

265 75  
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8.3  
OU1

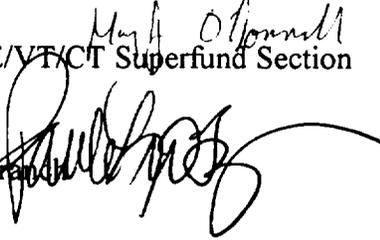
**U.S. ENVIRONMENTAL PROTECTION AGENCY  
REGION I  
J.F.K. FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203**

**MEMORANDUM**

Date: September 30, 1997

Subject: Kellogg-Deering Superfund Site, Norwalk, Connecticut (OU1)  
Second Five-Year Review Report

From: Leslie McVickar, Project Manager  
ME/VT/CT Superfund 

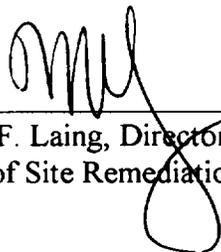
Through: MaryJane O'Donnell, Chief, ME/VT/CT Superfund Section  
&  
Paula Lia Fitzsimmons, Chief  
Remediation & Restoration II Branch 

To: Harley F. Laing, Director  
Office of Site Remediation and Restoration

Attached hereto is the Second Five-Year Review Report for the first operable unit at the Kellogg-Deering Superfund Site in Norwalk, Connecticut. Pursuant to Section 121(c) of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), as amended, and Section 300.430(f)(4)(ii) of the National Oil and Hazardous Substances Pollution Contingency Plan, reviews are mandated for all remedial actions which result in any hazardous substances remaining at the site. Reviews are conducted at least every five years after the initiation of the remedial action to assure that human health and the environment are being protected by the implemented remedial action.

The Record of Decision for the first operable unit was signed in September 1986 and required bringing into operation an existing air stripper at one of Norwalk's public water supplies, to remove volatile organic compounds (VOCs) from the contaminated groundwater. The primary objective of the selected remedy is to protect the public by assuring a reliable supply of safe, potable water to the public. This remedy was carried out by the Norwalk First Taxing District (NFTD) Water Department under a unilateral administrative order issued by EPA in May 1987. In May 1988, EPA certified in a letter to the NFTD that the District had satisfactorily implemented the selected remedial action and was in compliance with the administrative order. The first five-year review was completed in December 1992, through which it was determined that the remedial action remained protective of public health and the environment.

EPA has determined that the air stripper continues to operate effectively at the well field and that the remedial action continues to be protective of public health and the environment. EPA's review of sampling and analytical data collected at the well field indicate that the air stripper continues to achieve 100 percent removal of the VOCs. The stripper, therefore, continues to be protective of the public which relies on this water supply.



\_\_\_\_\_  
Harley F. Laing, Director  
Office of Site Remediation and Restoration

9-30-97

\_\_\_\_\_  
Date

**FIVE-YEAR REVIEW REPORT NO. 2**

**KELLOGG-DEERING WELL FIELD SITE  
OPERABLE UNIT NO. 1  
NORWALK, CONNECTICUT**

**RESPONSE ACTION CONTRACT (RAC), REGION I**

**For  
U.S. Environmental Protection Agency**

**By  
Brown & Root Environmental  
and  
Raytheon Engineers & Constructors**

**EPA Contract No. 68-W6-0045  
EPA Work Assignment No. 017-FRFE-0156  
B&RE Project No. 7674**

**September 1997**



**Brown & Root Environmental**

FIVE-YEAR REVIEW REPORT NO. 2

KELLOGG-DEERING WELL FIELD SUPERFUND SITE  
OPERABLE UNIT NO. 1  
NORWALK, CONNECTICUT

RESPONSE ACTION CONTRACT (RAC), REGION 1

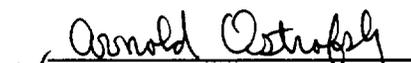
For  
U.S. Environmental Protection Agency

By  
Brown & Root Environmental and  
Raytheon Engineers & Constructors

EPA Contract No. 68-W6-0045  
EPA Work Assignment No. 017-FRFE-0156  
B&RE Project No. 7674

September 1997

  
Michael A. Penzo  
Project Manager

  
George D. Gardner, P.E.  
Program Manager

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## 1.0 INTRODUCTION

As requested by EPA, a second five-year review was conducted of the remedial action (air stripper) selected for the Kellogg-Deering Well Field, Operable Unit No. 1, in Norwalk, Connecticut. The first five-year review of Operable Unit No. 1 was conducted in 1992. Pursuant to Section 121 (c) of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), as amended, and Section 300.430 (f) (4) (ii) of the National Oil and Hazardous Substances Pollution Contingency Plan, reviews are mandated for all remedial actions which result in any hazardous substances remaining at the site. Reviews are conducted at least every five years after the initiation of the remedial action to assure that human health and the environment are being protected by the implemented remedial action.

The activities conducted for the five-year review were based on the Statement of Work attached to the Work Assignment Form prepared by EPA and dated July 11, 1997 and on the Draft Work Plan, Five-Year Review, OU1, Kellogg-Deering Well Field Site, prepared by Brown & Root Environmental and Raytheon Engineers & Constructors and dated August 1997. Work conducted for this review was authorized under Work Assignment No. 017-FRFE-0156.

### 1.1 Scope of the Five-Year Review

Activities conducted to complete the five-year review included:

- Document Review: applicable site-related documents were reviewed to become familiar with the site history and status. The following documents or files were reviewed:
  - Record of Decision for Operable Unit 1 signed September 25, 1986
  - Administrative Order issued to the Norwalk First Taxing District (NFTD) on May 1, 1987

- Brown & Root Environmental (formerly HALLIBURTON NUS Environmental Corporation) Site Files for the first five-year review, including historical operation and maintenance and sampling plans, data, and correspondence
  - Administrative Record (EPA Records Center)
  - Connecticut Department of Public Health (DPH) (formerly Department of Health Services) Site Files, including state inspection reports
  - Analytical results on influent and effluent samples from the air stripper obtained from the Connecticut DPH and Norwalk First Taxing District
- **Standards/ARARs Review:** federal criteria, advisories, and guidance and State standards which were listed in the ROD were reviewed and updated with revisions promulgated subsequent to the implementation of the ROD, with respect to site-related contaminants of concern listed in the ROD. The purpose of this review was to ensure that the selected remedy remains protective of human health and the environment, in light of revised standards, such as lowered MCLs. Table 3-1 presents the applicable standards as listed in the 1986 ROD with revisions effective in 1997.
  - **Site Visit:** a site visit to the Kellogg-Deering Well Field - Operable Unit No. 1 was conducted to observe the current operation of the air stripper unit and to obtain information on the operation and maintenance of the facility from the Norwalk First Taxing District Water Department (NFTD), owner and operator of the facility. Copies of the air stripper inspection reports from 1992 through the present were obtained during the site visit. Section 5.0, Site Visit Summary presents a summary of information obtained during the site visit. Table 5-1 presents a summary of sampling results obtained from the Connecticut DPH and NFTD.

- **Interviews:** interviews were conducted with NFTD (Distribution Manager and Water Quality Manager), Connecticut DPH (Water Supplies Section and Laboratories Certification Section), EPA Remedial Project Manager for the Site, Connecticut Department of Environmental Protection (Air Permits Section), Baron Consulting Company, and Hydro Group, Inc.

## **1.2 Description of the Remedy**

In September 1986, a Record of Decision (ROD) was approved by the U.S. EPA Regional Administrator for the selection of a remedial action for the Kellogg-Deering Well Field Site, Operable Unit No. 1. The primary objective of the remedy for the Kellogg-Deering Well Field Operable Unit No. 1 is to protect the public by assuring a reliable supply of safe, potable water to the public currently dependent on the well field.

As stated in the 1986 ROD, the remedy consisted of bringing into operation the packed tower air stripping facilities installed in 1985 to remove volatile organic compounds from the contaminated groundwater at the Kellogg-Deering Well Field. The stripped water is then discharged into the existing conventional water treatment plant and distribution system. The stripper has been designed to be 99 percent efficient in the removal of trichloroethylene (TCE), the contaminant of most concern, and other chlorinated hydrocarbons.

The packed column air stripper was installed in 1985 to treat water from any of the four existing production wells. To accommodate the disparity between system demand and production rate, a large holding tank/clear well (750,000 gallons) had been installed. Following installation, cracks developed in the tank rendering it unusable and thus preventing the operation of the air stripper. The selected remedy included the repair of the holding tank; operation and maintenance of the air stripper; groundwater monitoring of seven wells located east of the Norwalk River to allow for early detection of possible deterioration in the water-producing aquifer and time for any needed corrective action at the well field; sampling and testing of the treatment system's performance; and air monitoring during trial and operation of the air stripper to confirm that air emissions treatment is not required.

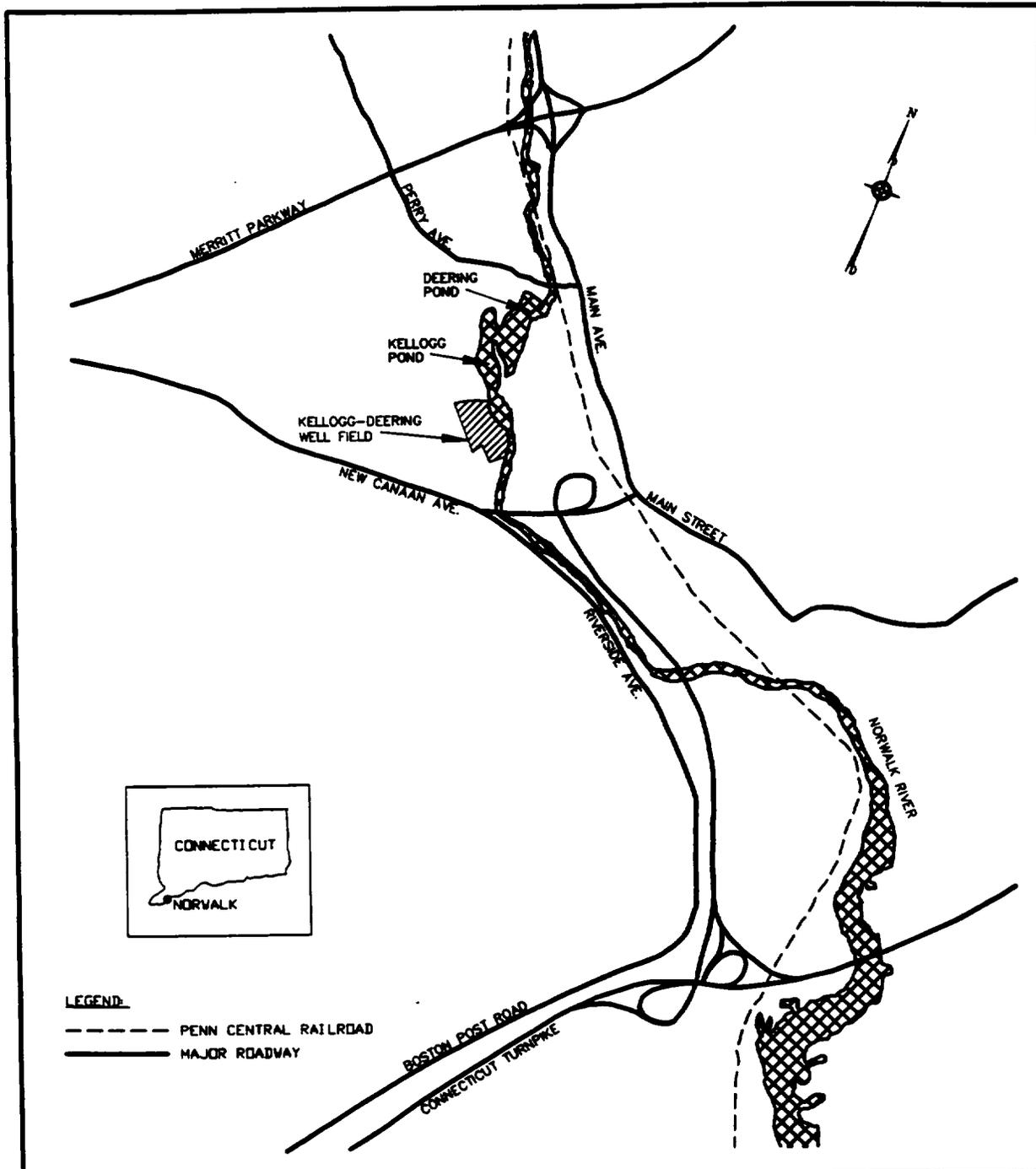
Site-related contaminants of concern, as listed in the ROD, include trichloroethylene (TCE); 1,2-dichloroethylene; tetrachloroethylene; methylenechloride; 1,1,1-trichloroethane; benzene; and xylenes.

## **2.0 SITE DESCRIPTION AND BACKGROUND**

The Kellogg-Deering Well Field Superfund Site is located in Norwalk, Fairfield County, Connecticut and consists of an approximately 10-acre municipal well field and adjacent areas that contribute to the well field contamination. A general location map of the Kellogg-Deering Site is presented as Figure 2-1. The well field is bordered to the east by the Norwalk River, to the north by residences along Broad Street, to the west by residences along Lakeview Avenue, and to the south by wooded land and residences in the vicinity of East Lakeview Drive and Nutmeg Place. The adjacent areas include light industrial and residential neighborhoods on the east side of the river.

The Kellogg-Deering Well Field is owned and operated by the Norwalk First Taxing District (NFTD) Water Department and includes four municipal supply wells (Layne 1 Replacement - L-1R, Layne 2 - L-2, Deering 1 - D-1, and Deering 2 - D-2), which supply approximately 15 to 35 percent of the water for about one-half of Norwalk. The NFTD serves approximately 45,000 people. The Layne 1 well at the well field was permanently capped and removed from service in 1994 due to elevated levels of TCE, iron, manganese, and suspended solids. Well L-1R was installed to replace the Layne 1 well. The primary source of public water supply to the NFTD is surface water from four reservoirs; reservoir water is blended with well field water at varying ratios depending on reservoir storage and distribution system location. The Norwalk Second Taxing District Water Department supplies water to the remainder of Norwalk.

Elevated levels of trichloroethylene (TCE) in groundwater at the well field were discovered in 1975. Since contamination was detected, the two Deering wells have been used regularly for public supply and the two Layne wells have been used sporadically as allowed by fluctuating contaminant concentrations. A redwood slat tower air stripping treatment system was installed by the NFTD at Layne 2 in 1981. This air stripper is no longer in service as the water pumped from Layne 2 has been treated by the packed column air stripper since implementation of the ROD in 1988. The packed column air stripper was not used upon its installation in 1985 due to cracking of the clearwell (storage tank).



<b>GENERAL LOCATION MAP</b>		<b>FIGURE 2-1</b>	
<b>KELLOGG-DEERING WELL FIELD</b>		 <b>Brown &amp; Root Environmental</b> 55 Jonspin Road      Wilmington, MA 01887 (508)658-7899	
<b>NORWALK, CONNECTICUT</b>			
<b>DRAWN BY:</b> D.W. MACDOUGALL	<b>REV.:</b> 0		
<b>CHECKED BY:</b> M. RAMBELLE	<b>DATE:</b> SEPTEMBER 29, 1997		
<b>SCALE:</b> NOT TO SCALE	<b>ACAD NAME:</b> C:\DWG\KELL\FIG_1-2.DWG		

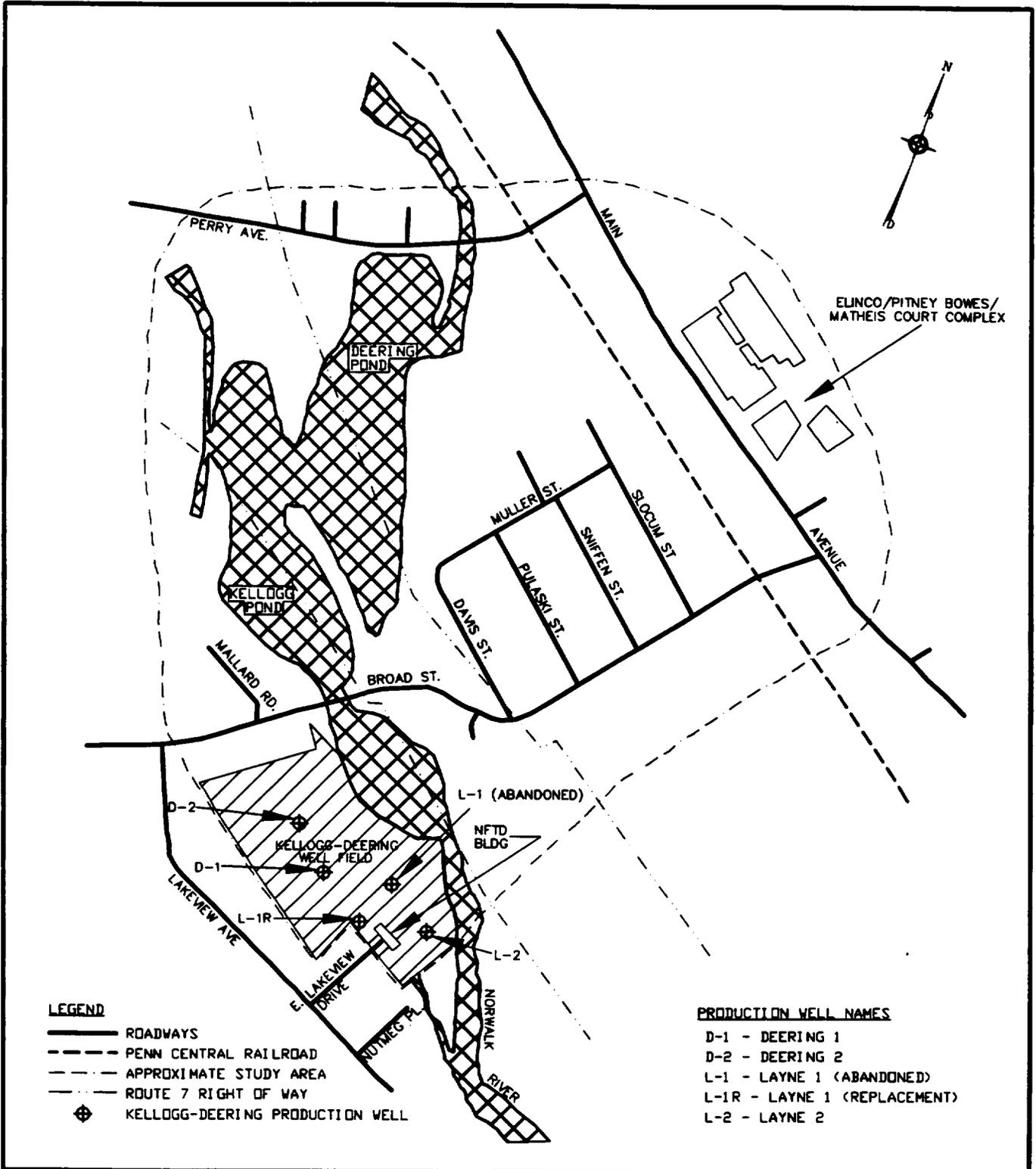
The Site was placed on the National Priorities List (NPL) in 1984; a Remedial Investigation and Feasibility Study (RI/FS) was conducted between 1984 and 1986 to determine the nature and extent of groundwater contamination at the Site and the treatment options for water at the municipal supply wells. Based on the information provided in this first operable unit RI/FS, a Record of Decision (ROD) was issued in 1986 that required the completion and operation of the existing well head treatment system (packed column air stripper) at the Kellogg-Deering Well Field.

In May 1987, EPA issued Administrative Order Docket number 1871067 to the NFTD to complete construction of, and to test and operate, the air stripping system required by the 1986 First Operable Unit ROD. This well head treatment facility became operational in 1988 and presently removes TCE and other volatile organic compounds (VOCs) from the contaminated groundwater prior to discharge into a conventional water treatment plant and distribution system. All wells are currently in use on an as-needed basis. In May 1988, EPA certified in a letter to the NFTD that the District had satisfactorily implemented the selected remedial action and was in compliance with the Administrative Order. In 1987, a supplemental RI/FS was initiated to provide further information regarding the source(s) and extent of groundwater TCE contamination at the Site (the Second Operable Unit). In addition to better defining the area of groundwater contamination found during the initial RI, the supplemental RI also identified a major source area of groundwater and soil TCE contamination at the Elinco/Pitney Bowes/Matheis Court Complex (the Complex) located at 272 and 282 Main Avenue in Norwalk. The supplemental RI concluded that the contamination at the Complex is contributing to the contamination at the Kellogg-Deering Well Field and the aquifer supplying the Well Field. The supplemental RI also identified soil gas contamination sources at the Complex and provided an analysis of indoor air quality. The Complex is considered to be a major soil and groundwater contamination source area. Figure 2-2 presents a Site Map, including approximate locations of the municipal wells and of the Complex.

In September 1989, EPA signed a ROD for the Second Operable Unit which provides for source control and contaminant migration management at the source area. The selected remedy is a comprehensive approach to Site remediation which addresses contamination of soils and groundwater. The primary components of the remedy for the Second Operable Unit

include in-situ soil vapor extraction to remediate contaminated soils, and pumping, treating, and discharging contaminated groundwater at the source area. In September 1990, a Consent Decree for performance of the Second Operable Unit Remedial Design/Remedial Action (RD/RA) was signed with four Potentially Responsible Parties. Remedial Action construction has been completed and the final Remedial Construction Report (RCR) was submitted to EPA on November 30, 1996. Operation and maintenance activities of the soil vapor and groundwater extraction and treatment systems began on September 30, 1996. To meet the cleanup objectives, the groundwater extraction and treatment system will operate for a minimum of ten years and a maximum of thirty years.

The first five-year review of the First Operable Unit was conducted by EPA in 1992 and is documented in the Final Five-Year Review Report, dated December 1992. The 1992 report concluded that the air stripper used to treat the NFTD public water supply continues to protect human health and the environment. Minor areas of deficiency with respect to the requirements of the Administrative Order and ROD were noted, but, based on the 100 percent removal efficiency maintained by the air stripper, no major recommendations were necessary.



<b>SITE MAP</b>	
<b>KELLOGG-DEERING WELL FIELD</b>	
<b>NORWALK, CONNECTICUT</b>	
DRAWN BY:	D.W. MACDOUGALL
CHECKED BY:	M. RAMBELLE
SCALE:	NOT TO SCALE
REV.:	0
DATE:	SEPTEMBER 29, 1997
ACAD NAME:	C:\DWG\KELL\FIG_2-2.DWG

**FIGURE 2-2**



**Brown & Root Environmental**

55 Jonspin Road      Wilmington, MA 01887  
(508)658-7899

### **3.0 STANDARDS REVIEW AND UPDATE**

The National Contingency Plan (NCP) requires that relevant Federal criteria, advisories, and guidance and State standards shall be considered during the evaluation of proposed remedial action alternatives. Applicable standards at the time of implementation of the ROD for Operable Unit No. 1 of the Kellogg-Deering Site (1986) are listed below:

- Connecticut Air Hazard Limiting Values
- Connecticut Drinking Water Regulations
- National Drinking Water Advisory Council recommendations
- Proposed Maximum Contaminant Level (PMCL), Recommended MCL (RMCL), and Proposed-Recommended MCL (PRMCL)
- Suggested Adjusted Acceptable Daily Intake

Federal and State drinking water standards and guidelines in effect in 1986 were presented in the ROD and are shown in Table 3-1 for comparison. Current (1997) Federal and State drinking water standards for contaminants of concern listed in the ROD are also presented in Table 3-1.

Since the signing of the ROD in 1986, several new Maximum Contaminant Levels (MCLs) have been established for compounds listed as contaminants of concern at the Site. As stated in the first five-year review report, new MCLs established through 1992 included tetrachloroethylene; trans-1,2-dichloroethylene; methylene chloride; 1,1,1-trichloroethane; and xylenes. The Federal MCLs for the compounds listed in Table 3-1 have not changed since 1992. Since 1992, all of the State MCLs for the compounds listed in Table 3-1 have been finalized and now match the respective Federal MCLs. Therefore, new State MCLs have been established for cis-1,2-dichloroethylene (MCL = 70 ug/l); trans-1,2-dichloroethylene (MCL = 100 ug/l); and methylene chloride (MCL = 5 ug/l).

**TABLE 3-1**  
**DRINKING WATER STANDARDS COMPARISON: 1997/1986**  
**FIVE-YEAR REVIEW REPORT NO. 2**  
**KELLOGG-DEERING WELL FIELD - OPERABLE UNIT NO. 1**  
**NORWALK, CONNECTICUT**  
 (all units in µg/l)

Contaminants of Concern	1997		1986				
	USEPA Drinking Water Standards (1)	Connecticut State Drinking Water Standards (2)	Federal Exposure Criteria and Guidance (3)			Connecticut State Limits (3)	
<b>VOLATILE ORGANICS</b>	<b>MCL</b>	<b>MCL</b>	<b>PMCL</b>	<b>RMCL</b>	<b>PRMCL</b>	<b>AADI</b>	
Trichloroethylene	5	5	5	0		260	25
Tetrachloroethylene	5	5					
1,2-dichloroethylene					70		
(cis-1,2-)	70	70					
(trans-1,2-)	100	100					
Methylene chloride	5	5		0		350*	25
1,1,1-trichloroethane	200	200					
Benzene	5	5	5	0		25	1
Xylenes	10,000	10,000					

## NOTES:

- (1) Drinking Water Regulations and Health Advisories, October 1996. USEPA Office of Drinking Water.
  - (2) Public Health Code Regulations 19-13-B102, Connecticut Department of Public Health, received September 16, 1997.
  - (3) Record of Decision, Kellogg-Deering Well Field, Norwalk, Connecticut, EPA Region I, September 25, 1986.
- MCL Maximum Contaminant Level (P = Proposed; R = Recommended)
- AADI Suggested Adjusted Acceptable Daily Intake (not considering carcinogenic effects and assuming 100% contribution from drinking water).
- \* Lifetime Health Advisory assuming 20% contribution from drinking water.

As presented in the analytical data summary in Table 5-1, the air stripper effluent has not exceeded the MCLs for any of the sampled contaminants since the first five-year review and, according to the sampling and analytical data available, is achieving 100 percent removal of volatile organic compounds. However, it is unclear whether the influent samples as collected may actually be effluent samples. There are two unlabelled sampling taps near the air stripper connected to the treatment system by underground piping. A piping schematic drawn by the Connecticut DPH on September 6, 1988 (and revised by DPH on April 5, 1995) indicates that the northern sampling tap, which is located closest to Deering 1, is the influent tap and that the other (southern) tap is the effluent. The NFTD indicated that it does not have any other drawings showing the underground piping arrangement. The NFTD, however, stated that the DPH's schematic is incorrect and corrected the schematic to show that the sampling tap that is located closest to Deering 1 is the effluent tap and that the other tap is the influent. To do this, the NFTD re-drew the underground piping lines in the vicinity of the tower. The original DPH schematic and the NFTD's version are included in Appendix 1. The NFTD collects influent samples from the sampling tap that is located closest to Layne 1. However, if this sampling tap is actually connected to the effluent from the tower as shown on the original DPH schematic, then the following would result: 1) the influent results would be considered to be air stripper effluent results, and 2) no influent data would be available because no samples are collected from the other sampling tap (because effluent samples are collected at the entry point to the water supply). Even if the above scenario is correct, the analytical results show that the samples collected at the entry point to the water supply do not exceed MCLs for any of the sampled contaminants.

Following the receipt of an air permit application from NFTD for operation of the air stripper, the Connecticut Department of Environmental Protection (DEP) issued an exemption letter to the NFTD stating that the District is not required to obtain an air emissions permit based on the projected maximum volatile chemical emissions from the air stripper stated in the permit application (see Appendix 2). The Connecticut Air Hazard Limiting Values are, therefore, not included as applicable standards for the NFTD facility.

One state regulation change regarding air permitting has occurred since the 1986 ROD, according to Mr. Ernie Bouffard, Supervising Air Pollution Control Engineer in the DEP's Air Permits Section. Beginning in 1989, air stripper emissions that exceed 0.10 lb/hr require a

permit. Based on the current measured influent and effluent concentrations and approved water flowrate (2800 gpm), calculated emissions from the air stripper are well under 0.10 lb/hr and a permit is not required. However, if the above scenario regarding switching of the sampling taps is correct, then influent concentrations would not be known and emissions from the air stripper could not be calculated.

#### **4.0 SUMMARY OF REQUIREMENTS OF THE ROD AND ADMINISTRATIVE ORDER/REMEDIAL ACTION PLAN**

As stated in the ROD, the primary objective of the selected remedial alternative for Operable Unit No. 1 is to assure a reliable supply of safe, potable water to the public. To ensure that the NFTD effectively implemented the ROD, specific requirements were detailed in the Administrative Order/Remedial Action Plan issued on May 1, 1987. Many of these requirements were applicable during the initial trial and operation of the air stripper or through the first year of operation.

Additional long-term/ongoing operation and maintenance and sampling requirements that were also listed in the Remedial Action Plan are summarized below:

- Water exceeding Federal and/or State contaminant levels shall not be discharged into the public supply distribution.
- NFTD shall submit a monitoring program to EPA for review and approval by June 30, 1987. The program shall include:
  - groundwater monitoring on the east side of the Norwalk River for early detection of migration of high levels of contamination towards the well field
  - water monitoring at the well field prior to stripping, after stripping, and prior to discharge into the public water supply system
  - water monitoring at various points along the distribution system
  - special monitoring during the trial period of the stripper system, including the monitoring activities listed above, and air sampling to determine whether stripper emissions require treatment
  - a Quality Assurance/Quality Control (QA/QC) plan for all monitoring

requirements specified above, to be reviewed and approved by EPA prior to implementation

- NFTD shall submit to EPA by June 15, 1987 a maintenance plan for review and approval describing and scheduling all necessary maintenance activities to insure the proper continuous operation of the treatment system, including stripper tower and storage tank maintenance requirements and estimated costs for such maintenance.
- NFTD shall submit to EPA a contingency plan by June 30, 1987 which shall discuss in detail measures to be taken in the event that:
  - the stripper fails to lower contaminant concentrations below Federal and/or State maximum acceptable levels for drinking water, due to mechanical failure or any other reason
  - monitoring on the east side of the river reveals the migration of highly contaminated groundwater towards the well field (to be indicated by a TCE level above 5,000 ppb at the closest monitoring well on the east side of the river)
  - the demand for public water supply exceeds the air stripper's treatment capacity

Additional details applicable to long-term sampling and operation and maintenance activities as provided in the ROD are specified below:

- Quarterly sampling of the production wells not in use for public water supply; weekly sampling of the production wells in use will be required. Any well water used for public supply must first be treated by the air stripper, unless otherwise approved by EPA. Any water used for public supply must satisfy available Federal and State criteria and standards.

- Annual inspections of the air stripper unit to ensure proper functioning.
- Off-site monitoring including quarterly sampling of seven monitoring wells on the east side of the river, including 6M, 6D, K2A, K2B, K-8 (or MW-3), 15, and 15R (some may be relocated due to construction of Route 7).
- Monthly monitoring at four points in the distribution system to be approved by EPA for the first three months of operation.
- Anticipated additional repairs to the storage tank after fifteen years of operation.

Based on monthly operational data submitted by NFTD, EPA notified the NFTD in May 1988 of the successful implementation of the remedial action/Administrative Order and successful operation of the air stripper and storage tank. A summary of previous and ongoing activities by NFTD applicable to these requirements and potential areas of noncompliance are included in Sections 5.0 - Site Visit Summary and 6.0 -Five-Year Review Summary of Findings.

## **5.0 SITE VISIT SUMMARY**

A Site visit to the Kellogg-Deering Well Field - Operable Unit No. 1 was conducted on September 16, 1997 to observe the current operation of the air stripper unit and to obtain information on the operation and maintenance of the facility from the Norwalk First Taxing District Water Department (NFTD), owner and operator of the facility. The Site visit was conducted with Mr. Franco Chieffalo, Distribution Manager of NFTD. Sampling and analysis data beginning in 1993 were obtained from the Connecticut Department of Public Health (DPH). Sampling and analysis data from 1992 (subsequent to the last sampling date (July 20, 1992) included in the first five-year review report) were obtained from NFTD. A summary of analytical results is presented in Table 5-1. Information obtained during the Site visit relating to the operation and maintenance and current status of the air stripper facility is summarized below:

- Minimal daily maintenance is required of the air stripper unit. NFTD staff conducts routine visual inspections of the air stripper facility twice daily, including the blower screen (washed if necessary), blower belt (checked for wear and replaced if needed), visual checks for leaks, cracks, or corrosion in the tower. NFTD follows the maintenance instructions contained in Hydro Group's "Packed Column Air Stripper Instructions and Maintenance" manual. NFTD owns two blower motors, which are alternated every year. Norwalk Electric Motor of Norwalk, Connecticut is responsible for storing, cleaning, lubricating, and changing the motors annually.

In 1996, a connection was added to the water riser pipe at the tower to allow for the addition of orthophosphate to the water to sequester manganese. Pipe insulation in the vicinity of this connection is partially exposed due to loose duct tape; NFTD will place stainless steel bands where needed to completely cover the insulation. NFTD is conducting a pilot program for manganese removal at the Layne 1R well.

**TABLE 5-1**  
**VOLATILE ORGANIC COMPOUNDS DETECTION SUMMARY: QUARTERLY SAMPLING - AIR STRIPPER INFLUENT/EFFLUENT**  
**FIVE-YEAR REVIEW REPORT NO. 2**  
**KELLOGG-DEERING WELL FIELD - OPERABLE UNIT NO. 1**  
**NORWALK, CONNECTICUT**

Sample Date	Wells Pumping	Influent Pumping Rate (MGD)	Compounds (all units in µg/l)																			
			Bromodichloro-methane		Bromoform		Chloroform		Dibromochloro-methane		1,1-Dichloroethane		1,1-Dichloroethylene		cis-1,2-Dichloroethylene		Tetrachloroethylene		1,1,1-Trichloroethane		Trichloroethylene	
			Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.
8/12/92	D-1, D-2	1.80					1.2	ND			1.5	ND					1.4	ND			4.7	ND
11/4/92	D-1, D-2	2.00	ND	6.6			1.1	5.7	ND	7.2	1.5	ND					1.7	ND			3.9	ND
1/25/93	D-1, D-2	1.9	ND	8.9	ND	2.5	2.9	7.1	ND	8.9	1.7	ND	1.0	ND			3.4	ND	1.3	ND	7.7	ND
3/31/93	D-2, L-2	2.5					4	ND											2	ND	3	ND
5/19/93	NR	NR	NR	8	NR	4	NR	5	NR	9												
8/4/93	D-1, D-2, L-2	NR	ND	8	ND	4	ND	4	ND	9											11	ND
11/3/93	NR	NR	ND	6	ND	3	ND	3													10	ND
2/16/94	D-1, D-2	NR	ND	5	ND	0.9	1.0	2	ND	5							1.2	ND	1.8	ND	4.5	ND
5/25/94	NR	NR	ND	2.9	ND	1.1	1.2	1.5	ND	3.6				1.1	ND	1.0	ND				4.3	ND
8/24/94	NR	NR	ND	5.3				37													2.5	ND
11/14/94	all wells	NR	ND	6.1	ND	1.6	ND	3.5	ND	7.4											3.4	ND
11/30/94	D-1, L-2	NR																			2.0	ND
2/23/95	L-1R	NR	ND	4.2	ND	1.6	ND	2.2	ND	5.1												
5/17/95	NR	NR	ND	3.6	ND	1.2	1.8	2.6	ND	5.8	2.5	ND	2.5	ND	4.3	ND	1.2	ND	1.8	ND	7.0	ND
8/9/95	D-2, L-1R	NR													0.76	ND					2.3	ND
12/5/95	NR	NR																				
2/21/96	NR	NR					2.2	ND							1.4	ND					3.1	ND
5/8/96	NR	NR	ND	4.9	ND	2.3	2.9	2.3	ND	6.9												
8/7/96	NR	NR													1.0	ND					3.0	ND
11/12/96	NR	NR																				
2/10/97	NR	NR					ND	0.5														
5/12/97	NR	NR																				

NOTES: Influent is prior to packed column of air stripper  
Effluent is after treatment system (chlorination, etc.)  
A blank space indicates compound was not detected  
MGD = million gallons per day

ND = None detected  
NR = Not reported  
D-1 = Deering well 1  
D-2 = Deering well 2  
L-2 = Layne 2 well  
L-1R = Layne 1 replacement well

Results listed through December 1992 are from data summary pages submitted to EPA from First Taxing District Water Department, Norwalk, CT.  
All other results are from data summary pages submitted to Connecticut DPH from Norwalk's First Taxing District Water Department.  
According to Baron Consulting Company, samples were analyzed by EPA Method 502.2.

**TABLE 5-1**  
**VOLATILE ORGANIC COMPOUNDS DETECTION SUMMARY: QUARTERLY SAMPLING - AIR STRIPPER INFLUENT/EFFLUENT**  
**FIVE-YEAR REVIEW REPORT NO. 2**  
**KELLOGG-DEERING WELL FIELD - OPERABLE UNIT NO. 1**  
**NORWALK, CONNECTICUT**

Sample Date	Wells Pumping	Influent Pumping Rate (MGD)	Compounds (all units in µg/l)																			
			Bromodichloro-methane		Bromoform		Chloroform		Dibromochloro-methane		1,1-Dichloroethane		1,1-Dichloroethylene		cis-1,2-Dichloroethylene		Tetrachloroethylene		1,1,1-Trichloroethane		Trichloroethylene	
			Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.
8/12/92	D-1, D-2	1.80					1.2	ND			1.5	ND					1.4	ND			4.7	ND
11/4/92	D-1, D-2	2.00	ND	6.6			1.1	5.7	ND	7.2	1.5	ND					1.7	ND			3.9	ND
1/25/93	D-1, D-2	1.9	ND	8.9	ND	2.5	2.9	7.1	ND	8.9	1.7	ND	1.0	ND			3.4	ND	1.3	ND	7.7	ND
3/31/93	D-2, L-2	2.5					4	ND											2	ND	3	ND
5/19/93	NR	NR	NR	8	NR	4	NR	5	NR	9												
8/4/93	D-1, D-2, L-2	NR	ND	8	ND	4	ND	4	ND	9												
11/3/93	NR	NR	ND	6	ND	3	ND	3													11	ND
2/16/94	D-1, D-2	NR	ND	5	ND	0.9	1.0	2	ND	5							1.2	ND	1.8	ND	10	ND
5/25/94	NR	NR	ND	2.9	ND	1.1	1.2	1.5	ND	3.6						1.1	ND	1.0	ND		4.5	ND
8/24/94	NR	NR	ND	5.3				ND	37												4.3	ND
11/14/94	all wells	NR	ND	6.1	ND	1.6	ND	3.5	ND	7.4											2.5	ND
11/30/94	D-1, L-2	NR																			3.4	ND
2/23/95	L-1R	NR	ND	4.2	ND	1.6	ND	2.2	ND	5.1											2.0	ND
5/17/95	NR	NR	ND	3.6	ND	1.2	1.8	2.6	ND	5.8	2.5	ND	2.5	ND	4.3	ND	1.2	ND	1.8	ND	7.0	ND
8/9/95	D-2, L-1R	NR													0.75	ND					2.3	ND
12/5/95	NR	NR																				
2/21/96	NR	NR					2.2	ND														
5/8/96	NR	NR	ND	4.9	ND	2.3	2.9	2.3	ND	6.9					1.4	ND					3.1	ND
8/7/96	NR	NR													1.0	ND					3.0	ND
11/12/96	NR	NR																				
2/10/97	NR	NR					ND	0.5														
5/12/97	NR	NR																				

NOTES: Influent is prior to packed column of air stripper  
Effluent is after treatment system (chlorination, etc.)  
A blank space indicates compound was not detected  
MGD = million gallons per day

ND = None detected  
NR = Not reported  
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L-2 = Layne 2 well  
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Results listed through December 1992 are from data summary pages submitted to EPA from First Taxing District Water Department, Norwalk, CT.  
All other results are from data summary pages submitted to Connecticut DPH from Norwalk's First Taxing District Water Department.  
According to Baron Consulting Company, samples were analyzed by EPA Method 502.2.

- NFTD currently utilizes groundwater from all four of the existing wells on an as-needed basis. The air stripper's design flowrate was 1750 gpm, but the Connecticut Department of Health Services approved an increased flowrate of 2800 gpm (4.0 MGD) in a letter dated October 11, 1988. NFTD is contemplating a new request to increase the approved flowrate. NFTD indicated that the flowrate through the air stripper usually does not exceed 2.5 MGD and the wells are not pumped 24 hours per day. During the Site visit, the Deering 1, Deering 2, and Layne 2 wells were pumping and the flowrate through the air stripper was unusually high (3.5 MGD) to make up for reduced capacity at the filter plant due to backwashing.
- NFTD's filter plant for surface water treatment operates continuously and is staffed 24 hours a day. The wellfield is staffed intermittently as needed. The water level in the clearwell can be monitored at the filter plant, but there are no controls or signals for individual well pumps or the air stripper at the filter plant. The pumps for each well can be controlled only at the wellfield treatment building. A control panel in the wellfield treatment building includes the following: lights that signal which wells are currently pumping, automatic and manual controls for the air stripper blower, and an automatic control for emergency power generation. Manual controls for the air stripper blower also are located in the pump house above the clearwell. ECS of Wayne, New Jersey maintains the wellfield's instrumentation. The wellfield has two emergency generators onsite to ensure continuous operation during power outages. Gentech Power Systems of Stratford, Connecticut inspects the generators about two to four times per year.
- Bypass of the air stripper is not possible since piping from each well pumps directly to the stripper tower and then gravity feeds to the clearwell/storage tank (750,000-gallon capacity, pre-stressed concrete). The water level in the clearwell is continuously monitored to ensure it is maintained between 8 and 12 feet. Water is then pumped to the wellfield treatment station and Five-Year

Plan distribution system. The inground clearwell/ storage tank is inspected annually for cracks and solids buildup by a diver from Shoreline Diving.

- Two sampling taps fed by underground piping are located in the vicinity of the air stripper tower. Mr. Chieffalo stated that the influent water samples are collected from the southern sampling tap, which is located closest to the Layne 1 well, and that the effluent water samples are collected from the northern sampling tap, which is located closest to the Deering 1 well. During the Site visit, the northern sampling tap was opened and water flowed from it. During a subsequent telephone conversation, however, Ms. Susan Ferrand, Water Quality Manager, stated that she collects the quarterly effluent samples from a sampling tap in a sink in the wellfield treatment building, and not from a sampling tap near the air stripper. (She also confirmed that she collects the influent samples from the southern sampling tap as indicated by Mr. Chieffalo.) The sampling tap in the wellfield treatment building was not viewed during the Site visit, but Ms. Ferrand indicated that it probably does not contain an aerator. As described in Section 3, it is unclear whether the southern sampling tap is connected to the influent or the effluent of the air stripper.

Ms. Ferrand has been collecting the samples since she joined NFTD in July 1996. Mr. William Lahey had collected the samples until his retirement in June 1996. Mr. Rob Mercurio, Chief Operator of the filter plant, showed Ms. Ferrand the sampling locations. It appears that Mr. Lahey collected the samples from the same locations as at present. Mr. Chieffalo and Ms. Ferrand indicated that effluent samples are not collected from the sampling tap near the air stripper due to historical occasional water pressure problems at the tap.

- Hydro Group, Inc. of Bridgewater, New Jersey, designer and installer of the air stripper system, conducted air stripping system inspections at the wellfield on October 14, 1992 and on April 25, 1995 (copies of the inspection reports are included as Appendix 3). NFTD stated that Hydro Group conducts inspections of the air stripping system every three years. Cleaning and flushing of the

tower has not yet been determined necessary, since there has been no deterioration in performance of the air stripper system (100 percent removal of volatile organic compounds, see Table 5-1). Hydro Group's 1992 inspection noted the following: 1) manganese buildup in the packing, packing support tray, and tower sump bottom, 2) blower belts were loose and cracked, and 3) slight pitting of the tower sump bottom. Hydro Group recommended the following: 1) a follow-up inspection in six to twelve months to monitor the manganese deposition for potential packing fouling problems and to track the pitting in the sump bottom, and 2) replacement of the blower belts. NFTD indicated that the blower belts were replaced and a follow-up inspection may have been performed, but documentation could not be found (although the 1995 inspection report referred to a 1993 inspection).

Hydro Group's 1995 inspection report concluded that the air stripping system was in excellent condition. The following three minor problems were noted: 1) leaking upper body flange at high water flow rates, 2) manganese oxide stains on the visible packing and sump floor, and 3) pit formations on the distributor tray and sump floor. An annual inspection program was recommended to monitor the manganese deposition and pit formations for potential problems. NFTD indicated that the leaking upper body flange was repaired by replacing the gasket material, and NFTD conducts annual visual inspections in the fall. Mr. Chieffalo has performed the last two inspections and noted no changes; he will perform the next inspection this fall.

- No vandalism to the air stripper unit or unusual problems have been noted by NFTD.
- According to U.S. EPA monitoring requirements for the selected remedy for this Superfund Site, sampling and analysis of the influent and effluent (following treatment/chlorination, etc.) to the packed tower/air stripper system is conducted quarterly for 51 volatile organic compounds (VOCs). Analyses include all Site contaminants of concern as listed in the ROD. Samples are

analyzed by Baron Consulting Co. of Milford, Connecticut, a State-certified laboratory, and results are forwarded by NFTD to the Connecticut DPH. Prior to 1996, NFTD's VOC samples were analyzed by Environmental Laboratories, Inc. of New Haven, Connecticut, which is no longer in business.

- The Connecticut Department of Public Health conducted inspections of NFTD public water system, including the well field and treatment facilities, in 1992 and 1995 (see Appendix 4). NFTD indicated that all of the items noted for the well field and treatment facilities have been completed, except for the extension of the sump discharge lines from wells Deering 1 and Layne 2 to at least fifty feet from the well. NFTD expects to complete this item during 1997.

The following requirements of the ROD/Administrative Order are not being met:

- Sampling of the monitoring wells east of the Norwalk River, as required in the ROD and Administrative Order, is not being conducted by NFTD. Monitoring wells east of the Norwalk River are being sampled as part of the Operation and Maintenance activities of Operable Unit No. 2. This was also noted in the first five-year review report.
- NFTD has not conducted air emissions sampling from the stripper unit. However, the Connecticut DEP issued NFTD an exemption letter (see Appendix 2) stating that the unit does not require an air permit based on the projected maximum emissions, as described in the permit application. This was also noted in the first five-year review report.
- According to NFTD personnel, no QA/QC plan for sampling was submitted to EPA, as specified in the Administrative Order, and QA/QC samples such as duplicates and blanks are not collected. Information on sample holding times was not included in the data reviewed. Based on available information, it appears that no review of holding times or other data validation efforts are conducted. This was also noted in the first five-year review report.

- The Administrative Order specified the collection of three samples during each sampling round (before the stripper, after the stripper, and prior to discharge to the public water supply). The ROD called for the collection of "raw and treated water" samples. According to NFTD personnel, samples are collected only before the stripper and prior to discharge to the public water supply.
- The ROD and Administrative Order specified the collection of samples in the distribution system during the first three months of the air stripper's operation. It appears that these samples were not collected.
- The ROD and NFTD's Monitoring and Sampling Program, which was submitted on June 23, 1987, specified yearly inspections of the air stripper, but Hydro Group's maintenance manual for this air stripper does not specify an inspection interval ("..the interval between inspections is directly related to water quality and will vary from system to system."). Hydro Group performs inspections of the air stripper's operation every three years, but NFTD began yearly inspections of the packing material in 1995, per Hydro Group's recommendation in its 1995 inspection report.

## 6.0 FIVE-YEAR REVIEW SUMMARY OF FINDINGS

The primary purpose of this second five-year review is to evaluate whether the remedial action selected for the Kellogg-Deering Site - Operable Unit No. 1 (air stripper) remains protective of public health and the environment. As presented in Table 5-1, available sampling and analytical data indicate that the air stripper continues to achieve 100 percent removal of the tested volatile organic compounds (to "not detected" levels, where the detection limit is 0.5 to 1.0 ug/l). The stripper, therefore, continues to be protective of the public which relies on this water supply. (It should be noted that the "effluent" samples are collected following treatment with chlorination, fluoridation, etc., just prior to distribution, as recommended by the State; the results may not be representative of effluent directly exiting the air stripper.) It should be noted, however, that it is unclear at this time whether the influent samples as collected by NFTD may actually be effluent samples from the air stripper, as described in Section 3. Some low levels of trihalomethane (THM) compounds (chloroform, chlorodibromomethane, bromodichloromethane, and bromoform) have been detected in effluent samples, however, these compounds are commonly associated with chlorinated treatment processes of water supply systems. As presented in Table 5-1, the levels detected are significantly lower than the Connecticut drinking water limit for THM compounds, which is 100 mg/l for total THMs.

Ongoing maintenance activities of the air stripping facility, as discussed in Section 5.0, appear to be satisfactory. No deterioration of performance of the air stripper is evident. Recommendations from two inspections by Hydro Group have reportedly been implemented (see Appendix 3). NFTD follows the maintenance recommendations contained in Hydro Group's "Packed Column Air Stripper Instructions and Maintenance" manual and expects to contact Hydro Group every three years to conduct a thorough inspection of the air stripper system. If exceedances of MCLs for the contaminants of concern are noted in the effluent sample results between three-year inspection intervals, it is suggested that Hydro Group be contacted at that time to conduct an inspection of the air stripper facility, with annual inspections thereafter, if necessary.

An area of noncompliance with requirements which were specified in the 1986 ROD and 1987 Administrative Order is that NFTD is not conducting groundwater sampling of monitoring wells on the east side of the Norwalk River. The purpose of this requirement was to provide an "early warning system" for the detection of potential high level contaminants which may be migrating toward the well field. The Administrative Order/Remedial Action Plan required that a contingency plan be submitted to EPA that includes measures to be taken in the event that a highly contaminated slug of groundwater (indicated by a level of trichloroethylene (TCE) above 5,000 ug/l at the closest monitoring well east of the river) is detected moving toward the well field. However, monitoring wells east of the Norwalk River are being sampled as part of the Operation and Maintenance activities of Operable Unit No. 2, and the levels of TCE and other VOCs detected in the untreated well field groundwater samples have remained significantly lower than 5,000 ug/l and have been decreasing since 1987 levels. Therefore, EPA has determined that groundwater sampling of offsite monitoring wells by NFTD is not necessary at this time, according to the Site's Remedial Project Manager.

Also required in the Remedial Action Plan was the submittal of a Quality Assurance/Quality Control (QA/QC) plan for all monitoring requirements. Based on information available from EPA and NFTD, a QA/QC plan has not been developed. QA/QC samples such as duplicates and blanks are not collected and data validation such as review of holding times is not being conducted, based on available information. However, the two laboratories that have analyzed the NFTD's VOC samples, Baron Consulting Co. and Environmental Laboratories, Inc., are certified by the State of Connecticut Department of Public Health for the analysis of organics in drinking water. The quality of public water supplies in the State of Connecticut is insured through regulations and procedures enforced by the Connecticut DPH.

In summary, the air stripping facility being utilized to treat the NFTD public water supply continues to protect human health and the environment. Minor areas of deficiency with respect to the requirements of the Administrative Order and ROD are discussed above, however, since the effluent has never exceeded MCLs, no major recommendations are necessary at this time. The following minor recommendations are noted: The locations of the influent and effluent sampling taps located near the tower should be confirmed. If as-built piping diagrams cannot be located, this may be done by comparing the pH of each tap (the

effluent water should be about 1 pH unit higher than the influent). The designations of the sampling taps may also be determined through the collection of effluent samples from the sampling tap near the tower instead of in the wellfield treatment building following chlorination (i.e., the collection of samples from both sampling taps). The sampling taps should then be labelled. If it is determined that influent samples to the air stripper have not been collected, influent samples should be collected in order to calculate air emissions to ensure that a permit is still not required and to determine the removal efficiency of the air stripper.

**APPENDIX 1**

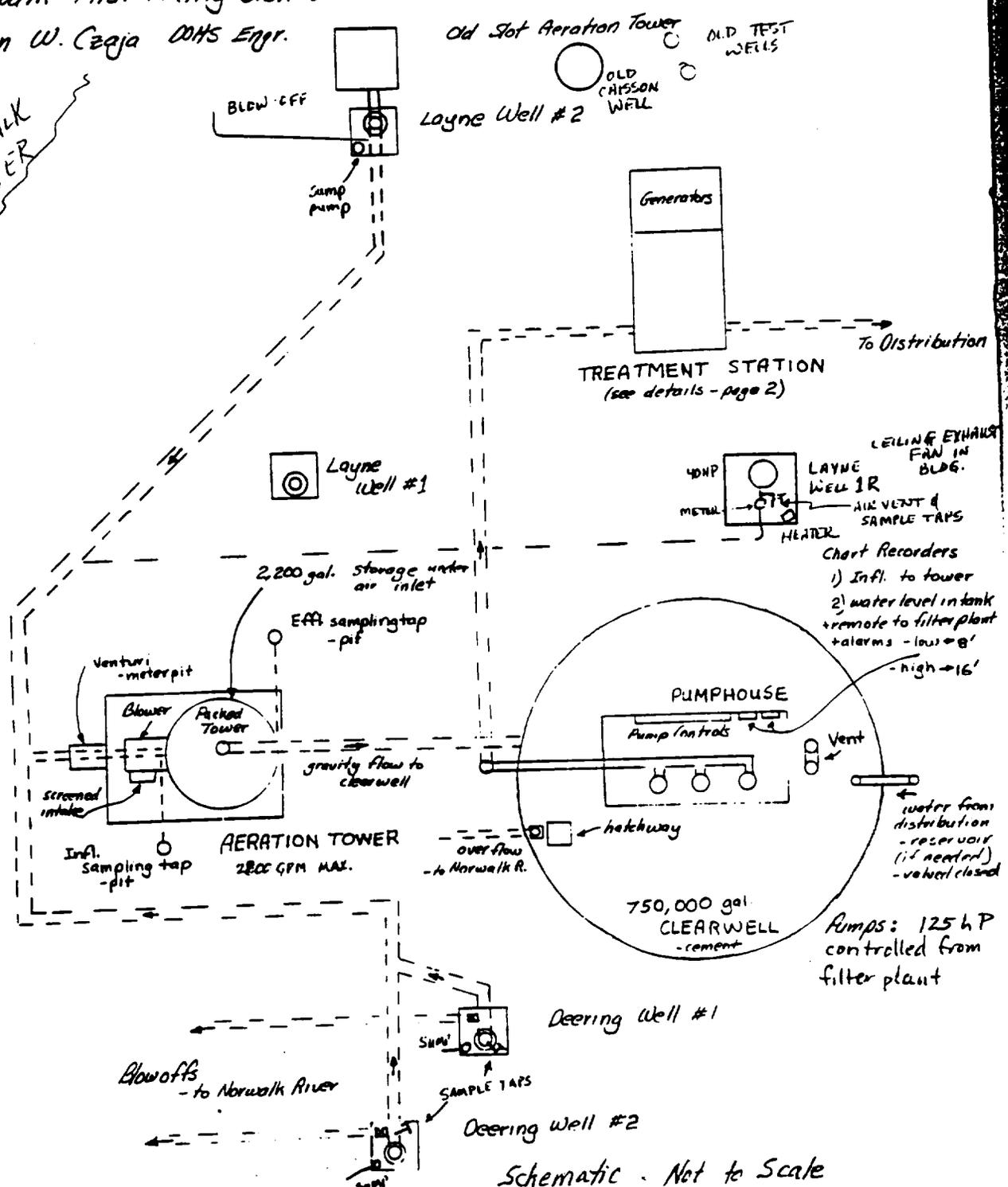
**PIPING SCHEMATICS PREPARED BY DPH  
AND REVISED BY NFTD**

From August 8, 1995 Connecticut Department  
of Public Health and Addiction Services  
Inspection Report

9-6-88  
REVISED 4/5/95 S. ROBBIN

Norwalk - First Taxing District  
John W. Czaja DMS Engr.

NORWALK RIVER



Schematic - Not to Scale

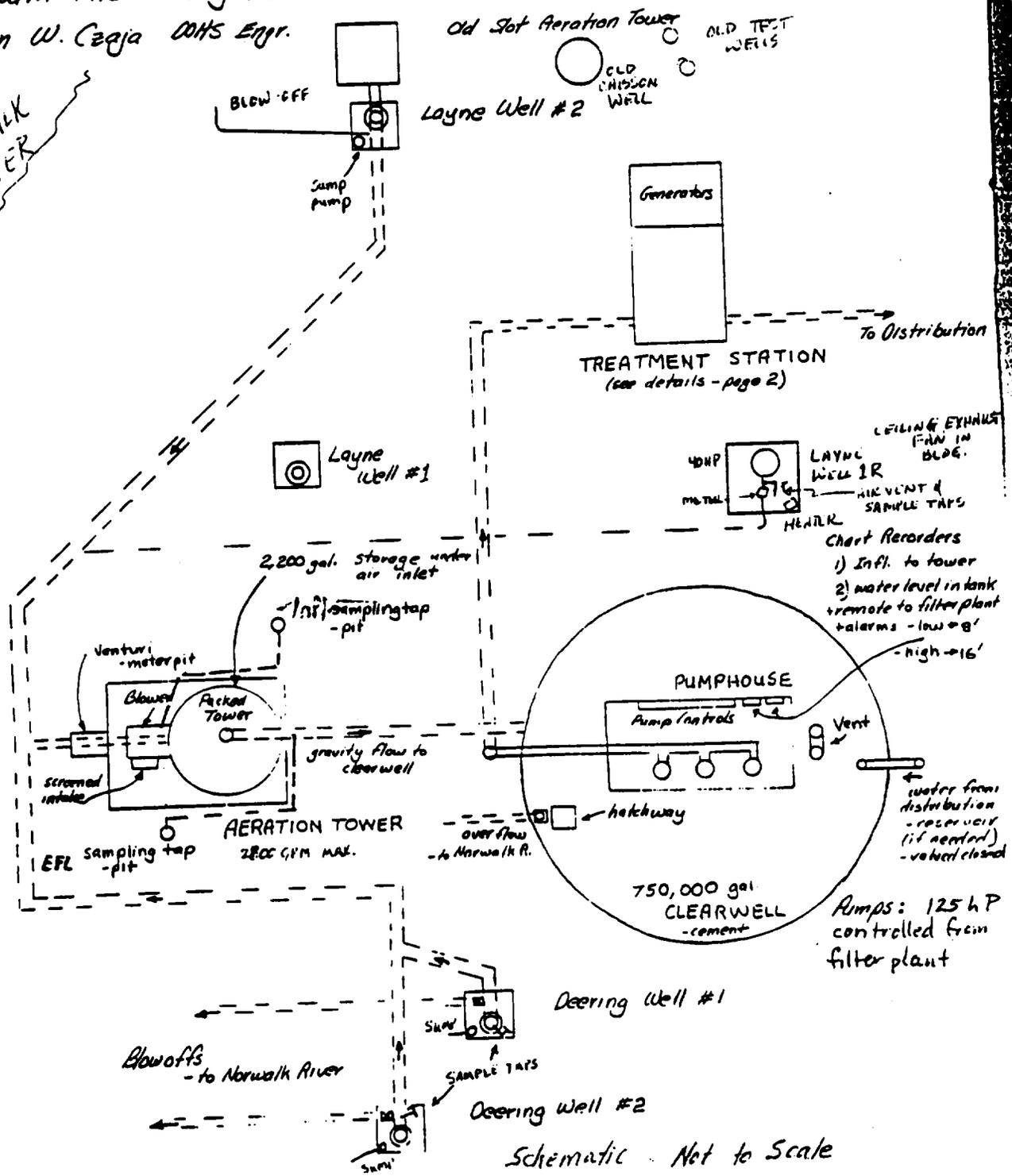
Connecticut DPHAS schematic,  
as revised by Norwalk First Taxing  
District

9-6-88  
REVISED 4/5/75 S. ZOHAN

Norwalk - First Taxing District  
John W. Czaja OHS Engr.

①

NORWALK RIVER



Schematic Not to Scale

**APPENDIX 2**

**AIR EMISSIONS PERMIT EXEMPTION LETTER**

STATE OF CONNECTICUT  
DEPARTMENT OF ENVIRONMENTAL PROTECTION



July 28, 1988

Mr. Brian F. Fitzgerald  
General Supervisor  
First District Water Department  
3 Beden Avneue  
Norwalk, Connecticut 06852

Dear Mr. Fitzgerald:

This letter is to inform you that the Department has completed the evaluation of your application, for permits to construct and operate an Induced Draft Air Stipping Column VOC Removal for the Smith Well Field.

Pursuant to Section 22a-174-3(a)(1) of the "Administrative Regulations for the Abatement of Air Pollution," permits for construction and operation of new or modified stationary sources are required. However, pursuant to Section 22a-174-3(a)(2) of the Regulations (revised October 1, 1982) "permits shall not be required for any stationary source..whose emissions of each air pollutant after the application of air pollution control equipment and where the emission rate is calculated using the maximum rated capacity would be less than forty (40) pounds per day and less than five (5) tons per year."

It is the opinion of this Department that the emissions from the above source, as described in the application, will be less than the above limits. Permits to construct and operate are therefore not required for this source at this time. If the above source is ever modified in such a manner as to result in an emission rate greater than forty (40) pounds per day and five (5) tons per year of any pollutants, permits will be required at that time. This exemption will become void if any of the design or operating parameters listed on the above mentioned application are varied resulting in a modification as defined in Section 22a-174-1 of the Regulations:

Water Flow Rate: 1750 gals/minute  
Concentration: 0-600 ppb or 0.6 ppm  
Solvent Catalyst: Trichloroethylene  
ACFM: 23,000

Phone:

165 Capitol Avenue • Hartford, Connecticut 06106

In Equal Opportunity Language

Mr. Brian F. Fitzgerald  
John W. Anderson  
First District Water Dept. Exemption

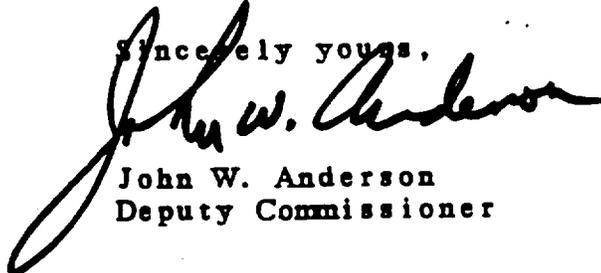
July 28, 1988

This letter in no way grants immunity from legal action resulting from the failure of this source to remain in compliance with existing air pollution regulations nor does it exempt the aforementioned device from compliance with future Federal, state or local legislation.

Please be advised that you will be receiving a permit fee refund check for \$50.00 in approximately 4-6 weeks.

If you have any questions, contact Mr. Rajendra P. Jain, the engineer who evaluated your permit application, by calling 566-8230.

Sincerely yours,

A handwritten signature in black ink, appearing to read "John W. Anderson". The signature is written in a cursive style with a large, looping initial "J".

John W. Anderson  
Deputy Commissioner

JWA/emw