Schedule 80 galvanized carbon steel pipe per ASTM A120, rated for 125 psig at 350°F. for air service. Air supply to the GAC Adsorption System shall be via a single point connection.

9. The exterior of the piping shall be cleaned to a power tool grade (mechanical grade) and a rust inhibitive alkyd metal primer shall be applied before any rust can form. A finish exterior painting of an alkyd resin based paint for outside service must be applied to the exterior of the piping before rust can form beneath the primer coat. The interior of the water piping shall be thoroughly cleaned and disinfected prior to introduction of potable water through the system.

(c) Butterfly Valves

The process and utility piping, excluding GAC fill and discharge piping shall be equipped with butterfly valves for flow control purposes.

1. Butterfly valves shall be tight closing, stainless steel to rubber type with seal achieved by rubber seats which are bonded to or mechanically retained in the valve body, or rubber seats which are retained on the disc with an 18-8 stainless steel clamp ring and stainless steel bolting. Valves shall be bubble-tight at rated pressures with flow in either direction, and shall be satisfactory for applications involving throttling service and/or frequent operation and for application involving valve operation after long periods of inactivity. Valve discs shall rotate 90 degrees from the full open position to the tight shut position. Butterfly valves shall meet the full requirements of AWWA Specification C504, Class 150B. Butterfly valves shall be as manufactured by the Henry Pratt Co., BIF Unit of General Signal Corp., American Valve & Mfg., or approved equal.

2. Valve bodies shall be constructed of cast iron ASTM A126, Class B, and shall have integrally cast mechanical joint ends or flanged ends. Unless otherwise shown on the plans, butterfly valves installed underground shall have mechanical joint ends and exposed valves shall have flanged ends. Mechanical joints shall conform to the requirements of ANSI Specification A21.11. Flanged joints shall conform to the requirements of ANSI/AWWA Specification C110. Two trunnions for shaft bearings shall be integral with each valve body. Where the rubber seat is mounted on the vane, the valve body shall be fitted with a 360 degree stainless steel seat offset from the shaft, mechanically retained.

3. Valve discs shall be constructed either of alloy cast iron ASTM A436, Type 1 (NiResist) or of ductile iron ASTM A536, Grade 65-45-12. Where the rubber seat is mounted in the body, the mating edge of the disc shall be 18-8 stainless steel, Type 304 or Type 316.

4. Valve shafts shall be turned, ground, and polished. Shafts shall be constructed of 18-8 Type 304 stainless steel and shall be either a one piece unit extending full size through the valve disc and valve bearing, or may be the stub shaft design where solid ductile iron disc is used.

5. Valve seats shall be of natural rubber or synthetic rubber compound. Seats may be installed on the valve disc or valve body. Seats installed in valve bodies

may be vulcanized to the body or mechanically retained. Seats vulcanized to the valve body shall be simultaneously molded in, vulcanized, and bonded to the valve body and seat bond shall withstand a 75-pound pull under test procedure ASTM D429, Method B. Valve seats which are mechanically retained shall be field adjustable and replaceable without dismounting the valve disc or shaft and without removing the valve from the line. Retaining segments and adjusting devices shall be of corrosion resistant materials and shall be capable of a 1/8-inch adjustment.

6. Valve bearings shall be of the sleeve type which are corrosion resistant and self-lubricating. Bearing load shall not exceed 1/5 that of the compressive strength of the bearing or shaft material and shall not exceed 2,500 psi.

7. Valve interior surfaces, except seating surfaces, shall be evenly coated with a suitable primer to inhibit rust or a black asphalt varnish.

8. Hydrostatic and leakage tests shall be conducted on butterfly valves in accordance with AWWA Specification C504, Section 13.

9. Valve operators shall be suitable for underground service and shall be fully gasketed, grease packed, watertight, and shall be provided with extension stem and operating nut, cast iron valve box, and tee wrench for opening and closing valves. Valves shall close in a clockwise rotation of the stem.

(d) Valves on GAC Lines

Valves on the GAC fill and discharge pipe shall be TFE lined, ductile iron body plug valve per Duriron Durco T-Line or equal.

(e) Valving for the compressed air supply shall be bronze or forged brass or barstock brass body regular port ball valves, rated for 500 psig at 100°F.

(f) Transfer hose Connectors

The Granular Activated Carbon piping shall be fitted with hose conectors, such that carbon transfer to and from the Adsorber vessel can be facilitated with transfer hoses. These connectors shall be 4" Quick Disconnector Adapters constructed of 304 stainless steel as manufactured by OPW Division of Dover Corporation as Kamlock Part No. 633-F or equal.

(g) Flush Connections

Two flush connections shall be provided on each GAC fill or discharge line, one upstream and one downstream of the plug valve. Connections shall be welded into steel pipe or supplied in solid polypropylene "spacers" for lined pipe. Flush connections shall consist of a short section of 3/4" quick disconnect adapter to match with water hose.

(h) Pressure Relief

A pressure relief device shall be provided, with relief capacity as required by ASME Code and hydraulic system analysis. Relief venting shall be integral to Adsorption System piping and directed to a common collection point.

(i) Pressure Gauges

The process piping shall be equipped with pressure gauges to indicate the pressure of water entering and exiting the Adsorber to provide information on pressure drops across the Adsorber. The pressure indicating gauges shall be 4½" (face diameter size) with a stainless steel boudon tube in a glycerin filled housing. The gauges shall read 0-100 psig with an accuracy of 1% of full range, and shall be a Weksler AS44P - liquid fill or equal.

SECTION 7 - GRANULAR ACTIVATED CARBON

7-01. Quantity

Twenty thousand (20,000) pounds of Granular Activated Carbon shall be provided and installed within the Adsorber vessel.

7-02. Quality

The Activated Carbon shall be virgin, granular and manufactured from bituminous coal. The Activated Carbon shall be Calgon Filtrasorb 300 or equal and conform to the following specifications:

(a)	Iodine Number (minimum)	900
(b)	Abrasion No. (minimum)	75
(c)	Effective Size	0.8 - 0.9 mm
(d)	Screen Analysis	
	on 8 mesh (maximum %)	15
	through 30 mesh (maximum.%)	4
(e)	Water soluble Ash (maximum %)	1
(f)	Total Ash (maximum %)	15
(g)	Moisture, as packed (maximum %)	2
(h)	Total Phosphate, as PO_4 (maximum %)	3

7-03. Analysis

The delivered GAC must be accompanied by an analysis sheet certifying compliance with the specifications.

SECTION 8 - SERVICES PROVIDED

8-01. Documents

(a) The supplier shall provide a complete set of engineering drawings and equipment specifications sealed by a professional engineer registered in the State of Florida for installation and maintenance purposes.

(b) The supplier shall also provide a System operating and maintenance manual.

8-02. Start-up Assistance

The supplier will provide the services of a field engineer who will be responsible for inspection of the GAC Adsorption System, mechanical trouble-shooting, system start-up and operator training.

8-03. Demonstration Testing

The supplier will provide the services of a monitoring coordinator during a two week demonstration period after System start-up.

(a) Testing Parameters:

The scheduling of the demonstration test will be as requested by the owner. The monitoring coordinator will be responsible for assuring the proper collection, storage, handling, packaging and shipment of the appropriate liquid samples as specified by the appropriate analytical methods, training of plant operators in completing these tasks, checking System flows and pressure readings, and aiding in the interpretation of operational and analytical data. The supplier will prepare a demonstration report which will include System flow rates, pressure readings, observations of operators, interpretation of laboratory results, and any other information pertinent for evaluating the Adsorption System.

(b) Testing:

The well will be operated at about 600 gpm for the demonstration test. System flows, pressures and totalizer readings will be checked daily over the two week test period by the supplier. At least 7 start up and shut down cycles will be made in the two week test period by the owner. Grab samples will be collected according to EPA Method 601* with

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* Methods for Organic Chemical Analysis of Municipal and Industrial Water, 40 CFR 136, Appendix A added by 49 FR 43250, October 26, 1984.

hermetic seals maintained until time of analysis. The supplier will originate chain-of-custody forms to accompanying the samples. Each sample shall be analyzed for trichloroethlene (TCE).

(c) Sample frequency:

The frequency of sample collection during each demonstration test will be conducted in accordance with the following schedule:

1. Day 2 (day after start-up) - influent, effluent.

2. Day 6 - effluent.

3. Day 10 - effluent.

4. Day 14 - influent, effluent.

(d) Sampling:

Influent samples to be collected from a tap near the well head. Effluent samples will be collected from the Adsorber effluent sampling tap. The owner reserves the right to collect samples on a more frequent basis if he so desires.

(e) Repeat samples:

If the acceptance standard described below is exceeded by any one sample, an additional sample will be collected. The supplier will then be responsible for submitting this additional sample to a certified laboratory for analysis by EPA Method 601. Any discrepancies shall be resolved by submitting an additonal sample to another independent certified laboratory.

(f) Performance requirements:

Analysis of TCE will be to a detection level of 0.5 ug/L. The treatment system will operate to produce a treatment level of 1.0 ug/L or less in the effluent from the Adsorption vessel. Exceedance of 1.0 ug/L shall be determined by the average of three consecutive combined flow samples from the Adsorption vessel including any additional samples collected in accordance with the confirmation procedures described above. If the 1.0 ug/L acceptance standard is exceeded, the supplier shall then make all necessary modifications including replacement of activated carbon if required, to bring the System into compliance. The supplier, once the System is brought into compliance, shall repeat the entire 14 day testing period at the supplier's expense.

SECTION 9 - WARRANTIES

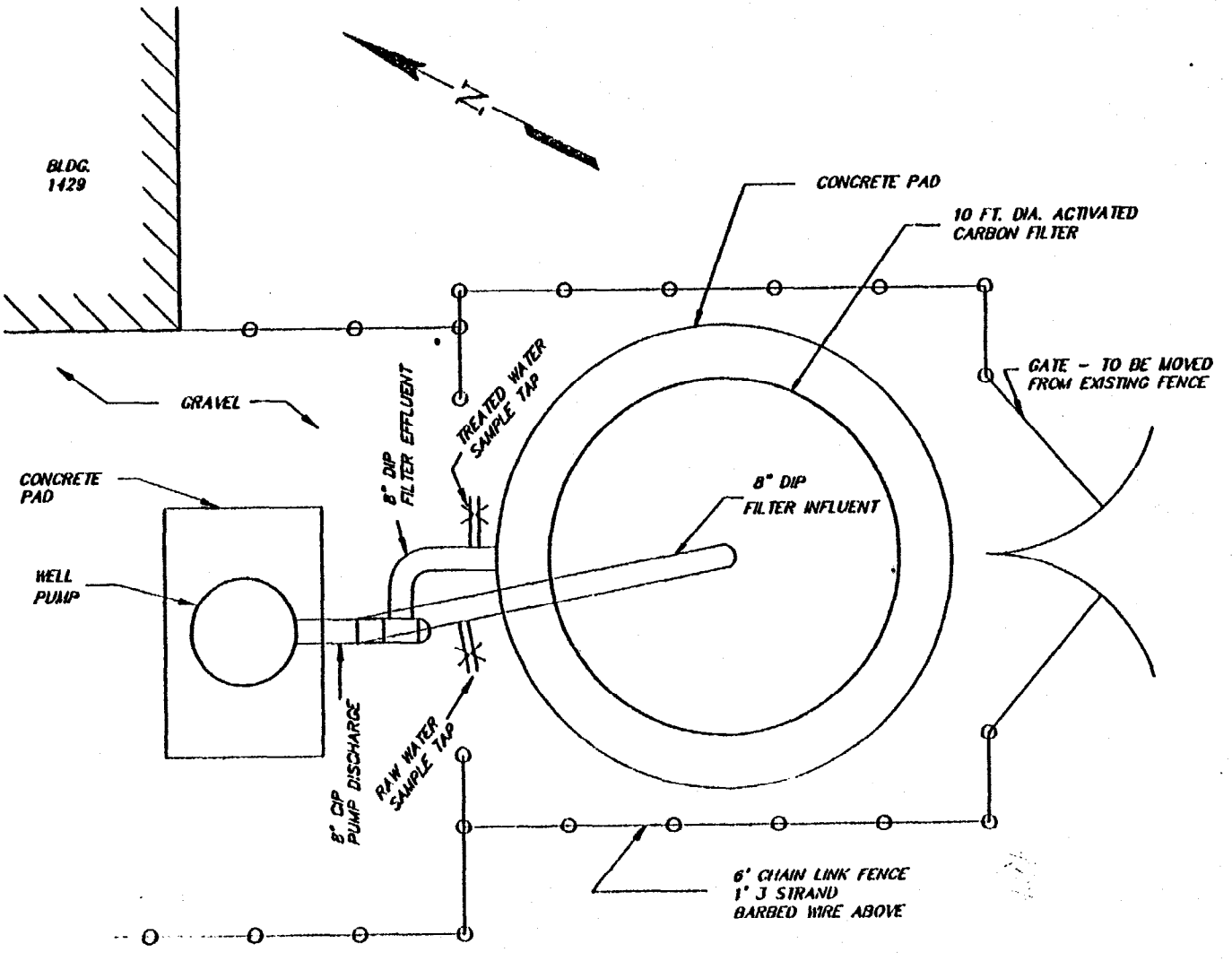
9-01. Equipment Warranty

The supplier will warrant the system to be free from defects in materials and workmanship for one (1) year from owner acceptance.

9-02. Performance Warranty

The supplier will warrant the system to meet the discharge criteria embodied in Section 6-03, Demonstration Testing, for the demonstration period.

RPT10/Y



PROPOSED ACTIVATED CARBON ABSORPTION SYSTEM

WEST WELL

NAS WHITING FIELD
MILTON, FLORIDA

APPENDIX X

Permit for Activated Carbon

Adsorption Facility

for

West Well

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

NORTHWEST DISTRICT
160 GOVERNMENTAL CENTER
PENSACOLA, FLORIDA 32501-5794

BOB MARTINEZ
GOVERNOR
DALE TWACHTMANN
SECRETARY
ROBERT V. KRIEGEL
DISTRICT MANAGER

PERMITTEE:

J. D. Mac Farquhar

I.D. Number: 1570489
Permit/Certification Number: WC57-137136
Date of Issue: SEP 14 1987

Expiration Date: September 1, 1988
County: Santa Rosa
Latitude/Longitude: 30°41'57"N/87°01'35"W
Section/Township/Range: N/A
Project: Granular Activated Carbon (GAC) Absorption System for the West Well

This permit is issued under the provisions of Chapter 403.861, Florida Statutes, and Florida Administrative Code Rules 17-4 and 17-22. The above named applicant, hereinafter called Permittee, is hereby authorized to perform the work or operate the facility shown of the application and approved drawing(s), plans, and other documents attached hereto or on file with the department and made a part hereof and specifically described as follows:

Install a granular activated carbon (GAC) absorption system on the West Well of the public water system owned and operated by the Naval Air Station Whiting Field (PWS ID No. 1570489) for the removal of trichlorethylene (TCE) and other volatile organic contaminants (VOCs). Also included are other necessary valves, fittings and appurtenances.

The installation shall be in accordance with the approved plans and specifications as prepared and submitted by E. F. Hubacker, P.E.

Protecting Florida and Your Quality of Life

PERMITTEE:

J. D. Mac Farquhar

I.D. Number: 1570489
Permit/Certification Number: WC57-137136
Date of Issue: SEP 14 1987

Expiration Date: September 1, 1988

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth herein are "Permit Conditions", and as such are binding upon the permittee and enforceable pursuant to the authority of Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is hereby placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of the "Permit Conditions" by the permittee, its agents, employees, servants or representatives.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the department.

3. As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Nor does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit does not constitute a waiver of or approval of any other department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute state recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the state. Only the Trustees of the Internal Improvement Trust Fund may express state opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, plant or aquatic life or property and penalties therefor caused by the construction or operation of this permitted source, nor does it allow the permittee to cause pollution in contravention of Florida Statutes and department rules, unless specifically authorized by an order from the department.

6. The permittee shall at all times properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by department rules.

PERMITTEE:

J. D. Mac Farquhar

I.D. Number: 1570489
Permit/Certification Number: WC57-137136
Date of Issue: SEP 14 1987

Expiration Date: September 1, 1988

GENERAL CONDITIONS:

7. The permittee, by accepting this permit, specifically agrees to allow authorized department personnel, upon presentation of credentials or other documents as may be required by law, access to the premises, at reasonable times, where the permitted activity is located or conducted for the purpose of:

a. Having access to and copying any records that must be kept under the conditions of this permit;

b. Inspecting the facility, equipment, practices, or operations regulated or required under this permit; and,

c. Sampling or monitoring any substances or parameters at any location reasonably necessary to assure compliance with this permit or department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately notify and provide the department with the following information:

a. A description of and cause of noncompliance; and

b. The period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance.

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the department for penalties or revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source, which are submitted to the department, may be used by the department as evidence in any enforcement case arising under the Florida Statutes or department rules, except where such use is prescribed by Sections 403.73 and 403.111, Florida Statutes.

PERMITTEE:

J. D. Mac Farquhar

I.D. Number: 1570489
Permit/Certification Number: WC57-137136
Date of Issue: SEP 14 1987

Expiration Date: September 1, 1988

GENERAL CONDITIONS:

10. The permittee agrees to comply with changes in department rules and Florida Statutes after a reasonable time for compliance, provided however, the permittee does not waive any other rights granted by Florida Statutes or department rules.

11. This permit is transferable only upon department approval in accordance with Florida Administrative Code Rules 17-4.12 and 17-30.30, as applicable. The permittee shall be liable for any noncompliance of the permitted activity until the transfer is approved by the department.

12. This permit is required to be kept at the work site of the permitted activity during the entire period of construction or operation.

13. The permittee shall comply with the following monitoring and record keeping requirements:

a. Upon request, the permittee shall furnish all records and plans under department rules. The retention period for all records will be extended automatically, unless otherwise stipulated by the department, during the course of any unresolved enforcement action.

b. The permittee shall retain at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation), copies of all reports required by this permit, and records of all data used to complete the application for this permit. The time period of retention shall be at least three years from the date of the sample, measurement, report or application unless otherwise specified by department rule.

c. Records of monitoring information shall include:

- the date, exact place, and time of sampling or measurement;
- the person responsible for performing the sampling or measurement;
- the date(s) analyses were performed;
- the person responsible for performing the analyses;
- the analytical techniques or methods used; and
- the results of such analyses.

PERMITTEE:

J. D. Mac Farquhar

I.D. Number: 1570489
Permit/Certification Number: WC57-137136
Date of Issue: SEP 14 1987

Expiration Date: September 1, 1988

GENERAL CONDITIONS:

14. When requested by the department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the department, such facts or information shall be submitted or corrected promptly.

SPECIFIC CONDITIONS:

15. To insure maintenance/operator personnel safety, Permittee shall affix permanent sign, or paint on the filter body shell near the access manway, a restricted sign with the following legend:

WARNING

DO NOT ENTER WITHOUT
AIR SUPPLY MASK OR
SELF CONTAINED BREATHING
APPARATUS. INTERIOR DOES NOT
CONTAIN ADEQUATE OXYGEN
ATMOSPHERE TO SUSTAIN LIFE

The sign is to be in contrasting safety colors: Yellow - Black - Red.

16. Permittee shall submit to the Department for review and approval within forty-five (45) days after issuance of this permit, a comprehensive operators/maintenance manual whose contents shall include:

a. Description of system operations.
b. Filter unit operating sequence procedures to startup, operate, back flush and drain.
c. Specifications for activated carbon media.
d. Procedures for filling new media in the vessel.
e. Procedures for removing spent media from the vessel.

17. Modified Water supply facilities, including mains, shall be installed, cleaned, disinfected, and bacteriologically cleared for service in accordance with the latest applicable AWWA standards and Department rules and regulations.

18. For initial filter startup, analysis and thereafter, when filter media is changed, the well shall pump thru the filter to the storm sewer for two (2) hours prior to taking samples.

PERMITTEE:

J. D. Mac Farquhar

I.D. Number: 1570489
Permit/Certification Number: WC57-137136
Date of Issue: SEP 14 1987

Expiration Date: September 1, 1988

SPECIFIC CONDITIONS:

19. A request to clear the system for the initial operation startup shall be submitted to the Department for approval within thirty (30) days of completion of construction, testing and disinfection.

This approval will be granted upon:

a. Receipt of certification by a registered professional engineer as to construction in accordance with the approved plans and specifications and compliance with Section 17-22.106, Florida Administrative Code; and,

b. Receipt of two (2) TCE analysis sets from the filter made at 4 hour intervals (with treated water product still flushed to waste) with resulting treated water product TCE level is equal to or less than 1.8 ug/l.

20. Conditions 18 and 19 shall be repeated for the filter body before putting the filter into service and after each change of GAC materials or if the test results from Specific Condition 19.b. exceed 1.8 ug/l. Under no circumstances will treated water that exceeds 2.8 ug/l be introduced into the potable water distribution system.

21. Permittee shall sample influent and effluent from the filter for TCE. Five sample taps are to be provided on each filter. These are to be installed at 0.45, 56, 67 and 100% of the carbon bed depth. (Influent to filter is at the top and corresponds to 0% level of bed depth).

a. <u>During Initial Start-up and Test Period</u>

Day 1. Influent and plant effluent between two and four hours after flow established.

Day 2. Common influent and 45% tap and 100% tap on the filter.

Day 4. 100% tap on the filter.

Day 6. 45% and 100% taps on the filter.

Day 9. 100% tap on the filter.

Day 12. 100% tap on the filter.

Day 14. Common influent and 45% and 100% taps on the filter.

PERMITTEE:

J. D. Mac Farquhar

I.D. Number: 1570489
Permit/Certification Number: WC57-137136
Date of Issue: SEP 14 1987

Expiration Date: September 1, 1988

SPECIFIC CONDITIONS:

21. (continued)

b. <u>During Routine Operation</u>

Every 2 weeks - influent and effluent.

Every 4 weeks - 45% tap on the filter.

This schedule is based on previously reported VOCs in the influent and is subject to adjustment based on results reported. The four-week sampling on the filter shall be moved to the next lower tap when break-through is detected.

Bacteriological analyses shall be taken concurrently with the above sampling.

The effluent (product) TCE data results shall be plotted or mathematically analyzed to statistically predict when the carbon should be removed and replaced based on gallons of water treated or calendar days of usage. As soon as the common effluent (product) water TCE level reaches a value of 1.8 ppb the routine sampling shall be increased to one per week. The Department shall be notified and consulted in order to review and approve the final stage sampling and test program.

Sampling and testing shall be in accordance with EPA Methods 601, 602 and 6234. Testing shall be performed at a laboratory certified by the Department of Health and Rehabilitative Services to perform drinking water analysis.

22. Upon receipt of effluent samples with TCE levels greater than or equal to 2.8 ug/l, the filter shall be taken out of service.

23. All P.V.C. pipe used in the distribution system shall bear the N.S.F. logo and shall meet all AWWA C-900-75 standards for 4"-12" diameter pipe.

24. The Department shall be notified and prior approval shall be obtained of any changes or revisions made during construction.

25. Permittee shall ensure that engineer provides contractor with instructions and field sketches detailing locations where concrete encased potable water pipe is required.

26. Permittee shall ensure that engineer provides location and detail of thrust and anchor blocks on potable water distribution system.

PERMITTEE:

J. D. Mac Farquhar

I.D. Number: 1570489
Permit/Certification Number: WC57-137136
Date of Issue: SEP 14 1987

Expiration Date: September 1, 1988

SPECIFIC CONDITIONS:

27. Permittee shall use necessary erosion control measures during and after construction and shall remove all construction debris prior to project completion. In addition, all surfaces disturbed by construction shall be recontoured to final grades prior to project completion. It is noted that the permit does not constitute the Department's review or approval of the stormwater aspects of the project.

28. Permittee will instruct the contractor to remove all surplus material and completely restore to good conditions, all surfaces disturbed, destroyed or removed by the contractor, or his agent, on account of construction. Before final inspection is made, all surfaces disturbed on account of this construction shall be leveled up and all surplus material and rubbish incident to the construction must be removed and disposed of and streets, ditches, sidewalks, crossings, railroad, grass plots and other property affected by the construction shall be left in good and acceptable condition.

29. Permittee shall ensure that paints and protective coatings to be used on this project which will come into contact with potable water as outlined in Florida Administrative Code Rule 17-22.106(3)(b) has EPA specific approval which details any limitations. Questions as to whether a particular paint or protective coating is on the latest EPA official listing of acceptable drinking water additions can be directed to the District Potable Water Engineer at (904)436-8380. It will be necessary to provide the product name and company name when inquiring.

Expiration date:

September 1, 1988

Issued this 14th day of Sept, 1987.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

Robert V. Kriegel
District Manager

APPENDIX XI

As-Built Life Cycle Costs

for

West Well

Air Stripping Facility

Air Stripping Facility
Updated Cost Estimate
NAS Whiting Field, Milton, Florida
12 January 1988

LRR | Project No. 808-15

Capital Cost

Stripping Tower	$48,000
Pad, Fence, Electrical and Engineering	15,000
(Based on current unit prices)	
Hypochlorinator	900
Installation of Hypochlorinator	600
Total Capital Cost	$64,500

O & M Costs

Current well pumping time
3264 hrs/yr
Time per year per well with two wells available - Year 1
3264 ÷ 2 = 1632 - 2,000 hrs/year - Year 1

Power for Blower and Repumping
20 HP + 30 HP = 50 HP = 37.3 KW
37.3 KW x 2,000 hrs. x $0.055/KWH = $4,100/year - Year 1
Estimated time per year per well with three wells available - Year 20
365 x 24 x 2/3 = 5,840 - 6,000 hrs/year - Year 20
37.3 KW x 6,000 hrs x $0.055/KWH = $12,300/yr - Year 20

Pump and Blower O & M
Labor - 500 MH/yr @ $15.00/hr. - &,500/year
Materials and Supplies - $1,000/yr

Hypochlorinator
Time of Operation per year - Year 1
2,000 hrs/year ÷ 4 = 500 hrs/year - Year 1
(Average operation at 25% capacity)
Hypochlorite Feed
500 hrs/year at 3 gal/hr = 1,500 gal/year - Year 1
Cost: 1,500 gal/yr x $1.50/gal = $2,300/year - Year 1
Time of operation per year - Year 20
6,000 hrs/yr ÷ 4 = 1,500 hrs/year - Year 20
1,500 hrs/year at 3 gal/yr = 4,500 gal/year - Year 20
Cost: 4,500 gal/yr x $1.50/gal = $6,800/year - Year 20
Labor: 100 MH/yr @ $15.00/hr = $1,500/year

Stripping Tower
General Labor - 100 MH/yr @ $15.00/hr = $1,500 year
Media Replacement
Required every 2 years
20 ÷ 2 = 10 times - 1 = 9 replacements
Cost per replacement
$3,000 material + $ 500 - $3,500/replacement
Cost: $3,500 x 9 = $31,500 - Total
$31,500 ÷ 20 = $1,600/year Media Replacement

Chemical Analyses

Trichloroethylene (TCE)

Samples required - Raw water + treated water

Monthly: (1 + 1) x 12 = 24 samples/year

Cost: $90/sample x 24 = $2,200/year

VOC's plus SOC's

Samples required - Raw water

Quarterly: 1 x 4 = 4 samples/year

Cost: $850/samples x 4 = $3,400/year

O & M Cost Summary

Item	Year 1	Year 20
Power	$ 4,100	$12,300
Pump and Blower O & M		
Labor	7,500	7,500
Materials and Supplies	1,000	1,000
Hypochlorite		
Chemicals	2,300	6,800
Labor	1,500	1,500
Stripping Tower		
General Labor	1,500	1,500
Media Replacement	1,600	1,600
Chemical Analyses		
TCE	2,200	2,200
VOC's and SOC's	3,400	3,400
Total	$25,100	$37,800

Activated Carbon Adsorption Facility

Activated Carbon Asdorption Facility
Updated Cost Estimate
NAS Whiting Field, Milton, Florida
12 January 1988

LRR | Project No. 808-15

Capital Cost

10' Dia. Carbon Adsorber Complete	$54,900
Installation, Pad, Fence and Engineering	38,380
(Based on supplier's stated cost for equipment and for total installed cost)	$93,280

O & M Costs

Carbon Adsorber O & M
General Labor - 100 MH/yr @ $15.00/hr - $1,500/yr
Media Replacement
Required every 2 years
(Supplier's projection)
20 ÷ 2 = 10 times - 1 = 9 replacements
9 Replacements plus ultimate carbon disposal 9 + 1 = 10
Cost per replacement - $16,000
Cost: $16,000 x 10 = $160,000 - Total
$160,000 ÷ 20 = $8,000/year Media Replacement
Chemical Analyses
Trichlorethylene (TCE)
Samples required - Raw water + treated water
Monthly: (1 + 1) x 12 = 24 samples/year
Cost: $90/sample x 24 = $2,200/year
VOC's plus SOC's
Samples required - Raw water
Quarterly: 1 x 4 = 4 samples/year
Cost $850/sample x 4 = $3,400/year

O & M Summary

	Year 1	Year 20
Carbon Adsorber		
General Labor	$ 1,500	$ 1,500
Media Replacement	8,000	8,000
Chemical Analyses		
TCE	2,200	2,200
VOC's and SOC's	3,400	3,400
Total	$15,100	$15,100

R808-FIN.(79)

As-Built Life Cycle Costs

Up-Dated Life Cycle Cost Comparison
NAS Whiting Field, Milton, Florida
12 January 1988

LRR

Project No. 808-15

	Air Stripping	Carbon Adsorption
CAPITAL COSTS		
Total Capital Cost	$ 64,500	$ 93,280
Salvage Value	6,500	9,300
Present Worth - Salvage Valu	-1,000	-1,380
Present Worth of Facilities	$ 63,500	$ 91,900
Average Annual Capital Cost	$ 7,461	$ 10,798
OPERATION & MAINTENANCE		
Year 1 O & M	$ 25,100	$ 15,100
Present Worth - Year 1 O & M	210,300	128,600
Year 20 O & M	37,800	15,100
Annual Increase	635	0
Present Worth - Annual Increase	35,200	0
Present Worth of O & M	$245,500	$128,600
Average Annual O & M Cost	$ 28,846	$ 15,111
PRESENT WORTH OF ALTERNATIVE	$309,000	$220,500
AVERAGE ANNUAL EQUIVALENT COST	$ 36,307	$ 25,909

R808-FIN.(79)

APPENDIX XII

Results of Performance Analyses

for

West Well

Pioneer LABORATORY, INC.
11 EAST OLIVE ROAD PENSACOLA, FLORIDA 32514
PHONE (904) 474-1001

Client: CALGON CARBON CORPORATION
03212 PO BOX 717
ATTN: FRANK STONE
PITTSBURGH, PA 15230-0717

Lab I.D.#: 87-3452
Order Number: P09067
Order Date: 11/04/87
Sampled By: P.CANEVARO
Sample Date: 11/3/87
Sample Time: 1230

Project Number: 87-3452
Project Name: CALGON CARBON CORPORATION
Sample Site: WELL #1
Sample Type: WELL WATER

N/S = Not Submitted

Lab ID	Sample ID	Parameter	Units	Results	Detection Limit
87-3452-01	11/3 1230 EFF	TOTAL COLIFORM	CNT/100	BDL	1
87-3452-02	11/3 1620 EFF	TOTAL COLIFORM	CNT/100	BDL	1
87-3452-03	11/4 0735 EFF	TOTAL COLIFORM	CNT/100	BDL	1
87-3452-01	11/3 1230 EFF	TRICHLOROETHENE	PPB	BDL	1
87-3452-02	11/3 1620 EFF	TRICHLOROETHENE	PPB	BDL	1
87-3452-03	11/4 0735 EFF	TRICHLOROETHENE	PPB	BDL	1
87-3452-04	11/3 1230 INF	TRICHLOROETHENE	PPB	3	1
87-3452-05	11/3 1620 INF	TRICHLOROETHENE	PPB	4	1
87-3452-06	WELL #1 45%	TRICHLOROETHENE	PPB	2	1

Comments: PPB = Parts Per Billion, ug/l BDL = Below Detection Limit
Federal Register 40 CFR Part 136, Vol. 49, No. 209.

Approved By : W. F. Bowers

page 1 end of report

CERTIFICATION NUMBERS: FL LAB ID = 81142 • EPA = FL094 • FDER = ELC20 • AL LAB ID = 40150 • NIOSH = 32514-001 • FL ENV = E81010

Pioneer
LABORATORY, INC
11 EAST OLIVE ROAD PENSACOLA, FLORIDA 32514
PHONE (904) 474-1001

Client: CALGON CARBON CORPORATION
03212 P.O. BOX 717
ATTN: FRANK STONE
PITTSBURGH, PA 15230-0717

Lab I.D.#: 87-3497
Order Number: P09120
Order Date: 11/06/87
Sampled By: P. CANEVARO
Sample Date: 11/06/87
Sample Time: 0700

Project Number: 87-3497
Project Name: CALGON CARBON CORPORATION
sample Site: WELL #1
Sample Type: WELL WATER

N/S = Not Submitted

Lab ID	Sample ID	Parameter	Units	Results	Detection Limit
87-3497-01	Well #1 EFF	TRICHLOROETHYLENE	PPB	BDL	1
87-3497-02	Well #1 45%	TRICHLOROETHYLENE	PPB	7	1

Comments: PPB = Parts Per Billion, ug/l; BDL = Below Detection Limits
Refernce: Federal Register, 40 CFR, Part 136, Vol. 49, No. 209.

Approved By : W. F. Bowers

page 1 end of report

CERTIFICATION NUMBERS [illegible]

Pioneer
LABORATORY, INC
11 EAST OLIVE ROAD PENSACOLA, FLORIDA 32514
PHONE (904) 474-1001

Client: CALGON CARBON CORPORATION
03212 P.O. BOX 717
ATTN: FRANK STONE
PITTSBURGH, PA 15230-0717

Lab I.D.#: 87-3529
Order Number: P09165
Order Date: 11/10/87
Sampled By: P. CANEVARO
Sample Date: 11/08/87
Sample Time: 0645

Project Number: 87-3529
Project Name: CALGON CARBON CORPORATION
sample Site: WELL #1
Sample Type: WELL WATER

N/S = Not Submitted

Lab ID	Sample ID	Parameter	Units	Results	Detection Limit
87-3529-01	Well #1 EFF	TRICHLOROETHYLENE	PPB	BDL	1
87-3529-02	Well #1 45%	TRICHLOROETHYLENE	PPB	5	1

Comments: PPB = Parts Per Billion, ug/l; BDL = Below Detection Limits
Refernce: Federal Register, 40 CFR, Part 136, Vol. 49, No. 209.

Approved By : W. F. Bowen

page 1 end of report

CERTIFICATION NUMBERS: FL LAB ID # 81142 • EPA # FL094 • FDER # EL020 • AL LAB ID # 40150 • NIOSH # 32514-001 • FL ENV. # E81010

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Client: CALGON CARBON CORPORATION
03212 PO BOX 717
ATTN: FRANK STONE
PITTSBURGH, PA 15230-0717

Lab I.D.#: 87-3539
Order Number: P09176
Order Date: 11/11/87
Sampled By: P.CANEVARO
Sample Date: 11/11/87
Sample Time: 0730

Project Number: 87-3539
Project Name: CALGON CARBON CORPORATION
Sample Site: WELL #1
Sample Type: WELL WATER

N/S = Not Submitted

Lab ID	Sample ID	Parameter	Units	Results	Detection Limit
87-3539-01	WELL #1	TRICHLOROETHYLENE	PPB	BDL	1

Comments: PPB = Parts Per Billion, ug/l; BDL = Below Detection Limit
Reference: Federal Register 40 CFR Part 136, Vol. 49, No. 209.

Approved By : W. F. Bowen
page 1 end of report

CERTIFICATION NUMBERS: FL LAB ID # 81142 • EPA # FL094 • FDER # EL020 • AL LAB ID # 40150 • NIOSH # 32514-001 • FL SN # 88101

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PHONE (904) 474-1001

Client: CALGON CARBON CORPORATION
03212 PO BOX 717
ATTN: FRANK STONE
PITTSBURGH, PA 15230-0717

Lab I.D.#: 87-3593
Order Number: P09239
Order Date: 11/17/87
Sampled By: P.CANEVARO
Sample Date: 11/16/87
Sample Time: 0730

Project Number: 87-3593
Project Name: CALGON CARBON CORP.
Sample Site: NAS WHITING FIELD BLD.1418
Sample Type: WELL WATER

N/S = Not Submitted

Lab ID	Sample ID	Parameter	Units	Results	Detection Limit
87-3593-01	11/14 EFF	TRICHLOROETHENE	PPB	BDL	1
87-3593-02	11/16 EFF	TRICHLOROETHENE	PPB	BDL	1
87-3593-03	11/16 45%	TRICHLOROETHENE	PPB	3	1
87-3593-04	11/16 INF	TRICHLOROETHENE	PPB	5	1

Comments: PPB = Parts Per Billion, ug/l; BDL = Below Detection Limit
Reference: Federal Register 40 CFR Part 136 Vol. 49, No. 209.

Approved By : W. F. Bowen

page 1 end of report

CERTIFICATION NUMBERS: FL LAB ID # 81142 • EPA # FL094 • FDER # EL020 • ALLLAB ID # 40150 • NIOSH # 32514001 • FL ENV # E81010

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PHONE (904) 474-1001

Client: NAS WHITING PUBLIC WORKS
14018 BUILDING 1418

MILTON FL 32570-0000

Lab I.D.#: 87-3611
Order Number: P09262
Order Date: 11/18/87
Sampled By: D.LOCKLEAR
Sample Date: 11/18/87
Sample Time: N/S

Project Number: 87-3611
Project Name: NAS WHITING FIELD
Sample Site: WEST WELL,GAC FILTER
Sample Type: WATER

N/S = Not Submitted

Lab ID	Sample ID	Parameter	Units	Results	Detection Limit
87-3611-01	INFLUENT	TRICHLOROETHENE	PPB	16	1
87-3611-02	EFFLUENT	TRICHLOROETHENE	PPB	BDL	1
87-3611-03	45%	TRICHLOROETHENE	PPB	7	1
87-3611-04	56%	TRICHLOROETHENE	PPB	2	1
87-3611-05	67%	TRICHLOROETHENE	PPB	BDL	1
87-3611-06	TRIP BLANK	TRICHLOROETHENE	PPB	BDL	1

Comments: PPB = Parts Per Billion, ug/l; BDL = Below Detection Limit
Reference: Federal Register 40 CFR Part 136, Vol. 49, No. 209.

Approved By : W. F. Bowers
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CERTIFICATION NUMBERS: FL LAB ID # 81142 • EPA # FL094 • FDER # EL020 • AL LAB ID # 40150 • NIOSH # 32514-001 • FL ENV # 88101

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PHONE (904) 474-1001

Client: NAS WHITING PUBLIC WORKS
14018 BUILDING 1418

MILTON FL 32570-0000

Lab I.D.#: 87-3630
Order Number: P09306
Order Date: 11/19/87
Sampled By: D.LOCKLEAR
Sample Date: 11/19/87
Sample Time: 0800

Project Number: 87-3630
Project Name: NAS WHITING FIELD
Sample Site: WEST WELL/GAC FILTER
Sample Type: WATER

N/S = Not Submitted

Lab ID	Sample ID	Parameter	Units	Results	Detection Limit
87-3630-01	INFLUENT	TRICHLOROETHENE	PPB	16	1
87-3630-02	EFFLUENT	TRICHLOROETHENE	PPB	BDL	1
87-3630-03	GAC FILTER 45%	TRICHLOROETHENE	PPB	4	1
87-3630-04	GAC FILTER 56%	TRICHLOROETHENE	PPB	1	1
87-3630-05	GAC FILTER 67%	TRICHLOROETHENE	PPB	BDL	1

Comments: PPB = Parts Per Billion, ug/l; BDL = Below Detection Limit
Reference: Federal Register 40 CFR Part 136 Vol 49, No. 209.

Approved By : W. F. Bowers
page 1 end of report

CERTIFICATION NUMBERS: FL LAB ID # 81142 • EPA # FL094 • FDER # EL020 • AL LAB ID # 40150 • NIOSH # 32514-001 • FL ENV # [illegible]

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PHONE (904) 474-1001

Client: CALGON CARBON CORPORATION
03212 PO BOX 717
ATTN: FRANK STONE
PITTSBURGH, PA 15230-0717

Lab I.D.#: 87-3733
Order Number: P09444
Order Date: 12/01/87
Sampled By: D.LOCKLEAR
Sample Date: 112/1/87
Sample Time: 0800

Project Number: 87-3733
Project Name: NAS WHITING FIELD
Sample Site: WEST WELL/GAC FILTER
Sample Type: WATER

N/S = Not Submitted

Lab ID	Sample ID	Parameter	Units	Results	Detection Limit
87-3733-01	INFLUENT	TRICHLOROETHENE	PPB	24	1
87-3733-02	100%	TRICHLOROETHENE	PPB	BDL	1
87-3733-03	67%	TRICHLOROETHENE	PPB	BDL	1
87-3733-04	56%	TRICHLOROETHENE	PPB	1	1
87-3733-05	45%	TRICHLOROETHENE	PPB	9	1
87-3733-06	TRIP BLANK	TRICHLOROETHENE	PPB	BDL	1

Comments: PPB = Parts Per Billion, ug/l: BDL = Below Detection Limit
Reference: Federal Register 40 CFR Part 136, Vol. 49, No. 209.

Approved By : W. F. Bowers

end of report

CERTIFICATION NUMBERS: FL LAB ID # 81142 • EPA # FL094 • FDER # EL020 • AL LAB ID # 40150 • NIOSH # 32514-001 • FL ENV # E81010

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Client: CALGON CARBON CORPORATION
03212 PO BOX 717
ATTN: FRANK STONE
PITTSBURGH, PA 15230-0717

Lab I.D.#: 87-3753
Order Number: P09469
Order Date: 12/02/87
Sampled By: D.LOCKLEAR
Sample Date: 12/2/87
Sample Time: N/S

Project Number: 87-3753
Project Name: CALGON CARBON CORP.
Sample Site: NAS WHITING FIELD
Sample Type: WATER

N/S = Not Submitt

Lab ID	Sample ID	Parameter	Units	Results	Detecti Limit
87-3753-01	INFLUENT	TRICHLOROETHENE	PPB	19	1
87-3753-02	GAC FILTER 100%	TRICHLOROETHENE	PPB	BDL	1
87-3753-03	GAC FILTER 67%	TRICHLOROETHENE	PPB	BDL	1
87-3753-04	GAC FILTER 56%	TRICHLOROETHENE	PPB	BDL	1
87-3753-05	GAC FILTER 45%	TRICHLOROETHENE	PPB	5	1
87-3753-06	TRIP BLANK	TRICHLOROETHENE	PPB	BDL	1

Comments: PPB = Parts Per Billion, ug/l; BDL = Below Detection Limit
Reference: Federal Register 40 CFR Part 136, Vol. 49, No. 209.

Approved By : W. F. Bowers

 end of repo

CERTIFICATION NUMBERS: FL LAB ID # 81142 • EPA # FL094 • FDER # EL020 • AL LAB ID # 40150 • NIOSH # 32514-001 • FL ENV # E81010

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11 EAST OLIVE ROAD PENSACOLA, FLORIDA 32514
PHONE (904) 474-1001

Client: DEL-JEN, INC.
04003 BUILDING 1429

MILTON FL 32572-0000

Lab I.D.#: 87-4067
Order Number: P09815
Order Date: 12/18/87
Sampled By: D.LOCKLEAR
Sample Date: 12/19/87
Sample Time: N/S

Project Number: 87-4067
Project Name: DEL JEN INC.
Sample Site: NAS WHITING FIELD
Sample Type: WATER

N/S = Not Submitte

Lab ID	Sample ID	Parameter	Units	Results	Detectio Limit
87-4067-01	WEST INFLUENT	TOTAL COLIFORM	CNT/100	BDL	1
87-4067-01	WEST INFLUENT	TRICHLOROETHENE	PPB	17	1
87-4067-02	WEST EFFLUENT	TRICHLOROETHENE	PPB	BDL	1
87-4067-03	45% TAP	TRICHLOROETHENE	PPB	7	1
87-4067-04	TRIP BLANK	TRICHLOROETHENE	PPB	BDL	1

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DEL-JEN WHITING DIVISI

Comments: PPB - parts per billion, ug/l; BDL = below detection limits.
Method Reference: Federal Register 40 CFR, Part 136, Vol. 49, No. 209, Friday, October 26, 1984.

Approved By : W. F. Bowers

page 1 end of report

CERTIFICATION NUMBERS: FL LAB ID # 81142 • EPA # FL094 • FDER # EL020 • AL LAB ID # 40150 • NIOSH # 32514-001 • FL ENV # E81010

APPENDIX XIII

Effective Life of Activated Carbon Bed

for

West Well

ACT Study

for

NAS Whiting Field

CALGON CARBON CORPORATION

Technical Service Report No. 0687-19

ACT STUDY FOR REMOVAL OF TRICHLOROETHYLENE FROM GROUNDWATER

Prepared For
Whiting Naval Air Station
Milton, FL

Author: J. D. McNamara — 6621/075*

Date: August 14, 1987

DISTRIBUTION
K. M. Ferraco
J. L. Fuchs
K. R. Tarbert
R. E. Whitesell

KEY WORDS
Groundwater
F-300 Carbon
ACT STUDY
Trichloroethylene
Whiting Naval Air Station,
Milton, FL

I. INTRODUCTION

Whiting Naval Air Station located in Milton, Florida, is interested in removing low level trichloroethylene from a groundwater using GAC. An ACT study has been requested to predict F-300 carbon performance for removal of the TCE from a sample of Whiting NAS groundwater.

II. SUMMARY AND CONCLUSIONS

A total of 14 gallons of groundwater containing an average of 5.5 ug/l TCE was received from Whiting NAS for use in the ACT study. The sample appeared water-white and clear and did not require filtration prior to AC treatment. An ACT study was set-up to simulate a 20,000 lb adsorber (10' diameter) containing F-300 GAC operating at a 600 GPM or a 7.64 GPM/ft^2 surface loading rate. The ACT study was continued until the 14 gallon sample was depleted.

The TCE concentration in the final ACT effluent sample was less than 1 ug/l, the detection limit of analysis, indicating no breakthrough of TCE after 200 simulated days of operation and the predicted treatment of 172.3 million gallons of groundwater. The carbon use rate at this point is .12 lbs GAC/1000 gallons of treated groundwater.

JDM/dao

bcc: F. X. Stone
K. R. Tarbert
R. E. Whitesell
KMF

CALGON

CALGON CARBON CORPORATION

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PANAFAX: 412-787-6713

787-6852

August 4, 1987

Mr. Gerald Anderson
NAS WHITING FIELD
P.W. Engineering Building 1418
Milton, Florida 32571

Dear Mr. Anderson:

I am writing this letter to confirm the results obtained from the Accelerated Column Test conducted by our lab. I recently relayed these results to you in a phone conversation on August 3, 1987.

Both our own lab and an independent lab tested the influent sample which showed a contamination level of 5 ppb TCE and 6 ppb TCE respectively. The actual test simulated 20,000 pounds of carbon treating 172.8 million gallons of TCE contaminated groundwater for 200 days. At this point, the supplied sample was exhausted and the TCE in the effluent was still at a non-detectable level.

It is difficult to estimate the carbon usage rate without attaining TCE breakthrough. Other similar tests conducted on low level TCE contaminated groundwater provided similar results. It is probably safe to say that 20,000 pounds of carbon treating low level TCE somewhere in the range of 5 - 20 ppb at 600 gpm should last at least one to two years with a carbon usage rate around 0.05 pounds of carbon per 1,000 gallons (of TCE contaminated groundwater). This could be determined exactly by monitoring the treated effluent during the actual treatment process.

If you have any further questions regarding the results of our testing, please contact Karen Tarbert in our Houston office at (713) 690-2000. She will be the Application Engineer following the project from this point.

Sincerely,

CALGON CARBON CORPORATION

Kolleen M. Ferraco

Kolleen M. Ferraco
Application Engineer

/dmr

General GAC Article

GRANULAR ACTIVATED CARBON ADSORPTION FOR VOC REMOVAL FROM DRINKING WATER SUPPLIES

Mark H. Stenzel
Marketing Manager

James L. Fisher
Marketing Manager

Calgon Carbon Corporation
Pittsburgh, PA 15230

INTRODUCTION

The recent amendments to the Safe Drinking Water Act (SDWA) have generated increased interest in evaluating a number of different technologies for the removal of Volatile Organic Contaminants (VOCs) from drinking water supplies. Since 1974, the EPA has generated Maximum Contaminant Levels (MCLs) for 26 contaminants, but the new amendments have called for accelerated regulation by requiring development of MCLs for 83 specific contaminants. Many of these contaminants are VOCs which have been discovered in groundwater sources for drinking water supplies. Of immediate concern are the 8 VOCs that are set for regulation in 1987, shown with their proposed MCLs in Table 1 (1).

The use of granular activated carbon (GAC) to remove organic contaminants by adsorption on the large internal surface area of the activated carbon granule has long been a proven and established technology. Over 150 public drinking water systems already have experience with GAC in the removal of taste and odor causing organic compounds in the United States and over 200 in Europe (2). Many industrial plants have also used GAC for the removal of specific organic compounds from water, wastewater and chemical products. Recently, GAC has been used to remove specific VOCs from groundwater or contaminated water resulting from accidental spills (3).

The success of GAC in removing organic contaminants from water has resulted in the amendment to the SDWA establishing GAC as the "yardstick" by which other treatment technologies are to be evaluated in the control of synthetic organic chemicals (4). Other treatment techniques must be at least as effective as GAC in order to be considered viable. Although often perceived as an expensive treatment technology, GAC can often be the most cost-effective solution to the problem at hand. What is needed is a reliable method to evaluate the applicability of adsorption and to estimate the cost to the water system operator.

This paper will present a methodology by which GAC can be evaluated, starting with isotherms for preliminary evaluation and continuing on to parameters for system design. The design of the GAC system will provide capital expenditure guidelines, while the evaluation procedure

should provide a good estimate of the ongoing operating costs.

PRELIMINARY EVALUATION: ISOTHERM TESTING

The liquid phase adsorption isotherm test is the basic preliminary evaluation technique for activated carbon treatment. The adsorption isotherm is a batch test designed to determine the equilibrium relationship between the contaminant in the liquid, measured as concentration, and the contaminant adsorbed on the activated carbon, expressed as carbon capacity or weight of contaminant per unit weight of activated carbon.

The application of the isotherm test to evaluate adsorption of VOCs has historically resulted in unreliable and disparate data. In response to the need for reliable evaluation data, an isotherm procedure has been developed which minimizes analytical errors and more accurately predicts adsorption capacity of GAC for VOCs. This procedure includes handling samples while allowing no head space, using relatively large quantities of powdered activated carbon to minimize weighing errors, and using relatively large initial concentrations of VOCs to minimize analytical errors and provide reliable data points at the higher concentrations to better fix the isotherm plot.

The isotherm test conditions are summarized in Figure 1. The activated carbon used is Calgon Carbon's Filtrasorb 300, a bituminous coal based activated carbon with a high surface area (1000 m^2/gm) and Iodine Number (typically 970). The activated carbon is pulverized to -325 mesh to eliminate the diffusion rate as a factor. The water samples consist of reagent grade chemicals added to purified water. As shown in Figure 1, the activated carbon dosages result in the development of low level VOC equilibrium concentrations which are useful for evaluation. The sealed flasks are agitated for a minimum of 20 hours to assure equilibrium. The contents are then pressure filtered through 0.45 micron filter pads, with the filtrates analyzed by gas chromatography using the purge and trap technique with the amount of the compound retained on the activated carbon calculated by difference.

In 1984, results from single component isotherms of five of the more common chlorinated solvents were presented (5). Single component isotherms from eight more VOCs have been conducted to expand this data base. It is most important to note that when comparing the relative adsorbability of one compound to another, and especially when adding consideration of concentration effects, that the testing protocol be consistent. Therefore, it is anticipated that this data base of isotherm tests will be useful in determining effects of contaminant and concentration changes possible in long term groundwater treatment.

All thirteen isotherms are presented here for reference.

Figure 2 shows the results of isotherms for seven of the VOCs due for regulation in 1987. The eighth VOC, vinyl chloride, is normally a gas at ambient temperature, and has a very low capacity on GAC in liquid phase adsorption. Investigations into the removal of vinyl chloride by activated carbon have reported poor capacities. However, vinyl chloride removal by aeration has produced good removal efficiencies (7). The isotherm results for p-dichlorobenzene are from earlier test results using less agitation time, but p-dichlorobenzene is well adsorbed by activated carbon and the results are consistent with recent tests.

Figure 3 has grouped the remaining chlorinated and brominated aliphatic solvents and Figure 4 the aromatic and chlorinated aromatic solvents. The isotherms point out characteristics useful for considering adsorption of other compounds; i.e., that the capacity of activated carbon for the contaminant increases with concentration, molecular weight and decreasing solubility of the contaminant.

Isotherms are useful in identifying whether a compound is amenable to adsorption by activated carbon. The test indicates the theoretical capacity for these contaminants by GAC, which as will be shown later, allows the development of estimates of carbon usage rates for cases where a single contaminant predominates. Care must be taken in using these single component isotherms when the contamination involves a mixture of adsorbable compounds. Although these isotherms might allow for preliminary estimates of activated carbon usage rates, additional testing would be warranted to establish more reliable carbon usage rates. Finally, background organic contaminants, usually more prevalent in surface water than groundwater, may cause reduced capacity. Isotherms performed on a specific water according to these procedures would provide for good comparison to these single component isotherms and a basis for estimating GAC usage rates.

After a column study is performed or actual operating data is obtained, isotherms are useful in evaluating effects of concentration or contaminant change. A relationship can be established between the actual usage rate and the equilibrium data of the isotherm, and changes in usage rate can be predicted using the isotherms as reference points.

ADVANCED EVALUATION: ACCELERATED COLUMN TESTING

The effect of short contact times experienced in actual operation and the accurate prediction of activated carbon usage rates is normally obtained in the scaled column study. The accepted test method for the column study has been to use the GAC in columns sized from 1 to 4 inches in diameter, and with selection of surface loading rates and media depth, obtain the desired empty bed contact times in single or multiple columns. The low usage rates expected

in groundwater treatment to remove low levels of VOCs often make a directly scaled study infeasible due to the time and analytical expense involved.

Several researchers have explored the possibility of small rapid column tests (6). The basic principle is to use smaller size granules of the same activated carbon, but with high surface loading rates and short contact times. Using mathematical models of basic adsorption kinetics, these rapid column tests can then be used to predict full size system performance. Calgon Carbon Corporation has developed a high pressure mini-column technique, the Accelerated Column Test (ACT), which uses 50 mg of Filtrasorb 300 grade GAC that has been sized to less than 100 mesh in a column with an internal diameter of 1.94 mm (7). The ACT procedure has been tested in comparison with one inch diameter column studies and existing full scale systems with the results showing a high degree of correlation (8).

The ACT can be used, as mentioned previously, to model the performance of a particular system in order to fix contact times and predict usage rates and breakthrough characteristics. Historical ACT data can also be used to predict performance on potential applications. In this procedure, ACT data can be compared to isotherm data to determine how much of the theoretical capacity can be realized under dynamic conditions. As when comparing isotherm results, these ACT's need to be performed under similar conditions with the same mathematical scale-up model to assure consistency.

PREDICTION OF USAGE RATES WITH ACT AND ISOTHERM DATA

We have performed numerous ACT studies on waters contaminated with low levels of VOCs. These studies can be reviewed to determine how much of the equilibrium capacity identified in the isotherm test can be realized in an operating system.

Table 2 shows the results of ACTs run on actual and synthetic groundwater samples containing essentially a single VOC. Both the synthetic and actual samples used waters with low (<0.5 ppm TOC) background of organic compounds. These tests show that operating systems with short contact times can generally obtain 45-55% of the theoretical capacity of the activated carbon at breakthrough of the contaminant. Besides indicating that a predictable amount of capacity can be obtained, these tests indicate a relatively short adsorption zone in the bed, and that upon breakthrough little adsorptive capacity remains. Results of this testing suggests that contact times of 12-15 minutes be used to optimize activated carbon usage and that single stage adsorption systems be employed to minimize capital costs in designing systems to remove low levels of VOCs.

Table 3 shows results of ACTs run on actual groundwaters including results from other commonly encountered

situations. The first site shows the effect of higher contaminant levels of a well adsorbed VOC. With higher levels of trichloroethylene (TCE) and slightly greater than 15 minutes contact time, the ACT predicts a 68% attainment of the equilibrium isotherm data. This result indicates that in the adsorption process, the higher concentration contaminant acts as a greater driving force towards equilibrium capacity.

The second site investigated shows the influence of background organic contaminants on the adsorption of chlorinated solvents. A municipal drinking water containing 135 ppb of chloroform that also contained 6 ppm background organic contamination measured as TOC was tested. The ACT indicated that the presence of this organic background resulted in only 37% of the theoretical capacity being achieved. This capacity is approximately 20% less than the capacity achieved in the municipal drinking water sample shown on Table 2.

The third site in this set shows the effects of a mixture of VOCs; 1,1,1 trichloroethane (TCA) and TCE. As shown in the isotherm data in Figure 2, the TCA is not adsorbed as strongly, so it is expected to break through first. The column study did indicate that the TCA was detected first in the effluent, and the capacity of carbon for TCA was only 34.3% of its equilibrium value. Another way of looking at this mix is that at an equilibrium capacity of 3.5 mg/gm and 55 ppb of TCA, the theoretical usage rate would be 0.13 lbs. GAC per thousand gallons. This usage rate can be added to a usage rate of 0.06 lbs. GAC/1000 gallons for TCE (24 mg/gm at 165 ppb) for a total usage rate of 0.19 lbs. GAC/1000 gallons for both contaminants. The actual usage rate is approximately 58% greater than the theoretical, indicating a working capacity that realizes approximately 63% of the equilibrium capacity.

In considering these ACT studies on VOC removal, it can be concluded that for low level VOC contamination in waters containing low background TOC, operating activated carbon adsorption systems can achieve 45-55% of the theoretical isotherm capacity. When the chemistry becomes more complex, with background TOC or the prescence of a mixture of contaminants, a simple rapid mini-column technique can be conducted to explore these additional effects.

ADSORPTION SYSTEM DESIGN AND ECONOMICS

Based upon the evaluation procedure discussed above, the investigator can proceed with preliminary system design and establish the economics for activated carbon treatment. It was shown earlier that for waters with one or two VOCs present at low levels - 200 ppb or less, contact times of 12 to 15 minutes are acceptable. Also, for these conditions, and especially if only a single VOC is present, the mass transfer zone is sufficiently short that a single stage adsorption system can usually achieve optimum economic utilization of the activated carbon. The use of single stage systems rather than multiple stages

will minimize costs for the treatment equipment. A simple in-bed sample port can be utilized to anticipate contaminant breakthrough and provide an added safety factor for effluent quality.

The use of single stage systems allows the use of GAC as substitute media in sand filters, if these are already in position at the treatment facility. At a 2 gpm per square foot loading rate, a 4 ft. deep bed of GAC will provide 15 minutes of contact time. Other investigators have reported that GAC is also an adequate replacement for most media in performing required filtration (2). In such a case, there is no major capital expenditure for additional equipment.

For most groundwater treatment applications, however, it is more likely that a treatment unit would be required between the groundwater well pump and the distribution system. In this case, a single stage pressure adsorber can be placed in-line to provide treatment without repumping. Typically, 10 ft. diameter adsorption vessels containing 20,000 lbs. of GAC are used for this service. Adsorption vessels with 20,000 lbs. of GAC have become a standard size unit, as the spent GAC from a single unit can be transported from the site for spent carbon handling in a single over-the-road trailer. The limitation is due to weight considerations, as the entire quantity of GAC, retained moisture and adsorbate will weigh approximately 40,000 pounds. Each of these units can treat 350 gpm and provide a contact time of 15 minutes. The adsorption process, operated in a downflow mode, will typically add a 15 psig pressure drop to the system.

Each single adsorber as described above, complete with process, utility and carbon transfer piping can be installed on an existing foundation for approximately $75,000. This cost would not include other portions of the overall installation, such as foundations, pump work or tie-in to the existing system.

The following example illustrates the methodology that can be applied to obtain preliminary economics for a groundwater treatment scenario. The conditions that can exist at a groundwater sourced drinking water supply are:

Flow:	600 gpm (0.864 mgd)
Contaminant:	Trichloroethylene
Concentration:	180 ug/l (ppb)
TCE MCL:	5 ug/l
Background TOC Level:	Negligible (<1 ppm)

Based upon the evaluation information provided, the following design assumptions can be made:

Adsorber Size:	10 ft. dia., 20,000 lbs. GAC
Adsorber Quantity:	Two Units
Contact Time:	17 minutes
Equilibrium Capacity:	25 mg TCE/gm GAC (Figure 2)
% Eq. Capacity Realized:	50% (Table 2; estimate)

Estimated Capacity: 12.5 mg TCE/gm GAC
Estimated GAC Usage: 0.12 lbs./1000 gallons
Estimated Annual GAC Usage: 40,000 lbs.

To predict the operating cost, an estimate is made for the installation of the adsorption system as shown in Table 4, resulting in a total installed capital expenditure of approximately $250,000. In some geographical areas, freeze protection such as insulation with heat tracing, or a building, may also be necessary.

Finally, the annualized operating cost for the adsorption system can be estimated by amortization of the capital expenditure and addition of the expenses as shown in Table 5. The unit cost for the treatment system under consideration can therefore be estimated to be 27 cents for each 1000 gallons treated. This figure is consistent with a value of 34 cents per 1000 gallons estimated by the EPA for systems below 1 mgd and for 99% removal of TCE up to 500 ppb (9).

CONCLUSION

The recent interest in technologies for treatment of waters contaminated with low levels of VOCs has increased the need for reliable data bases to be used for preliminary evaluation. This need is especially critical in the evaluation of activated carbon adsorption, which is regarded as the basis by which other technologies are measured.

The adsorption isotherm is the basic evaluative tool for activated carbon adsorption, and can be an effective predictor for activated carbon usage rates when combined with reliable dynamic studies. For the isotherms presented in this paper, care was taken to minimize analytical errors and assure equilibrium conditions. As a result, this series of isotherms can be compared to each other and used as a reliable point of reference for column studies. Finally, rapid mini-column tests similar to the Accelerated Column Test can be used to effectively model full scale systems.

Results discussed here indicate that for groundwaters contaminated with essentially a single VOC at low levels with little background organic contaminants, 45-55% of the equilibrium capacity can be obtained using contact times of 12 to 15 minutes. The short mass transfer zones also indicate that single stage adsorbers can be employed to minimize capital expenditures.

The methodology exists then, to properly evaluate activated carbon treatment for both performance operation and costs. This procedure will be helpful as a point of reference to evaluate other treatment technologies and as a planning technique for the employment of activated carbon adsorption.

ACKNOWLEDGMENTS

The authors would like to acknowledge the efforts of the Research and Development Group of Calgon Carbon Corporation for their consistent efforts in testing and analysis: Mr. Joseph Bellissimo, Ms. Diane Galicic and Mr. Dave McNamara for isotherm and ACT testing, and Ms. Pat Reiser for VOC analysis.

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TABLE 1

Proposed VOC Regulations

VOC	Maximum Contaminant Level (MCL); ug/l
Vinyl Chloride	2
Benzene	5
Carbon Tetrachloride	5
1,2 - Dichloroethane	5
Trichloroethylene	5
1,1 - Dichloroethylene	7
p-Dichlorobenzene	75
1,1,1 - Trichloroethane	200

FIGURE 1

ACTIVATED CARBON
ISOTHERM REPORT

SAMPLE VOLUME	137 ml
TEMPERATURE	AMBIENT
AGITATION TIME	20 hrs.
CARBON	FILTRASORB 300
CONTAMINANT	

GRAMS CARBON	REMAINING		ADSORBED mg	ADSORPTIVE CAPACITY mg/gm
	mg/l	mg		
Control	400		--	--
0.05				
0.25	(meas.)		(by difference)	(calculated)
0.5				
1.0				
2.5				
5.0				
10.0				
20.0				

FIGURE 2
ACTIVATED CARBON ADSORPTION ISOTHERMS

VOCs TO BE REGULATED IN 1987

(1) Benezene
(2) Carbon Tetrachloride
(3) 1,2 Dichloroethane
(4) Trichloroethylene
(5) 1,1 Dichloroethylene
(6) p Dichlorobenzene
(7) 1,1,1 Trichloroethane

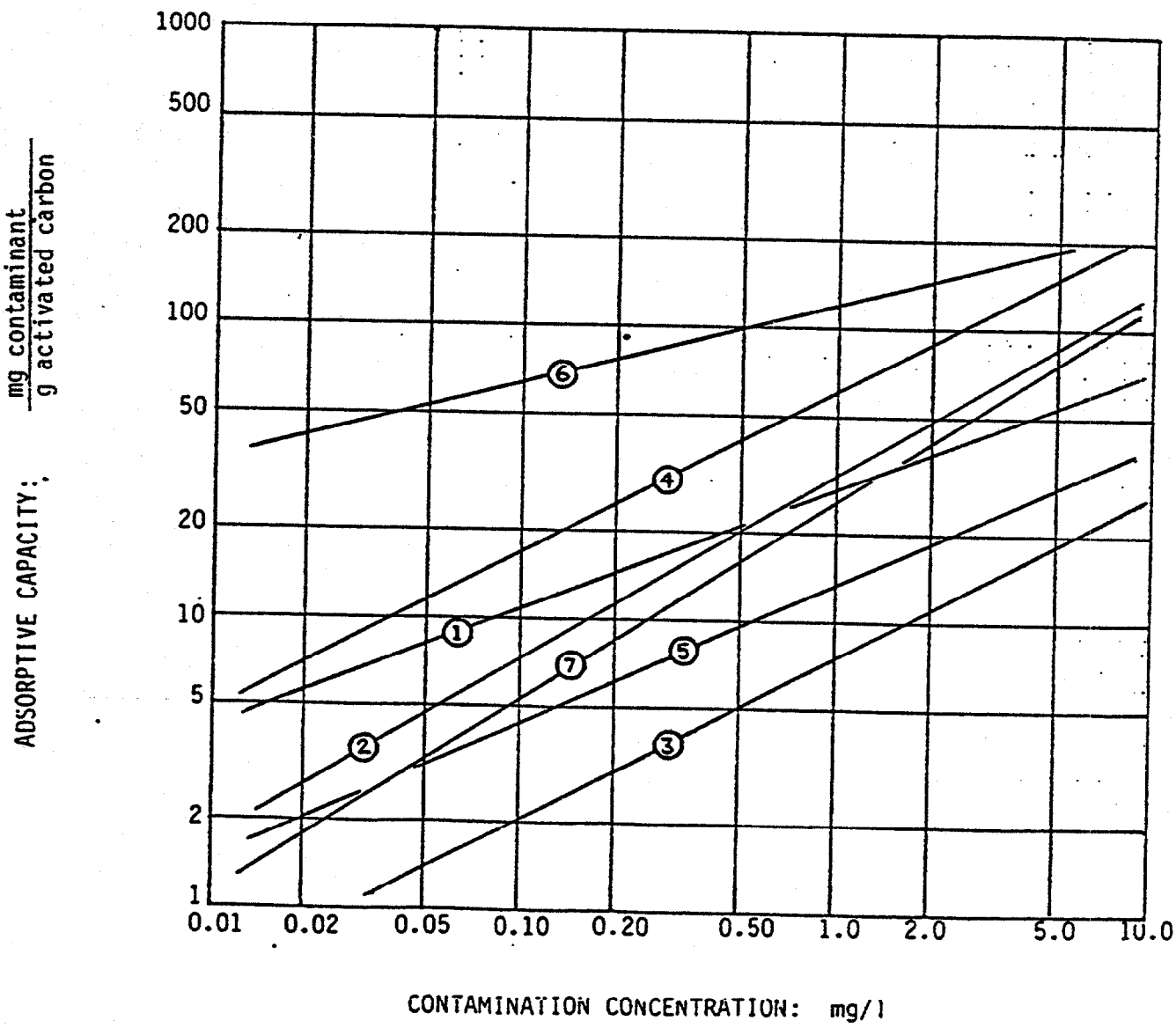

FIGURE 3
ACTIVATED CARBON ADSORPTION ISOTHERMS
CHLORINATED SOLVENTS

(1) Tetrachloroethylene
(2) Trichloroethylene
(3) Cis 1,2 Dichloroethylene
(4) Chloroform
(5) 1,2 Dichloroethane
(6) Methylene Chloride

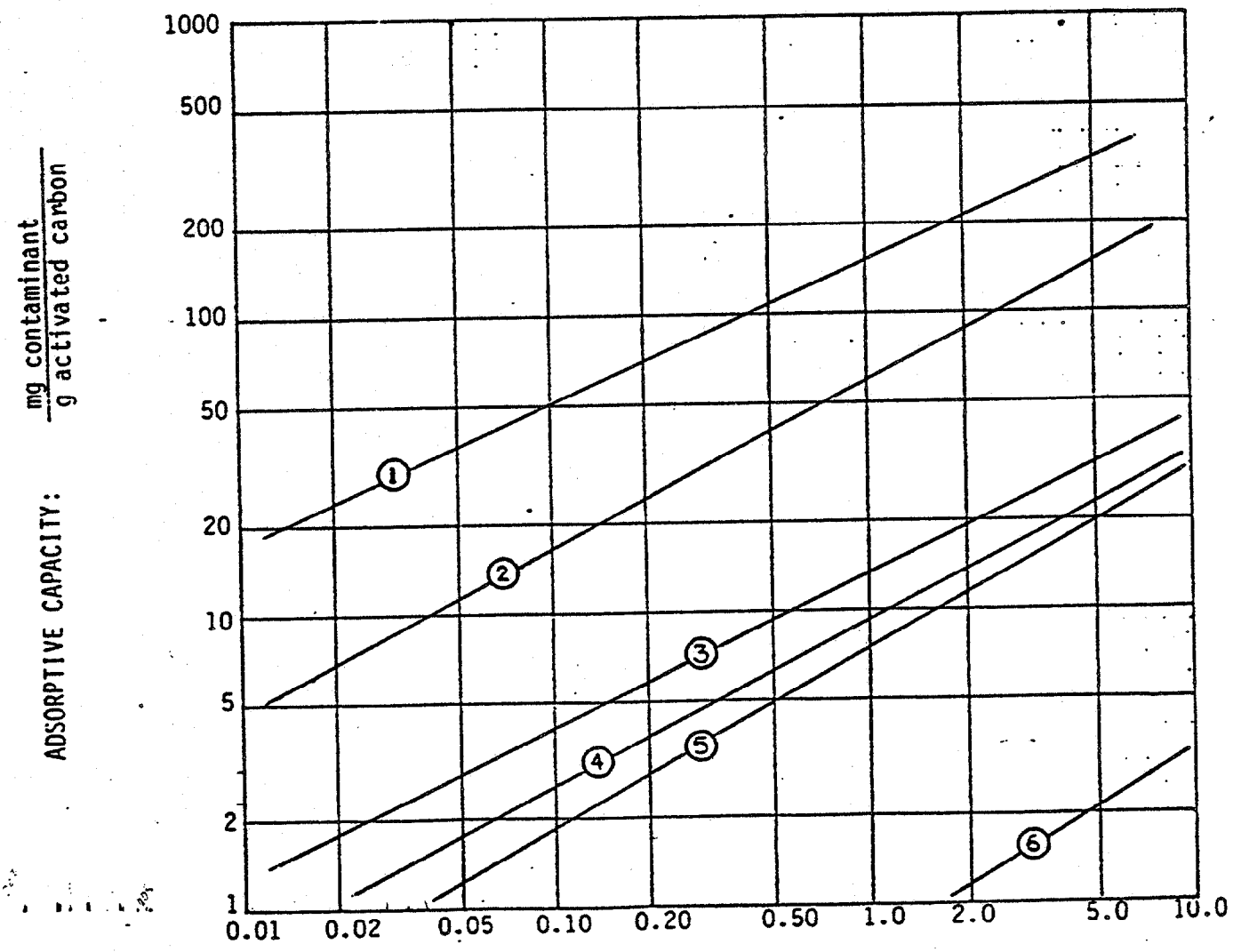

FIGURE 4

ACTIVATED CARBON ADSORPTION ISOTHERMS

AROMATIC SOLVENTS

(1) m Xylene
(2) Toluene
(3) Benzene

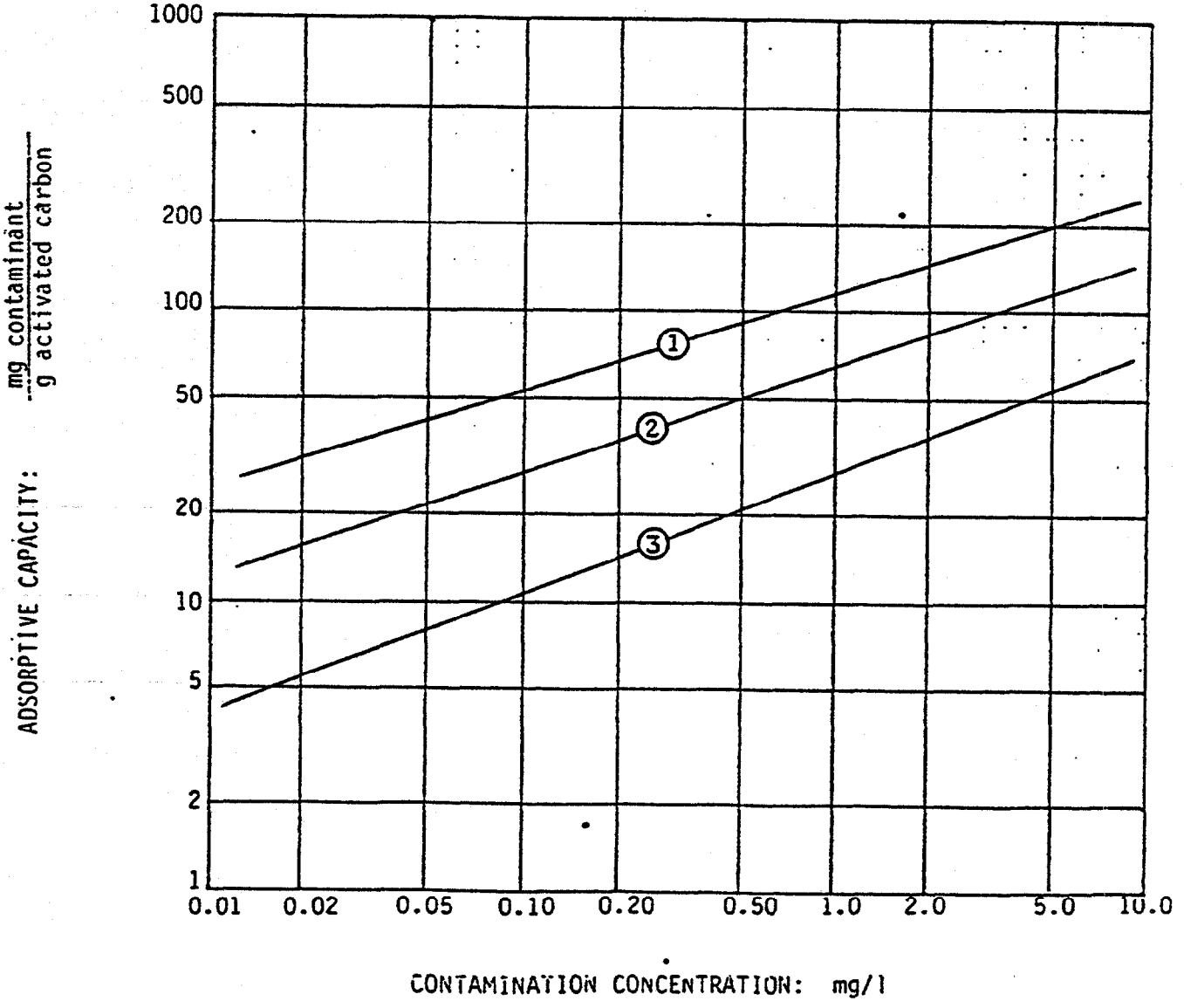

TABLE 2
ACCELERATED COLUMN TEST STUDIES

LOW LEVEL/SINGLE CONTAMINANT CASES

SITE:	MUNICIPAL GROUNDWATER	SYNTHETIC GROUNDWATER	SYNTHETIC GROUNDWATER	MUNICIPAL GROUNDWATER
CONTAMINANT	TRICHLOROETHYLENE	TRICHLOROETHYLENE	TRICHLOROETHANE	CHLOROFORM
CONCENTRATION, ppb	30	202	205	126
EFFLUENT OBJECTIVE, ppb	1	1	1	1
CONTACT TIME, minutes	10	8.5	8.5	12
GAC USAGE RATE, pounds, 1000 gals.	0.07	0.12	0.36	0.9
REALIZED CAPACITY mg/gm	3.6	14.1	4.8	1.2
ISOTHERM (EQUILIBRIUM) CAPACITY, mg/gm	8.0	27.0	8.8	2.6
PERCENT OF EQUILIBRIUM CAPACITY REALIZED	45%	52%	54.5%	46%

TABLE 3
ACCELERATED COLUMN TEST STUDIES

SELECTED VOC CONTAMINATION CASES

SITE	INDUSTRIAL GROUNDWATER	MUNICIPAL DRINKING WATER	GROUNDWATER		
			SINGLE COMPONENT	TWO COMPONENT	
CONTAMINANT	TRICHLORO-ETHYLENE	CHLOROFORM	1,1,1 TRICHLORO-ETHANE	1,1,1 TRI-CHLOROETHANE	TRICHLORO-ETHYLENE
CONCENTRATION, ppb	3300	135	55	55	165
EFFLUENT OBJECTIVE, ppb	1	1	1	--	--
CONTACT TIME, minutes	18	20	25	--	--
GAC USAGE RATE pounds/1000 gallons	0.45	1.1	0.3	--	--
REALIZED CAPACITY mg/gm	61	1.0	1.2	--	--
ISOTHERM (EQUILIBRIUM)	90	2.7	3.5	3.5	24.0
USAGE RATE FROM ISOTHERM CAPACITY pounds/1000 gals.	--	--	--	0.13	0.06
				(TOTAL = 0.19)	
PERCENT OF EQUILIBRIUM CAPACITY REALIZED	67.8%	37.0%	34.3%	63.3%	
BACKGROUND CONTAMINATION	--	6 ppm TOC	165 ppb TCE	---	

TABLE 4

Adsorption System Capital Expenditure

BASIS: 600 gpm

Adsorption equipment, installed	$150,000
Foundation, installed	20,000
Well pump upgrade (if necessary	10,000
Tie-ins; pump discharge/distribution	10,000
Equipment freight	10,000
Project management	25,000
Contingency	25,000
TOTAL PROJECT COST	$250,000

TABLE 5

Adsorption System Annual Costs

Amortization of Capital (8.75% of 20 yrs.)	$26,800
Maintenance (5% of installed capital)	$12,500
Energy Costs (7 BHP for additional 15 psig; 8¢/KWH)	$ 4,800
Carbon usage[1] (40,000 lb. Calgon F-300 @ $0.86/lb.)	$34,400
Carbon Freight (two bulk trailer deliveries)	$ 5,500
Total Annual Cost	$83,500
Unit Cost	$0.265/1000 gals.

[1] Assumes supplier of GAC can remove spent carbon and arrange for disposition of same in acceptable manner.

NOTE: The above cost estimate and the preceeding article are based on a water supply containing 180 ug/L TCE as compared to 11 ug/L at NAS. The water projected in the article will therefore require two filters instead of one and more frequent carbon replacements.

APPENDIX XIV

Estimated Life Cycle Costs

for

South Well

Air Stripping Facility

6' Dia x 12' tall fiberglass tower
Delivery: 6-8 Weeks
Installation: 3-5 Days
Installed Cost: $45,000

Blower: 20 HP, 17,000 scfm, 4" Static Pressure
Pump: 25 HP, 400 gpm, 55 psi
Packing: 265 cu. ft.
Change: 2 Years Cost: $3,000
Tank Material: Food Grade Fiber Glass, FDA approved, UV Protection Incorporated

Hypochlorinator System
Capacity: 3 gal/hr. Installed Cost: $900 + $600 = $1,500
NaOCl: $1.50/gallon

Air Stripping Facility For South Well
Cost Estimates
NAS Whiting Field, Milton, Florida
13 January 1988

LRR | Project No. 808-15

Capital Cost

Stripping Tower	$45,000
Pad, Fence, Electrical and Engineering	15,000
(Based on current unit prices)	
Hypochlorinator	900
Installation of Hypochlorinator	600
Total Capital Cost	$61,500

O & M Costs

Current well pumping time
3264 hrs/yr
Time per year per well with two wells available - Year 1
3264 ÷ 2 = 1632 - 2,000 hrs/year - Year 1

Power for Blower and Repumping
20 HP + 25 HP = 45 HP = 33.7 KW
33.7 KW x 2,000 hrs. x $0.055/KWH = $3,700/year - Year 1
Estimated time per year per well with three wells available - Year 20
365 x 24 x 2/3 = 5,840 - 6,000 hrs/year - Year 20
33.7 KW x 6,000 hrs x $0.055/KWH = $11,100/yr - Year 20

Pump and Blower O & M
Labor - 500 MH/yr @ $15.00/hr - $7,500/year
Materials and Supplies - $1,000/yr

Hypochlorinator
Time of operation per year - Year 1
2,000 hrs/year ÷ 4 = 500 hrs/year - Year 1
(Average operation at 25% capacity)
Hypochlorite Feed
500 hrs/year at 3 gal/hr = 1,500 gal/yr - Year 1
Cost: 1,500 gal/yr x $1.50 gal = $2,300/year - Year 1
Time of operation per year - Year 20
6,000 hrs/yr ÷ 4 = 1,500 hrs/yr - Year 20
1,500 hrs/yr at 3 gal/hr = 4,500 gal/year - Year 20
Cost: 4,500 gal/yr x $1.50/gal = $6,800/year - Year 20
Labor - 100 MH/yr @ $15.00/hr = $1,500/year

Stripping Tower
General Labor - 100 MH/yr @ $15.00/hr = $1,500 year
Media Replacement
Required every 2 years
20 ÷ 2 = 10 times - 1 = 9 replacements
Cost per replacement
$3,000 material + $ 500 - $3,500/replacement
Cost: $3,500 x 9 = $31,500 - Total
$31,500 ÷ 20 = $1,600/year Media Replacement

Chemical Analyses

Trichloroethylene (TCE) and Benzene

Samples required - Raw water + treated water

Monthly: (1+1) x 12 = 24 samples/year

Cost: $150/sample x 24 = $3,600/year

VOC's plus SOC's

Samples required - Raw Water

Quarterly: 1 x 4 = 4 samples/year

Cost: $850/samples x 4 = $3,400/year

O & M Cost Summary

Item	Year 1	Year 20
Power	$ 4,100	$11,100
Pump and Blower O & M		
Labor	7,500	7,500
Materials and Supplies	1,000	1,000
Hypochlorite		
Chemicals	2,300	6,800
Labor	1,500	1,500
Stripping Tower		
General Labor	1,500	1,500
Media Replacement	1,600	1,600
Chemical Analyses		
TCE	2,200	2,200
VOC's and SOC's	3,400	3,400
Total	$26,100	$37,000

Activated Carbon

Replacement Requirements

CALGON
CALGON CARBON CORPORATION

CALGON CARBON CORPORATION BENCHMARK I BUILDING SUITE 804 13430 NORTHWEST FREEWAY HOUSTON, TX 77040-6071 (713) 690-2000

November 18, 1987

Dr. Lloyd Robinson
HENDON ENGINEERING ASSOCIATES
1025 Montgomery Hwy.
Vestaria Hills
Birmingham, Alabama 35216

RE: ACT Report for NAS Whiting Field and
Information for Calculating Carbon Usage Rate.

Dear Dr. Robinson:

Per your request to Mr. Ralph Whitesell, I am enclosing a copy of the accelerated column test that Calgon performed on a groundwater sample from Whiting Field.

I am also enclosing a copy of a paper that was presented at the AWWA meeting last June in Kansas City. This paper presents a methodology for evaluating activated carbon adsorption of VOC's via isotherms. Laboratory tests show that operating systems with short contact times can generally obtain 45-55% of the theoretical capacity of the activated carbon at breakthrough of the contaminant. Therefore, the isotherm curves presented in this paper can be used to predict the carbon usage rate of the 450 gpm system you discussed with Mr. Whitesell. I estimate that a 10 foot diameter vessel containing 20,000 lbs. activated carbon could treat groundwater containing 29 ppb benzene and 4 ppb TCE for approximately 300 days at 450 gpm. This estimate is based on a continuous 24 hour operation. (Of course, an ACT test should be performed to confirm this.)

If you have any questions, please call me.

Sincerely,

Karen Tarbert

Karen Tarbert
Applications Engineer

KT:lh

cc: R. E. Whitesell
Technical Sales Representative - CALGON CARBON

Activated Carbon

Adsorption Facility

Activated Carbon Adsorption Facility For South Well
Updated Cost Estimate
NAS Whiting Field, Milton, Florida
13 January 1988

LRR | Project No. 808-15

Capital Cost

10' Dia. Carbon Adsorber Complete	$60,000
Installation, Pad, Fence and Engineering	35,000
(Based on supplier's stated cost for equipment and for total installed cost)	
Total Capital Cost	$95,000

O & M Costs

Carbon Adsorber O & M
General Labor - 100 MH/yr @ $15.00/hr - $1,500/yr
Media Replacement
Required every year
(Supplier's projection)
19 replacements
19 Replacements plus ulitmate carbon disposal - 19 + 1 = 20
Cost per replacement - $16,000
Cost: $16,000 x 20 = $320,000 - Total
$320,000 ÷ 20 = $16,000/year Media Replacement

Chemical Analyses
Trichloroethylene (TCE) plus Benzene
Samples required - Raw water + treated water
Monthly: (1 + 1) x 12 = 24 samples/year
Cost: $150/Sample x 24 = $3,600/year
VOC's plus SOC's
Samples required - Raw Water
Quarterly: 1 x 4 = 4 samples/year
Cost $850/sample x 4 = $3,400/year

O & M Summary

	Year 1	Year 20
Carbon Adsorber		
General Labor	$ 1,500	$ 1,500
Media Replacement	16,000	16,000
Chemical Analyses		
TCE plus Benzene	3,600	3,600
VOC's and SOC's	3,400	3,400
Total	$24,500	$24,500

R808-FIN.(82)

Life Cycle Costs

Up-Dated Life Cycle Cost Comparison For South Well
NAS Whiting Field, Milton, Florida

LRR | 13 January 1988 | Project No. 808-15

	Air Stripping	Carbon Adsorption
CAPITAL COSTS		
Total Capital Cost	$ 61,500	$ 95,000
Salvage Value	6,200	9,500
Present Worth - Salvage Valu	- 900	-1,400
Present Worth of Facilities	$ 60,600	$ 93,600
Average Annual Capital Cost	$ 7,121	$ 10,998
OPERATION & MAINTENANCE		
Year 1 O & M	$ 26,100	$ 24,500
Present Worth - Year 1 O & M	222,200	208,600
Year 20 O & M	37,000	24,500
Annual Increase	550	0
Present Worth - Annual Increase	30,500	0
Present Worth of O & M	$252,700	$208,600
Average Annual O & M Cost	$ 29,692	$ 24,511
PRESENT WORTH OF ALTERNATIVE	$313,300	$302,200
AVERAGE ANNUAL EQUIVALENT COST	$ 38,813	$ 35,509

R808-FIN.(93)

APPENDIX XV

Golf Course Water Supply

New Potable Water Line

to

Club House

Serving Club House with New Potable Water Lines
Cost Estimate
NAS Whiting Field, Milton, Florida

LRR | 15 January 1988 | Project No. 808-15

Water Lines

Main Line	- 4" PVC - 9,500 ft. @ $10/ft. =	$ 95,000
Service Lines	- 2" PVC - 6,500 ft. @ $ 8/ft. =	$ 52,000
	Total	$147,000

Maintenance

$147,000 @ 1% = $1,470/yr.

Irrigation Water

Old North Well

Repair	= $ 40,000	
New Pump & Motor	= 42,000	
Electrical	= 12,000	
Total	$ 94,000	$ 94,000

Operation

75 HP @ 342 hrs/year @ $0.055/KWH = $ 1,050/yr.

Maintenance

50 MH/hr @ $15.00/MH	= 750/yr.
Supplies	= 250/yr.
Total O & M	$2,050/yr.

TOTAL CAPITAL COST		$241,000
TOTAL O & M COST	$3,520/yr.	

New Potable Water Well

at

Club House

Serving Club House with New Potable Water Well
Cost Estimate
NAS Whiting Field, Milton, Florida

LRR | 15 January 1988 | Project No. 808-15

Water Lines

Main Lines and Service Lines - 2" PVC - 12,100 ft. @ $8/ft. = $ 96,800

Maintenance

$96,800 @ 1% = $968 - $1,000/yr.

Potable Water Well

Well, pressure tank and chlorination $ 10,000

Operation

6 HP @ 3360 hrs/year @ $0.055/KWH = $ 690/yr.

Maintenance

100 MH/yr @ $15.00/MH	=	$1,500/yr.
Supplies	=	100/yr.
Chlorine	=	50/yr.
Chemical Analysis	=	2,000/yr
Permitting and Reporting	=	1,000/yr
Total		$4,650/yr.

Irrigation Water

Old North Well

Repair	=	$ 40,000	
New Pump & Motor	=	42,000	
Electrical	=	12,000	
Total		$ 94,000	$ 94,000

Operation

75 HP @ 342 hrs/yr @ $0.055/KWH = $1,050/yr.

Maintenance

50 MH/yr @ $15.00/MH	=	750/yr.
Supplies	=	250/yr.
Total O & M		$2,050/yr.

TOTAL CAPITAL COST		$200,800
TOTAL O & M COST	$ 7,700/yr.	

R808-FIN.(99)

Existing System

for

Golf Course

Existing System for Golf Course
Cost Estimate
NAS Whiting Field, Milton, Florida

LRR | 16 January 1988 | Project No. 808-15

Operation		
Irrigation Water - 16 MG/yr @ $1.11/1,000 gal		$ 17,760/yr.
Booster Pump - 50 HP @ 342 hrs/yr @ $0.055/KWH		2,670/yr.
Potable Water - 57,600 gal/yr @ $1.11/1,000 gal		60/yr.
	Total	$ 20,490/yr.
Maintenance		
Booster Pump - 50 MH/yr @ $14.00/MH		$ 750/yr.
Supplies		250/yr.
	Total	$ 1,000/yr.
TOTAL ANNUAL COST		$ 21,490

Cost Effective Analysis

for

Golf Course

Alternate Systems to Serve Golf Course
Cost Effective Analysis
NAS Whiting Field, Milton, Florida
16 January 1988

LRR

Project No. 808-15

CAPITAL COSTS	New Potable Water Lines	New Potable Water Well	Present System
Total Capital Cost	$ 241,000	$ 200,800	-
Salvage Value	36,000	24,200	-
Present Worth - Salvage Value	- 5,500	-3,600	-
Present Worth of Facilities	$ 235,500	$ 197,200	-
Average Annual Capital Cost	$ 27,670	$ 23,170	
OPERATION & MAINTENANCE			
Year 1 O & M	$ 3,500	$ 7,700	$ 20,490
Present Worth - Year 1 O & M	30,000	65,000	174,440
Year 20 O & M	3,500	7,700	20,490
Annual Increase	0	0	0
Present Worth - Annual Increase	0	0	0
Present Worth of O & M	$ 30,000	$ 65,550	$ 174,440
Average Annual O & M Cost	$ 3,530	$ 7,700	$ 20,500
PRESENT WORTH OF ALTERNATE	$ 265,500	$ 262,750	$ 174,440
AVERAGE ANNUAL EQUIVALENT COST	$ 31,200	$ 30,870	$ 20,500

R808-FIN.(102)

New Potable Water Line

to

Club House

with

Increased Demand

Serving Club House with New Potable Water Lines with Increased Demand
Cost Estimate
NAS Whiting Field, Milton, Florida
9 December, 1988

LRR | Project No. 808-15

Water Lines

Main Line	- 4" PVC - 9,500 ft. @ $10/ft	$ 95,000
Service Lines	- 2" PVC - 6,500 ft. @ $ 8/ft	$ 52,000
	Total	$147,000

Maintenance

$147,000 @ 1% - $ 1,470/yr.

Irrigation Water

Old North Well

Repair	$ 40,000	
New Pump & Motor	42,000	
Electrical	12,000	
Total	$ 94,000	$ 94,000

Operation

75 HP @ 1300 hrs/year @ $0.055/KWH - $ 4,000/yr.

Maintenance

50 MH/hr @ $15.00/MH	-	750/yr.
Supplies	-	250/yr.
Total O & M		$5,000/yr.

TOTAL CAPITAL COST		$241,000
TOTAL O & M COST	$6,470/yr.	

R808-FIN.(114)

New Potable Water Well

at

Club House

with

Increased Demand

Serving Club House with New Potable Water Well with Increased Demand
Cost Estimate
NAS Whiting Field, Milton, Florida

LRR — 9 December 1988 — Project No. 808-15

Water Lines

Main Lines and Service Lines - 2" PVC - 12,100 ft. @ $8/ft. = $ 96,800

Maintenance

$96,800 @ 1% = $968 - $1,000/yr.

Potable Water Well

Well, pressure tank and chlorination $ 10,000

Operation

6 HP @ 3360 hrs/year @ $0.055/KWH = $ 690/yr.

Maintenance

100 MH/yr @ $15.00/MH	=	$1,500/yr.
Supplies	=	100/yr.
Chlorine	=	50/yr.
Chemical Analysis	=	2,000/yr
Permitting and Reporting	=	1,000/yr
Total		$4,650/yr.

Irrigation Water

Old North Well

Repair	=	$ 40,000	
New Pump & Motor	=	42,000	
Electrical	=	12,000	
Total		$ 94,000	$ 94,000

Operation

75 HP @ 1300 hrs/yr @ $0.055/KWH = $4,000/yr.

Maintenance

50 MH/yr @ $15.00/MH	=	750/yr.
Supplies	=	250/yr.
Total O & M		$5,000/yr.

TOTAL CAPITAL COST		$200,800
TOTAL O & M COST	$11,340/yr	

R808-FIN.(115)

Existing System

for

Golf Course

with

Increased Demand

Existing System for Golf Course with Increased Demand
Cost Estimate
NAS Whiting Field, Milton, Florida
9 December 1988

LRR | Project No. 808-15

Operation		
Irrigation Water	- 53 MG/yr @ $1.11/1,000 gal	$ 58,830/yr.
Booster Pump	- 50 HP @ 1300 hrs/yr @ $0.055/KWH	$ 2,670/yr.
Potable Water	- 57,600 gal/yr @ $1.11/1,000 gal	60/yr.
	Total	$ 61,560/yr.
Maintenance		
Booster Pump	- 50 MH/yr @ $14.00/MH	$ 750/yr.
Supplies		250/yr.
	Total	$ 1,000/yr
Total Annual Cost		$ 62,560

Cost Effective Anaysis

for

Golf Course

with

Increased Demand

Alternate Systems to Serve Golf Course
with Increased Demand
Cost Effective Analysis
NAS Whiting Field, Milton, Florida
9 December 1988

LRR

Project No. 808-15

CAPITAL COSTS	New Potable Water Lines	New Potable Water Well	Present System
Total Capital Costs	$ 241,000	$ 200,800	-
Salvage Value	36,000	24,200	-
Present Worth - Salvage Value	-5,500	-3,600	-
Present Worth of Facilities	$ 235,500	$ 197,200	-
Average Annual Capital Cost	$ 27,671	$ 23,171	-
OPERATION & MAINTENANCE			
Year 1 O & M	$ 6,470	$ 11,340	$ 62,560
Present Worth - Year 1 O & M	55,100	96,500	532,610
Year 20 O & M	6,470	11,340	62,560
Annual Increase	0	0	0
Present Worth - Annual Increase	0	0	0
Present Worth of O & M	$ 55,100	$ 96,500	$532,610
Average Annual O & M Cost	$ 6,474	$ 11,339	$ 62,582
PRESENT WORTH OF ALTERNATIVE	$ 290,600	$ 293,700	$532,610
AVERAGE ANNUAL EQUIVALENT COST	$ 34,145	$ 345,510	$ 62,582

R808-FIN.(119)

Appendix XVI

Special Project Request Forms for an Activated Carbon Filter System for the South Well

Cost Estimate

NAVFAC 11013/7 (1-78)
Supersedes NAVDOCKS 2417 and 2417A

COST ESTIMATE

DATE PREPARED: 22 January 1988

SHEET 1 OF 1

ACTIVITY AND LOCATION: NAS Whiting Field, Milton, Florida

CONSTRUCTION CONTRACT NO.:

IDENTIFICATION NUMBER:

ESTIMATED BY: Hendon Engineering Associtess, Inc.

CATEGORY CODE NUMBER:

PROJECT TITLE: Activated Carbon Adsorption for South Well

STATUS OF DESIGN: [X] PED [ ] 30% [ ] 100% [ ] FINAL [ ] Other (Specify) _____

JOB ORDER NUMBER:

ITEM DESCRIPTION	QUANTITY		MATERIAL COST		LABOR COST		ENGINEERING ESTIMATE	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
1.00 Activated Carbon Adsorption System	1	ea	$95,000	$95,000				
1.01 General O & M Labor	100	MH			$15.00	$1,500		
2.00 Media Replacement	1	ea	$16,000	$16,000				
3.00 Chemical Analyses - TCE + Benzene	24	ea	$ 150	$ 3,600				
3.01 Chemical Analyses - VOC's + SOC's	4	ea	$ 850	$ 3,400				

S/N 0105-LF-010-1335

★U.S. GOVERNMENT PRINTING OFFICE: 1981—703-100/7795 2-1

Special Project Request (Interim)

Step One Submission

SPECIAL PROJECT REQUEST *(INTERIM)*
NAVFAC 11014/64A (5-74)
S/N 0105-LF-003-4235

STEP ONE SUBMISSION

PART I – SUBMISSION

1. FROM *(Activity name and location)*
NAS Whiting Field, Milton, Florida

2. ACTIVITY NO.

3. TO

4. PROJECT NO.

TITLE
Activated Carbon Adsorption System for South Well

5. TYPE
a. [ ] MAINT./REPAIR b. [ ] MINOR CONSTRUCTION/ ALTERATION c. [ ] AIR CONDITIONING d. [X] EQUIPMENT INSTALLATION

6. DESCRIPTION AND FUNCTION OF FACILITY
Installation of activated carbon adsorption system to remove trichlorethylene (TCE) and benzene from water pumped from south well in order to meet Florida and Federal safe drinking water requirements.

a. PROPERTY RECORD CARD NO.

b. NAVY CATEGORY CODE

c. BLDG. OR STRUCTURE NO.

7. THE REQUIREMENT FOR THE FACILITY IS BASED ON:
a. [ ] A CHANGE IN MISSION b. [X] FULL-TIME CONTINUING NEED c. [ ] 3 TO 5 YEAR NEED d. [ ] LESS THAN 3 YEARS' NEED e. [ ] CURRENTLY REQUIRED LESS THAN 50% OF TIME f. [ ] RESERVED FOR FUTURE REQUIREMENTS

8. ESTIMATED PROJECT COST
$ 95,000

9. ESTIMATED PLANNING COST
$

10. DESCRIPTION OF CONDITION TO BE CORRECTED, OR PROBLEM TO BE SOLVED WITH PROPOSED SOLUTION. *Attach additional description if necessary. ONE PAGE ONLY.*
TCE has been found inwater from south well in excess of 3 ug/L and benzene in excess of 1 ug/ the maximum contaminant levels (MCL's) permitted by the Florida Administrative Code, Chapter 17-22.104(1),(g). The west well has recently been returned to service after installation of similar facilities. Although the west well and the north well are now both available to supply potable water to NAS, the two wells have insufficient capacity to provide needed back up supply during peak periods. The proposed system for the south well will provide the needed supplement to the NAS potable water system.

*11. CAN PROJECT BE FUNDED IN PHASES? *How? How many?*
[ ] YES [X] NO

12. SIGNATURE OF OFFICIAL WHO CAN CERTIFY THAT THE DATA PROVIDED IS VALID | TITLE | DATE

PART II – MAJOR CLAIMANT ACTION

1. FROM *(Major claimant)*

2. TO *(Activity name and location)*

3. ACTION TO BE TAKEN

a. [ ] APPROVED FOR SECOND STEP SUBMISSION AND CONSIDERATION. FOR FUNDING IN FY_____ OR FY _____.

b. [ ] DEFERRED PENDING FURTHER STUDY. RECOMMEND UPDATE AND RESUBMISSION IN _____ MONTHS.

c. [ ] OTHER:_____.

SIGNATURE OF APPROVING OFFICIAL | TITLE | DATE

**NOT applicable to Minor Construction, Alterations, or Equipment Installation.*

Special Project Request

Step Two Submission

SPECIAL PROJECT REQUEST
NAVFAC 11014/54 (REV. 5-74)
Supersedes NAVFAC 9-11014/64 (11-68)
S/N 0105-LF-003-4230

STEP TWO SUBMISSION

1. ACTIVITY SNOL NO.

ACTIVITY NAME AND LOCATION: NAS Whiting Field, Milton, Florida

DATE SUBMITTED:

2. PROJECT NO.

TITLE: Activated Carbon Adsorption System for South Well

3. TYPE
a. [ ] MAINT./REPAIR b. [ ] MINOR CONSTRUCTION/ ALTERATION c. [ ] AIR CONDITIONING [XX] EQUIPMENT INSTALLATION

4. DESCRIBE AND STATE FUNCTION OF FACILITY
Installation of activated carbon adsorption system to remove trichlorethylene (TCE) and benzene from water pumped from south well in order to meet Florida and Federal safe drinking water requirements.

a. PROPERTY RECORD CARD NO.
b. NAVY CATEGORY CODE
c. BLDG. OR STRUCTURE NO.

5. WHAT IS THE EFFECT OF THIS PROJECT ON THE MISSION OF THE ACTIVITY?
This project is required to insure a continued supply of potable water for all persons at NAS Whiting Field.

6. THE REQUIREMENT FOR THE FACILITY IS BASED ON:
a. [ ] A CHANGE IN MISSION b. [X] FULL-TIME CONTINUING NEED c. [ ] 3 TO 5 YEAR NEED d. [ ] LESS THAN 3 YEARS' NEED e. [ ] CURRENTLY REQUIRED LESS THAN 50% OF TIME f. [ ] RESERVED FOR FUTURE REQUIREMENTS

7a. EST. FUNDED COST	b. EST. PROJECT COST	c. EST. PLANNING COST	d. TOTAL FUNDS REQUESTED	e. EST. FACIL. REPL. COST
$ 95,000	$ 95,000	$	$ 95,000	$

8. DATE FACILITY CONSTRUCTED

9. IS FACILITY ON AN APPROVED BASIC FACILITY REQUIREMENTS LIST? *If "NO," how was need determined?*
[ ] YES [X] NO Emergency need to comply with safe drinking water requirements

10. IS PROJECT LISTED ON ANNUAL INSPECTION SUMMARY? *If answer is "NO," and AIS is applicable, explain exclusion.*
[ ] YES [X] NO [ ] N.A.

11. DESCRIBE CONDITION TO BE CORRECTED, OR PROBLEM TO BE SOLVED WITH PROPOSED SOLUTION. *Attach additional description if necessary, ONE PAGE ONLY.*
TCE has been found in water from south well in excess of 3 ug/L and benzene in excess of 1 ug/L, the maximum contaminant levels (MCL's) permitted by the Florida Administrative Code, Chapter 17-22.104(1),(g). The west well has recently been returned to service after installation of similar facilities. Although the west well and the north well are now both available to supply potable water to NAS, the two wells have insufficient capacity to provide needed back up supply during peak periods. The proposed system will provide the needed supplement to the NAS potable water system.

12. WHY IS THE PROPOSED SOLUTION BEST – AND WHAT ALTERNATIVES WERE CONSIDERED?
Life cycle costing indicates activated carbon adsorption to be about 5 percent less expensive than air stripping, the only other viable system.

13. WERE ANY NON-NAVY EXPERTS INVITED TO REVIEW THIS PROBLEM AND THIS SOLUTION? *Explain effect on solution.*
a. [X] YES b. [ ] NO
Recommendation prepared by civilian contractor (environmental cousulting engineers) in consultation with Southern Division and NAS staff.

14. HAS EFD DESIGN DIVISION REVIEWED SOLUTION? a. [ ] YES b. [ ] NO

15. CAN ANOTHER FACILITY BE ECONOMICALLY ADAPTED FOR THIS FUNCTION? a. [ ] YES b. [X] NO

*16. CAN PROJECT BE FUNDED IN PHASES? *How? How many?*
a. [ ] YES b. [X] NO

*17. THIS PROJECT IS THE RESULT OF
a. [ ] INADEQUATE MAINTENANCE b. [ ] FACILITY AGE c. [ ] DEFICIENT CONSTR. d. [ ] DEFICIENT DESIGN e. [X] OTHER: Newly identified well contamination

*18. HAS THIS SPECIFIC PROBLEM BEEN CORRECTED PREVIOUSLY?
a. [ ] YES b. [X] NO *When?*

HOW LONG WILL PROPOSED CORRECTIVE ACTION LAST? 20 YEARS

19. ARE COMPONENTS BEING INCREASED IN SIZE OR CAPACITY? *Explain the difference, including cost.*

a. [ ] YES b. [X] NO

20. ARE MATERIALS PROPOSED FOR USE THE SAME AS THOSE EXISTING? *If "NO," explain the difference, including cost.*

a. [ ] YES b. [X] NO New treatment function, piping is consistent with existing piping.

21. PROJECT IS PLANNED TO BE ACCOMPLISHED BY

a. [ ] STATION LABOR b. [X] CONTRACT

22. HAS A PROJECT EVER BEEN SUBMITTED FOR THE REPLACEMENT OF THIS OR SIMILAR FACILITIES? *Check and explain if "YES."*

Similar facilities were installed at west well during 1987.

a. [X] YES b. [ ] NO *When?*

23. ANTICIPATED SAVINGS IF PROJECT IS DONE THIS YEAR AS COMPARED TO A DEFERRAL OF ONE YEAR.

PROBABLE INCREASE IN PROJECT COST FOR ANY JUSTIFIABLE REASON	REDUCTION IN CURRENT MAINT. COST	REDUCTION IN CURRENT OPERATIONS COST
$	$	$

JUSTIFY ANY SAVINGS INDICATED

Immediate action required for safety

WHAT IS PAY BACK PERIOD OF PROJECT? *(In years)*

WILL ACCOMPLISHMENT GENERATE REQUIREMENTS FOR ADDITIONAL M&O FUNDS OR PERSONNEL? a. [ ] NO b. [X] YES *Est. Ann.* $24,500

24. WHAT WOULD BE THE EFFECT OF DEFERRING THE PROJECT ONE YEAR?

If either the north well or the west well should fail, there would not be sufficient potable water for peak demand periods.

*25. IF THE PROJECT IS NOT ACCOMPLISHED NOW, IN HOW MANY YEARS WILL THERE BE SERIOUS DAMAGE TO THE FACILITY AND/OR ITS CONTENTS OR IMPAIRMENT TO ESSENTIAL OPERATIONS? *Explain, include loss value to facility and/or contents.*

YEARS BEFORE SERIOUS DAMAGE OCCURS _____. Only a matter of months.

*26. HAS THE REDUCED UTILIZATION OF THIS SPECIFIC FACILITY AFFECTED A LARGE FACILITY SYSTEM OPERATION? *Explain.*

a. [X] YES b. [ ] NO BY HOW MUCH? 30 %. Only about 70 percent of potable water system is presently available for use.

27. ARE THERE ANY OTHER FACTORS INVOLVED? *Check and explain.*

a. [X] MORALE b. [X] HEALTH c. [X] PUBLIC RELATIONS d. [X] SAFETY e. [X] FIRE PROTECTION f. [X] SECURITY g. [ ] OTHER

28. CERTIFICATION BY RESPONSIBLE OFFICER AT ACTIVITY: I am personally cognizant of the need for, the essentiality of, and the proposed method of accomplishment of this project and certify that the above information is correct, and that this project meets all criteria specified in OPNAVINST 11010.20 and subsequent changes thereto.

SIGNATURE	TITLE	DATE

29. EFD TECHNICAL VALIDATION *(If required) (see para 7303, OPNAVINST 11010.20C)*

SIGNATURE	TITLE	DATE

ENCLOSURES:

a. [ ] ENGINEERING EST. *(NAVFAC 2417)* b. [ ] LOCATION PLAN(S) c. [ ] DRAWINGS d. [ ] PHOTOGRAPHS

**NOT applicable to Minor Construction, Alterations, or Equipment Installation*

NAVFAC 11014/64 (REV. 5-74)
Sheet 2 of 2

S/N 0106-LF-003-4230

Appendix XVII

Technical Specifications
for Purchase of an
Activated Carbon Filter System
for the
South Well

TECHNICAL SPECIFICATIONS
FOR
DETAILED DESIGN, SUPPLY AND INSTALLATION
OF
AN ACTIVATED CARBON ADSORPTION FILTRATION SYSTEM
FOR
THE SOUTH WATER SUPPLY WELL
AT
NAVAL AIR STATION WHITING FIELD
MILTON, FLORIDA

POSSIBLE BIDDERS

Adsorption Systems, Inc.	P. O. Box 387 Millburn, New Jersey 07041
Arrowhead Industrial Water, Inc.	95 Lower Morrisville Road Fallsington, Pennsylvania 19054
Calgon Carbon Corp.	13430 Northwest Freeway Suite 804 Houston, Texas 77040
CECA, Inc.	4150 South 100th East Avenue Suite 300 Tulsa, Oklahoma 74147
Continental Water Systems	2300 N.W. 71st Place P. O. Box 5038 Gainsville, Florida 32606
Detox, Inc.	P. O. Box 324 Dayton, Ohio 45459
Groundwater Technology, Inc.	1514½ 8th Avenue Tampa, Flordia 33605
Hungerford and Terry, Inc.	226 Atlantic Avenue P. O. Box 45 Clayton, New Jersey 08312
ICI Americas, Inc.	Wilmington, Delaware 19897
Met-Pro Corporation	252 Cassell Road P. O. Box 144 Harleysville, Pennsylvania 19438
Westvaco Corporation	Covington, Virginia 24426

SECTION 1 - DESCRIPTION AND GENERAL INFORMATION

1-01. Description

The following specification describes all equipment, materials and services necessary to provide a completely installed Granular Activated Carbon Adsorption System to treat water from the south well at NAS Whiting Field, Milton, Florida and reinject it into the water supply system. The Adsorption System will consist of a single unit and all related appurtenances required for a completely installed and operational system. The total system must be designed for economical carbon usage and ease and completeness of Granular Activated Carbon changeout.

1-02. Scope

(a) The Carbon Adsorption System supplier must take unit responsibility for the completely installed system. The supplier will be responsible for design, fabrication, installation and startup of all mechanical components including, but not limited to, vessels, piping, instrumentation and controls.

(b) The Carbon Adsorption System supplier will also demonstrate the ability to supply, deliver, load and unload, and dispose of the spent carbon by an environmentally approved method. Removal and disposal of the spent carbon must be in accordance with all applicable local, state, and Federal regulations regarding solid waste materials.

(c) The Carbon Adsorption System supplier shall be able to guarantee a supply of virgin grade Granular Activated Carbon and verify the quality of such material with lot analyses of all shipments. This quality shall be in full compliance with the specification herein for Granular Activated Carbon.

(d) The Carbon Adsorption System supplier shall also be able to remove and transport spent Granular Activated Carbon classified as hazardous under RCRA regulations, so that it can be transported to a disposal site or reactivation facility as required.

(e) The Adsorption System will be designed and supplied using materials of construction on the FDA approved list for food grade applications.

1-03. Work Included

(a) The work covered by this specification includes the furnishing and installation of all equipment, materials, carbon and services to comprise a complete Granular Activated Carbon Adsorption System.

(b) System limits for the Granular Activated Carbon Adsorption

System will be defined as beginning at the influent connection for the System and ending with the effluent connection for the System. All equipment between these two points will be provided as part of the complete design by the System supplier.

(c) Specified work items for the Granular Activated Carbon Adsorption System are:

1. One (1) downflow Adsorber including a water collection system and all internals.

2. Influent and effluent piping to the System (8" Ductile Iron) and connecting pipe to tie the adsorption system into the existing water line.

3. Granular activated carbon fill and discharge piping and valves.

4. Integral vent and safety relief piping, water piping and utility connections.

5. 20,000 pounds of Granular Activated Carbon, as specified.

6. Air distribution piping complete with all related appurtenances for properly functioning air system (i.e., filters, drip legs, shut-off valves, etc.), in order to receive air from a compressor and supply it at proper pressure and rate for carbon transfers.

7. Installation within described System limits.

8. Plans and specifications for the System sealed by a professional engineer registered in Florida.

9. Complete set of technical specifications and operating manual.

10. Experienced technical assistance as required.

11. Foundations.

12. Anchor bolts.

13. Temporary air compressor for initial carbon fill.

14. Chain link fence to enclose the Adsorption System.

d. The following work is not covered by this specification and is to be the responsibility of others:

1. Influent supply, effluent disposition and utility water supply.

2. Freeze protection.

3. Clean water for carbon transfer.

4. Flow indicator-totalizer.

SECTION 2 - BID SUBMITTALS

2-01. General Qualification Requirements

In order to insure the supply of a Granular Activated Carbon (GAC) Adsorption System that will be fully effective in meeting effluent requirements for a safe drinking water supply, potential suppliers of said System shall provide the following information with the bid. These submittals shall show the ability to design and supply a GAC Adsorption System in a timely manner, supply GAC media when required, provide safe and legal removal of spent GAC when required and provide ongoing technical support.

2-02. Experience Qualifications

The potential System supplier shall submit the following information on three (3) existing GAC Adsorption Systems which demonstrate the ability to design and supply an effective GAC Adsorption System and meet the qualifications noted above:

(a) Provide GAC Adsortion System description including flow, contact time, System design (flow diagrams of general arrangement), Adsorber sizing.

(b) Provide underdrain design showing ability to remove water across GAC cross-section for effective use of all GAC contained in unit. Water removal shall have a uniform velocity profile across the entire bed.

(c) Provide Adsorption System flow diagram utilizing vessel in Item (a), showing actual flow rates treated.

(d) Provide GAC Adsorption System general arrangement for this site, showing space utilized, influent and effluent locations.

(e) Provide operating weight of GAC Adsorption System for this site.

(f) Provide field tests on Adsorption vessel to verify at least ninety-nine percent (99%) removal of spent GAC so that spent media remaining will not contaminate effluent water. Vessel design shall incorporate the feature to remove carbon without requiring the tank to be opened or cleaned and hosed.

2-04. GAC Adsorption System Process Design

The potential System supplier shall submit the following information with the proposal to exhibit capability for the Adsorption System:

(a) Provide pressure drop information across System.

(b) Provide interpretation of carbon adsorption isotherms to show ability of GAC to remove contaminants and fix dynamic test parameters.

(c) Provide capability to obtain a dynamic pilot simulation of field performance of the proposed System. This dynamic pilot simulation will include a pilot column study conducted on the actual groundwater from the treatment site. The column study will simulate the hydraulic loading rates to be encountered in the full-scale treatment operation. The column study will identify the mass transfer zone for contaminants in this application and identify the carbon utilization rate in a simulation of up to one year's field performance.

(d) Provide analytical procedures used to support Items (b) and (c).

2-05. GAC Supply

The potential System supplier shall demonstrate ability to supply acceptable GAC media, and, therefore, provide the following information with the proposal:

(a) Supply specifications of GAC to be utilized in the System. Show that this GAC is in all respects equivalent to that used in testing (Section 2-04). Provide recent lot analysis that exhibit that GAC supplier is providing media according to published specifications.

(b) Demonstrate ability to supply complete GAC fill in a timely manner upon System completion or notification by client. Demonstrate that inventory of GAC proposed is adequate to meet the initial fill requirements in a timely manner.

(c) Demonstrate ability to transport GAC to site in a reasonable time frame and transfer GAC from delivery units into Adsorber in a safe and timely manner. Provide typical delivery trailer drawings, number of trailers, tractors and drivers currently available. Provide delivery trailer unloading procedures. Provide delivery trailer lining information showing that such lining is on the FDA approved list.

2-06. GAC Reactivation

The potential System supplier shall demonstrate ability to arrange for spent GAC reactivation, so that spent GAC can be removed from the site and reactivated in an enviromentally safe and legally approved manner. Landfill of spent GAC shall not be an approved manner of GAC disposition. The following information shall be required of reactivation capability, and submitted with the proposal:

(a) Provide reactivation testing procedures showing that the spent GAC will be received at the facility and reactivated in an environmentally safe manner.

(b) Spent GAC transportation equipment showing transport of spent GAC is enclosed, DOT approved equipment. Provide transportation equipment drawings and necessary permits to transport hazardous waste.

(c) Ability to transport and receive RCRA manifested material. Provide facility RCRA identification numbers.

(d) The supplier shall submit a health and safety plan for all personnel involved in handling spent carbon.

(e) The supplier shall, to the extent of its negligence, indemnify and hold harmless the owner for any liability that may arise after the spent carbon is loaded into contractor's trailers and signed for by contractor at the owner's facility, provided that the spent carbon contains no PCB, dioxin, DBCP or any other compounds that, due to government regulation, precludes handling the spent carbon in a RCRA approved and permitted facility.

(f) The supplier will provide a certificate of insurance evidencing sudden and accidental pollution liability of insurance in excess of 1 million dollars at the supplier's reactivation site.

2-07. Field Support and Operating Assistance Qualifications

The potential System supplier shall submit the following information exhibiting ability to provide on-going support to the client to insure effective operation of the GAC Adsorption System for the foreseeable future:

(a) Provide resumes of key technical personnel who would be able to consult on process or operational problems, showing their experience on similar applications.

(b) Provide typical analytical programs to assist on-going applications.

(c) Demonstrate ability to provide on-site support to operations. Provide per diem rate for engineering (process) support and technical (operations) support. Provide organization chart showing technical (operations) support groups and resumes of key personnel in this department.

SECTION 3 - FACILITIES TO BE PROVIDED

3-01. Adsorption Vessel

The supplier shall deliver and install one free-standing 10' Diameter x 10' straight side carbon steel lined Adsorption vessel ASME coded for 75 psig capable of treating 400 gpm. Also, included are 8" concrete lined ductile iron pipe and influent and effluent valves. The Adsorption System will be tied in to the existing piping.

3-02. General Layout

A general layout of the proposed Adsorption System is appended to these specifications.

3-03. Foundation

The supplier shall design and pour a 15' x 20' concrete pad or concrete pad and gravel paving for installation of the Adsorption vessel.

3-04. Fence

The supplier shall provide and install a 6' high chain link fence around the pad with 7' posts and 3 strands of barbed wire on top. This fence will be tied into the existing chain link fence presently around the pump. The existing 10' gate will be relocated to the front of the Adsorption System to allow entry of a trailer for loading and unloading carbon.

3-05. Carbon

The suppler shall deliver and install 20,000 pounds of Filtrasorb 300 Granular Activated Carbon, or equal, into the Adsorption vessel.

3-06. Technical Assistance

The supplier shall provide:

(a) Construction plans and specifications for the facilities to be provided. Said plans and specifications shall be sealed by a professional engineer registered in the State of Florida.

(b) Operator training.

(c) An operation and maintenance manual.

(d) Start-up assistance.

(e) Process verification testing.

3-07. Time of Completion

The supplier shall complete installation of all facilities and have them ready for use and testing within twelve (12) weeks of contract award.

SECTION 4 - POST AWARD SUBMITTALS

Upon award of the contract, the GAC Adsorption System supplier shall submit the following information in the time and manner specified. Information provided by the supplier that is considered by the supplier to be confidential in nature must be clearly marked and so designated.

4-01. Initial Submittal

(a) Project schedule indicating submittals, equipment delivery, installation and start-up.

(b) Flow schematic drawing indicating line sizes, valving, utility lines sizes and connections.

(c) Vessel shop or fabrication drawings.

(d) Shop inspection procedure and schedule.

(e) Equipment arrangement and weights - detailed drawing(s) and listing of all required anchor bolts and nuts and a dimensional setting plan to conform to the requirements of the furnished equipment.

(f) Piping arrangement drawings and plans and elevations including detail and location of required interface connections sealed by a professional engineer registered in the State of Florida.

(g) Bill of materials for all supplied equipment.

(h) List of any extra materials or supplies supplied with equipment.

(i) List of spare parts to be furnished.

(j) List of any special tools required.

(h) Equipment tagging and identification.

4-02. Intermediate Submittal

Six (6) weeks after return of approved first submittal, the following submittals shall be made:

(a) Operating and maintenance manual incorporating all necessary information from previous submittal. Operating section shall include complete instruction on unloading spent carbon and loading fresh virgin grade carbon, including any auxiliary utilities required.

(b) Names, functional titles, addresses and phone numbers of technical personnel available for on-going technical support.

4-03. Start-up

The facilities shall be ready for start-up and testing twelve (12) weeks after contract award.

4-04. Final Submittal

Four (4) weeks after start-up and final system acceptance the following submittals shall be made:

(a) Complete set of reproducible drawings and final bill of materials.

(b) Manufacturer's data sheet for Adsorber vessel.

SECTION 5 - PROCESS DESCRIPTION

5-01. General Description of Process

The Adsorption System utilizes Granular Activated Carbon (GAC) for efficient removal of dissolved organic compounds from water intended for potable use. Adsorption is a physical process in which the compounds adhere to the surface of the carbon particle. The large surface area contained within the internal pore structure of the granular carbon particle provides the Carbon Adsorption System with a substantial capacity for the organic compounds to be removed. The Adsorption System provides effective exposure of the contaminated water to a quantity of Granular Activated Carbon.

5-02. Technical Requirements

The Contractor shall furnish and install one (1) GAC Adsorption System designed and sized with a capacity to continuously provide:

(a) Treatment requirements:

1. Maximum anticipated TCE concentration of raw water - 4 ug/L.

2. Design capability for maximum TCE concentration of raw water - 10 ug/L.

3. Required maximum contaminant level (MCL) of water treated by GAC prior to addition of disinfection and stability chemicals - 1 ug/L TCE.

4. Maximum anticipated benzene concentration of raw water - 29 ug/L.

5. Design capacity of maximum benzene concentration of raw water - 60 ug/L.

6. Required benzene MCL of treated water - 0.5 ug/L.

(b) Water flow capacity:

1. 400 gallons per minute (gpm) or 0.576 million gallons per day (MGD).

2. Maximum pressure drop across the entire Adsorption System shall not exceed 10 psig during normal operation.

5-03. Adsorber System Configuration

The Granular Activated Carbon Adsorption System will consist of one (1) process vessel (Adsorber) operated in a downflow mode. The Adsorber will contain twenty thousand pounds (20,000#) of Granular Activated Carbon (GAC). Water will be conveyed to the Adsorption System from the source, will enter the vessel at the top and flow downward through the carbon bed. An internal collector system shall be provided to collect the treated water and retain the granular media in the bed. The treated water will be discharged from the system through the effluent piping.

5-04. Carbon Contact Requirements

The Adsorption System design will provide for a contact time of thirteen and four-tenths minutes (13.4) at a flow of 400 gpm through the Adsorber vessel. The contact time is calculated on a "superficial" or "empty bed contact time" basis. The pressure drop across the entire Adsorption System (within System Limits) is limited to 10 psig during normal operation.

5-05. Carbon Replacement

When the carbon vessel becomes saturated with contaminants adsorbed from the water, the vessel will be taken out of service to replace the spent Granular Activated Carbon with virgin grade Granular Activated Carbon. The vessel will be pressurized with compressed air and the spent carbon displaced into a transfer tank or receiving trailer. The bottom of the carbon bed shall be contained in a coned section, so that nearly complete removal of the spent carbon will be possible in a single step. Fresh carbon can be transferred as a slurry from a delivery container to the empty Adsorber utilizing air pressure. Carbon transfer shall be accomplished hydraulically in slurry form and without human contact, in a closed loop piping system, in order to minimize environmental exposure. Supplier must demonstrate that following removal of spent carbon there would be less than five (5) cubic feet of material remaining in the adsorber.

5-06. Disposal of Spent Carbon

Disposal of spent carbon must be performed in an environmentally safe manner. If the carbon is to be reactivated, it must be accomplished in a facility permitted to accept RCRA manifested material. If unsuitable for reacivation and reuse, the Carbon Adsorption System supplier shall assist the owner in the proper disposition. Therefore, a Procedure for Qualification of Materials to RCRA permitted TSDF, should be made available.

SECTION 6 - EQUIPMENT DESCRIPTION

6-01. Adsorber Vessel

(a) Vessel Configuration

The Adsorber shall be a vertical cylindrical pressure vessel with an elliptical top head. The Adsorber shall be designed such that the GAC is contained in a bottom cone (minimum 45°) such that it can be easily discharged when spent. The vessel shall be designed, constructed and stamped in accordance with the ASME Code, Section VIII for a design pressure rating of 75 psig at 150°F. The vessel shall be equipped with two (2) manways, one located on the top head and the other on the straight side. All nozzle connections must be flush on the inside of the shell and provided with 150 pound full face flanges on the outside.

(b) Vessel Surfaces

The Adsorber shall be constructed of carbon steel and shall have all welds and any other sharp edges ground smooth, and all imperfections such as skip welds, delaminations, scabs, slivers and slag corrected prior to abrasive blasting. The Adsorber internal surface shall be blasted to a white metal surface (SSPC-SP5) to provide an anchor pattern in the metal corresponding to approximately 20% to 25% of the film thickness of the coating. The exterior of the Adsorber shall be sandblasted to a commercial blast cleaning (SSPC-SP6).

(c) Vessel Lining

The interior of the Adsorber vessel shall be lined in order to prevent corrosion that will occur when wet GAC is in contact with carbon steel. This lining shall exhibit abrasion-resistant qualities to prevent erosion by movement of the granular media. A coating shall be used which exhibits excellent chemical resistance to a wide range of water solutions, and meets requirements of the U. S. Federal Register, Food and Drug Regulations Title 21, Chapter 1, Paragraph 175.300.

(d) Exterior Finish

Following sandblasting of the exterior, a rust inhibitive primer shall be applied to a dry film thickness of 3.0 mil before any rust can form. The finish exterior painting of an alkyd resin based paint for outside service must be applied to the exterior of the Adsorber before rust can form beneath the primer coat.

(e) Sample Taps

Sample taps with intake screens, positioned 3 feet in from the inner tank wall, shall be installed at 45, 56, 67, 78, and 89 percent depths of the activated carbon.

6-02. Underdrain Collection System

There shall be a collection system at or near the bottom of the carbon bed to collect treated water across the carbon bed cross section. The water velocity profile across the diameter of the bed shall be uniform in the downward direction at the underdrain location. The collection device(s) shall have slots of a determined width to retain the Granular Activated Carbon and allow free passage of treated water with a minimum of pressure drop. The treated water is to be collected by this system and discharged from the vessel to convey the treated water to the effluent pipe. In no case will material other than Granular Activiated Carbon, i.e., sand or gravel, be installed inside the vessel to assist treated water collection.

6-03. Piping Network

A process piping network shall be provided for the Adsorption System that will enable the following functions to be performed:

(a) Treatment - Under normal operation, the full flow of 400 gpm shall be accepted at the System limits and directed to the unit.

(b) Carbon Exchange - During carbon exchange, the Adsorber being exchanged shall be isolated completely from the potable water system with valving on influent and effluent lines. The process flow shall be discontinued.

6-04. Process and Utility Piping

(a) Pipe Sizes

The process and utility piping to the Adsorption System shall be eight-inch (8") for both influent water to the System and treated water from the System. Adsorber vent lines shall be three inches (3") and Granular Activated Carbon supply and discharge piping shall be four-inch (4). The vessel shall have independent vent, carbon fill and discharge lines.

(b) Pipe Materials

1. In general, all metal pipe 4-inches in diamter and larger shall be ductile iron pipe and all pipe 3½-inches in diameter or smaller shall be galvanized steel pipe.

2. Ductile iron pipe with flanged joings shall conform to the requirements of ANSI Specification A21.15 and shall be suitable for a minimum working pressure of 250 psi. Flanges shall conform to the requirements of ANSI Specification A21.15.

3. Fittings for flanged ductile iron pipe shall be of ductile iron. Flanged fittings shall conform to the requirements of ANSI/AWWA Specifications C110 and shall be suitable for a working pressure of 250 psi. Flanges shall conform to the requirements of ANSI/AWWA Specification C110.

4. All ductile iron pipe and cast and ductile iron fittings shall have a cement-mortar lining of standard thickness conforming to the requirements of ANSI Specification A21.4.

5. Flanged joints on ductile iron pipe shall be joined with bolts and nuts conforming to the chemical and mechanical requirements of ASTM Specification A307, Grade B. Bolts and nuts shall be hexagonal. Bolts and nuts shall be threaded in accordance with American National Standard B1.1 for Screw Threads-Coarse Thread Series, Class 2A, external, and Class 2B, internal. Gaskets shall be full face, of first quality red rubber, 1/8-inch thick.

6. Steel pipe shall have screwed joints and shall be standard strength unless otherwise shown on the plans. Steel pipe shall be hot-dipped galvanized and shall conform to the requiremnts of ASTM Specification A120. Fittings for steel pipe shall be banded standard screwed fittings made of malleable iron or cast steel and shall be galvanized. Fittings shall conform to current ANSI specifiations for 150 psi pressure.

7. GAC discharge piping to and including the shut-off valve and fittings shall be polypropylene lined steel per Dow Chemical Company's MORAF PPL brand, rated at 150 psig to 225°F. Piping shall be Schedule 40, ASTM A53 steel pipe with 125 pound ASTM A126, Class A cast iron flanges and fittings.

8. Compressed air piping (1½") shall be threaded, Schedule 80 galvanized carbon steel pipe per ASTM A120, rated for 125 psig at 350°F. for air service. Air supply to the GAC Adsorption System shall be via a single point connection.

9. The exterior of the piping shall be cleaned to a power tool grade (mechanical grade) and a rust inhibitive alkyd metal primer shall be applied before any rust can form. A finish exterior painting of an alkyd resin based paint for outside service must be applied to the exterior of the piping before rust can form beneath the primer coat. The interior of the water piping shall be thoroughly cleaned and disinfected prior to introduction of potable water through the system.

(c) Butterfly Valves

The process and utility piping, excluding GAC fill and discharge piping shall be equipped with butterfly valves for flow control purposes.

1. Butterfly valves shall be tight closing, stainless steel to rubber type with seal achieved by rubber seats which are bonded to or mechanically retained in the valve body, or rubber seats which are retained on the disc with an 18-8 stainless steel clamp ring and stainless steel bolting. Valves shall be bubble-tight at rated pressures with flow in either direction, and shall be satisfactory for applications involving throttling service and/or frequent operation and for application involving valve operation after long periods of inactivity. Valve discs shall rotate 90 degrees from the full open position to the tight shut position. Butterfly valves shall meet the full requirements of AWWA Specification C504, Class 150B. Butterfly valves shall be as manufactured by the Henry Pratt Co., BIF Unit of General Signal Corp., American Valve & Mfg., or approved equal.

2. Valve bodies shall be constructed of cast iron ASTM A126, Class B, and shall have integrally cast mechanical joint ends or flanged ends. Unless otherwise shown on the plans, butterfly valves installed underground shall have mechanical joint ends and exposed valves shall have flanged ends. Mechanical joints shall conform to the requirements of ANSI Specification A21.11. Flanged joints shall conform to the requirements of ANSI/AWWA Specification C110. Two trunnions for shaft bearings shall be integral with each valve body. Where the rubber seat is mounted on the vane, the valve body shall be fitted with a 360 degree stainless steel seat offset from the shaft, mechanically retained.

3. Valve discs shall be constructed either of alloy cast iron ASTM A436, Type 1 (NiResist) or of ductile iron ASTM A536, Grade 65-45-12. Where the rubber seat is mounted in the body, the mating edge of the disc shall be 18-8 stainless steel, Type 304 or Type 316.

4. Valve shafts shall be turned, ground, and polished. Shafts shall be constructed of 18-8 Type 304 stainless steel and shall be either a one piece unit extending full size through the valve disc and valve bearing, or may be the stub shaft design where solid ductile iron disc is used.

5. Valve seats shall be of natural rubber or synthetic rubber compound. Seats may be installed on the valve disc or valve body. Seats installed in valve bodies

may be vulcanized to the body or mechanically retained. Seats vulcanized to the valve body shall be simultaneously molded in, vulcanized, and bonded to the valve body and seat bond shall withstand a 75-pound pull under test procedure ASTM D429, Method B. Valve seats which are mechanically retained shall be field adjustable and replaceable without dismounting the valve disc or shaft and without removing the valve from the line. Retaining segments and adjusting devices shall be of corrosion resistant materials and shall be capable of a 1/8-inch adjustment.

6. Valve bearings shall be of the sleeve type which are corrosion resistant and self-lubricating. Bearing load shall not exceed 1/5 that of the compressive strength of the bearing or shaft material and shall not exceed 2,500 psi.

7. Valve interior surfaces, except seating surfaces, shall be evenly coated with a suitable primer to inhibit rust or a black asphalt varnish.

8. Hydrostatic and leakage tests shall be conducted on butterfly valves in accordance with AWWA Specification C504, Section 13.

9. Valve operators shall be suitable for underground service and shall be fully gasketed, grease packed, watertight, and shall be provided with extension stem and operating nut, cast iron valve box, and tee wrench for opening and closing valves. Valves shall close in a clockwise rotation of the stem.

(d) Valves on GAC Lines

Valves on the GAC fill and discharge pipe shall be TFE lined, ductile iron body plug valve per Duriron Durco T-Line or equal.

(e) Valving for the compressed air supply shall be bronze or forged brass or barstock brass body regular port ball valves, rated for 500 psig at 100°F.

(f) Transfer hose Connectors

The Granular Activated Carbon piping shall be fitted with hose conectors, such that carbon transfer to and from the Adsorber vessel can be facilitated with transfer hoses. These connectors shall be 4" Quick Disconnector Adapters constructed of 304 stainless steel as manufactured by OPW Division of Dover Corporation as Kamlock Part No. 633-F or equal.

(g) Flush Connections

Two flush connections shall be provided on each GAC fill or discharge line, one upstream and one downstream of the plug valve. Connections shall be welded into steel pipe or supplied in solid polypropylene "spacers" for lined pipe. Flush connections shall consist of a short section of 3/4" quick disconnect adapter to match with water hose.

(h) Pressure Relief

A pressure relief device shall be provided, with relief capacity as required by ASME Code and hydraulic system analysis. Relief venting shall be integral to Adsorption System piping and directed to a common collection point.

(i) Pressure Gauges

The process piping shall be equipped with pressure gauges to indicate the pressure of water entering and exiting the Adsorber to provide information on pressure drops across the Adsorber. The pressure indicating gauges shall be 4½" (face diameter size) with a stainless steel boudon tube in a glycerin filled housing. The gauges shall read 0-100 psig with an accuracy of 1% of full range, and shall be a Weksler AS44P - liquid fill or equal.

SECTION 7 - GRANULAR ACTIVATED CARBON

7-01. Quantity

Twenty thousand (20,000) pounds of Granular Activated Carbon shall be provided and installed within the Adsorber vessel.

7-02. Quality

The Activated Carbon shall be virgin, granular and manufactured from bituminous coal. The Activated Carbon shall be Calgon Filtrasorb 300 or equal and conform to the following specifications:

(a)	Iodine Number (minimum)	900
(b)	Abrasion No. (minimum)	75
(c)	Effective Size	0.8 - 0.9 mm
(d)	Screen Analysis	
	on 8 mesh (maximum %)	15
	through 30 mesh (maximum %)	4
(e)	Water soluble Ash (maximum %)	1
(f)	Total Ash (maximum %)	15
(g)	Moisture, as packed (maximum %)	2
(h)	Total Phosphate, as PO_4 (maximum %)	3

7-03. Analysis

The delivered GAC must be accompanied by an analysis sheet certifying compliance with the specifications.

SECTION 8 - SERVICES PROVIDED

8-01. Documents

(a) The supplier shall provide a complete set of engineering drawings and equipment specifications sealed by a professional engineer registered in the State of Florida for installation and maintenance purposes.

(b) The supplier shall also provide a System operating and maintenance manual.

8-02. Start-up Assistance

The supplier will provide the services of a field engineer who will be responsible for inspection of the GAC Adsorption System, mechanical trouble-shooting, system start-up and operator training.

8-03. Demonstration Testing

The supplier will provide the services of a monitoring coordinator during a two week demonstration period after System start-up.

(a) Testing Parameters:

The scheduling of the demonstration test will be as requested by the owner. The monitoring coordinator will be responsible for assuring the proper collection, storage, handling, packaging and shipment of the appropriate liquid samples as specified by the appropriate analytical methods, training of plant operators in completing these tasks, checking System flows and pressure readings, and aiding in the interpretation of operational and analytical data. The supplier will prepare a demonstration report which will include System flow rates, pressure readings, observations of operators, interpretation of laboratory results, and any other information pertinent for evaluating the Adsorption System.

(b) Testing:

The well will be operated at about 400 gpm for the demonstration test. System flows, pressures and totalizer readings will be checked daily over the two week test period by the supplier. At least 7 start up and shut down cycles will be made in the two week test period by the owner. Grab samples will be collected according to EPA Method 601* with

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* Methods for Organic Chemical Analysis of Municipal and Industrial Water, 40 CFR 136, Appendix A added by 49 FR 43250, October 26, 1984.

hermetic seals maintained until time of analysis. The supplier will originate chain-of-custody forms to accompanying the samples. Each sample shall be analyzed for trichloroethylene (TCE) and benzene.

(c) Sampling frequency:

The frequency of sample collection during each demonstration test will be conducted in accordance with the schedule specified in Section 10 to these Specifications.

(d) Sampling:

Influent samples to be collected from a tap near the well head. Intermediate samples shall be taken from the taps specified in Section 6 - 01.(e) of these specifications. Effluent samples will be collected from the Adsorber effluent sampling tap. The owner reserves the right to collect samples on a more frequent basis if he so desires.

(e) Repeat samples:

If the acceptance standard described below is exceeded by any one sample, an additional sample will be collected. The supplier will then be responsible for submitting this additional sample to a certified laboratory for analysis by EPA Method 601. Any discrepancies shall be resolved by submitting an additional sample to another independent certified laboratory.

(f) Performance requirements:

Analysis of TCE and benzene will be to a detection level of 0.5 ug/L and 0.1 ug/L respectively. The treatment system will operate to produce a treatment level of TCE and benzene of 1.0 ug/L and 0.5 ug/L or less respectively in the effluent from the Adsorption vessel. Exceeding either of these standards shall be determined by the average of three consecutive combined flow samples from the Adsorption vessel including any additional samples collected in accordance with the confirmation procedures described above. If the acceptance standard is exceeded, the supplier shall then make all necessary modifications including replacement of activated carbon if required to bring the System into compliance. The supplier, once the System is brought into compliance, shall repeat the entire 14 day testing period at the supplier's expense.

SECTION 9 - WARRANTIES

9.01. Equipment Warranty

The supplier will warrant the system to be free from defects in materials and workmanship for one (1) year from owner acceptance.

9-02. Performance Warranty

The supplier will warrant the system to meet the discharge criteria embodied in Section 6-03, Demonstration Testing, for the demonstration period.

SECTION 10 - STATE REQUIREMENTS

10-01. The State of Florida, Department of Environmental Regulation

The supplier shall be responsible for all equipment, construction, safety and testing procedures specified in the following Permit conditions.

10-02. General Conditions

1. The terms, conditions, requirements, limitations, and restrictions set forth herein are "Permit Conditions", and as such are binding upon the permittee and enforceable pursuant to the authority of Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is hereby placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of the "Permit Conditions" by the permittee, its agents, employees, servants or representatives.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the department.

3. As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Nor does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit does not constitute a waiver of or approval of any other department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute state recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the state. Only the Trustees of the Internal Improvement Trust Fund may express state opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, plant or aquatic life or property and penalties therefor caused by the construction or operation of this permitted source, nor does it allow the permittee to cause pollution in contravention of Florida Statutes and department rules, unless specifically authorized by an order from the department.

6. The permittee shall at all times properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized department personnel, upon presentation of credentials or other documents as may be required by law, access to the premises, at reasonable times, where the permitted activity is located or conducted for the purpose of:

a. Having access to and copying any records that must be kept under the conditions of this permit;

b. Inspecting the facility, equipment, practices, or operations regulated or required under this permit; and,

c. Sampling or monitoring any substances or parameters at any location reasonably necessary to assure compliance with this permit or department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately notify and provide the department with the following information:

a. A description of and cause of noncompliance; and

b. The period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance.

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the department for penalties or revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source, which are submitted to

the department, may be used by the department as evidence in any enforcement case arising under the Florida Statutes or department rules, except where such use is prescribed by Sections 403.73 and 403.111, Florida Statutes.

10. The permittee agrees to comply with changes in department rules and Florida Statutes after a reasonable time for compliance, provided however, the permittee does not waive any other rights granted by Florida Statutes or department rules.

11. This permit is transferable only upon department approval in accordance with Florida Administrative Code Rules 17-4.12 and 17-30.30, as applicable. The permittee shall be liable for any noncompliance of the permitted activity until the transfer is approved by the department.

12. This permit is required to be kept at the work site of the permitted activity during the entire period of construction or operation.

13. The permittee shall comply with the following monitoring and record keeping requirements:

a. Upon request, the permittee shall furnish all records and plans under department rules. The retention period for all records will be extended automatically, unless otherwise stipulated by the department, during the course of any unresolved enforcement action.

b. The permittee shall retain at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation), copies of all reports required by this permit, and records of all data used to complete the application for this permit. The time period of retention shall be at least three years from the date of the sample, measurement, report or application unless otherwise specified by department rule.

c. Records of monitoring information shall include:

- the date, exact place, and time of sampling or measurement;
- the person responsible for performing the sampling or measurement;
- the date(s) analyses were performed;
- the person responsible for performing the analyses;
- the analytical techniques or methods used; and
- the results of such analyses.

14. When requested by the department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the department, such facts or information shall be submitted or corrected promptly.

10-03. Special Conditions

15. To insure maintenance/operator personnel safety, Permittee shall affix permanent sign, or paint on the filter body shall near the access manway, a restricted sign with the following legend:

WARNING

DO NOT-ENTER WITHOUT
AIR SUPPLY MASK OR
SELF CONTAINED BREATHING
APPARATUS. INTERIOR DOES NOT
CONTAIN ADEQUATE OXYGEN
ATMOSPHERE TO SUSTAIN LIFE

The sign is to be in contrasting safety colors: Yellow - Black - Red.

16. Permittee shall submit to the Department for review and approval within forty-five (45) days after issuance of this permit, a comprehensive operators/maintenance manual whose contents shall include:

a. Description of system operations.
b. Filter unit operating sequence procedures to startup, operate, back flush and drain.
c. Specifications for activated carbon media.
d. Procedures for filling new media in the vessel.
e. Procedures for removing spent media from the vessel.

17. Modified water supply facilities, including mains, shall be installed, cleaned, disinfected, and bacteriologically cleared for service in accordance with the latest applicable AWWA standards and Department rules and regulations.

18. For initial filter startup, analysis and thereafter, when filter media is changed, the well shall pump thru the filter to the storm sewer for two (2) hours prior to taking samples.

19. A request to clear the system for the initial operation startup shall be submitted to the Department for approval within thirty (30) days of completion of construction, testing and disinfection.

This approval will be granted upon:

a. Receipt of certification by a registered professional engineer as to construction in accordance with the approved plans and specifications and compliance with Section 17-22.106, Florida Administrative Code; and,

b. Receipt of two (2) TCE analysis sets from the filter made at 4 hour intervals (with treated water product still flushed to waste) with resulting treated water product TCE level is equal to or less than 1.8 ug/l.

20. Conditions 18 and 19 shall be repeated for the filter body before putting the filter into service and after each change of GAC materials or if the test results from Specific Condition 19.b. exceed 1.8 ug/l. Under no circumstances will treated water that exceeds 2.8 ug/l be introduced into the potable water distribution system.

21. Permittee shall sample influent and effluent from the filter for TCE. Five sample taps are to be provided on each filter. These are to be installed at 0.45, 56, 67 and 100% of the carbon bed depth. (Influent to filter is at the top and corresponds to 0% level of bed depth).

a. <u>During Initial Start-up and Test Period</u>

Day 1. Influent and plant effluent between two and four hours after flow established.

Day 2. Common influent and 45% tap and 100% tap on the filter.

Day 4. 100% tap on the filter.

Day 6. 45% and 100% taps on the filter.

Day 9. 100% tap on the filter.

Day 12. 100% tap on the filter.

Day 14. Common influent and 45% and 100% taps on the filter.

b. <u>During Routine Operation</u>

Every 2 weeks - influent and effluent.

Every 4 weeks - 45% tap on the filter.

This schedule is based on previously reported VOCs in the influent and is subject to adjustment based on results reported. The four-week sampling on the filter shall be moved to the next lower tap when break-through is detected.

Bacteriological analyses shall be taken concurrently with the above sampling.

The effluent (product) TCE data results shall be plotted or mathematically analyzed to statistically predict when the carbon should be removed and replaced based on gallons of water treated or calendar days of usage. As soon as the common effluent (product) water TCE level reaches a value of 1.8 ppb the routine sampling shall be increased to one per week. The Department shall be notified and consulted in order to review and approve the final stage sampling and test program.

Sampling and testing shall be in accordance with EPA Methods 601, 602 and 6234. Testing shall be performed at a laboratory certified by the Department of Health and Rehabilitative Services to perform drinking water analysis.

22. Upon receipt of effluent samples with TCE levels greater than or equal to 2.8 ug/l, the filter shall be taken out of service.

23. All P.V.C. pipe used in the distribution system shall bear the N.S.F. logo and shall meet all AWWA C-900-75 standards for 4"-12" diameter pipe.

24. The Department shall be notified and prior approval shall be obtained of any changes or revisions made during construction.

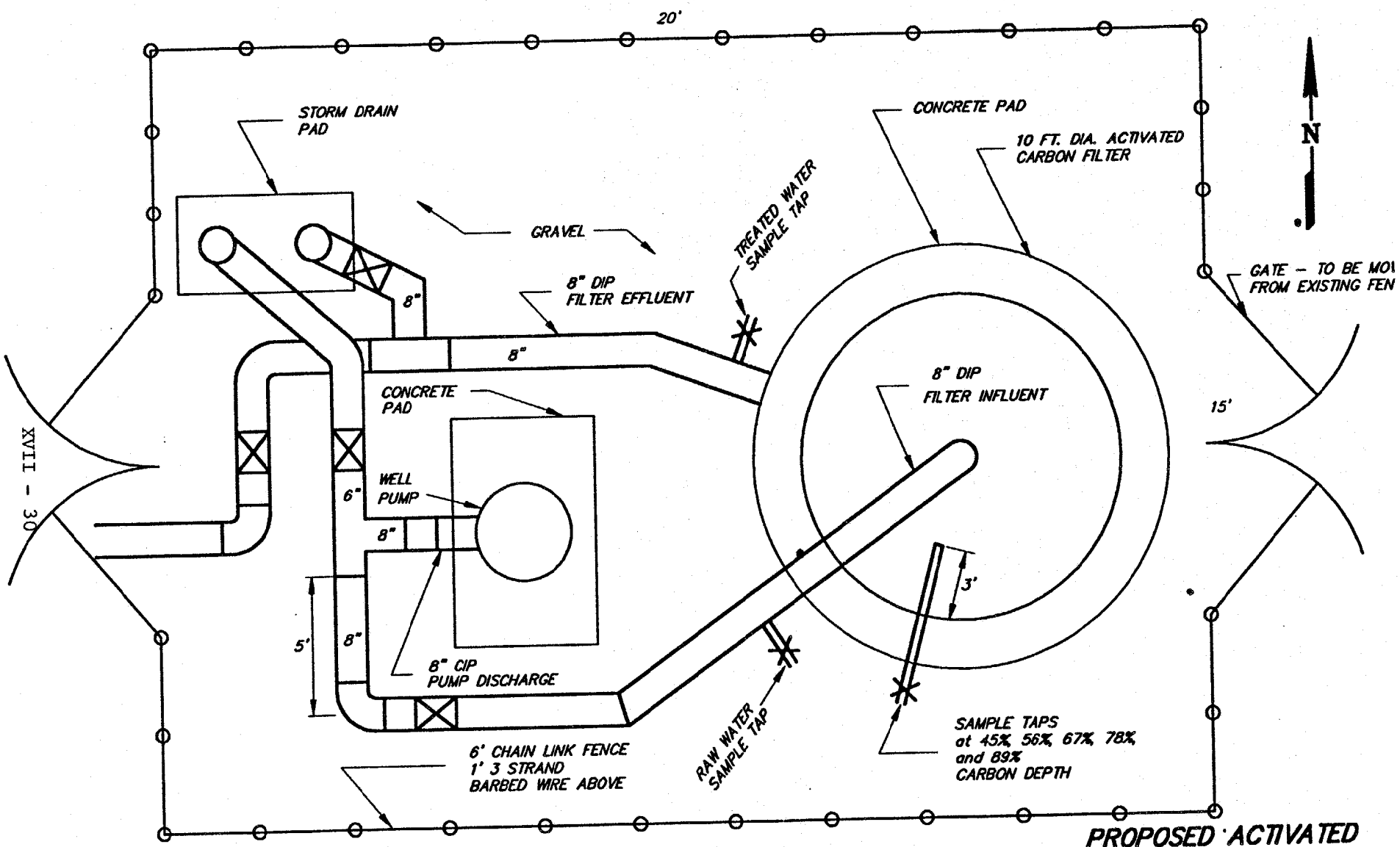
25. Permittee shall ensure that engineer provides contractor with instructions and field sketches detailing locations where concrete encased potable water pipe is required.

26. Permittee shall ensure that engineer provides location and detail of thrust and anchor blocks on potable water distribution system.

27. Permittee shall use necessary erosion control measures during and after construction and shall remove all construction debris prior to project completion. In addition, all surfaces disturbed by construction shall be recontoured to final grades prior to project completion. It is noted that the permit does not constitute the Department's review or approval of the stormwater aspects of the project.

28. Permittee will instruct the contractor to remove all surplus material and completely restore to good conditions, all surfaces disturbed, destroyed or removed by the contractor, or his agent, on account of construction. Before final inspection is made, all surfaces disturbed on account of this construction shall be leveled up and all surplus material and rubbish incident to the construction must be removed and disposed of and streets, ditches, sidewalks, crossings, railroad, grass plots and other property affected by the construction shall be left in good and acceptable condition.

29. Permittee shall ensure that paints and protective coatings to be used on this project which will come into contact with potable water as outlined in Florida Administrative Code Rule 17-22.106(3)(b) has EPA specific approval which details any limitations. Questions as to whether a particular paint or protective coating is on the latest EPA official listing of acceptable drinking water additions can be directed to the District Potable Water Engineer at (904)436-8380. It will be necessary to provide the product name and company name when inquiring.



Not to Scale

PROPOSED ACTIVATED CARBON ABSORPTION SYSTEM

SOUTH WELL

NAS WHITING FIELD
MILTON, FLORIDA

01.05.89
WHIT-H