Site: Wells G H
Break: 5.4
Other: 16796

# Declaration of the Record of Decision

## Site Name and Location

Wells G & H
Woburn, Massachusetts

## Statement of Purpose

This decision document presents the selected remedial action for the Wells G & H site in Woburn, Massachusetts, developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Contingency Plan (NCP); 40 CFR Part 300 et seq., 47 Federal Register 31180 (July 16, 1982), as amended.

The Commonwealth of Massachusetts has concurred with the selected remedy.

## Statement of Basis

This decision is based on the administrative record which was developed in accordance with Section 113(k) of CERCLA and which is available for public review at the information repositories located at the Woburn Public Library, Woburn, Massachusetts, and at 90 Canal Street, Boston, Massachusetts. The attached index identifies the items which comprise the administrative record upon which the selection of a remedial action is based.

## Description of the Selected Remedy

The selected remedial action for the Wells G & H site will be conducted as the first operable unit and consists of a source control and management of migration component for the five properties identified as sources of contamination. This approach is appropriate as the source areas of contamination contain the majority of the mass of contaminants at the site, and pose the principal threat at the site.

The Aberjona River and the central area of the site surrounding Wells G & H will be addressed as a separate operable unit.

The source control remedial measures include:

- Excavation and on-site incineration of approximately 2100 cubic yards of contaminated soil. Excavated areas will be backfilled.

- In situ volatilization of approximately 7400 cubic yards of contaminated soil, part of which is located in a wetlands area. In situ treatment will use carbon adsorption for vapor treatment.

The management of migration remedial measures include:

- Pumping contaminated groundwater from the overburden and/or bedrock aquifers, pretreatment to remove suspended solids and metals, and treatment by air stripping to remove contaminants. Carbon adsorption will be used to treat emissions from the air stripper.

- Groundwater will be treated at separate source area treatment plants.

- Groundwater will be pumped with the objective of achieving Safe Drinking Water Act Maximum Contaminant Levels in the aquifer.

Additional measures include:

- The removal and disposal of approximately 410 cubic yards of sludge and debris.

Declaration

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate for this remedial action, and is cost effective. This remedy satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

Because this remedy is being conducted as the first operable unit at the site, it will result in hazardous substances remaining on-site above health based levels. A review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Sept 14, 1989
Date

Paul G. Keough
Paul G. Keough
Acting Regional Administrator, EPA Region I

# WELLS G & H

# RECORD OF DECISION

**WELLS G & H**

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**WELLS G & H**

**Record of Decision Summary**

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# ROD DECISION SUMMARY

## I. SITE NAME, LOCATION AND DESCRIPTION

**SITE NAME:** Wells G & H

**SITE LOCATION:** Woburn, Massachusetts

**SITE DESCRIPTION:**

The Wells G & H Site (Site) located in east Woburn, Massachusetts includes the aquifer and land mass area located within the zone of contribution of the two municipal drinking water wells known as Wells G and H. The Site is bounded by Route 128 to the north, Route 93 to the east, the Boston and Maine railroad to the west, and Salem Street to the south. It is approximately 330 acres (see Figure 1).

Wells G & H are located in the sand and gravel aquifer of the Aberjona River basin within the Mystic River watershed. The area surrounding the wells within the Site boundary is a mixed use area consisting of light industry, commercial businesses, industrial parks, residences, and recreational property. The area surrounding the Site is dominated by industrial and commercial property to the North, and residential property to the South.

The Aberjona River, which begins in Reading, Massachusetts, flows through the Site and eventually reaches the Mystic Lakes in Winchester. A substantial wetland area associated with the Aberjona River flood plain is located on either side of the River within the Site boundary. An additional description of the Site can be found in the Supplemental Remedial Investigation Report at page 1.

## II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

### A. Site Use History

Wells G & H were developed by the City of Woburn in 1964 and 1967, respectively. The wells, screened in the Aberjona River aquifer and capable of supplying two million gallons of water per day, were initially intended to supplement previously existing supplies. Local officials estimate that 27-28% of the community's water supply was provided by Wells G & H. The remainder of the water supply was provided by seven wells located near Horn Pond south of Salem Street. These wells are located in a different aquifer from Wells G & H and are not affected by contamination present in the study area. Woburn currently uses the Horn Pond water as its major water supply.

In 1979, the Massachusetts Department of Environmental Protection (DEP), formerly the Massachusetts Department of Environmental Quality Engineering, prompted by a local disposal problem, tested the water supply from Wells G & H. Several chlorinated volatile organic compounds, including 1,1,1-trichloroethane (1,1,1-TCA), trans-1,2-Dichloroethene, tetrachloroethene (PCE), and trichloroethene (TCE), were detected at concentrations ranging from 1 to 400 parts per billion (ppb). As a result of this sampling the wells were immediately shut down. Woburn then revived an existing agreement with the Metropolitan District Commission (now the Massachusetts Water Resources Authority or MWRA) to compensate for the lost water supply. The MWRA continues to supplement Woburn's water supply.

As a result of the contamination at Wells G & H, and disposal problems discovered at the Industriplex Superfund Site just north of Wells G & H, the United States Environmental Protection Agency (EPA, or the Agency) conducted a hydrogeologic investigation and groundwater quality evaluation of a ten square mile portion of East and North Woburn. This investigation was conducted in 1981. The purpose of the investigation was to determine the extent and degree of contamination in the aquifer, and to identify the sources of contamination. Based on the direction of groundwater flow, the areal extent of groundwater contamination, and property inspections, EPA identified the source areas for contamination at Wells G & H to be within a one square mile area surrounding the wells on either side of the River within the Site boundary.

The following five facilities have been identified as sources of contamination - W. R. Grace & Company, Unifirst Corporation, New England Plastics, Wildwood Conservation Corporation (also referred to as the Beatrice property), and Olympia Nominee Trust (see Figure 2). Wells G & H, located in the center of these properties, were listed as a Superfund Site on the National Priorities List (NPL) on December 21, 1982.

### B. Response History

EPA and various property owners have conducted numerous studies to determine the nature and extent of contamination at the Site. The following is a brief chronological description and summary of those studies. Further explanation can be found in the reports that are summarized below.

1983

EPA completed a report entitled Remedial Action Master Plan for East Woburn. Its purpose was to identify the scope of the sequence of activities necessary to identify and implement remedial action at the Site.

EPA issued three Administrative Orders pursuant to Section 3013 of the Resource Conservation and Recovery Act (RCRA). These Orders required W. R. Grace & Company, Beatrice Foods Inc., and the Unifirst Corporation to investigate the nature and extent of contamination on their properties. These investigations have all been completed and the results have been forwarded to EPA.[1]

1985

The United States Geological Survey (USGS), under an agreement with the EPA, conducted a 30-day aquifer test to determine the zone of contribution of Wells G & H . The description of the study and the results can be found in the report entitled: Area of Influence and Zone of Contribution to Superfund Site Wells G & H, Woburn, Massachusetts, 1987.

EPA issued an Order to the Wildwood Conservation Corporation (Beatrice property) pursuant to Section 106 of CERCLA. This Order required the construction of a fence at the property boundaries to limit contact with soil contamination discovered during previous investigations. In addition, the Order required the presence of a security guard at the Site. Soil data results used to support this action can be found in the Order itself.

An evaluation of the wetlands area within the Site boundary was conducted by EPA to determine the extent and type of wetlands that exist at the Site. The study also evaluated whether there were any adverse impacts to the wetlands as a result of contamination at the Site. Further detail of the study can be found in the report entitled: Wells G & H Wetlands Assessment, Final Report, March 25, 1986, prepared by Alliance Technologies Corp.

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[1] GeoEnvironmental Consultants, Inc., W.R. Grace & Co., Cryovac Division Woburn Plant, Field Investigations and Remedial Measures, Phases I-III, 1983; and W.R. Grace & Co., Cryovac Division, Woburn Plant Field Investigations and Remedial Measures, Phase VI-Field Descriptions, 1985; Woodward-Clyde Consultants, Geohydrology and Groundwater Contamination, J.J. Riley Site, Woburn, Massachusetts,1984; and Phase II Groundwater Investigation, J.J. Riley Site, Woburn, Massachusetts, 1984; Environmental Research & Technology, Inc., Assessment of Ground Water Contamination Potential at Interstate Uniform Services Corp., Woburn. MA, 1983; Summary of Monitoring Program, Unifirst Corporation, Woburn,MA, 1984; and Evaluation and Recommendations For Alternatives Concerning Additional Investigation of Groundwater Contamination, 1984.

1986

EPA completed a Remedial Investigation which included the installation of groundwater monitoring wells, the collection of samples from the groundwater and surface waters of the Aberjona River, and oversight of work done under the above orders at the Site. The report is entitled: Wells G & H Site, Remedial Investigation Report, Part I, Woburn, Massachusetts, Vol. I-IV, October 17, 1986, prepared by NUS Corporation.

EPA completed a report as an addendum to the RI Part I that focused on the nature and extent of soil contamination at the Site through a review and validation of data previously collected. The report is entitled: Wells G & H Remedial Investigation, Part II, November 1986, prepared by Alliance Corp.

1987

EPA issued an Administrative Order to Unifirst Corporation, pursuant to Section 106 of CERCLA. This Order required Unifirst to install monitoring wells on its property to evaluate the extent of, and to remove, all pure tetrachloroethene contamination found under its property. The results of this investigation can be found in the report entitled: Summary of Investigation, Unifirst Site, Woburn, Massachusetts, February 1988, prepared by ERT. Following this study, Unifirst installed several multi-port bedrock wells downgradient of their property in order to collect groundwater samples. The results of this sampling effort are incorporated in the report entitled: Final Supplemental Remedial Investigation for Feasibility Study, Wells G & H Site, December 1988, prepared by Ebasco Services, Inc.

Under two separate Orders issued by EPA in 1986 and 1987 pursuant to Section 106 of CERCLA, Olympia Nominee Trust removed drums and debris from the western half of its property. The types and levels of contamination are summarized in the individual orders.

1988

EPA completed an Endangerment Assessment which examined the current and future potential risks from exposure to contamination at the Site if no remedial action were to occur. Further details of this study can be found in a report entitled: Endangerment Assessment for the Wells G & H Site, Woburn, Massachusetts, December 1988, prepared by Clement Associates, Inc.

EPA completed a supplemental Remedial Investigation which involved gathering additional soil information at several source areas, installing additional monitoring wells and collecting samples, updating groundwater information from existing wells,

and collecting sediment and surface water samples from the Aberjona River. The results of the study can be found in the report entitled: Final Supplemental Remedial Investigation for Feasibility Study, Wells G & H Site, Woburn, Massachusetts, December 1988, prepared by Ebasco Services Inc.

1989

EPA conducted soil sampling at the W. R. Grace and Olympia Nominee Trust properties in July and August, 1989. Soil borings originally sampled and reported in the Final Supplemental Remedial Investigation for Feasibility Study, December 1988, were repeated in order to confirm earlier results. This sampling was initiated in response to concerns regarding the laboratory that analyzed the original samples. The results of the soil sampling conducted in July and August confirm the earlier results. Further details can be found in the report entitled: Soil Sampling at the Wells G & H Superfund Site (W.R. Grace and Olympia Nominee Trust), July/August 1989, EPA.

In addition to the above studies done by or for EPA, the DEP has been involved in investigating activities at properties that border the Site. Property owned by the Whitney Barrel Company, Olympia Nominee Trust, and Weyerhauser are currently under investigation by DEP due to groundwater contamination found at these sites.

### C. Enforcement History

On April 20, 1988, EPA notified eight potentially responsible parties (PRPs) of their potential liability for response actions at the Site. On February 3, 1989, EPA notified an additional 14 parties. In addition, PRPs have received numerous Administrative Orders related to response activities at the Site. These Orders were summarized in section II B above. Discussions with PRPs regarding ROD implementation will not commence until issuance of this ROD completes the remedy selection process for this operable unit.

The PRPs have been active in the remedy selection process for the Site. Extensive legal and technical comments were submitted by the PRPs during the public comment period. These comments are included in the Administrative Record. EPA responses to the comments are included in the Responsiveness Summary (Appendix A).

## III. COMMUNITY RELATIONS

There has been a great deal of community concern and involvement associated with this Site. EPA has kept the community and other interested parties apprised of Site activities through

informational meetings, fact sheets, press releases and public meetings.

In April 1986, EPA released a community relations plan which outlined a program to address community concerns and keep citizens informed and involved in activities during remedial activities. In November 1986, EPA held a public meeting to present the results of the Remedial Investigation, Part I. In May 1988, EPA held an informational meeting to explain the Feasibility Study process and possible alternatives for remediation of the Site.

The Agency published a notice and brief analysis of the Proposed Plan in "The Daily Times Chronicle" on February 3, 1989, and made the plan available to the public at the Thompson Public Library in Woburn and at the headquarters of "For A Cleaner Environment," also located in Woburn.

On February 9, 1989, EPA held an informational meeting to discuss the results of the Supplemental Remedial Investigation, the cleanup alternatives presented in the Feasibility Study, and to present the Agency's Proposed Plan. During this meeting the Agency also answered questions from the public.

From February 10, 1989 to March 21, 1989, the Agency held a forty day public comment period to accept comments on the alternatives presented in the Feasibility Study, the Proposed Plan, and documents previously released to the public. On February 27, 1989, the Agency held a public meeting to accept oral comments. A transcript of this meeting, a summary of the comments received during the public comment period, and the Agency's responses to the comments are included in the Responsiveness Summary (Appendix A).

## IV. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

The 330 acre Wells G & H Site consists of the unsaturated soils and aquifer associated with the five source areas of contamination and the central area surrounding Wells G & H, the Aberjona River, and associated wetlands (Figure 2). The remedy associated with this ROD will be conducted as the first operable unit and addresses remediation of contaminated groundwater, soil, and sludge found at the five properties identified as sources of contamination at the Site. The remedy also calls for a study of the central aquifer area to determine the most effective way of addressing contamination in the central area. EPA will address the cleanup of the central area of the Site, as well as the contamination found in the Aberjona River sediments, as a separate operable unit.

The overall response objective for the Site is to restore the entire aquifer to drinking water standards, i.e., the aquifer in the vicinity of both the source areas and the central area. The Agency believes, however, that the source areas of contamination contain the majority of the mass of contaminants at the site, and pose the principal threat at the Site. It is, therefore, appropriate to address the sources of contamination to the aquifer first, while continuing to evaluate other problems at the Site. This strategy will reduce the infiltration of volatile organics to the aquifer from the soil at the source areas, and will prevent further migration of contamination towards the central aquifer and off-site from the source areas. Therefore, cleanup as operable units is appropriate, and the remedial action associated with this operable unit is consistent with the overall response objective for the Site.

## V. SITE CHARACTERISTICS

A complete discussion of Site characteristics can be found in the Remedial Investigations, Parts I, II, and the Supplemental RI Report. Chapter 1 of the Feasibility Study also contains an overview of the Remedial Investigations. The significant findings are summarized below.

### A. Hydrogeologic setting

Groundwater in the study area occurs in two principal formations, the bedrock underlying the entire area, and the stratified drift which overlies bedrock in most of the study area. The two formations are separated in a few areas by a thin deposit of glacial till. The glacial till is exposed at land surface in the northeastern and southwestern parts of the study area. A peat deposit of variable thickness and extent overlies the stratified drift throughout most of the wetlands area.

The stratified drift is composed primarily of sand and gravel and yields the largest quantities of water in the area. Wells G & H are located in the stratified drift. Stratified drift deposits of up to 140 feet thick are found directly overlying the till and bedrock.

Recharge to stratified drift, till, and bedrock is from precipitation and periodically from the Aberjona River. The general direction of groundwater flow is from upland areas east, west, and north of the Aberjona River valley southward. The Aberjona River and its wetlands are a seasonal discharge area. Groundwater from the aquifer flows upward discharging into these surface water bodies.

The Aberjona River, which has its headwaters in Reading and empties into the Mystic Lakes in Winchester, flows north to south through the site. Relatively small amounts of groundwater enter the Aberjona River Valley from upgradient areas north of Interstate 95, and exit the narrow southern end of the valley south of Salem Street. A 38 acre wetland area exists on both sides of the Aberjona River in the center of the Site (see Figure 3). These wetlands are located within the 100-year floodplain of the Aberjona River.

River sediments are composed of silt and sand ranging in thickness from 0.5 to 2 feet and are underlain by peat averaging up to 7 feet in thickness. The peat, a relatively loose nearly saturated material, permits groundwater discharge to the river.

Water within the bedrock occurs in fractures and joints. Where fractures and joints are numerous, open, and well-connected, significant quantities of water may be obtained. The depth to bedrock from land surface ranges from zero, where bedrock is located on the surface at several locations along the eastern and western sides of the valley, to approximately 140 feet in the south central area of the valley. The primary axis of the bedrock valley is north-northwest/south-southeast, parallel to the orientation of the Aberjona River.

The pumping of Wells G & H and the Riley Tannery production well (Riley well) have influenced the movement of groundwater for much of the sites history.[2] Each generated a cone of influence which intercepted groundwater. When all wells were pumping, a groundwater divide was created between Wells G & H and the Riley well. This divide separated the groundwater flowing towards Wells G & H and the groundwater flowing towards the Riley well. This divide was located in the southwestern part of the Site. Further information is presented in the USGS aquifer test.

### B. Groundwater Classification and Use

The Aberjona River aquifer, beneath and downgradient of the Site, is classified as Class I by the Commonwealth of Massachusetts (314 CMR §6.03). Class I aquifers are those groundwaters that are designated as a source of potable water supply.

Under the EPA Groundwater Classification System [EPA Groundwater Protection Strategy (GWPS), Office of Groundwater Protection, August 1984], this aquifer is classified as Class II B. Class II aquifers are aquifers that are currently used or potentially available for drinking water or other beneficial uses. Class II

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[2] The tannery ceased operations in January 1989.

A aquifers are those that are currently used, and Class II B aquifers are potential drinking water sources. The GWPS establishes groundwater protection goals based on the "highest beneficial uses to which groundwater having significant water resources value can presently or potentially be put." Guidelines for protection of aquifers are based on characteristics of vulnerability, use, and value.

The Aberjona River aquifer, in the vicinity of Wells G & H, can yield up to 2 million gallons of water a day. Although it was used in the 1960's and 70's as a supplemental water supply for Woburn, it is unusable for drinking water purposes in its present condition.

### C. Contamination

#### 1. Groundwater

Volatile organic compounds (VOCs) are the primary contaminants in the groundwater at the Site. Groundwater contamination has been found in the overburden and bedrock aquifers at the W.R. Grace & Company property, the Unifirst Corporation property, the Wildwood Conservation Corporation property, the New England Plastics Company property and the central area of the Site. In addition, groundwater contamination has been found in the overburden aquifer at the Olympia Nominee Trust property,

Plumes of VOCs in the overburden and bedrock groundwater extend from the W.R. Grace and Unifirst Corporation properties to Wells G & H. The W.R. Grace plume consists primarily of chlorinated solvents and is characterized by a high percentage of TCE and 1,2-Dichloroethene (DCE). Other contaminants include PCE and vinyl chloride. The Unifirst Corporation plume is characterized by a predominance of PCE. Secondary constituents are 1,1,1-TCA, and smaller amounts of TCE and DCE.

In addition, groundwater contamination was discovered beneath the Wildwood Conservation Corporation, the Olympia Nominee Trust and New England Plastics Corporation properties. The contamination at the Wildwood Corporation property consists primarily of TCE detected at a number of wells, with 1,1,1-TCA, DCE, and PCE detected at a few locations. At the Olympia property TCE and xylene were detected in the overburden. Concentrations of PCE, TCE, 1,1,1-TCA and DCE were found in both bedrock and overburden wells at the New England Plastics property.

#### 2. Soil

Soil investigations were performed on several properties throughout the Site. VOCs are the primary contaminants in the soil at the Site and were found at various levels on the Wildwood

Corporation, Olympia Nominee Trust, W.R. Grace & Co., New England Plastics and Unifirst Corporation properties. Some soil contamination was found in a wetlands area on the Wildwood property.

Other contaminants found in soil include PCBs, chlordane (a pesticide), phthalates, and PAHs. These contaminants were found dispersed throughout the Wildwood property. PAHs were found in one location on the Olympia property. PCE and phthalates were found in a small area on the New England Plastics property. In addition, small quantities of sludge, contaminated with lead, VOCs, PAHs, pesticides, and assorted debris, was also found on the Wildwood property.

3. Sediment/River

Sediment samples taken from the Aberjona River, and along the banks of the Aberjona River in the wetlands, revealed contamination including PAHS and metals such as arsenic, mercury, and chromium. Surface water samples revealed low levels of VOCs.

4. Air

Air monitoring, conducted during all site investigations, did not reveal any readings above background at the breathing zone.

## VI. SUMMARY OF SITE RISKS

An Endangerment Assessment (EA) was performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants at the Site. Thirty-five contaminants of concern, listed in Table 1, were selected for evaluation in the EA. These contaminants constitute a representative subset of the total number of contaminants identified at the Site during the Remedial Investigation. The thirty-five contaminants were selected to represent potential on-site hazards based on their toxicity, concentration, frequency of detection, and mobility and persistence in the environment.

Potential human health effects associated with the contaminants of concern in groundwater, surface and subsurface soils, surface water, sediments, sludge, and air were estimated quantitatively through the development of several hypothetical exposure scenarios. The incremental lifetime cancer risks and the potential for noncarcinogenic adverse health effects were estimated for various exposure scenarios. Exposure scenarios were developed to reflect the potential for exposure to hazardous substances based on the characteristic uses and location of the Site. Factors of special note that are reflected in the EA are that the Site is a mixed use area which includes residences, commercial businesses and light industry, the aquifer was used at

one time as a municipal drinking water supply, the aquifer is currently used to a limited degree for industrial process water, and that the Wildwood property is currently fenced and guarded.

For risk assessment purposes, individual contaminants are separated into categories of chemical toxicity depending on whether or not they exhibit carcinogenic effects. Carcinogenic risks are derived by multiplying the potency factor for a specific carcinogen, developed by EPA's Carcinogen Assessment Group, by its chronic daily intake (CDI). CDIs are the amount of a substance taken into the body per unit body weight per unit time. The product results in a number such as $1x10^{-4}$. This number represents the probability that one out of ten thousand people will contract cancer as a result of exposure to a potential carcinogen. This number is then used by EPA to evaluate the risk associated with exposure to a contaminant under a particular exposure scenario.

Noncarcinogenic health risks posed by contaminants at a Superfund site are expressed via a hazard index. The hazard index is a term used to describe the ratio between the CDI and a relevant contaminant specific noncarcinogenic guideline such as the reference dose (RfD). This ratio (CDI:RfD) provides a measure of the potential for noncarcinogenic health effects to occur. When the hazard index is less than one, then adverse health effects from exposures attributed to the chemical(s) at the site are not anticipated.

A separate evaluation of risk was performed on each of the five source areas at the Site and the central area including the Aberjona River. This evaluation included selecting chemicals of potential concern on an area by area basis based on the presence of the chemical in background samples, the extent and magnitude of chemical contamination, chemical and physical properties affecting fate and transport of the chemical in the environment, and chemical toxicity. In addition, possible exposures to human and environmental populations were also examined. Table 2 summarizes the risks, by media, at the five source areas and the central area.

The greatest potential risks identified at the Site are attributed to future ingestion of contaminated groundwater, the inhalation of volatiles while showering, and exposure to surface soils through dermal contact and incidental ingestion. Other potential exposures include the inhalation of dust generated by site activities, the inhalation of volatiles released from the groundwater during industrial processes, and exposure to surface water and sediments from the Aberjona River through ingestion or dermal contact.

A comparison was made of all pathways of exposure for each of the contaminants of concern at each property at the Site to determine

which chemicals presented the greatest risks. It was found that the same group of chemicals posed a risk at most, if not all, of the properties. The chemicals contributing the greatest carcinogenic risk under the groundwater exposure scenarios are vinyl chloride, 1,1-Dichloroethene, TCE, PCE, 1,1-Dichloroethane, chloroform, and 1,2-Dichloroethane. The chemicals contributing the greatest carcinogenic risk under the surface soil exposure scenarios are chlordane, chloroform, 4,4'-DDT, carcinogenic PAHs, PCBs, TCE, and PCE. The hazard index for noncarcinogenic risks exceeded one in surface soils for trans-1,2-Dichloroethene, 1,1,1-TCA and lead. The hazard index exceeded one in groundwater for trans-1,2-Dichloroethene, PCE and 1,1,1-TCA.

The results of the EA were used to assist EPA in developing response objectives for the Site and in setting cleanup goals for those chemicals which posed the greatest threat to human health and the environment. The response objectives, as well as the cleanup goals selected for the soil and groundwater contaminants listed above, are further discussed under Section X. A detailed discussion of Site risks can be found in the EA.

## VII. DOCUMENTATION OF SIGNIFICANT CHANGES

EPA published a Proposed Plan for remediation of the Site on February 9, 1989. The two-part cleanup plan consisted of a source control remedy and a management of migration remedy. The source control portion of the plan included alternatives for the treatment of contaminated soils. The preferred source control alternative consisted of the treatment of soils contaminated with volatiles using in-situ volatilization, and the incineration of soils contaminated with PCBs, PAHs, and pesticides. The management of migration portion of the plan covered alternatives for the treatment of contaminated groundwater. The preferred management of migration alternative included the extraction of groundwater from the five source areas of contamination and the center of the Site. The groundwater would be pumped to a central treatment facility where it would be pretreated for metals, and then sent through an air stripper and vapor phase carbon filter for removal of volatile organic contamination.

The remedy selected in this ROD adopts the same source control component that was presented in the Proposed Plan. For the management of migration component, however, this ROD contains the following changes:

- Extraction of groundwater will still occur on all five source areas of contamination as stated in the preferred alternative section of the Proposed Plan, but the groundwater will be treated at individual treatment plants as opposed to one central treatment plant.

- Groundwater will not be extracted from the central area aquifer at this time. Rather, a study of the central area will be conducted to select the best remedial alternative for addressing contaminated groundwater in that area. The objectives of the study are delineated in Section X of this ROD. The study will be developed and implemented during the predesign phase of the remedy selected under this ROD. As discussed in Section IV of this ROD, the central area will be addressed as a separate operable unit and the remedy will be selected in a separate decision document.

- It is no longer necessary for the Riley Tannery production well to be pumped in an effort to maintain the southern boundary of the Site as was stated in the Proposed Plan.

- Treatment technologies other than air stripping may be considered for implementation of the groundwater remedy if they can be demonstrated to be equally or more effective.

Each of the changes listed above will be discussed in turn in the remainder of this section.

EPA received strong opposition from both the public and the PRPs to a central treatment facility. Many of the comments received concern the fact that construction of a single central treatment facility would require that pipes be placed in a wetlands area, and that contaminated water be moved across uncontaminated areas of the Site. In addition, some commenters felt that a single treatment plant would rule out the possibility of using different treatment options to address unique chemical combinations and concentrations found at individual source areas. These comments are further described in the attached Responsiveness Summary (Appendix A).

The Agency believes that the comments regarding these issues raise valid concerns, and that the overall protectiveness and effectiveness of the remedy will not be compromised by using individual treatment plants at the source areas of contamination. Therefore, in response to the public's comments, the Agency has decided to deviate from the originally preferred alternative in favor of a remedy which employs individual source area treatment plants.

In addition, many individuals raised issues during the public comment period which challenged the effectiveness and protectiveness of extracting groundwater from the central area. While it is the Agency's intent to address the contamination in the central area aquifer, EPA does see merit in further evaluating options for remediating this area while implementing

the source area cleanup. Therefore, the Agency has decided to refrain from making a decision on the remedy for the central area until the concerns raised during the comment period can be more fully evaluated.

As mentioned above, the Agency has decided to address the central area as a separate operable unit. EPA believes that this approach is environmentally sound and logical for several reasons: the majority of contamination at the site is associated with the source areas; cleanup of these areas will prevent further migration of contaminants into the central area, and further migration of contaminants off-site from the source areas; and further evaluation of the central area will ensure that the eventual central area cleanup will be protective and effective.

Since completion of the Feasibility Study for this Site the Riley Tannery production well has ceased operation. The Proposed Plan called for pumping of the Riley well in conjunction with the central aquifer extraction system. This measure was intended to create a groundwater barrier that would prevent water from outside of the southern hydraulic boundary of the Site from being drawn into the central area. As the cleanup of the central area will be addressed as a separate operable unit, the maintenance of the Southern hydraulic boundary is no longer critical. Accordingly, the selected remedy provides simply that pump rates and well locations be determined that will capture the contamination associated with each individual property, and reduce the capture of contamination from other properties. The exact pumping rates and well locations to best accomplish this objective will be determined during remedial design.

During the public comment period, the Agency considered comments regarding the engineering advantages of employing individualized treatment processes at the source areas. EPA concurs that technologies in addition to air stripping may be appropriate for use at certain areas. Therefore, during remedial design EPA will consider proposals for the use of alternative treatment technologies which were evaluated in the Feasibility Study for groundwater remediation. It must be demonstrated that the proposed technology is equally or more effective than air stripping. In addition, treatment technologies other than those evaluated in the Feasibility Study may be considered by EPA subject to public comment.

As a result of the changes outlined above the Agency now supports a different management of migration (MOM) alternative than was presented in the Proposed Plan. The preferred MOM alternative has changed from MOM-4 (Pump and Treat Source Areas and the Central Area) to MOM-2 (Pump and Treat Source Areas). The MOM-2 alternative will be supplemented by a study of the central area to determine the most appropriate method of addressing groundwater contamination in that area, as well as an

investigation of contamination in the Aberjona River. The reader is referred to Section IX for an analysis of the alternatives that were presented in the Feasibility Study, and to Section X for the rationale for selection of the selected alternative.

The Agency does not believe that it is necessary to reissue the Proposed Plan for further comment and provides the following rationale: because the Feasibility Study (FS) and the Proposed Plan discussed the alternatives of using separate treatment facilities at the source areas, and of proceeding with source area treatment only, the public already had an opportunity to comment on these alternatives; the suggested changes, including the potential use of an alternative groundwater treatment technology which was evaluated in the FS, do not alter the overall remedial objectives for the Site (presented in Section VIII); and the eventual proposal for remediation of the central area, as well as any proposal for use of a groundwater treatment technology that was not evaluated in the FS, will be subject to public comment.

## VIII. DEVELOPMENT AND SCREENING OF ALTERNATIVES

### A. Statutory Requirements/Response Objectives

Prior to the passage of the Superfund Amendments and Reauthorization Act of 1986 (SARA), actions taken in response to releases of hazardous substances were conducted in accordance with CERCLA as enacted in 1980 and the revised National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300, dated November 20, 1985. Although EPA proposed revisions on December 21, 1988 to the NCP to reflect SARA, until those proposed revisions are finalized, the procedures and standards for responding to releases of hazardous substances, pollutants and contaminants shall be in accordance with Section 121 of CERCLA, and to the maximum extent practicable, the current NCP.

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences, including: a requirement that EPA's remedial action, when complete, must comply with applicable or relevant and appropriate requirements (ARARs) established under federal and state environmental laws unless a statutory waiver is warranted and justified in the ROD; a requirement that EPA select a remedial action that is cost effective and that uses permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a statutory preference for remedies that permanently and significantly reduce the volume, toxicity or mobility of

hazardous substances over remedies that do not achieve such results through treatment. Response alternatives were developed to be consistent with these Congressional mandates.

A number of potential exposure pathways were analyzed for risk and threats to public health and the environment in the Endangerment Assessment and the Wetlands Assessment. Guidelines were used to assist EPA in the development of response actions including the Superfund Public Health Evaluation Manual (EPA, 1986) and the Draft Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites, October 1986 and April 1988. As a result of these assessments, EPA identified several objectives for the cleanup of the Wells G & H Superfund Site. These objectives were developed to mitigate existing and future threats to public health and the environment. The response objectives listed here are the overall objectives for the entire Site including the central area, the five source areas of contamination, the Aberjona River and its associated wetlands within the Site boundary. The specific response objectives for the operable unit associated with this ROD - the five source areas of contamination - are listed in Section X, part A. The response objectives for the entire Site cleanup, at the completion of all operable units, are as follows:

1. Restore the aquifer that supplied water to Wells G & H to drinking water standards.

2. Stop the introduction of contaminated groundwater from the source areas to the rest of the aquifer.

3. Stop the leaching of soil contaminants to the groundwater.

4. Prevent public contact with contaminated groundwater and soil above the cleanup levels.

5. Protect the natural resources in the area, such as the river and wetlands, from becoming further degraded.

6. Reduce further migration of contaminated groundwater off-site.

**B. Technology and Alternative Development and Screening**

CERCLA, the NCP, and EPA guidance documents including, "Guidance on Feasibility Studies Under CERCLA" dated June 1985, and the "Interim Guidance on Superfund Selection of Remedy" [EPA Office of Solid Waste and Emergency Response (OSWER)], Directive No. 9355.0-19 (December 24, 1986) set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements and guidance documents, a range of treatment alternatives were developed for the Site ranging from an

alternative that, to the extent possible, would eliminate the need for long term management at the Site (including monitoring), to alternatives involving treatment that would reduce the mobility, toxicity, or volume of the hazardous substances as their principal element. In addition to the range of treatment alternatives, a containment option involving little or no treatment and a no action alternative were developed in accordance with Section 121 of CERCLA.

Section 121(b)(1) of CERCLA presents several factors that at a minimum EPA is required to consider in its assessment of alternatives. In addition to these factors and the other statutory directives of Section 121 of CERCLA, the evaluation and selection process was guided by the EPA document "Additional Interim Guidance for FY 87 Records of Decision" dated July 24, 1987. This document provides direction on the consideration of SARA cleanup standards and sets forth nine factors that EPA should consider in its evaluation and selection of remedial actions. The nine factors are:

1. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs).
2. Long term Effectiveness and Permanence.
3. Reduction of Toxicity, Mobility or Volume.
4. Short term Effectiveness.
5. Implementability.
6. Cost.
7. Overall Protection of Human Health and the Environment.
8. Community Acceptance.
9. State Acceptance.

Section 2 of the Feasibility Study identified, assessed and screened technologies for both soil and groundwater remediation based on technical feasibility, implementability, effectiveness, and cost. The purpose of the initial screening process was to narrow the number of potential remedial actions for further detailed analysis while preserving a range of options. These technologies were separated into source control (SC) and management of migration (MOM) alternatives. Each alternative was then evaluated and screened in Section 3 of the Feasibility Study. Section 3 of the Feasibility Study presented the remedial alternatives developed by combining the technologies that passed the previous screening process into the categories required by OSWER Directive No. 9355.0-19. A total of eleven SC alternatives and five MOM alternatives were evaluated and screened in Section 3. Of these, nine SC alternatives and four MOM alternatives were retained for detailed analysis in Section 4. Table 3 identifies the thirteen alternatives that were retained throughout the screening process.

## IX. DESCRIPTION/SUMMARY OF THE ANALYSIS OF ALTERNATIVES

This section presents a narrative summary and brief evaluation of each alternative according to the evaluation criteria described above. A detailed tabular assessment of each alternative can be found in the Feasibility Study, Section 4, Tables 4-36 and 4-39.

### A. Source Control (SC) Alternatives Analyzed

The source control alternatives analyzed for the Site include a limited action alternative, SC-1; on-site and off-site incineration alternatives, SC-3 and SC-4; on-site high temperature enhanced volatilization, SC-5; on-site supercritical fluid extraction, SC-7; on-site enhanced volatilization/incineration, SC-8; on-site enhanced volatilization/off-site incineration, SC-9; in-situ volatilization/on-site incineration, SC-10; and in-situ volatilization/off-site incineration, SC-11. These alternatives are described briefly below with approximate capital and present worth operation and maintenance costs.

SC-1
<u>Limited Action</u>

The limited action alternative entails leaving contaminants untreated on site, and monitoring contaminant concentrations every year for 30 years. EPA would conduct a more extensive review of the Site every five years to determine whether further remedial action is necessary to protect human health and the environment. The limited action alternative also involves limiting access to the Site, limiting Site use, and conducting public education programs to increase public awareness of the Site. Although it is expected that contamination will remain on site beyond 30 years, EPA's cost analysis is based upon a 30 year timeframe. SC-1 was referred to as a no-action alternative in the Feasibility Study and Proposed Plan.

Because this alternative would not involve disturbing the contaminated soil, other than to construct a fence, it provides short term effectiveness in protecting public health during implementation. In addition, little difficulty would be involved in the implementation of the tasks associated with this alternative and the work could be completed within a relatively short period of time. However, this alternative would require ongoing surveillance and maintenance to ensure long term effectiveness. This alternative would not involve removal or other on-site containment and treatment to reduce the toxicity, mobility, or volume of the contaminants. It would not, therefore, provide adequate protection of human health and the environment. This alternative does not comply with ARARs.

The no-action alternative (i.e., the baseline scenario presented and evaluated in the risk assessment) does not include activities

to reduce the potential for exposure such as restrictions on site use and access. Since the limited action alternative, which includes institutional controls to limit site access and use, is not protective and does not attain ARARs, the no-action alternative, which is less protective than the limited use alternative, would also not be protective nor attain ARARs.

**Total Capital and Operation and Maintenance Costs:** $800,800

SC-3
Excavation/On-Site Incineration/Backfill On-Site

This alternative would involve excavating approximately 9,500 cubic yards (cy) of contaminated soil at the Site and treating the soil on-site in a mobile incinerator. The contaminated soil would be burned at very high temperatures. Because incineration will destroy virtually all of the organic contaminants in the soil, the treated soil can be backfilled.

This alternative would use treatment to reduce the toxicity, mobility and volume of contaminants and would achieve permanence by destroying the contaminants of concern. This would effectively reduce risks associated with the Site and adequately protect human health and the environment. While there is a potential for short term public health threats to workers and area residents during excavation, soil handling and incineration, risks would be minimized by the use of adequate preventive measures. All components of this alternative are well developed and commercially available. No long term management of treated soil would be required, nor would there be a need for future remedial actions. This alternative would, however, require excavation and placement of fill in a wetlands, and if it is determined that a practicable alternative exists, it would not meet the Federal Wetlands Protection ARARs.

**Estimated Time for Completion Including Design, Bidding, Construction and Operation:** 4 years
**Estimated Time for On-Site Construction and Operation Only:** 15 months
**Total Costs:** $7,500,000

SC-4
Excavation/Off-Site Incineration/Backfill with Clean Off-Site Soil

This alternative is similar to SC-3 except that contaminated soil would be transported to an off-site incineration facility for treatment, and the excavated area would be backfilled with clean off-site soil.

This alternative would meet the criteria in the same way as SC-3 with the following exceptions. While the components of this alternative are well developed and commercially available, the available capacity of off-site incineration facilities could be a potential problem since there are only a few currently in operation in the country. In addition, this alternative is more costly than SC-3.

**Estimated Time for Completion Including Design, Bidding, and Construction and Operation:** 3.5 years
**Estimated Time for Construction and Operation Only:** 15 months
**Total Costs:** $22,100,000

SC-5
Excavation/On-Site High Temperature Enhanced Volatilization/Backfill On-Site

This alternative involves excavating approximately 9,500 cy of contaminated soils and treating the soils in a mobile treatment unit by high temperature enhanced volatilization. High temperature enhanced volatilization is a type of thermal treatment process that involves mixing the contaminated soil with heated air. This causes the release and transfer of VOCs, PAHs, PCBs and chlordane from the soil to the air in the unit. The contaminants in the air are then destroyed afterwards in a burner. The treated soil would then be backfilled into the excavated areas.

While there is a potential for short term public health threats to workers and area residents during excavation, soil handling, and high temperature volatilization, risks would be minimized by the use of adequate preventive measures. All components of this alternative are well developed and commercially available. However, data is lacking with respect to the effectiveness of this technology to achieve target levels for chlordane and PAHs. While the technology would use treatment to reduce the toxicity, mobility and volume of contaminants at the Site, it is uncertain as to whether the technology can reduce the concentrations of all contaminants to their target levels. Therefore, institutional controls may need to be implemented to ensure the long term effectiveness of this alternative. Treatability studies would have to be done to confirm whether this process would meet target levels for all contaminants. As with SC-3 and SC-4, this alternative would require excavation and placement of fill in a wetlands area, and if it is determined that a practicable alternative exists, it would not meet the Federal Wetlands Protection ARARs.

**Estimated Time for Completion Including Design, Bidding, Construction and Operation:** 3 years
**Estimated Time for On-Site Construction and Operation Only:** 9 months
**Total Costs:** $6,600,000

SC-7
Excavation/On-Site Supercritical Fluid Extraction/Backfill On-Site

This alternative would use an innovative technology to treat approximately 9500 cy of contaminated soil. Contaminated soil from the Site would be excavated and mixed with water to create a slurry that can be pumped into a mobile on-site extractor unit. Liquified carbon dioxide introduced into the unit would work as a solvent, dissolving contaminants as it passes over the slurry in the extraction unit under elevated pressure. Treated soil would be backfilled to the excavated areas. The small quantity of extractant containing the contaminants stripped from the soils would be collected and shipped off-site to a commercial incineration facility.

This alternative would use treatment to reduce toxicity, mobility and volume of contaminants at the Site. Although currently in use to treat PCB laden oily wastewater and sludges from refinery industries, this technology has not been used on a large scale for removal of the kind of soil contamination present at the Site. Therefore, its ability to reduce contamination to target levels is uncertain, and institutional controls may need to be implemented to ensure the long term effectiveness of this alternative. Treatability studies would be necessary before supercritical fluids extraction could be implemented at the Site. In addition, because this is an innovative technology, we are uncertain of the availability of materials and services to implement this alternative. As with all other alternatives involving excavation and placement of fill in a wetlands, this alternative would not meet the Federal Wetlands Protection ARARs if it is determined that a practicable alternative exists.

**Estimated Time for Completion Including Design, Bidding, Construction and Operation:** 3.5 years
**Estimated Time for Construction and Operation Only:** 1 year
**Total Costs:** $7,500,000

SC-8
Excavation/On-Site Enhanced Volatilization/On-Site Incineration/Backfill On-Site

This alternative would use enhanced volatilization as described under SC-5, except at lower temperatures, to treat approximately 7,600 cy of soil contaminated with VOCs only, and on-site incineration in a mobile unit as described under SC-3 to treat approximately 1,900 cy of soil contaminated with a mixture of PAHs, PCBs, VOCs, and pesticides. Treated soil from both the enhanced volatilization and incinerator units would be backfilled on-site.

While there is a potential for short term public health threats to workers and area residents during excavation, enhanced volatilization, and incineration activities, risks would be minimized by the use of adequate preventive measures. All components of this alternative are well developed and commercially available. This combination would use treatment to reduce toxicity, mobility and volume of contaminants at the Site. Soil contaminants would be reduced to target levels by incineration in this alternative. However, the ability of enhanced volatilization to achieve target levels is uncertain, and institutional controls may need to be implemented to ensure the long term effectiveness of this alternative. Treatability studies would be required to confirm the long term effectiveness of enhanced volatilization with respect to achieving target levels. This alternative requires excavation and placement of fill in a wetlands. If it is determined that a practicable alternative exists, it would not meet the Federal Wetlands Protection ARARs.

**Estimated Time for Completion Including Design, Bidding, Construction and Operation:** 4 years
**Estimated Time for Construction and Operation Only:** 16 months
**Total Costs:** $6,200,000

SC-9
Excavation/On-Site Enhanced Volatilization/Off-Site Incineration/Backfill with Treated and Clean Off-Site Soil

This alternative differs from SC-8 only in that soils contaminated with a mixture of organic contaminants would be excavated, packaged and shipped off-site for incineration. Since only the soil treated by enhanced volatilization would remain on-site for use as a backfill, clean fill would have to be brought in to supplement the treated soils. This alternative would meet the criteria in the same way as SC-8 except that this alternative is more costly.

**Estimated Time for Completion Including Design, Bidding, Construction and Operation:** 3.5 years
**Estimated Time for Construction and Operation Only:** 10 months
**Total Costs:** $9,000,000

SC-10
In Situ Volatilization/Excavation/On-Site Incineration/Backfill On-Site

This alternative uses both in-situ volatilization and incineration to treat the contaminated soil on-site. In-situ volatilization would be used to treat 7600 cy of soil contaminated only with VOCs. This technology involves installing extraction wells into the contaminated soils above the groundwater table. Piping is attached to each well and also to a vacuum pump. The vacuum pump draws air from the surrounding soils into the wells without disturbing the soils. As the air passes over the contaminated soils, VOC contaminants are transferred from the soil to the air. The air is sent through columns of activated carbon that filter out the contaminants, and the treated air is discharged to the atmosphere. The carbon is then regenerated to remove contaminants. Incineration would be used to treat the remaining 1900 cy of soil at the Site contaminated with a mix of PCBs, PAHs, pesticides and VOCs.

While there is a potential for short term public health threats to workers and area residents during excavation, incineration, and in-situ volatilization, risks would be minimized by the use of adequate preventive measures. All components of this alternative are well developed. In-situ volatilization has been successfully used at a number of Superfund sites for VOC removal, and incineration technologies are demonstrated to be reliable. Pilot scale testing would be required for in-situ volatilization for full-scale design and optimization.

This alternative would effectively reduce the toxicity, mobility and volume of contaminants in the soil. This alternative would reduce contaminants to target levels. In addition, a portion of the soil to be treated by in-situ volatilization is located in a wetland area where the technology could be implemented without damaging the wetland. SC-10 would meet all Federal and State ARARs.

SC-10 is the chosen source control alternative for implementation at the Site. It is discussed in greater detail in Section X.

**Estimated Time for Completion Including Design, Bidding, Construction and Operation:** 4 years
**Estimated Time for Construction and Operation Only:** 16 months
**Total Costs:** $3,200,000

SC-11
In-Situ Volatilization/Excavation/Off-Site Incineration/Backfill With Clean Off-Site Soil

This alternative is similar to SC-10 except that the soil with mixed contaminants would be packaged and shipped off-site for incineration.

This alternative would meet the criteria in the same way as SC-10 except that this alternative is more costly.

**Estimated Time for Completion Including Design, Bidding, Construction and Operation:** 3.5 years
**Estimated Time for Construction and Operation Only:** 10 months
**Total Costs:** $6,200,000

**B. Management of Migration (MOM) Alternatives Analyzed**

The management of migration alternatives address contamination of the groundwater at the source areas and at the center of the Site. Contamination which exists in the overburden and bedrock aquifers of the source areas has migrated to the center of the Site. In addition, some groundwater contamination exists beyond the southern boundary of the Site. The MOM alternatives evaluated include a limited action alternative, MOM-1; pumping and treating the source areas, MOM-2; pumping and treating the central area, MOM-3; and pumping and treating both the source areas and the central area, MOM-4.

Section 4 of the Feasibility Study examines 11 variations of the three "pump and treat" MOM alternatives (see Table 3), all of which include three basic procedures: 1) the installation of wells to extract contaminated groundwater from the Site; 2) pretreatment of the extracted groundwater to remove suspended solids and metals that could potentially foul the principal treatment unit; and 3) a treatment scheme to remove VOCs from the groundwater. These 11 variations differ according to the location of the extraction well, the type of treatment scheme employed, and the location and number of treatment facilities.

The three different treatment schemes that were evaluated for the removal of VOCs include physical treatment by air stripping, chemical treatment by ultraviolet (UV)/chemical oxidation, and physical treatment by carbon adsorption. Below is a brief description of each technology.

**Air Stripping:** Extracted groundwater is first pretreated and then passed through an air stripping chamber which is encased in a cylindrical structure. In the chamber, air is forced up through the water. As a result, contaminants are carried into the air stream. The air stream is then treated

in activated carbon columns to remove contaminants before being released to the atmosphere. Treated groundwater would then be discharged.

**Ultraviolet (UV)/Chemical Oxidation:** This technology uses a chemical reaction to destroy organic contaminants in the groundwater. Hydrogen peroxide would be introduced into the contaminated groundwater in the presence of ultraviolet light to create new compounds called hydrogen radicals. These radicals react to chemically alter organic contaminants to non-hazardous carbon dioxide and water.

**Carbon Adsorption:** This technology can be used as a principal or secondary treatment; either to remove organic contaminants from groundwater or to remove organics from the airstream. Activated carbon is carbon that has been treated to enhance properties that cause contaminants to adhere to the carbon surface areas. Groundwater is continuously pumped through the activated carbon units until cleanup goals are met. The carbon filter is regenerated from time to time to maintain its efficiency.

As stated earlier in this ROD, the Riley Tannery production well is no longer in use. The cleanup timeframes and approximate pump rates for the MOM alternatives were estimated based on the conditions that existed when the Riley well was pumping. The absence of the Riley well does not change the recommended pump rates as discussed in the Feasibility Study as these rates were developed excluding the effects of the Riley well. The absence of the Riley well, however, does impact the movement of contaminants into the central area and the timeframe associated with the cleanup of the central area. The Agency does not believe that these changes are significant since the central area is not being addressed under this ROD, and the objectives of remediating the five source areas are not modified by the fact that the Riley well is no longer pumping.

The following is a brief description of each of the MOM alternatives evaluated for the treatment of contaminated groundwater.

MOM-1
Limited Action

A limited action alternative for groundwater would consist of a long term monitoring program and review every five years to determine whether further remedial action is necessary to treat contaminated groundwater. The limited action alternative also involves limiting the withdrawal of groundwater and conducting educational programs to increase public awareness. Groundwater contamination, however, would remain and continue to migrate to other areas within the Site and downgradient from the Site. The

actual time it would take for remediation to be accomplished, through natural attenuation, is greater than 100 years. Thirty years, however, is the estimate being used for costing purposes only. MOM-1 was referred to as a no-action alternative in the Feasibility Study and Proposed Plan.

This alternative poses no short term threat to the community as groundwater use would continue to be restricted. While workers at the site for sample collection and site inspection would be exposed to contaminated groundwater, risks would be minimized by the use of personal protective equipment. However, as this alternative contains no active remediation, it would not result in any immediate reduction in toxicity, mobility, or volume of contaminants, and would not result in the attainment of target cleanup levels in a rapid time frame. Also, the volume of contaminated groundwater would probably increase with time due to the migration of contaminants into other areas of the Site as well as into the deeper fractures in the bedrock. Therefore, this alternative will not provide long term effectiveness and permanence, and it is not protective of human health and the environment. Finally, this alternative does not comply with ARARs.

The no-action alternative (i.e., the baseline scenario presented and evaluated in the risk assessment) does not include activities to reduce the potential for exposure such as limiting groundwater withdrawal. Since the limited action alternative, which includes institutional controls to limit the withdrawal of groundwater for potable use, is not protective and does not attain ARARs, the no-action alternative, which is less protective than the limited use alternative, would also not be protective nor attain ARARs.

**Total Costs:** $440,200

MOM-2
<u>Pump and Treat Source Areas</u>

This alternative would involve pumping groundwater from each of the five source areas, pretreatment to remove suspended solids and metals, and treatment by either air stripping or ultraviolet (UV)/chemical oxidation to remove VOCs. Treatment by carbon adsorption alone was not evaluated for this alternative because of the superiority of air stripping and UV/chemical oxidation for removing higher levels of VOCs. Contaminated groundwater in the overburden aquifer would be pumped and treated at all of the properties. Contaminated groundwater in the bedrock would be pumped and treated at all properties except Olympia Nominee Trust. Contaminated groundwater would be treated at either separate source area treatment plants or one centrally located treatment plant. Source areas would be pumped with the objective of achieving MCLs.

Under this alternative, potential public health threats would exist for area residents and workers during construction, but would be minimized by the use of adequate preventive measures. Eventually, contamination in the groundwater would be reduced to target levels throughout the Site. Although MOM-2 does not directly address the central area of the Site, it was anticipated, at the time the Feasibility Study was conducted, that pumping at the Riley well and natural attenuation would remediate the central area to MCLs over a period of 22 years. A small portion of contaminated groundwater may migrate off-site.

The extraction at source areas would control the migration of contaminated groundwater to the central area and beyond, thereby preventing further contamination of the aquifer. Also, treatment would directly reduce the toxicity, mobility and volume of contaminants in the groundwater. The effectiveness of extraction of contaminated groundwater from the fractured bedrock is uncertain, however, and some residual contamination could remain in the bedrock. Finally, this alternative would comply with ARARs.

MOM-2 is the chosen management of migration alternative for implementation at the Site and is discussed in greater detail in Section X.

**Estimated Time for Completion Including Design, Bidding, Construction, and Operation:** 22 years for central area; 20-50 years for source areas.

**Total Costs:** The cost for implementing this alternative will depend on the number and type of treatment plants selected for the remedy. See Table 4 for a breakdown of costs for each variation.

MOM-3
Pump and Treat Central Area

This alternative involves pumping contaminated groundwater from the central area of the site followed by pretreatment and either air stripping, UV/chemical oxidation, or carbon adsorption. This alternative would significantly reduce migration of contaminants off-site to the south due to the large capture zone for Wells G & H. However, contaminated groundwater in source areas could migrate off-site.

Potential public health threats to area residents and workers during construction would exist from direct contact with contaminated groundwater, soils and inhalation of fugitive dust and organic vapors. These risks, however, could be minimized by using preventive measures and personal protective equipment.

This alternative would capture contaminated groundwater from the central area, and would also intercept a limited amount of contaminated groundwater that flows from the source areas to the central area. Since no direct bedrock pumping at the sources would occur, some contaminated groundwater may remain in the bedrock at the source areas and continue to recontaminate the overburden in the future. As the achievement of MCLs throughout the site is anticipated to require in excess of 60 years, this alternative would result in protection of human health and the environment only after a lengthy remediation period. This alternative will meet ARARs throughout the Site, although there is more uncertainty that ARARs can be met in the bedrock.

**Estimated Time for Completion Including Design, Bidding, Construction and Operation:** Exceeds 60 years
**Total Costs:** See Table 4

MOM-4
Pump and Treat Source Areas and the Central Area

This alternative combines MOM-2 and MOM-3 to provide pumping and treatment of contaminated groundwater from the source areas and the center of the Site. Treatment of groundwater would occur at either six separate treatment plants or at one centrally located treatment plant. Groundwater would first be pretreated and then principally treated by either an air stripper or by UV/chemical oxidation. Treatment by carbon adsorption alone was not evaluated for this alternative because of the superiority of the other two treatment processes for removing higher levels of VOCs.

The extraction of contaminated groundwater at the source areas and central area followed by pretreatment and air stripping would significantly reduce the migration of contaminants from source areas as well as the central area. The source areas and central area would be pumped with the objective of achieving MCLs throughout the Site. The effectiveness of extraction of contaminated groundwater from the fractured bedrock is uncertain, however, and some residual contamination could remain in the bedrock in the source areas.

Potential public health threats to area residents and workers during construction would exist from direct contact with contaminated groundwater, soils and inhalation of fugitive dust and organic vapors. These risks, however, could be minimized by using preventive measures and personal protective equipment. This alternative would result in overall protection of human health and the environment upon completion of remediation. MOM-4 would comply with ARARs.

**Estimated Time for Completion Including Design, Bidding, Construction and Operation:** 10 years for the central area, 20-50 years for the source areas.
**Total Costs:** See Table 4

## X. THE SELECTED REMEDY

The remedial action selected for implementation at the Wells G & H Site consists of the source control alternative SC-10, and the management of migration alternative MOM-2. The operable unit addressed by this ROD includes the five identified source areas of contamination. In addition, the remedial action also includes a study of the central area to determine the most effective remedial alternative for restoring the central area aquifer to drinking water quality, as well as an investigation to identify the extent of contamination in the Aberjona River.

### A. Description of the Selected Remedy

#### 1. Remedial Action Objectives/Cleanup Goals

The selected remedy was developed to satisfy the following remedial objectives which will guide the design of the remedy and be used to measure the success of the remedy. The objectives listed below are specific to the operable unit described in this ROD.

a. Soil

The remedial objectives for contaminated soil at the five source areas of contamination at the Wells G & H site are as follows:

- Prevent public contact with contaminated soil above the Cleanup levels;
- Stop the leaching of soil contaminants to the ground water; and
- Protect the natural resources at the site from further degradation.

EPA has identified site-wide cleanup goals for each of the chemicals of concern in soil. These goals satisfy the above objectives. The soil cleanup goals represent the concentrations that can remain in the soil and still be considered protective of public health. Three approaches were used to determine these levels. For volatile organic compounds detected in the soil and the groundwater, and which pose a substantial risk from exposure via groundwater, a leaching model was used to calculate a level in the soil that is protective of groundwater. These chemicals and their respective target soil concentrations are presented in Table 5.

The second approach involved developing soil cleanup goals for PCBs, PAHs, and the pesticides chlordane and DDT. Consistent with the Superfund Public Health Evaluation Manual, 1986, EPA evaluated a risk range of $10^{-4}$ to $10^{-7}$ individual lifetime excess cancer risks associated with direct contact with the contaminants in the soil. The soil cleanup levels corresponding with a $10^{-6}$ increase in potential excess cancer risk were chosen for these contaminants. These chemicals and their respective target soil concentrations are presented in Table 6.

The third approach develops a cleanup goal for lead based on acceptable blood lead levels. The chosen cleanup goal for lead in soil, based on a target blood lead level of 10 ug/dl, is 640 mg/kg. The methodologies used to derive the cleanup goals for each of the three approaches presented above are discussed in detail in the Feasibility Study, Section 1.

b. Groundwater

The remedial objectives for contaminated groundwater at the five source areas of contamination at the Wells G & H Site are as follows:

- Prevent the further introduction of contaminated ground water from the source areas to the central area;
- Limit the further migration of contaminated ground water off-site from the source areas;
- Restore the bedrock and overburden aquifers (aquifers) in the vicinity of the source areas to drinking water quality; and
- Prevent public contact with contaminated groundwater above the cleanup levels.

The target groundwater cleanup levels are based upon the classification of the groundwater at the Site as a potential source of drinking water. Therefore, EPA has identified Maximum Contaminant Levels (MCLs) promulgated under the Safe Drinking Water Act as the cleanup goals to be applied to the Site groundwater within the aquifer. These goals satisfy the above objectives and are protective of human health and the environment. Table 7 presents the cleanup goals for the chemicals of concern in groundwater.

Cleanup goals for treated groundwater effluent will depend on the point of discharge. Presently, EPA believes that treated groundwater will be discharged to the Aberjona River. In this case, the Massachusetts Ambient Water Quality Standards (AWQSs) will be used to set effluent targets. If the effluent is discharged to the aquifer, MCLs will be the appropriate

standards. Specific effluent discharge requirements will be refined during design.

2. Description of Remedial Components

The following components define the selected remedy. This remedy addresses groundwater, soil, sludge and debris at the Site.

a. Contaminated Soil Treatment

This component of the remedy is composed of the following: in-situ volatilization, excavation, on-site incineration, backfilling, predesign work, implementation monitoring, and completion requirements.

Incineration will be used to treat approximately 2100 cy of soil at the Site contaminated with a mix of PCBs, PAHs, pesticides and VOCs. These soils will be excavated from the Wildwood, Unifirst Corporation, New England Plastics Company and Olympia Nominee Trust properties and then destroyed in a mobile temporary on-site incinerator. The incinerator will employ Best Available Control Technology, such as air scrubbers, and will be monitored to control air emissions. Test burns will be required to determine actual performance of incineration on the mixed contaminant soil and to generate treated samples for EP toxicity and TCLP tests to confirm that the treated soil would be acceptable for backfill at the site. If EPA determines that the incinerator ash is subject to the Land Disposal Restrictions of the Resource Conservation and Recovery Act (RCRA), the ash will be managed in accordance with such restrictions. After the soil has been treated and tested, and it is determined to meet cleanup goals, it will be used as backfill for excavated areas.

In-situ volatilization will be used to treat approximately 7400 cubic yards of VOC contaminated soil on the Wildwood property. A portion of the soil to be treated by in-situ volatilization is located in a wetland area on the Wildwood property. The in-situ volatilization system will be installed in such a way that it minimizes damage to the wetland. In-situ treatment will use carbon adsorption for vapor treatment. Pilot scale testing will be required to ensure full scale design and optimization.

The areas of contaminated soils at the Site are identified in Figure 4. There was no soil found at the W.R. Grace property in concentrations above the target cleanup levels. Consequently, there is no soil removal prescribed for the W.R. Grace property. Following are approximate volumes of contaminated soils per property. The methodology used to estimate these volumes is presented in Appendix D and Section 3.1 of the Feasibility Study.

Wildwood - 7400 cubic yards of VOC contaminated soil and 1900 cubic yards of mixed contaminant soil.

Olympia - 5 cubic yards of PAH contaminated soil.

New England Plastics - 40 cubic yards of VOC contaminated soil.

Unifirst - 150 cubic yards of VOC contaminated soil.

Requirements of predesign will include soil sampling to refine estimates of contaminated soil volumes and to generate property specific values for the fraction of organic carbon in the soil. This information will be used to modify soil volumes and soil cleanup goals as necessary. VOCs are the primary soil contaminant at the Site. The volume of VOC contaminated soil requiring remediation is largely determined by the target cleanup levels for VOCs. These levels are based on the leaching model discussed in Section X.A.1.a above and presented in Section 1.0 of the Feasibility Study. As the soil fraction of organic carbon is a component of that model, a variation in this number may necessitate refinement of the cleanup goals for VOCs in soil. A value of 1% for the fraction of organic carbon in soil was used to generate the approximate volumes of contaminated soil per property listed above. That value was assumed based on the soil types present. Any refinement of the cleanup goals based on the fraction of organic carbon value will be made in accordance with the leaching model.

Air monitoring will be performed during the implementation of the remedy to ensure that fugitive and point source emissions do not result in unacceptable ambient air quality. Consideration will be given to the sequencing of the soil and groundwater components of the remedy to avoid recontamination of treated soil by volatilization of contaminated groundwater. This is of special interest at the Unifirst property due to the presence of dense non-aqueous phase liquids which have the potential to volatilize and recontaminate the soils. In addition, wetlands monitoring will occur to avoid degradation of the wetlands.

A soil sampling and analysis program will be implemented to monitor the performance of in-situ volatilization. At a minimum, it will include soil and soil gas sampling at the beginning, during, and end of implementation. Soil samples will also be taken during excavation for the incineration component of this remedy in order to refine the extent of soil for removal. Upon completion of the excavation and in-situ volatilization programs, soil samples will be taken and evaluated against cleanup goals. This data will be used to evaluate the success of the remedy, and ultimately for site delisting. A specific soil sampling and analysis program will be developed during design.

b. Sludge and Debris Disposal

A specific program for the removal and disposal of sludge and debris from the Wildwood property will be defined during design.

This material does not lend itself to on-site incineration due to its metal content. If EPA determines that this material is subject to the Land Disposal Restrictions of RCRA, it will be managed in accordance with such restrictions. If the material is not subject to the Land Disposal Restrictions of RCRA, it will be removed by a licensed waste hauler for appropriate disposal. Upon completion of removal, soil samples will be taken and evaluated against ROD soil cleanup goals to determine the need for additional excavation or treatment.

c. Ground Water Extraction and Treatment

This component of the remedy consists of the following: construction of groundwater treatment plants, predesign pump tests and bench tests, development of extraction and monitoring wells, groundwater treatment, groundwater monitoring, and effluent monitoring.

Ground water extraction and treatment systems are to be implemented at each source area. As the location and type of contamination may vary among the source areas, each system will be designed to address the bedrock and/or overburden contamination associated with a particular area. Following are approximate pumping rates used in the Feasibility Study for comparison purposes. The methodology used to estimate the pump rates is presented in Section 3.2 and Appendix C of the Feasibility Study. The exact number, location, depth, and pumping rate of extraction wells at each source area will be developed during remedial design.

W.R. Grace - 45 gallons per minute (gpm) in the overburden, 20 gpm in the bedrock.

Unifirst - 60 gpm in the overburden, 20 gpm in the bedrock.

Olympia - 50 gpm in the overburden.

Wildwood - 240 gpm in the overburden, 60 gpm in the bedrock.

New England Plastics - 15 gpm in the overburden, 6 gpm in the bedrock.

The proposed groundwater treatment system consists of pretreatment by precipitation, coagulation, flocculation, and clarification to remove suspended solids and metals followed by air stripping to remove VOCs. Pretreatment sludge will be disposed of at a licensed facility. The sludge will be tested to determine if it is subject to the RCRA Land Disposal Restrictions. If EPA determines that the sludge is subject to such restrictions, it will be managed accordingly.

Carbon adsorption will be used to treat emissions from the air stripper in order to comply with the Massachusetts Air Pollution

Control requirements to use Best Demonstrated Available Technology for point source emissions (310 CMR § 7.00). Treated groundwater will be discharged to the Aberjona River, reinjected into the aquifer, or both, depending on design. Given that each source area is unique in regard to its contaminants, EPA will consider alternative treatment approaches that can be demonstrated to be equally or more effective in contaminant removal as the presented system.

The approximate area of groundwater contamination associated with each source area is defined in Figure 5. This figure delineates approximate boundaries for groundwater extraction that will be refined during design.

Predesign work will consist of pump tests, groundwater sampling, and bench and pilot testing of the presented and/or proposed treatment technologies. Pump tests will be performed to determine well yields. This information will be used to help determine pumping rates and the location and number of extraction wells. Groundwater sampling will occur at each source area to refine and confirm the nature and extent of contamination in both the bedrock and overburden. Bench scale treatability studies will be performed for the presented and/or proposed treatment technology employed at each source area.

Groundwater monitoring of the overburden and bedrock aquifers will occur during implementation of the remedy in order to determine compliance with the cleanup goals. A specific monitoring program will be developed during design and will include, at a minimum, overburden and bedrock monitoring wells at each source area including those wells that have been installed as part of the remedial investigation. Monitoring wells will be sampled at least quarterly. In addition, pumping rates at each extraction well will be monitored. Treatment system influent and effluent concentrations will be monitored at a minimum of once per day. The objectives of monitoring are to define the mass of contaminants extracted over the life of the remedy, to evaluate the efficiency of the remedy, and to ensure compliance with appropriate Federal and State requirements.

In addition to the monitoring program, a summary report will be generated yearly during the implementation of the remedy. The report will summarize the status of groundwater remediation and, at a minimum, will include the following: summary tables of contaminant concentrations; a summary of the mass of contaminants removed, i.e., groundwater pump rates and the influent and effluent concentrations; contour maps of the distribution of contaminants; and an interpretation of the trends in contaminant concentration and distribution.

Once cleanup goals have been satisfied, the extraction wells will be shut down and a monitoring program will be implemented. This program will consist of a minimum of three years of quarterly

monitoring of ground water quality. If the monitoring data during this period shows an increase in contaminant levels over time, such that cleanup goals are not maintained, active groundwater remediation will be resumed. The results of this monitoring program will be reviewed by EPA in order to evaluate the success of the remedy, the maintenance of cleanup goals, the need for any additional site work including the resumption of the remedy or the implementation of institutional controls, and to provide information for site delisting.

d. Institutional Controls

EPA recommends that the State and the City of Woburn implement controls, such as regulations, ordinances, deed and land restrictions, or other effective forms of land use control to prevent the use of the aquifer in the vicinity of the Site. Groundwater use should be restricted until it is determined conclusively that cleanup goals have been met.

e. Central Aquifer/Aberjona River Study

EPA's objective is to restore the central area aquifers to drinking water quality. This study is being pursued in part in response to the number of commenters who have questioned whether or not this objective is feasible. The objectives of the study were developed in order to investigate more fully the concerns that were raised during the public comment period. They include, but are not limited to, the following:

- Define the nature and extent of contamination in the Aberjona River.
- Define the upgradient introduction of contaminants to the Aberjona River.
- Refine the present understanding of the interaction of the Aberjona River and the aquifer systems on the Site.
- Evaluate the effectiveness of pump and treat as a remedial alternative for the cleanup of contaminated groundwater in the central area.
- Evaluate the impact of pumping the central aquifer on the Aberjona River and associated wetlands.
- Identify and evaluate innovative remedial technologies for aquifer restoration, e.g., in-situ bioremediation.
- Evaluate the mobility of contaminants including semi-volatile organics and metals under ambient and pumping conditions.

This study will be developed and implemented during the predesign portion of the remedy. The central aquifer and the Aberjona River will be addressed as a separate operable unit and the remedy for the central area and the Aberjona River will be selected in a separate decision document.

### B. Rationale for Selection

The rationale for choosing the selected alternative is based on the assessment of each criteria listed in Section VIII, Part B. In accordance with Section 121 of CERCLA, to be considered as a candidate for selection in the ROD, the alternative must have been found to be protective of human health and the environment and able to attain ARARs unless a waiver is granted. In assessing the alternatives that met these statutory requirements, EPA focused on the other evaluation criteria, including, short term effectiveness, long term effectiveness, implementability, use of treatment to permanently reduce the mobility, toxicity and volume, and cost. EPA also considered nontechnical factors that affect the implementability of a remedy such as state and community acceptance. Based upon this assessment, and taking into account the statutory preferences under CERCLA, and public comment on the Proposed Plan, EPA selected the remedial approach for the first operable unit at the Site.

#### 1. Source Control

The selected source control remedy, SC-10, as well as SC-3, 4, and 11, reduces risks to human health and the environment by reducing VOCs, PCBs, PAHs, pesticides, and lead in soil and sludge to cleanup goals. The limited action soil alternative, SC-1, is not protective of human health and the environment. Because soil alternatives SC-5, 7, 8, and 9 may require the use of institutional controls to provide protection of human health and the environment, there is greater uncertainty as to their long term effectiveness and permanence.

SC-3, 4, 10 and 11 reduce risks to human health and the environment through complete destruction of the contamination, and result in a permanent, protective cleanup that requires no long term management after cleanup goals are reached. The long term effectiveness of soil alternatives SC-5, 7, 8, and 9 is less certain as they may require the use of institutional controls, such as access restrictions, to achieve protection if cleanup goals cannot be met. SC-1 does not provide reliable protection, does not meet cleanup goals, and is not a permanent remedy.

SC-10 and 11 use treatment to permanently reduce the level of toxicity of the contaminants at the Site, to prevent the potential for contaminants to move away from the source, and to reduce the volume, or amount, of contamination at the Site. SC-1 would not treat or destroy any of the contaminated soil exceeding target levels and therefore would not achieve any reduction in

toxicity, mobility or volume. For all other source control alternatives, except for SC-3 and 4, there is greater uncertainty as to their ability to achieve the target levels for all contaminants.

All alternatives except SC-1 pose short term impacts due to excavation activities which require dust control to protect workers and the community. The alternatives that include in-situ volatilization, SC-10 and 11, have fewer adverse effects since they only require excavation of the mixed contaminant areas.

SC-1 is easily implemented since it does not involve any soil excavation or treatment. All other alternatives are feasible and readily available technologies with the exception of SC-7 which is an innovative technology and is not readily available. The most proven and commonly used alternative is incineration (SC-3 and 4). The enhanced volatilization (SC-8 and 9) and high temperature enhanced volatilization (SC-5) technologies have been used to a lesser extent. The in-situ volatilization process (SC-10 and 11) has been used successfully at a number of sites to treat volatile organics in soil to concentrations in the range of the proposed soil target levels. There is less certainty that alternatives SC-5, 7, 8, and 9 can achieve the target levels in soil.

All of the technologies except for SC-7 are available in mobile transportable units which can be transported to the Site. There is some uncertainty associated with the availability of capacity of off-site permitted commercial incineration facilities (SC-4, 9, and 11) and therefore the implementability of these alternatives is less certain.

Other than SC-1, SC-10 and 11 are likely to result in the least adverse impacts on wetlands since excavation is minimized. All other alternatives (SC-3, 4, 5, 7, 8, and 9) require excavation and filling of wetlands. Because there is a practicable alternative to construction in the wetlands area, and this alternative satisfies the other evaluation criteria, SC-3, 4, 5, 7, 8, and 9 would not meet the Wetlands Executive Order. In addition, under the Massachusetts Wetlands Protection Act all alternatives except for SC-10 and 11 require replication of the wetlands that are lost due to excavation. This is expected to be difficult to do.

Alternative SC-4, off-site incineration, is the most expensive remedial alternative at approximately $22 million (see Table 12). In general, none of the alternatives involving off-site incineration (SC-4, 9, and 11) would be considered cost effective as they are substantially more expensive than their on-site counterparts and offer no additional reduction of risk to human health and the environment. SC-10, the chosen source control alternative, is the least expensive alternative that will achieve cleanup goals.

2. Management of Migration

The management of migration portion of the remedial action is designed primarily to reduce the volatile organic contamination in the overburden and/or bedrock aquifers of the five source areas of contamination at the Site to drinking water standards as quickly as possible. It is also designed to prevent off-site migration of contaminants from the source areas.

Section VII, Documentation of Significant Changes, presents the Agency's rationale for deciding to approach the cleanup of the Site through the implementation of operable units. This ROD addresses the first operable unit of the Site, the five source areas of contamination. The central area and the Aberjona River will be addressed as a separate operable unit. Accordingly, evaluation of the alternatives addressing the central area, i.e., MOM-3 (Pump and Treat Central Area), and MOM-4 (Pump and Treat Source Areas and Central Area), is not appropriate for this first operable unit. Alternatives for the central area aquifer cleanup will be evaluated and addressed in a separate decision document following the completion of further investigation of this area. Therefore, the following discussion simply compares the MOM-1 alternative (Limited Action) to the various treatment options evaluated for the MOM-2 alternative (Pump and Treat Source Areas).

The selected management of migration remedy MOM-2, including pretreatment and air stripping at separate treatment plants, will reduce risks to human health and the environment by reducing VOC contamination in the bedrock and overburden groundwater. While the source areas will be pumped with the objective of achieving MCLs there is some uncertainty in how effective the bedrock remediation will be. Therefore, some residual bedrock contamination may remain after the remediation period (see discussion of groundwater cleanup goals Section X.A.1.b). MOM-1 provides minimal protection of human health and the environment by monitoring the contaminant migration downgradient of the Site.

For alternative MOM-1, although use of the aquifer would continue to be restricted, the future risk of exposure to groundwater contamination remains. MOM-2 would permanently reduce contamination at the source areas.

MOM-2 will significantly reduce the toxicity, mobility, and volume of contaminants in the groundwater at the source areas. MOM-1 does not provide extraction and treatment of contaminated groundwater and therefore does not provide any reduction in the toxicity, mobility, or volume of contaminants other than through natural attenuation.

MOM-1 does not include any active remediation and therefore does not present a risk to the community or to workers at the site.

MOM-2 requires construction of pumping systems and treatment plants. Therefore, protection and controls will need to be provided to protect the community and on-site workers using measures such as dust control, personal protection equipment, and air monitoring during construction activities.

MOM-2 will comply with all State and Federal ARARs. Treatment plants will be located outside of wetlands and floodplains to the extent possible. The limited action alternative MOM-1 would not attain ARARs.

MOM-1 is easily implemented since it does not involve any construction. However, while it would be easy to implement, it does not use treatment to reduce the toxicity, mobility, or volume of contaminants at the source areas, is not protective of public health and the environment, and does not comply with ARARs. For MOM-2, treatment plants can be easily constructed at the individual source areas. All of the treatment technologies are well proven, reliable and available with the exception of UV/Chemical oxidation. UV/chemical oxidation is feasible and available, but is an innovative technology and may not be reliable for conditions at the Site. While carbon adsorption is feasible and available, it may not be reliable for the levels of VOC contamination found in groundwater at all of the source areas.

The preferred alternative MOM-2 is the least expensive alternative for addressing the remedial action objective of achieving cleanup goals in the bedrock and overburden aquifers (see further discussion of cost in Section XI.C.).

## XI. STATUTORY DETERMINATIONS

The remedial action selected for implementation at the Wells G & H Site is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, attains ARARs and is cost effective. The selected remedy also satisfies the statutory preference for treatment which permanently and significantly reduces the mobility, toxicity or volume of hazardous substances as a principal element. Additionally, the selected remedy uses alternate treatment technologies or resource recovery technologies to the maximum extent practicable.

### A. The Selected Remedy is Protective of Human Health and the Environment

The remedy at this Site will significantly and permanently reduce the current and potential risks presently posed to human health and the environment by:

- reducing PCBs, PAHs, VOCs, and pesticides in the soil at the source areas of contamination to cleanup levels, thus preventing exposure to contamination that may present a risk to human health and wildlife;

- eliminating the leaching of soil contamination to the groundwater at levels in excess of groundwater cleanup goals;

- reducing the contamination in the bedrock and overburden aquifers in the vicinity of the source areas to cleanup levels;

- preventing off-site migration of contaminated groundwater from the source areas; and

- preventing further degradation of surface water in the Aberjona River by contaminated groundwater from the source areas.

**B. The Selected Remedy Attains ARARs**

This remedy will meet or attain all applicable or relevant and appropriate federal and state requirements that apply to the Site. Environmental requirements which are applicable or relevant and appropriate to the selected remedial action at the Wells G & H Site are:

**Resource Conservation and Recovery Act (RCRA)**

**Toxic Substances Control Act (TSCA)**

**Clean Water Act (CWA)**

**Safe Drinking Water Act including the Underground Injection Control Provisions at 42 U.S.C. Section 300(H)**

**Executive Order 11988 (Floodplain Management)**

**Executive Order 11990 (Protection of Wetlands)**

**Clean Air Act (CAA)**

**Protection of Archeological Resources**

**Occupational Safety and Health Administration (OSHA)**

**Transportation of Hazardous Waste Regulations (DOT)**

**310 CMR 30.00 - Hazardous Waste Management Requirements**

**310 CMR 6.00 - Ambient Air Quality Standards for the Commonwealth of Massachusetts**

**310 CMR 7.00 - Air Pollution Controls**

**310 CMR 33.00 - Employee and Community Right to Know Requirements**

**310 CMR 10.00 - Massachusetts Wetlands Protection Requirements**

**314 CMR 3.00 - Surface Water Discharge Permit Program Requirements**

**314 CMR 4.00 - Surface Water Quality Standards**

**314 CMR 5.00 - Groundwater Discharge Permit Program**

**314 CMR 6.00 - Groundwater Quality Standards**

**310 CMR 9.00 - Massachusetts Water Ways Licenses**

**314 CMR 9.00 - Massachusetts Certification for Dredging and Filling**

**302 CMR 6.00 - Inland Wetlands Orders**

**314 CMR 12.00 - Operation and Maintenance and Pretreatment Standards for Wastewater Treatment Works and Indirect Discharges**

Tables 8 and 9, taken from Section 1 of the Feasibility Study, list the chemical specific ARARs and guidances to be considered during the implementation of the remedy, present a brief synopsis of the requirements, and outline the action which will be taken to attain the ARARs. Tables 10 and 11, taken from Section 4 of the Feasibility Study, identify the action specific and location specific ARARs and guidances to be considered during the implementation of the source control and management of migration alternatives, present a brief synopsis of the requirements, and outline the action which will be taken to attain the ARARs.

### C. The Selected Remedial Action is Cost Effective

Once EPA has identified alternatives that are protective of human health and the environment, and attain ARARs, EPA analyzes those alternatives to determine a cost-effective means of achieving the cleanup. Each of the alternatives underwent a detailed cost analysis to develop costs to the accuracy of -30 to +50 percent. In that analysis, capital and operation and maintenance costs have been estimated and then used to develop present worth costs. In the present worth analysis, annual costs were calculated for thirty years (estimated life of an alternative) using a five percent interest rate factor and were based on 1988 costs.

For source control, the combination of on-site incineration and in-situ volatilization is the least costly method for soil remediation except for the limited action alternative (Table 12). However, the limited action alternative will not meet ARARs, and is not protective of public health and the environment. Thus, the selected source control component is a cost effective method of achieving protection of human health and the environment.

For the management of migration alternative, the treatment of groundwater at one central treatment plant, by both the air stripping and UV/chemical oxidation treatment technologies, is less expensive than treatment at separate plants (see Table 4). EPA believes, however, that the public has raised valid concerns regarding the construction of a single central treatment facility. These concerns, discussed in Section VII and further documented in the Responsiveness Summary, include the fact that construction of a single central treatment facility would require that pipes be placed in a wetlands area, and that contaminated water be moved across uncontaminated areas of the Site. Therefore, EPA believes that construction of separate plants is the most cost effective option for groundwater treatment which does not potentially degrade the wetlands area or spread contamination across uncontaminated areas of the Site. Furthermore, treatment by air stripping at separate treatment plants is less costly than treatment by UV/chemical oxidation at separate treatment plants, and is therefore the most cost effective technology for achieving cleanup goals at the Site.

### D. The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

In-situ volatilization is an alternative treatment technology which provides permanent removal of the mass of volatile organic contamination in soil, thereby permanently and significantly reducing the toxicity, mobility and volume of contamination. Contaminant reduction efficiencies of 99.999% have been achieved at other sites using in-situ volatilization.

The incineration portion of the selected remedy also provides for permanent destruction of the PAHs, PCBs, VOCs, and pesticide components in the soil. Because incineration uses high temperatures to destroy virtually all of the organic contaminants in the soil, the treated soil can be used to fill in excavated areas on Site. Treated soil samples will be tested to confirm that the soil is acceptable as backfill.

The groundwater extraction/treatment portion of the selected remedy also provides permanent removal and reduction of the mass of volatile organic contaminants in groundwater through groundwater recovery and treatment via air stripping and carbon adsorption. Carbon columns will remove contaminants from the

airstream before being released to the atmosphere. Treated groundwater will be discharged to the Aberjona River, reinjected to the aquifer, or both.

### E. The Selected Remedy Satisfies the Preference for Treatment as a Principal Element

The principal elements of the selected source control remedy for contaminated soil are in-situ volatilization and incineration. The principal elements of the selected management of migration remedy for contaminated groundwater are air stripping and carbon adsorption. These elements are all technologies that use treatment to address all human health and environmental threats at the Site resulting from contamination of soil and groundwater.

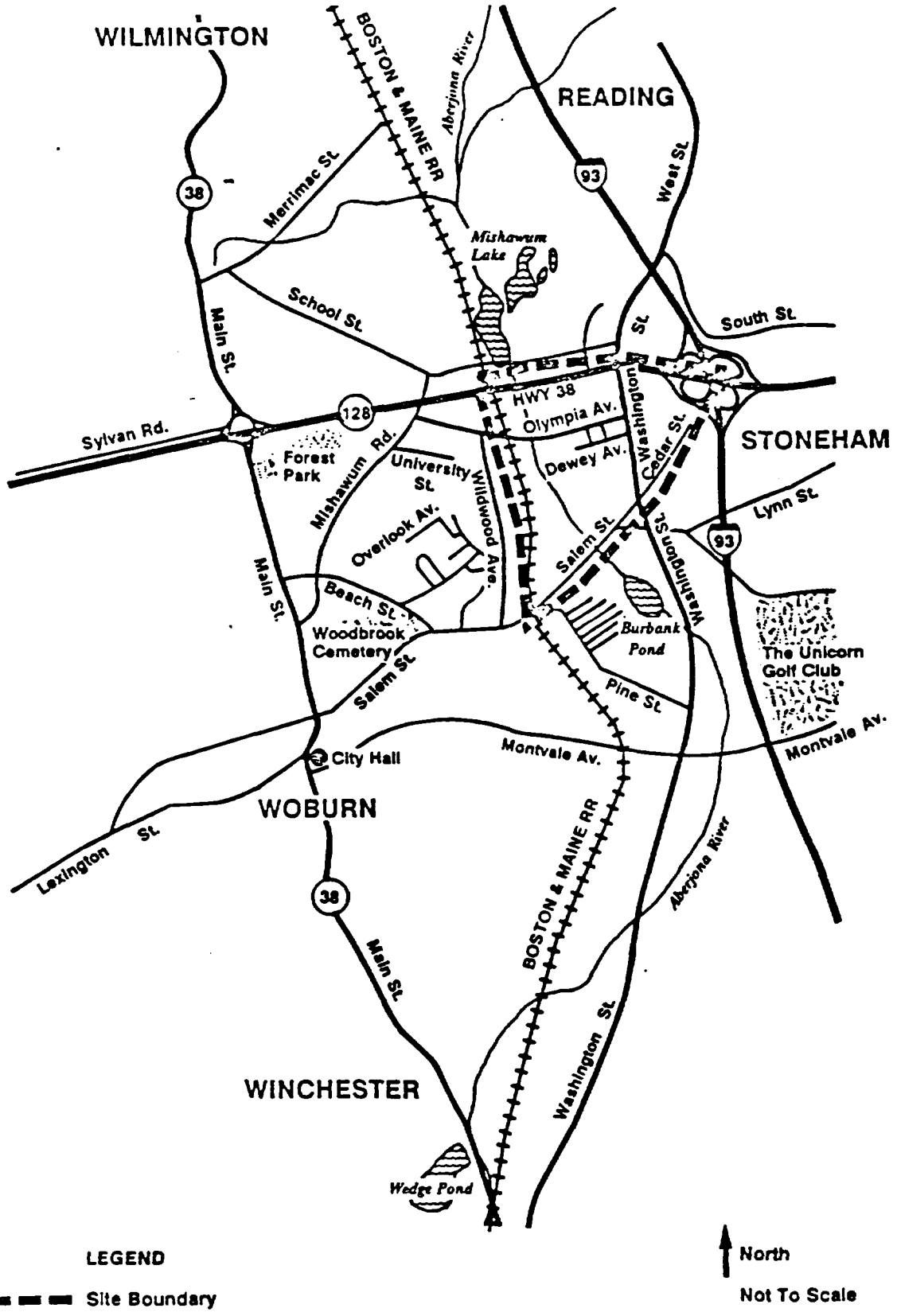
## XII. STATE ROLE

The Commonwealth of Massachusetts' Department of Environmental Protection has reviewed the various alternatives and has indicated its support for the selected remedy. The Commonwealth of Massachusetts has also reviewed the Remedial Investigations, Endangerment Assessment and Feasibility Study to determine if the selected remedy is in compliance with applicable or relevant and appropriate State environmental laws and regulations. The Commonwealth of Massachusetts concurs with the selected remedy for the Wells G & H Site. A copy of the declaration of concurrence is attached as Appendix C.

# WELLS G & H

## FIGURES

Figure 1 Site Location Map of Wells G and H in Woburn, MA



# FIGURE 2

## SOURCE AREA MAP FOR THE WELLS G & H SITE WOBURN, MA

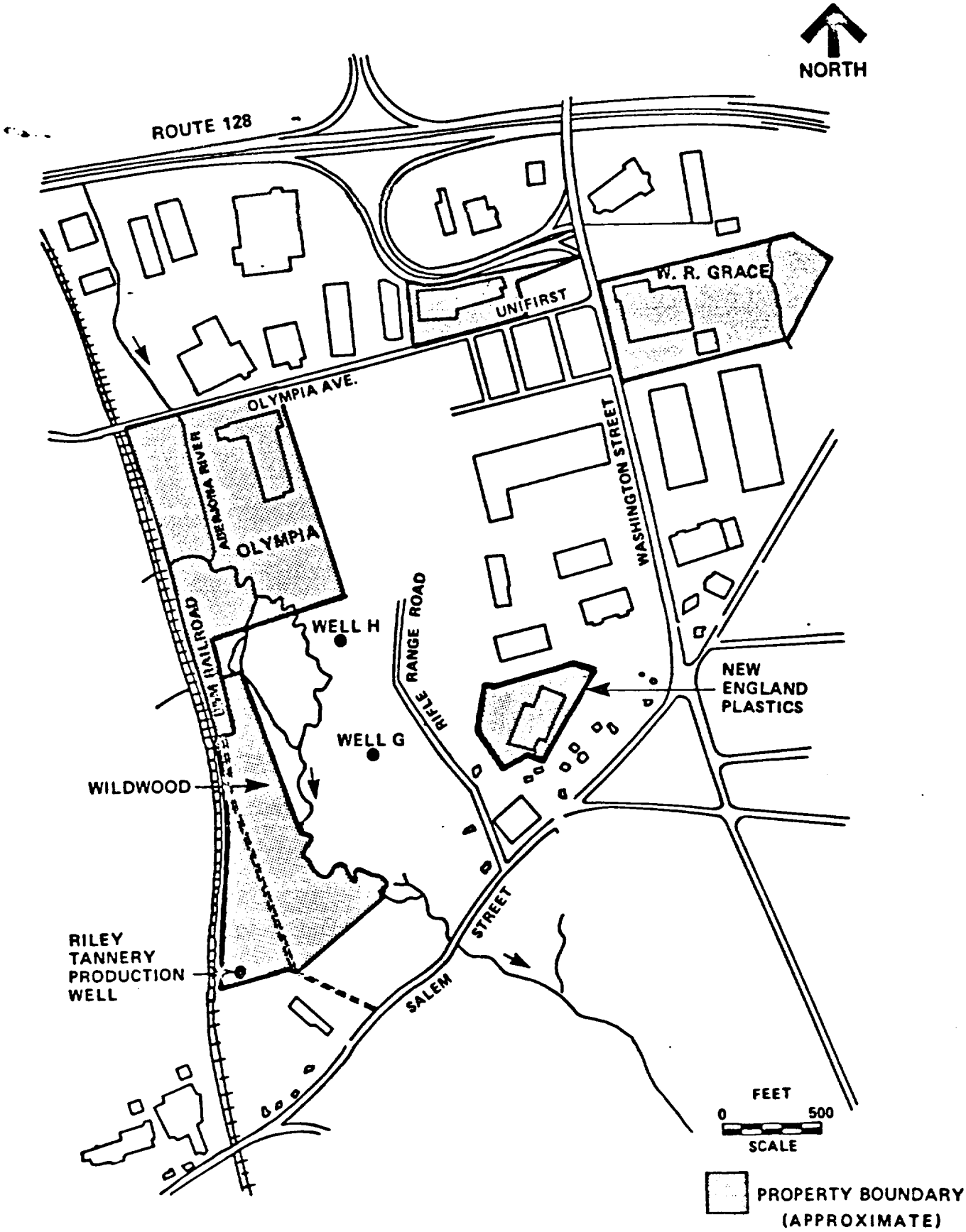
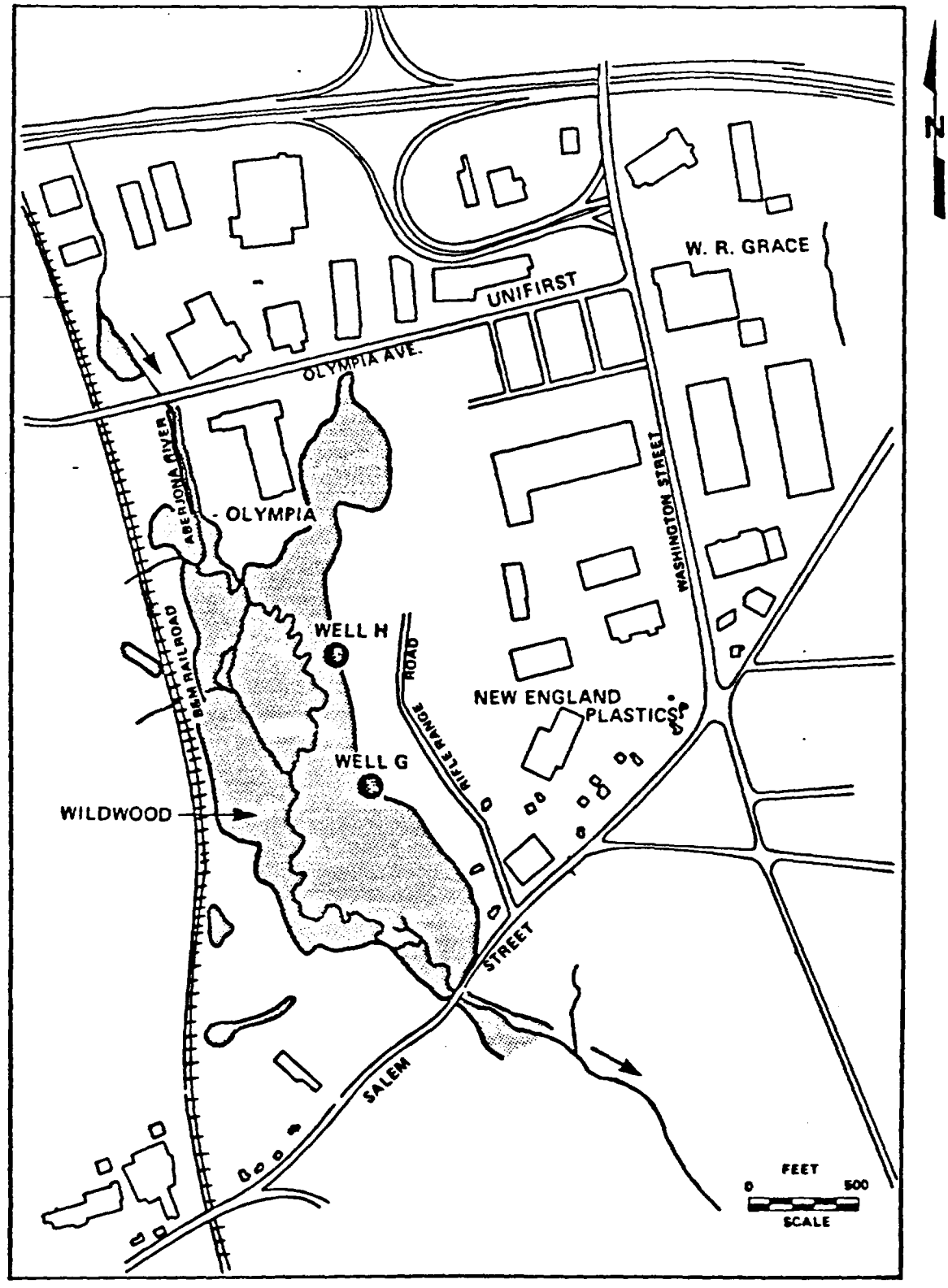


FIGURE 3




WETLANDS AREA

U.S. ENVIRONMENTAL PROTECTION AGENCY

WELLS G & H

FIGURE 1–5
APPROXIMATE BOUNDARY OF THE WETLANDS AREA

EBASCO SERVICES INCORPORATED

# FIGURE 4
# AREAS OF CONTAMINATED SOILS AT WELLS G&H

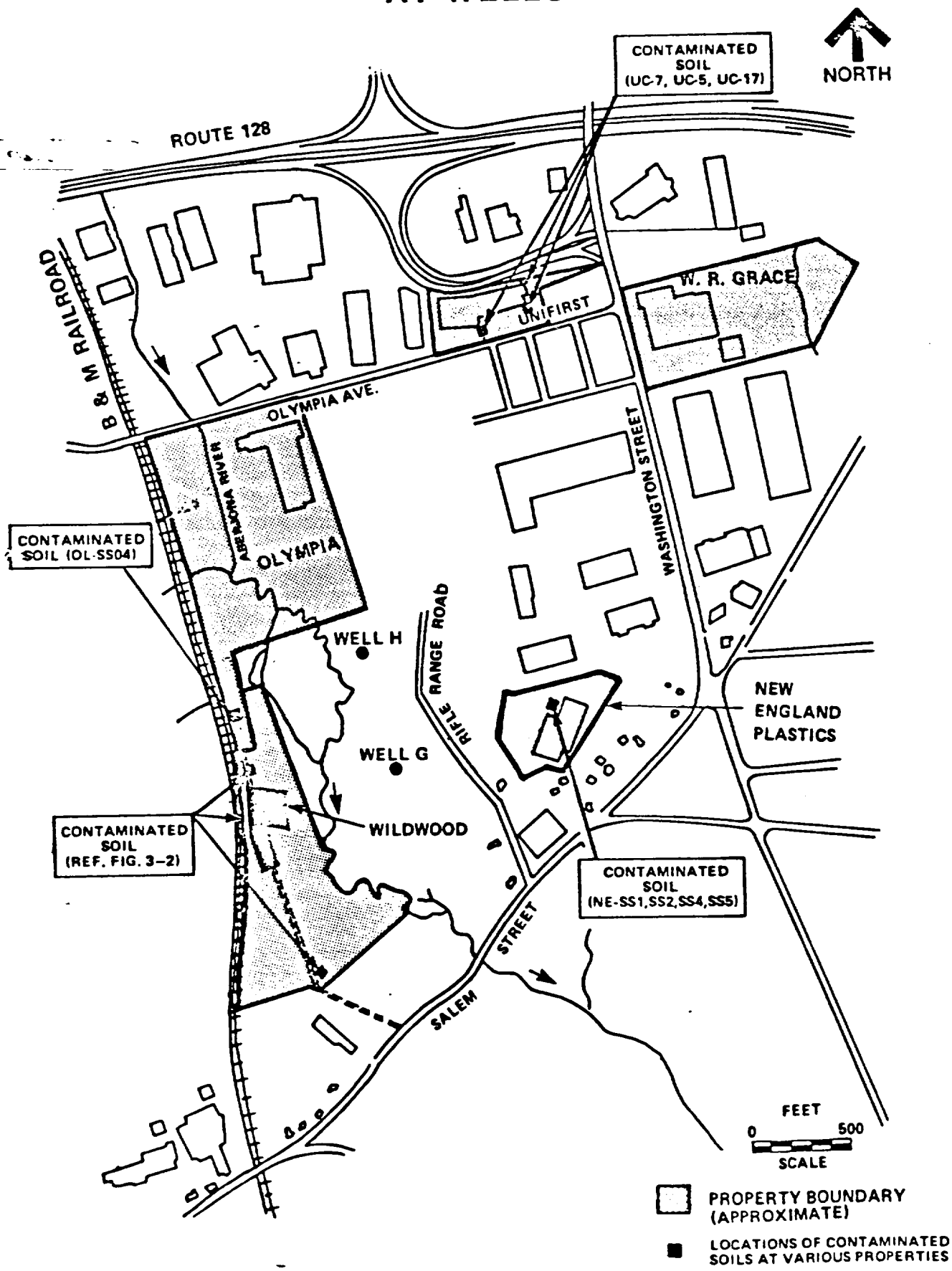
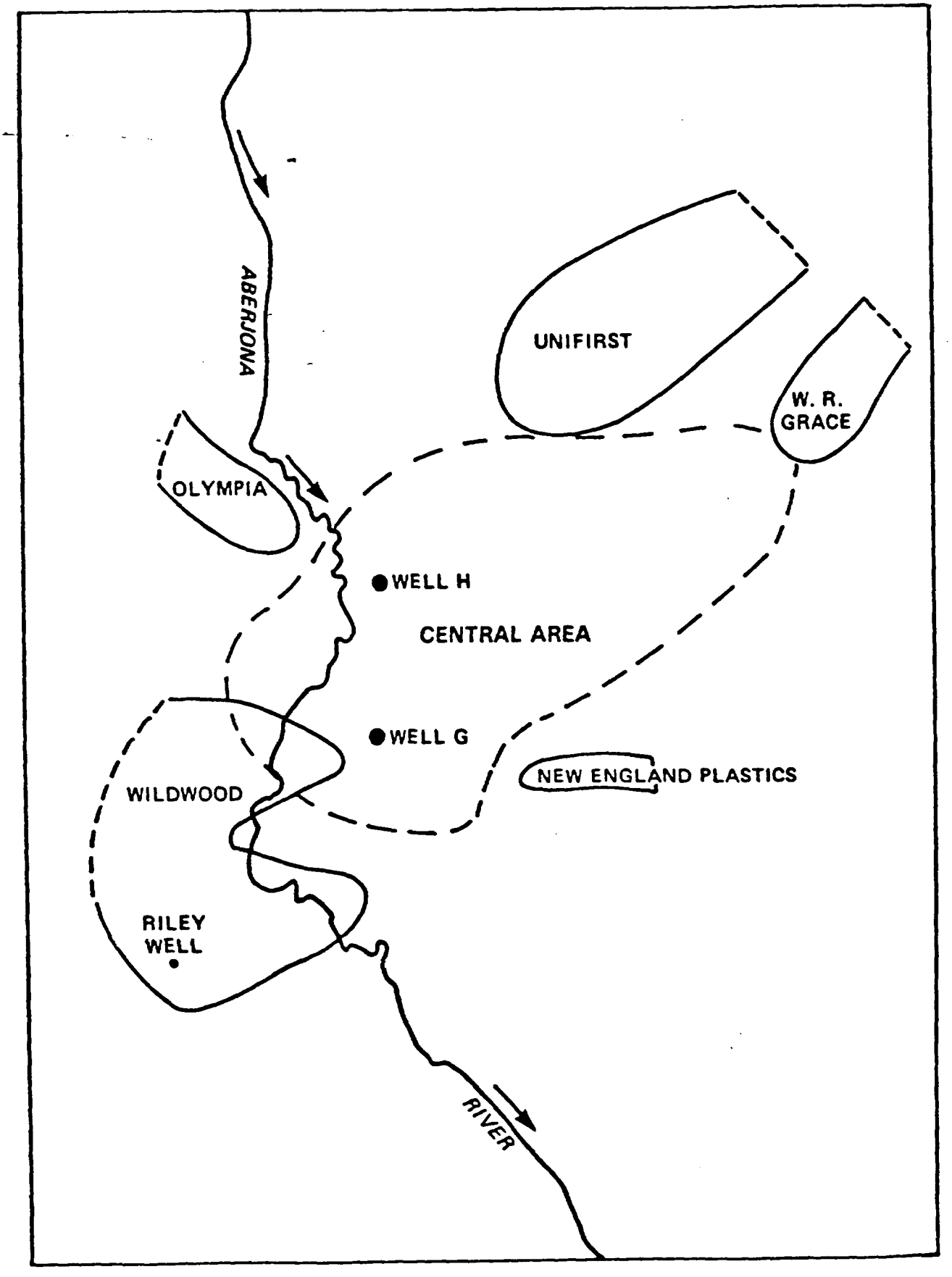


FIGURE 5*
LOCATION OF SOURCE PLUMES AND
THE CENTRAL AREA AT THE WELLS G&H SITE




* This figure represents the approximate area of groundwater contamination
(Source: Feasibility Study, Appendix C, Figure C-1)

# WELLS G & H

## TABLES

Table 1
Chemicals of Potential Concern at the Wells G&H Site

| | WR GRACE | NEW ENGLAND PLASTICS | | OLYMPIA NOMINEE TRUST | | UNIFIRST | | WILDWOOD | | | CENTRAL AREA | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | GW | S | GW | S | GW | S | GW | S | SL | GW | S | SD | GW | SW |
| VOLATILE ORGANICS | | | | | | | | | | | | | | |
| Acetone | | ● | | | | | | ● | | | | ● | | |
| Chloroform | | | | | | | | | ● | ● | | | | |
| 1,2-Dichlorobenzene | | | | | | | | | | ● | | | | |
| 1,1-Dichloroethane | | | | | ● | | ● | | | | | | | |
| 1,2-Dichloroethane | ● | | | | | | | | | | | | | |
| 1,1-Dichloroethene | ● | | | | | | ● | | | | | | | |
| trans-1,2-Dichloroethene | ● | | ● | | ● | | ● | ● | ● | ● | | | ● | ● |
| Methylene chloride | | ● | | | | | | ● | | | | ● | | |
| Pentachlorophenol | | | | | | | | | ● | | | | | |
| Phenol | | | | | | | | | ● | | | | | |
| Tetrachloroethene | ● | ● | ● | | ● | ● | ● | ● | ● | ● | | | ● | ● |
| Toluene | | | | | | | ● | ● | ● | | | | | |
| 1,1,1-Trichloroethane | | ● | ● | | | | ● | | ● | ● | | | ● | |
| Trichloroethene | ● | ● | ● | | ● | | ● | ● | ● | ● | | | ● | ● |
| Vinyl chloride | ● | | | | | | | | | ● | | | | |
| Xylenes | | | | | ● | | | | ● | ● | | | | |
| SEMI-VOLATILE ORGANICS | | | | | | | | | | | | | | |
| Aldrin | | | | | | | | | | | | | ● | |
| Bis(2-ethylhexyl)phthalate | ● | ● | | | ● | | | ● | ● | | | ● | | ● |
| Chlordane | | | | | | | | ● | ● | | ● | | | |
| 4,4'-DDT | | | | ● | | | | ● | ● | | | | | |
| Polyaromatic hydrocarbons | | | | ● | | | | ● | ● | | | ● | | |
| Polychlorinated biphenyls | | | | | | | | ● | | | | | | |
| Pyrene | | | | | | | | | | | ● | | | |
| INORGANICS | | | | | | | | | | | | | | |
| Arsenic | | | | | ● | | | | | | | ● | | |
| Barium | | | | | | | | | | | | | ● | |
| Cadmium | | ● | | | | | | ● | ● | | ● | ● | | |
| Chromium | | | | ● | | | | ● | ● | | | ● | | |
| Copper | | | | | | | | | | | | ● | | |
| Iron | | | | | | | | | | | | ● | | |
| Lead | | ● | | ● | | | | ● | ● | | ● | ● | | ● |
| Manganese | | | | | ● | | | | | ● | | | | |
| Mercury | | | | | | | | | | | | ● | | |
| Nickel | | | | | | | | | | | | ● | | |
| Zinc | | | | | | | | | | | | ● | | |
| RADIONUCLIDES | | | | | | | | | | | | | ● | |

S -Soil
SL-Sludge
SD-Sediment
SW-Surface water
GW-Groundwater

DGW: CHEMIC

TABLE 2

SUMMARY TABLE OF ESTIMATED RISKS ASSOCIATED WITH EXPOSURE AT THE WELLS G & H SITE

| LOCATION | RISK | | HAZARD INDEX | |
|---|---|---|---|---|
| | AVERAGE | PLAUSIBLE MAXIMUM | AVERAGE | PLAUSIBLE MAXIMUM |
| **W. R. Grace and Company** | | | | |
| Ingestion of Groundwater | 2E-03 | 2E-01 | <1 (0.2) | >1 (24) |
| Inhalation of Volatiles Released while Showering | 4E-04 | 5E-02 | <1 (0.2) | >1 (23) |
| **New England Plastics Corporation** | | | | |
| Inhalation of Volatiles Released During Industrial Processes by Industrial Workers | 1E-07 | 1E-06 | <1 (0.007) | <1 (0.06) |
| Dermal Contact and Incidental Ingestion of Surface Soil by Industrial Workers | 7E-08 | 4E-05 | <1 (0.005) | <1 (0.7) |
| Inhalation of Volatiles Released from Soil by Industrial Workers | 3E-13 | 1E-09 | <1 (8E-09) | <1 (4E-05) |
| Future Exposure to Surface Soil | 1E-08 | 8E-04 | <1 (0.02) | >1 (4) |
| Future Inhalation of Volatiles Released from Soil | 3E-12 | 1E-08 | <1 (1E-08) | <1 (2E-04) |
| Future Ingestion of Groundwater | 8E-05 | 5E-04 | <1 (0.08) | <1 (0.5) |
| Future Inhalation of Volatiles Released While Showering | 6E-06 | 3E-05 | <1 (0.07) | <1 (0.4) |
| **Olympia Nominee Trust Company** | | | | |
| Dermal Contact and Incidental Ingestion of Soil by Industrial Workers | 5E-10 | 3E-06 | <1 (0.002) | <1 (0.3) |
| Dermal Contact and Incidental Ingestion of Soil by Young Adults | 2E-09 | 3E-06 | <1 (0.01) | <1 (0.9) |
| Inhalation of Dust Generated While Dirtbike Riding | 3E-08 | 5E-06 | <1 (2E-05) | <1 (0.001) |
| Future Exposure to Surface Soil | 2E-08 | 6E-05 | <1 (0.009) | <1 (0.8) |
| Future Ingestion of Groundwater | 4E-04 | 1E-03 | <1 (0.2) | <1 (0.7) |
| Future Inhalation of Volatiles Released While Showering | 9E-06 | 4E-04 | <1 (0.02) | <1 (0.06) |
| **Unifirst Corporation** | | | | |
| Future Ingestion of Groundwater | 1E-03 | 4E-02 | 1 | >1 (47) |
| Future Inhalation of Volatiles Released While Showering | 3E-04 | 1E-02 | <1 (0.9) | >1 (41) |
| Future Exposure to Surface Soil | 8E-10 | 4E-08 | <1 (8E-07) | <1 (4E-05) |
| **Wildwood Conservation Corporation** | | | | |
| Dermal Contact and Incidental Ingestion of Soil | | | | |
| - Surface Soil | 7E-08 | 7E-05 | <1 (0.02) | >1 (2) |
| - Northern Sludges | 8E-07 | 5E-05 | <1 (0.4) | >1 (12) |
| - Southern Sludges | 2E-07 | 2E-05 | <1 (0.3) | >1 (18) |
| Inhalation of Dust Generated While Dirtbike Riding | | | | |
| - Surface Soil | 1E-07 | 3E-05 | <1 (0.002) | 1 |
| - Northern Sludges | 5E-07 | 3E-05 | <1 (0.004) | <1 (0.5) |
| - Southern Sludges | 7E-08 | 3E-06 | <1 (0.0005) | <1 (0.3) |

NOTE: Scientific notation (such as 2E-06) is a shorthand way of indicating decimal places, (i.e., the magnitude of the number). A negative exponent indicates that the decimal should be moved the specified number of places to the left (i.e., 2E-03 = $0.002 = 2 \times 10^{-3}$)

TABLE 2 CONTINUED

SUMMARY TABLE OF ESTIMATED RISKS ASSOCIATED WITH EXPOSURE AT THE WELLS G & H SITE

| LOCATION | RISK | | HAZARD INDEX | |
|---|---|---|---|---|
| | AVERAGE | PLAUSIBLE MAXIMUM | AVERAGE | PLAUSIBLE MAXIMUM |
| **Wildwood Conservation Corporation Continued** | | | | |
| Future Exposure to Surface Soil | | | | |
| - Surface Soil | 7E-07 | 2E-03 | <1 (0.01) | >1 (3) |
| - Northern Sludges | 8E-06 | 1E-03 | <1 (0.3) | >1 (14) |
| - Southern Sludges | 2E-06 | 4E-04 | <1 (0.2) | >1 (20) |
| Future Inhalation of Volatiles Released from Soil | | | | |
| - Surface Soil | 3E-07 | 1E-04 | <1 (0.0009) | <1 (0.8) |
| - Northern Sludges | 1E-07 | 2E-04 | <1 (0.002) | <1 (0.3) |
| - Southern Sludges | 1E-09 | 1E-05 | <1 (2E-06) | <1 (0.2) |
| Future Ingestion of Groundwater | 8E-04 | 2E-01 | <1 (0.2) | >1 (116) |
| Future Inhalation of Volatiles Released While Showering | 2E-04 | 7E-02 | <1 (0.08) | >1 (96) |
| **Nonsource Area of Wells G&H** | | | | |
| Inhalation of Volatiles Released During Industrial Processes by Industrial Workers | 2E-06 | 3E-05 | <1 (0.1) | <1 (0.3) |
| Dermal Contact and Incidental Ingestion of Soil | 2E-09 | 1E-07 | <1 (0.03) | <1 (0.2) |
| Incidental Ingestion of Surface Water | | | | |
| - Adults | 4E-11 | 1E-08 | <1 (2E-05) | <1 (8E-04) |
| - Children | 2E-09 | 6E-08 | <1 (0.001) | <1 (0.02) |
| Dermal Contact and Incidental Ingestion of Sediments | | | | |
| - Adults | 3E-07 | 4E-04 | <1 (0.002) | <1 (0.09) |
| - Children | 8E-07 | 2E-04 | <1 (0.003) | <1 (0.02) |
| Future Ingestion of Groundwater | 4E-05 | 3E-04 | <1 (0.1) | 1 |
| Future Ingestion of Groundwater Containing Radionuclides | | | | |
| - Gross Alpha Particles | -- | -- | >1 (3) | >1 (35) |
| - Gross Beta Particles | | | | |
| - Strontium-90 | -- | -- | <1 (0.6) | >1 (4) |
| - Tritium | -- | -- | <1 (3E-04) | <1 (0.002) |
| - Radium | -- | -- | <1 (0.2) | 1 |
| - Uranium | -- | -- | <1 (0.03) | <1 (0.05) |
| Future Inhalation of Volatiles Released While Showering | 4E-06 | 3E-05 | <1 (0.05) | <1 (0.6) |

NOTE: Scientific notation (such as 2E-06) is a shorthand way of indicating decimal places. (i.e., the magnitude of the number). A negative exponent indicates that the decimal should be moved the specified number of places to the left (i.e., 2E-03 = 0.002 = $2x10^{-3}$)

TABLE 3

LIST OF ALTERNATIVES FOR DETAILED ANALYSIS

Source Control Alternatives (SC)

SC-1 No Action (Source Control)

SC-3 Excavation/On-Site Incineration/Backfill On-Site

SC-4 Excavation/Off-Site Incineration/Backfill with Clean Off-Site Soil

SC-5 Excavation/On-Site High Temperature Enhanced Volatilization/Backfill On-Site

SC-7 Excavation/On-Site Supercritical Fluid Extraction/ Backfill On-Site

SC-8 Excavation/On-Site Enhanced Volatilization/On-Site Incineration/Backfill On-Site

SC-9 Excavation/On-Site Enhanced Volatilization/Off-Site Incineration/Backfill With Treated and Clean Off-Site Soil

SC-10 In Situ Volatilization/Excavation/On-Site Incineration/ Backfill On-Site

SC-11 In Situ Volatilization/Excavation/Off-Site Incineration/ Backfill With Clean Off-Site Soil

Management of Migration Alternatives (MOM)

MOM-1 No Action (Management of Migration)

MOM-2 Pump and Treat Source Areas

-2A(i) Pretreatment and Air Stripping at Separate Treatment Plants

-2A(ii) Pretreatment and Air Stripping at a Central Treatment Plant

-2B(i) Pretreatment and UV/Chemical oxidation at Separate Treatment Plants

-2B(ii) Pretreatment and UV/Chemical oxidation at a Central Treatment Plant

MOM-3 Pump and Treat Central Area

-3A Pretreatment and Air Stripping at Central Treatment Plant

TABLE 3 (Cont'd)

LIST OF ALTERNATIVES FOR DETAILED ANALYSIS

| | |
|---|---|
| -3B | Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant |
| -3C | Pretreatment and Carbon Adsorption at a Central Treatment Plant |
| MOM-4 | Pump and Treat Source Areas and Central Area |
| -4A(i) | Pretreatment and Air Stripping at Separate Treatment Plants |
| -4A(ii) | Pretreatment and Air Stripping at a Central Treatment Plant |
| -4B(i) | Pretreatment and UV/Chemical Oxidation at Separate Treatment Plants |
| -4B(ii) | Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant |

## Table 4 Costs Associated with Groundwater Treatment Alternatives
(Total Present Worth Cost)

| | Alternative No. 1 No Action [1] | Alternative No. 2 Pump and Treat Source Areas | Alternative No. 3 Pump and Treat Central Area | Alternative No. 4 Pump and Treat Source Areas and Central Area |
|---|---|---|---|---|
| **Air Stripping** | | | | |
| Treatment at Separate Plants | N/A | $65,200,000 [2] | N/A | $79,100,000 |
| Treatment at One Central Plant | N/A | $27,400,000 | $24,200,000 | $37,100,000 |
| **Ultraviolet (UV)/Chemical Oxidation** | | | | |
| Treatment at Separate Plants | N/A | $89,100,000 | N/A | $104,800,000 |
| Treatment at One Central Plant | N/A | $44,200,000 | $28,200,000 | $60,200,000 |
| **Carbon Adsorption** | | | | |
| Treatment at Separate Plants | N/A | N/A | N/A | N/A |
| Treatment at One Central Plant | N/A | N/A | $26,900,000 | N/A |

1. Total present worth cost of no-action: $440,000.
2. This is the preferred alternative for groundwater treatment.

**Other Notes**
Alternatives 2,3 & 4 have been costed to 30 years only; however, some alternatives may take longer than 30 years to complete cleanup.
Alternative No. 1 predicted to exceed 100 years to remediate.
Alternative No. 2 predicted to take 22 years for central area; 20-50 years for source areas to remediate.
Alternative No. 3 predicted to exceed 60 years to remediate.
Alternative No. 4 predicted to take 10 years for central area, 20-50 years for source areas to remediate.

[See Appendix C in FS for detailed discussion of timeframes.]

## Table 5

ACTION LEVELS FOR SOIL AT THE WELLS G & H SITE
BASED ON THE LEACHING OF CONTAMINANTS FROM SOIL INTO GROUNDWATER

A. POTENTIAL CARCINOGENS

| COMPOUND | Koc (l/kg) | Kd (l/kg) | DRINKING WATER STANDARD (mg/l) | TARGET SOIL CCONCENTRATION (ug/kg) |
|---|---|---|---|---|
| Chloroform | 3.10E+01 | 3.10E-01 | 1.00E-01 MCL (a) | 62.5 |
| Tetrachloroethene | 3.64E+02 | 3.64E+00 | 5.00E-03 MCL (b) | 36.7 |
| Trichloroethene | 1.26E+02 | 1.26E+00 | 5.00E-03 MCL | 12.7 |

B. NONCARCINOGENS

| COMPOUND | Koc (l/kg) | Kd (l/kg) | DRINKING WATER STANDARD (mg/l) | TARGET SOIL CONCENTRATION (ug/kg) |
|---|---|---|---|---|
| trans-1,2-Dichloroethene | 5.90E+01 | 5.90E-01 | 7.00E-02 MCLG (c) | 83.2 |
| 1,1,1-Trichloroethane | 1.52E+02 | 1.52E+00 | 2.00E-01 MCL | 613 |

Action levels based on the attainment of a target risk level in soils which corresponds to the attainment of ARARs in groundwater.

(a) MCL is for total trihalomethanes; refers to the sum of chloroform, bromochloromethane, and bromoform.

(b) MCL is for trichloroethene. This value was used based on the chemical similarities between the two compounds and their toxicological endpoints.

(c) Proposed.

NOTE: Scientific notation (such as 2E-06) is a shorthand way of indicating decimal places, (i.e., the magnitude of the number). A negative exponent indicates that the decimal should be moved the specified number of places to the left (i.e., 2.4E-03 = 0.0024 = $2.4 \times 10^{-3}$)

(Source: Feasibility Study, Section 1.0, Table 1-5)

Table 6

ACTION LEVELS FOR SOIL AT THE WELLS G & H SITE
FUTURE USE CONDITIONS FOR DIRECT CONTACT

POTENTIAL CARCINOGENS

| COMPOUND | POTENCY FACTOR (mg/kg/d)-1 | TARGET SOIL CONCENTRATION (mg/kg) TARGET RISK LEVEL 10-4 | 10-5 | 10-6* | 10-7 |
|---|---|---|---|---|---|
| Chlordane | 1.30E+00 | 6.14E+02 | 6.14E+01 | 6.14E+00 | 6.14E-01 |
| 4,4'-DDT | 3.40E-01 | 2.35E+03 | 2.35E+02 | 2.35E+01 | 2.35E+00 |
| cPAHs | 1.15E+01 | 6.94E+01 | 6.94E+00 | 6.94E-01 | 6.94E-02 |
| PCBs | 7.70E+00 | 1.04E+02 | 1.04E+01 | 1.04E+00 | 1.04E-01 |

Action levels based on the attainment of a target risk level for the potential carcinogens and a CDI:RfD of one for the noncarcinogens for exposure to compounds in the soil via direct contact (dermal contact with and and incidental ingestion of soil); exposure assumptions are presented in the endangerment assessment and below.

GENERAL ASSUMPTIONS: Body weight = 70 kg; Average lifetime = 70 yrs; Exposure period = 70 yrs; Frequency of exposure = 100 d/yr; Incidental ingestion rate = 54 mg/d; Dermal contact rate = 790 mg/d.

ASSUMPTIONS FOR PESTICIDES, PAHS, AND PCBS: Ingestion absorption factor = 0.3; Dermal absorption factor = 0.02.

ASSUMPTIONS FOR VOLATILE ORGANICS: Ingestion absorption factor = 1.0; Dermal absorption factor = 0.3.

ASSUMPTIONS FOR INORGANICS: Ingestion absorption factor = 1.0; Dermal absorption is negligible.

NOTE: Scientific notation (such as 2E-06) is a shorthand way of indicating decimal places, (i.e., the magnitude of the number). A negative exponent indicates that the decimal should be moved the specified number of places to the left (i.e., 2.4E-03 = 0.0024 = $2.4 \times 10^{-3}$)

* Cleanup levels for the Wells G & H Site are based on a $10^{-6}$ risk level.

(Source: Feasibility Study, Section 1.0, Table 1-6)

## Table 7

ARAR-BASED ACTION LEVELS FOR GROUNDWATER

A. POTENTIAL CARCINOGENS

| COMPOUND | DRINKING WATER STANDARD OR CRITERIA (ug/l) | INTAKE (mg/kg/day) | POTENCY FACTOR (mg/kg/day)-1 | RISK |
|---|---|---|---|---|
| Chloroform | 100 MCL (a) | 2.86E-03 | 6.10E-03 | 1.7E-05 |
| 1,1-Dichloroethane | 5 (b) | 1.43E-04 | 9.10E-02 | 1.3E-05 |
| 1,2-Dichloroethane | 5 MCL | 1.43E-04 | 9.10E-02 | 1.3E-05 |
| 1,1-Dichloroethene | 7 MCL | 2.00E-04 | 5.80E-01 | 1.2E-04 |
| Tetrachloroethene | 5 (c) | 1.43E-04 | 5.10E-02 | 7.3E-06 |
| Trichloroethene | 5 MCL | 1.43E-04 | 1.10E-02 | 1.6E-06 |
| Vinyl Chloride | 2 MCL | 5.71E-05 | 2.30E+00 | 1.3E-04 |

B. NONCARCINOGENS

| COMPOUND | DRINKING WATER STANDARD OR CRITERIA (mg/l) | INTAKE (mg/kg/day) | REFERENCE DOSE (RfD) (mg/kg/day) | RATIO OF INTAKE TO RfD |
|---|---|---|---|---|
| trans-1,2-Dichloroethene | 70 MCLG (d) | 2.00E-03 | 1.00E-02 | 2.00E-01 |
| 1,1,1-Trichloroethane | 200 MCL | 5.71E-03 | 9.00E-02 | 6.35E-02 |

(a) MCL is for total trihalomethanes; refers to the sum of chloroform, bromodichloromethane, dibromochloromethane, and bromoform.

(b) MCL is for 1,2-Dichloroethane. This value was used based on the chemical similarities between the two compounds and their toxicological endpoints.

(c) MCL is for trichloroethene. This value was used based on the chemical similarities between the two compounds and their toxicological endpoints. This value is also the CLP detection limit.

(d) Proposed.

NOTE: Scientific notation (such as 2E-06) is a shorthand way of indicating decimal places, (i.e., the magnitude of the number). A negative exponent indicates that the decimal should be moved the specified number of places to the left (i.e., 2.4E-03 = 0.0024 = $2.4 \times 10^{-3}$)

(Source: Feasibility Study, Section 1.0, Table 1-4)

TABLE 8

CHEMICAL - SPECIFIC ARARS AND TBCS FOR
WELLS G&H SITE, WOBURN, MASSACHUSETTS

| REQUIREMENT | REQUIREMENT SYNOPSIS | ACTION TO BE TAKEN TO ATTAIN REQUIREMENT |
|---|---|---|
| 1) ARARS | | |
| o SDWA - Maximum Contaminant Levels (MCLs) (40 CFR 141.11 -141.16)[2] | o MCLS have been promulgated for a number of common organic and inorganic contaminants. These levels regulate the concentration of contaminants in public drinking water supplies, but may also be considered relevant and appropriate for groundwater aquifers potentially used for drinking water. | o Treatment will be conducted to achieve SDWA MCLs in groundwater. |
| o RCRA - Maximum Concentraton Limits (MCLS) (40 CFR 264.94)[2] | o RCRA MCLS provide groundwater protection standards for 14 common contaminants. All are equal to the SDWA MCLs for those contaminants. | o Treatment will be conducted to achieve RCRA MCLs in groundwater. |
| o DEQE Regulations - Massachusetts Drinking Water Maximum Contaminant Levels (MCL) (310 CMR 22.00)[2] | o Massachusetts MCLs establish levels of contaminants allowable in public water supplies. They are essentially equivalent to SDWA MCLs. | o Since DEQE MCLS are the same as SDWA MCLs, they were used to set clean-up levels for contaminants of concern. |
| o DEQE - Massachusetts Groundwater Quality Standards (314 CMR 6.00)[2] | o These standards consist of groundwater classifications which designate and assign the uses of Commonwealth groundwaters, and water quality criteria necessary to substain these uses. There is a presumption that all groundwaters are Class I. | o DEQE groundwater standards were considered when determining clean-up levels. |
| o CWA - Ambient Water Quality Criteria (AWQC) - Protection of Freshwater Aquatic Life, Human Health - Fish Consumption | o AWQC are developed under the Clean Water Act (CWA) as guidelines from which states develop water quality standards. A more strigent AWQC for aquatic life may be found relevant and appropriate rather than an MCL, when protection of aquatic organisms is being considered at a site. | o AWQC were used to characterize risks to fresh water aquatic life resulting from discharge of treated groundwater to the Aberjona River. |
| 2) TBCS | | |
| o EPA Risk Reference Doses (RfDs) | o RfDs are dose levels developed by the EPA for noncarcinogenic effects. | o EPA RfDs were used to characterize risks due to exposure to contaminants in groundwater, as well as other media. |
| o EPA Carcinogen Assessment Group Potency Factors | o Potency Factors are developed by the EPA from Health Assessments or evaluation by the Carcinogen Efforts Assessment Group. | o EPA Carcinogenic Potency Factors were used to compute the individual incremental cancer risk resulting from exposure to site contamination. |
| o Massachusetts Drinking Water Halth Adviseries | o DEQE Health Advisories are guidance criteria for drinking water. | o DEQE Health Advisories were considered when developing clean-up levels for groundwater. |

TABLE 9

CHEMICAL-SPECIFIC POTENTIALLY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND "TO BE CONSIDERED" REQUIREMENTS

| | Safe Drinking Water Act Maximum Contaminant Levels (MCLs) 40 CFR 141 | Safe Drinking Water Act Maximum Contaminant Level Goals (MCLGs) 40 CFR 141 & 50 FR 46936 | Clean Water Act Water Quality Criteria for Fresh-Water Aquatic Life Acute/Chronic | Clean Water Act Water Quality Criteria for Human Health - Fish Consumption | Massachusetts Drinking Water Maximum Contaminant Levels (e) (310 CMR 22.00) |
|---|---|---|---|---|---|
| 1,1-Dichloroethene | 7 | 7 | 11,600/-[c] | 1.85 | 7 |
| 1,1,1-Trichloroethane | 200 | 200 | - | 1,030,000 | 200 |
| trans-1,2-Dichloroethene | - | 70** | - | - | - |
| Tetrachloroethene | - | 0** | 5,280/840[c] | 8.85 | - |
| Trichloroethene | 5 | 0 | 45,000/21,900[c] | 80.7 | 5 |
| Chloroform | 100[a] | - | 28,900/1,240[c] | 15.7 | 100[a] |
| Trichlorofluoroethane | - | - | - | - | - |
| Methylene chloride | - | - | - | - | - |
| Carbon tetrachloride | 5 | 0 | 35,200/-[c] | 6.94 | 5 |
| para-Dichlorobenzene | 75 | - | 1,100/760[c] | 2,600 | 75 |
| Dichlorobenzenes | - | - | 1,100/760[c] | 2,600 | - |
| 1,1-Dichloroethane | - | - | - | - | - |
| 1,2-Dichloroethane | 5 | 0 | 118,000/20,000[c] | 243 | 5 |
| 1,2,4-Trichlorobenzene | - | - | - | - | - |
| Vinyl Chloride | 2 | 0 | - | 525 | 2 |
| 1,2-Dichlorobenzene | - | - | 1,120/763[c] | 2,600 | - |
| Benzene | 5 | 0* | 5,300/-[c] | 40 | 5 |
| Toluene | - | 2000** | 17,500/-[c] | 424,000 | - |
| Acetone | - | - | - | - | - |
| Methyl ethyl ketone (MEK) | - | - | - | - | - |
| Ethylbenzene | - | 680** | 32,000/-[c] | 3,250 | - |
| Xylene | - | 440** | - | - | - |
| Styrene | - | 140** | - | - | - |

All values in ug/l unless otherwise noted

TABLE 9 (Cont'd)

CHEMICAL-SPECIFIC POTENTIALLY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND "TO BE CONSIDERED" REQUIREMENTS

| | Safe Drinking Water Act Maximum Contaminant Levels (MCLs) 40 CFR 141 | Safe Drinking Water Act Maximum Contaminant Level Goals (MCLGs) 40 CFR 141 & 50 FR 46936 | Clean Water Act Water Quality Criteria for Fresh-Water Aquatic Life Acute/Chronic | Clean Water Act Water Quality Criteria for Human Health - Fish Consumption | Massachusetts Drinking Water Maximum Contaminant Levels (e) (310 CMR 22.00) |
|---|---|---|---|---|---|
| Carbon Disulfide | - | - | - | - | - |
| Phenol | - | - | 10,200/2,560[c] | - | - |
| Naphthalene | - | - | 2,300/620 | - | - |
| 2-Methylnaphthalene | - | - | - | - | - |
| dibutyl phthalate | - | - | - | 154,000 | - |
| diethyl phthalate | - | - | - | 1,800,000 | - |
| bis(2-ethylhexyl)phthalate | - | - | - | 50,000[h] | - |
| Acenaphthylene | - | - | - | - | - |
| Acenaphthene | - | - | 1,700/520[c] | - | - |
| Phenanthrene | - | - | - | - | - |
| Fluoranthene | - | - | 3,980/-[c] | 54 | - |
| Chrysene | - | - | - | - | - |
| 2-Methylphenol | - | - | - | - | - |
| 4-Methylphenol | - | - | - | - | - |
| 2,4-Dimethylphenol | - | - | 2,120/-[c] | - | - |
| 2-Hexane | - | - | - | - | - |
| 4-Ethyl-2-pentanone | - | - | - | - | - |
| Trichloroisocyanuric acid | - | - | - | - | - |
| Chlordane | - | 0** | 2.4/0.0043 | .00048 | - |
| Polychlorinated Biphenyls | - | 0** | 2.0/0.014 | 0.000079 | - |
| Arsenic | 50 | 50** | 850/48[c][f] | .0175 | 50 |
| Chromium | 50[b] | 120** | 1,700/210[d][g] | 3,433,000[g] | 50 |

All values in ug/l unless otherwise noted

TABLE 9 (Cont'd)

CHEMICAL-SPECIFIC POTENTIALLY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND "TO BE CONSIDERED" REQUIREMENTS

| | Safe Drinking Water Act Maximum Contaminant Levels (MCLs) 40 CFR 141 | Safe Drinking Water Act Maximum Contaminant Level Goals (MCLGs) 40 CFR 141 & 50 FR 46936 | Clean Water Act Water Quality Criteria for Fresh-Water Aquatic Life Acute/Chronic | Clean Water Act Water Quality Criteria for Human Health - Fish Consumption | Massachusetts Drinking Water Maximum Contaminant Levels (e) (310 CMR 22.00) |
|---|---|---|---|---|---|
| Barium | 1000 | 1500** | - | - | 1,000 |
| Mercury | 2 | 3** | 2.4/0.012 | 0.146 | 2 |
| Lead | 50(5*) | 20**(0*) | 82/3.2(d) | - | 50 |
| Cadmium | 10 | 5** | 3.9/1.1(d) | - | 10 |
| Manganese | - | - | - | 100 | - |
| Zinc | - | - | 120/110(d) | - | - |
| Iron | - | - | 1,000 | - | - |
| Cadmium | 10 | - | 3.9/1.1(c) | - | 10 |
| Copper | 1,300* | 1,300* | 18/12 (d) | - | - |
| Nickel | - | - | 1,400/160 (d) | 100 | - |

All values in ug/l unless otherwise noted.

* - Proposed MCL or MCLG (1988) (53 FR 31516)
** - Proposed MCLGs 50 FR 46936 (November 13, 1985)
(a) MCL for total trihalomethane concentration
(b) Chromium +6
(c) Lowest Observed Effect Level
(d) Hardness dependent criteria (100 mg/l used)
(e) As of 8/31/1988
(f) Value shown is for (pent)arsenic. (tri)arsenic is 360/190 ug/L.
(g) (tri)chromium
(h) Value shown is for di-2-ethylhexylphthalate.

TABLE 10

ACTION-SPECIFIC AND LOCATION-SPECIFIC ARARS AND TBCS FOR ALTERNATIVE SC-10:
IN-SITU VOLATILIZATION/EXCAVATION/ON-SITE INCINERATION/BACKFILL ON-SITE
WELLS G&H SITE, WOBURN, MASSACHUSETTS

| REQUIREMENT | REQUIREMENT SYNOPSIS | ACTION TO BE TAKEN TO ATTAIN REQUIREMENT |
|---|---|---|
| 1) Action-Specific ARARs | | |
| o RCRA - General Facility Requirements (40 CFR 264.10-264.18)[2] | o General facility requirements outline general waste security measures, inspections, and training requirements. | o Facilities will be constructed, fenced, posted, and operated in accordance with this requirement. All workers will be properly trained. |
| o RCRA Incineration Requirements (40 CFR 264 Subpart O)[2] | o Principal Organic Hazardous Constituents (POHC) are to be destroyed to 99.99 percent destruction and removal efficiency, stringent particulate and HCL limits are imposed. | o On-site incineration activities will be designed and operated in compliance with Subpart O. |
| o TSCA - PCB Incineration Requirements (40 CFR 761.70(a)(2),(b)[1] | o Contaminated soil in excess of 50 ppm PCB concentration must be incinerated to a 99.9999 percent destruction efficiency. | o Appropriate technology will be employed to achieve the 99.9999 percent TSCA destruction requirement. |
| o RCRA - Generator and Transporter Responsibilities (40 CFR 262 and 263)[2] | o Provides standards for packing and accumulating hazardous waste prior to off-site disposal. | o Decontamination and scrubber water and carbon adsorption waste management and off-site disposal will proceed in accordance with RCRA requirements. |
| o RCRA - Land Disposal Restrictions (40 CFR 268)[2] | o Provide treatment standards and schedules governing land disposal of RCRA wastes and of materials contaminated with or derived from RCRA wastes. | o On-site incinerators will be designed in accordance with standards to allow site-specific RCRA delisting of material. |
| o RCRA - Container Requirements (40 CFR 264 Subpart I)[2] | o This regulation sets forth RCRA requirements for use and management of containers at RCRA facilities. | o Packing and accumulation of excavated soil treatment sludges and other materials will adhere to these standards. |
| o DOT - Transportation of Hazardous Waste Requirements (49 CFR 171-179)[2] | o Those regulations set forth DOT requirements for transportation of hazardous waste. These are generally identical to RCRA requirements at 40 CFR 263. | o All on- and off-site transport of excavated soil treatment sludges, and other materials will follow these standards. |

TABLE 10 (Cont'd)

ACTION-SPECIFIC AND LOCATION-SPECIFIC ARARS AND TBCS FOR ALTERNATIVE SC-10:
IN-SITU VOLATILIZATION/EXCAVATION/ON-SITE INCINERATION/BACKFILL ON-SITE
WELLS G&H SITE, WOBURN, MASSACHUSETTS

| REQUIREMENT | REQUIREMENT SYNOPSIS | ACTION TO BE TAKEN TO ATTAIN REQUIREMENT |
|---|---|---|
| o RCRA - Tank Requirements (40 CFR 264 Subpart J) | o Provides design and operating requirements for RCRA waste treatment facilities utilizing tanks. | o Design and operation of the in-situ volatilization facility will follow these requirements. |
| o RCRA - Preparedness and Prevention (40 CFR 264.30 - 264.31)[2] | o This regulation outlines requirements for safety equipment and spill control. | o On-site facilities and activities will be designed and operated in accordance with RCRA requirements. |
| o RCRA - Contingency Plan and Emergency Procedures (40 CFR 264.50 - 264.56)[2] | o This regulation outlines the requirements for emergency procedures to be used following explosions, fires, etc. | o Emergency procedures will be developed and implemented in accordance with RCRA requirements. |
| o RCRA - Manifesting, Recordkeeping, and Reporting (40 CFR 264.70 - 264.77)[2] | o This regulation specifies the recordkeeping and reporting requirements for RCRA facilities. | o Records will be maintained during site remediation in compliance with this requirement. |
| o RCRA - Closure and Post-Closure (40 CFR 264 Subpart G)[2] | o This regulation details the specific requirements for closure and post-closure care of hazardous waste facilities. | o Hazardous waste facilities will be closed in a manner that meets the requirements of the closure regulations. |
| o OSHA - General Industry Standards (29 CFR 1910)[1] | o This regulation specifies the 8-hour, time-weighted average concentration for various organic compounds and 2 PCB compounds; site control procedures; training; and protective clothing requirements for worker protection at site remediations. | o Proper respiratory equipment will be worn if it is not possible to maintain the work atmosphere below these concentrations. |
| o OSHA - Safety and Health Standards (29 CFR 1926)[1] | o This regulation specifies the type of safety equipment and procedures to be followed during construction and excavation activities. | o All appropriate safety equipment will be on-site and procedures will be followed during groundwater monitoring and excavation. |
| o OSHA - Recordkeeping, Reporting and Related Regulations (29 CFR 1904)[1] | o The regulation outlines the recordkeeping and reporting requirements for an employer under OSHA. | o These regulations are applicable to the company contracted to execute site remediation. |

TABLE 10 (Cont'd)

ACTION-SPECIFIC AND LOCATION-SPECIFIC ARARS AND TBCS FOR ALTERNATIVE SC-10:
IN-SITU VOLATILIZATION/EXCAVATION/ON-SITE INCINERATION/BACKFILL ON-SITE
WELLS G&H SITE, WOBURN, MASSACHUSETTS

| REQUIREMENT | REQUIREMENT SYNOPSIS | ACTION TO BE TAKEN TO ATTAIN REQUIREMENT |
|---|---|---|
| o DEQE - Hazardous Waste Management Requirements (310 CMR 30.00)[2] | o These regulations provide comprehensive monitoring, storing, recordkeeping, etc. programs at hazardous waste sites. | o During remedial design, these regulations will be compared to the corresponding federal RCRA regulations, and the more stringent requirements will be utilized. Note that Massachusetts considers soil contaminated in excess of 50 ppm PCBs to be a hazardous waste (310 CMR 30.131, waste #M002). |
| o DEQE - Hazardous Waste Incinerator Air Emisson Requirements 310 CMR 7.08(4)[2] | o Provides air emission requirements for hazardous waste incinerators. Principal Organic Hazardous Constituents (POHCS) destroyed to 99.99 percent, PCBs to 99.9999 percent. Particulate, HCL and CO emissions also controlled. | o On-site incineration activities to be designed and operated in compliance with requirements. |
| o TSCA - Marking of PCBs and PCB Items (40 CFR 761.40 - 761.79)[1] | o 50 ppm PCB storage areas, storage items, and transport equipment must be marked with the $M_L$ mark. | o All storage areas, drums, and transport equipment will carry the appropriate markings displayed in an easily readable position. |
| o TSCA - Storage and Disposal (40 CFR 761.60 - 761.79)[1] | o This requirement specifies the requirements for storage and disposal/destruction of PCBs in excess of 50 ppm. These PCB-contaminated soils would have to be disposed of or treated in a facility permitted for PCBs, in compliance with TSCA regulations. Treatment must be performed using incineration or some other method with equivalent destruction efficiencies. | o Storage areas for drums containing PCB soils in excess of 50 ppm will be constructed to comply with this requirement. Verification of incinerator compliance will be made prior to drum shipment. |
| o TSCA - Records and Reports (40 CFR 761.18-761.185)[1] | o This regulation outlines the requirements for recordkeeping for storage and disposal of >50 ppm PCBs. | o Records will be maintained during remedial action in compliance with this regulation for all PCB drums which contain soils in excess of 50 ppm. |
| o CAA - National Air Quality Standards for Total Suspended Particulates (40 CFR 129.105, 750)[1] | o This regulation specifies maximum primary and secondary 24-hour concentrations for particulate matter. | o Fugitive dust emissions from site activities will be maintained below 150 $ug/m^3$ (secondary standard) by water sprays and other dust suppressants. |
| o DEQE - Ambient Air Quality Standards for the Commonwealth of Massachusetts (310 CMR 6.00)[1] | o This regulation specifies dust, odor, and noise emissions from construction activities. | o Fugitive dust will be controlled by water sprays or suppressants. All equipment will be maintained so as not to produce excessive noise. |
| o DEQE - Air Pollution Controls (310 CMR 7.00)[1] | o Regulates new sources of air pollution to prevent air quality degradation. Requires the use of "Best Available Control Technology" (BACT) on all new sources. | o BACT will be used on all new sources. |

TABLE 10 (Cont'd)

ACTION-SPECIFIC AND LOCATION-SPECIFIC ARARS AND TBCS FOR ALTERNATIVE SC-10:
IN-SITU VOLATILIZATION/EXCAVATION/ON-SITE INCINERATION/BACKFILL ON-SITE
WELLS G&H SITE, WOBURN, MASSACHUSETTS

| REQUIREMENT | REQUIREMENT SYNOPSIS | ACTION TO BE TAKEN TO ATTAIN REQUIREMENT |
|---|---|---|
| o Employee and Community Right-to-Know Requirements (310 CMR 33)[1] | o Establishes rules for the dissemination of information related to toxic and hazardous substances to the public. | o Information dissemination procedures in these regulations will be used. |
| 2) Action-Specific TBCs | | |
| o RCRA - Proposed Air Emission Standards for Treatment Facilities (52 FR 3748, February 5, 1987) | o This proposal would set performance standards for RCRA treatment facility air emissions. | o Volatilization facilities and other non-incinerators that have air emissions (e.g., air strippers) will be designed to meet the proposed federal regulations. |
| 3) Location-Specific ARARs | | |
| o RCRA - Location Standards (40 CFR 264.18)[1] | o This regulation outlines the requirements for constructing a RCRA facility on a 100-year floodplain.<br><br>A facility located on a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout of any hazardous waste by a 100-year flood, unless waste may be removed safely before floodwater can reach the facility, or no adverse effects on human health and the environment would result if washout occurred. | o It is assumed that remediation facilities will be located outside floodplains. Temporary staging areas or remediation facilities that are located in a floodplain will be a designed to allow quick mobilization out of the area and to prevent damage caused by initial floodwaters. |
| o CWA - Section 404 Dredge and Fill Requirements (Guidelines at 40 CFR 230)[1] | o The placement for fill following excavation of contaminated soil pursuant to remediation activities in the Aberjona River wetlands triggers Section 404 jurisdiction. The governing regulations favor practicable alternatives that have less impact on wetlands. If no mitigated practicable alternative exists, impacts must be mitigated. | o Under this alternative no excavation will occur in Section 404 wetlands. Soil contamination in such areas will be remediated using in-situ volatilization which does not require excavation and subsequent filling. |
| o Massachusetts Wetlands Protection Requirements (310 CMR 10.00)[1] | o These requirements control regulated activities in freshwater wetlands, 100-year floodplains, and 100-foot buffer zones beyond these areas. Regulated activities include virtually any construction or excavation activity. Performance standards are provided for evaluation of the acceptability of various activities. | o Under this alternative, no excavation will occur in the regulated wetlands. Excavation of contaminated soil may occur in the wetlands buffer zone. In this case, the alternative will meet performance standards for activities in the buffer zone. |

TABLE 10 (Cont'd)

ACTION-SPECIFIC AND LOCATION-SPECIFIC ARARS AND TBCS FOR ALTERNATIVE SC-10:
IN-SITU VOLATILIZATION/EXCAVATION/ON-SITE INCINERATION/BACKFILL ON-SITE
WELLS G&H SITE, WOBURN, MASSACHUSETTS

| REQUIREMENT | REQUIREMENT SYNOPSIS | ACTION TO BE TAKEN TO ATTAIN REQUIREMENT |
|---|---|---|
| o Wetlands Executive Order (EO 11990)[1] | o Under this Executive Order, federal agencies are required to select alternatives that minimize the destruction, loss or degradation of wetlands, and preserve and enhance natural and beneficial values of wetlands. | o No excavation will occur in Section 404 wetlands. This is the best practicable alternative for treating contaminated wetlands. |
| o Floodplains Executive Order (EO 11888)[1] | o Federal agencies are required to reduce the risk of flood loss, to minimize impact of floods, and to restore and preserve the natural and beneficial value of floodplains. In addition, practicable alternatives must be selected that have less impact on wetlands. | o Excavation and filling are temporary disruptions, and filling will match preconstruction topography. Thus, there is no permanent disruption of floodplain values and the ARAR will be met. |
| o Protection of Archaeological Resources (32 CFR 229) | o These regulations develop procedures for the protection of archaeological resources. | o If archaeological resources are encountered during excavation, work will stop until the area has been reviewed by federal and state archaeologists. |

[1]Applicable

[2]Relevant and Appropriate

TABLE 11

ACTION-SPECIFIC AND LOCATION-SPECIFIC ARARS AND TBCS FOR MOM ALTERNATIVES:

MOM-2 Pump and Treat Source Areas
- 2B(i) Pretreatment and UV/Chemical Oxidation at Separate Treatment Plants
- 2B(ii) Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant

MOM-3 Pump and Treat Central Area
- 3B Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant

MOM-4 Pump and Treat Source Areas and Central Area
- 4B(i) Pretreatment and UV/Chemical Oxidation at Separate Treatment Plants
- 4B(ii) Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant

WELLS G&H SITE, WOBURN, MASSACHUSETTS

| REQUIREMENT | REQUIREMENT SYNOPSIS | ACTION TO BE TAKEN TO ATTAIN REQUIREMENT |
|---|---|---|
| 1) Action-Specific ARARs | | |
| o RCRA - General Facility Requirements (40 CFR 264.10-264.18)[2] | o General facility requirements outline general waste security measures, inspections, and training requirements. | o Facilities will be constructed, fenced, posted, and operated in accordance with this requirement. All workers will be properly trained. |
| o RCRA - Generator and Transporter Responsibilities (40 CFR 262 and 263)[2] | o Provides standards for packing and accumulating hazardous waste prior to off-site disposal. | o Pretreatment, sludge management and off-site disposal will proceed in accordance with RCRA requirements. |
| o RCRA - Preparedness and Prevention (40 CFR 264.30 - 264.31)[2] | o This regulation outlines requirements for safety equipment and spill control. | o On-site facilities and activities will be designed and operated in accordance with RCRA requirements. |
| o RCRA - Contingency Plan and Emergency Procedures (40 CFR 264.50 - 264.56)[2] | o This regulation outlines the requirements for emergency procedures to be used following explosions, fires, etc. | o Emergency procedures will be developed and implemented in accordance with RCRA requirements. |
| o RCRA - Manifesting, Recordkeeping, and Reporting (40 CFR 264.70 - 264.77)[2] | o This regulation specifies the recordkeeping and reporting requirements for RCRA facilities. | o Records will be maintained during site remediation in compliance with this requirement. |
| o RCRA - Container Requirements (40 CFR 264 Subpart I)[2] | o This regulation sets forth RCRA requirements for use and management of containers at RCRA facilities. | o Packing and accumulation of treatment sludges and other materials will adhere to these standards. |
| o RCRA - Land Disposal Restrictions (40 CFR 268)[2] | o Provide treatment standards and schedules governing land disposal of RCRA wastes and of materials contaminated with or derived from RCRA wastes. | o On-site treatment will be conducted in accordance with standards to allow site-specific RCRA delisting of material. |

TABLE 11 (Cont'd)
ACTION-SPECIFIC AND LOCATION-SPECIFIC ARARS AND TBCS FOR MOM ALTERNATIVES:

MOM-2 Pump and Treat Source Areas
- 2B(i) Pretreatment and UV/Chemical Oxidation at Separate Treatment Plants
- 2B(ii) Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant

MOM-3 Pump and Treat Central Area
- 3B Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant

MOM-4 Pump and Treat Source Areas and Central Area
- 4B(i) Pretretment and UV/Chemical Oxidation at Separate Treatment Plants
- 4B(ii) Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant

WELLS G&H SITE, WOBURN, MASSACHUSETTS

| REQUIREMENT | REQUIREMENT SYNOPSIS | ACTION TO BE TAKEN TO ATTAIN REQUIREMENT |
|---|---|---|
| | | bottom contours. These actions meet the terms of the U.S. Army Corps of Engineers Nationwide Permit No. 12 (33 CFR 330.5(a)(12)). This permit provides authorization under Section 404 for discharge of material for backfill or bedding for "utility lines", provided there is no change in preconstruction bottom contours. A "utility line" is defined as a pipe for the transportation of any liquid for any purpose. |
| o Massachusetts Wetlands Protection Requirements (310 CMR 10.00)[1] | o These requirements control regulated activities in freshwater wetlands, 100-year floodplains, and 100-foot buffer zones beyond these areas. Regulated activities include virtually any construction or excavation activity. Performance standards are provided for evaluation of the acceptability of various activities. | o Eextraction pipes will be laid underground through regulated wetlands, floodplains, and buffer zones. This will not cause loss of flood storage capacity, and will only temporarily disturb wetlands. The performance standards of the regulations will therefore be achieved. All treatment facilities will be constructed above the 100-year floodplain elevation (e.g., 48 feet above sea level. |
| o Massachusetts Waterways Licenses (310 CMR 9.00)[1] | o Controls dredging, filling, and other work in water of the Commonwealth. | o Alternatives involving source area pumping and central area treatment require placement of pipes under and across the Aberjona River. Pertinent requirements will be followed regarding dredging methods and management of dredged spoil. |
| o Massachusetts Certification for Dredging and Filling (314 CMR 9.00)[1] | o Establishes water quality-based standards for filling activities (CWA Section 401). | o Alternatives involving source area pumping and central area treatment require placement of pipes under and across the Aberjona River. Proper measures will be taken to avoid contravention of water quality standards (i.e., turbidity) during installation of pipes. |

TABLE 11 (Cont'd)

ACTION-SPECIFIC AND LOCATION-SPECIFIC ARARS AND TBCS FOR MOM ALTERNATIVES:

MOM-2 Pump and Treat Source Areas
- 2B(i) Pretreatment and UV/Chemical Oxidation at Separate Treatment Plants
- 2B(ii) Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant

MOM-3 Pump and Treat Central Area
- 3B Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant

MOM-4 Pump and Treat Source Areas and Central Area
- 4B(i) Pretreatment and UV/Chemical Oxidation at Separate Treatment Plants
- 4B(ii) Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant

WELLS G&H SITE, WOBURN, MASSACHUSETTS

| REQUIREMENT | REQUIREMENT SYNOPSIS | ACTION TO BE TAKEN TO ATTAIN REQUIREMENT |
|---|---|---|
| o DOT - Transportation of Hazardous Waste Requirements (49 CFR 171-179)[2] | o Those regulations set forth DOT requirements for transportation of hazardous waste. These are generally identical to RCRA requirements at 40 CFR 263. | o All on- and off-site transport of treatment sludges and other materials will adhere to these standards. |
| o CAA - National Air Quality Standards for Total Suspended Particulates (40 CFR 129.105, 750)[1] | o This regulation specifies maximum primary and secondary 24-hour concentrations for particulate matter. | o Fugitive dust emissions from site activities will be maintained below 150 ug/m$^3$ (secondary standard) by water sprays and other dust suppressants. |
| o DEQE - Ambient Air Quality Standards for the Commonwealth of Massachusetts (310 CMR 6.00)[1] | o This regulation specifies dust, odor, and noise emissions from construction activities. | o Fugitive dust will be controlled by water sprays or suppressants. All equipment will be maintained so as not to produce excessive noise. |
| o DEQE - Air Pollution Controls (310 CMR 7.00)[1] | o Regulates new sources of air pollution to prevent air quality degradation. Requires the use of "Best Available Control Technology" (BACT) on all new sources. | o BACT will be used on all new sources. |
| o OSHA - General Industry Standards (29 CFR 1910)[1] | o This regulation specifies the 8-hour, time-weighted average concentration for various organic compounds and 2 PCB compounds; site control procedures; training; and protective clothing requirements for worker protection at site remediations. | o Proper respiratory equipment will be worn if it is not possible to maintain the work atmosphere below these concentrations. |
| o OSHA - Safety and Health Standards (29 CFR 1926)[1] | o This regulation specifies the type of safety equipment and procedures to be followed during construction and excavation activities. | o All appropriate safety equipment will be on site and procedures will be followed during groundwater monitoring. |
| o OSHA - Recordkeeping, Reporting and Related Regulations (29 CFR 1904)[1] | o The regulation outlines the recordkeeping and reporting requirements for an employer under OSHA. | o These regulations are applicable to the company contracted to execute site remediation. |
| o CWA - National Pollutant Discharge Elimination System (NPDES) (40 CFR 122-125)[1] | o Provides permitting process for surface water body point source discharges. | o Water discharges to the Aberjona River will be treated to ensure that violations of the Clean Water Act do not occur. |

TABLE 11 (Cont'd)
ACTION-SPECIFIC AND LOCATION-SPECIFIC ARARS AND TBCS FOR MOM ALTERNATIVES:

MOM-2 Pump and Treat Source Areas
- 2B(i) Pretreatment and UV/Chemical Oxidation at Separate Treatment Plants
- 2B(ii) Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant

MOM-3 Pump and Treat Central Area
- 3B Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant

MOM-4 Pump and Treat Source Areas and Central Area
- 4B(i) Pretreatment and UV/Chemical Oxidation at Separate Treatment Plants
- 4B(ii) Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant

WELLS G&H SITE, WOBURN, MASSACHUSETTS

| REQUIREMENT | REQUIREMENT SYNOPSIS | ACTION TO BE TAKEN TO ATTAIN REQUIREMENT |
|---|---|---|
| o DEQE - Surface Water Discharge Permit Program Requirements (314 CMR 3.00)[1] | o Provides permitting process for surface water body point discharges. This requirement is generally identical to CWA NPDES. | o Water discharges to the Aberjona River will be treated to ensure that violations of the DEQE water discharge permit program do not occur. |
| o DEQE - Surface Water Quality Standards (314 CMR 4.00)[1] | o This regulation consists of surface water classifications which designate and assign uses, and water quality criteria necessary to sustain the designated uses. | o Water discharges to the Aberjona River will be treated to ensure that violations of the DEQE water quality standards for that water body do not occur. |
| o DEQE - Groundwater Quality Standards (314 CMR 6.00)[1] and Groundwater Discharge Permit Program (314 CMR 5.00)[1] | o This regulation consists of groundwater classifications which designate and assign uses, and water quality criteria necessary to sustain the designated uses. | o Class I groundwater quality criteria will be achieved at end of the remediation process. |
| o DEQE - Air Emission Limitations for Unspecified Sources of Volatile Organic Compounds (310 CMR 7.18(17))[2] | o Unspecified source with the potential to emit 100 tons/year of VOCs must install "Reasonably Available Control Technology" (RACT). | o Treatment of VOC air emissions from pretreatment units to 99.99 percent combustion efficiency in vapor phase carbon adsorption. |
| o DEQE - Hazardous Waste Management Requirements (310 CMR 30.00)[2] | o These regulations provide comprehensive monitoring, storing, recordkeeping, etc. programs at hazardous waste sites. | o During remedial design, these regulations will be compared to the corresponding federal RCRA regulations, and the more stringent requirements will be utilized. Note that Massachusetts considers liquids contaminated with PCBs greater than 50 ppm to be hazardous wastes (M002). |
| o DEQE - Air Pollution Control New Source Approvals (310 CMR 7.00)[1] | o Regulates new sources of air pollution to prevent air quality degradation. Requires the use of "Best Available Control Technology" (BACT) on all new sources. | o BACT will be used on all new sources. |
| o Employee and Community Right-to-Know Requirements (310 CMR 33)[1] | o Establishes rules for the dissemination of information related to toxic and hazardous substances to the public. | o Information dissemination procedures in these regulations will be used. |

TABLE 11 (Cont'd)
ACTION-SPECIFIC AND LOCATION-SPECIFIC ARARS AND TBCS FOR MOM ALTERNATIVES:

MOM-2 Pump and Treat Source Areas
- 2B(i) Pretreatment and UV/Chemical Oxidation at Separate Treatment Plants
- 2B(ii) Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant

MOM-3 Pump and Treat Central Area
- 3B Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant

MOM-4 Pump and Treat Source Areas and Central Area
- 4B(i) Pretreatment and UV/Chemical Oxidation at Separate Treatment Plants
- 4B(ii) Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant

WELLS G&H SITE, WOBURN, MASSACHUSETTS

| REQUIREMENT | REQUIREMENT SYNOPSIS | ACTION TO BE TAKEN TO ATTAIN REQUIREMENT |
|---|---|---|
| 2) Action-Specific TBCs | | |
| o RCRA - Proposed Air Emission Standards for Treatment Facilities (52 FR 3748, February 5, 1987) | o The proposal would set performance standards for RCRA treatment facility air emissions. | o Vapor phase carbon adsorption facilities and other non-incinerators that have air emissions will be designed to meet the proposed federal regulations. |
| o USEPA Office of Solid Waste and Emergency Response, Directive 9355.0-28; Air Stripper Control Guidance | o Establishes guidance on the control of air emissions from air strippers used at Superfund sites for groundwater treatment. | |
| 3) Location-Specific ARARs | | |
| o RCRA - Location Standards (40 CFR 264.18)[2] | o This regulation outlines the requirements for constructing a RCRA facility on a 100-year floodplain.<br><br>'A facility located on a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout of any hazardous waste by a 100-year flood, unless waste may be removed safely before floodwater can reach the facility, or no adverse effects on human health and the environment would result if washout occurred. | o There is adequate space to site treatment plants outside a floodplain. Pipes extending from pumping areas and treatment plants through floodplains do not present any risk of washout due to flooding and will not displace floodplains. |
| o CWA - Section 404 Dredge and Fill Requirements (Guidelines at 40 CFR 230)[1] | o The placement for fill pursuant to remediation activities in Aberjona River wetlands triggers Section 404 jurisdiction. The governing regulations favor practicable alternatives that have less impact on wetlands. If no practicable alternative exists, impacts must be mitigated. | o There is adequate space to site treatment plants outside Section 404 wetlands.<br><br>Excavation and subsurface placement of extraction wells and piping to and from source areas and treatment plants will be designed to match preconstruction |

TABLE 11 (Cont'd)
ACTION-SPECIFIC AND LOCATION-SPECIFIC ARARS AND TBCS FOR MOM ALTERNATIVES:

MOM-2 Pump and Treat Source Areas
- 2B(i) Pretreatment and UV/Chemical Oxidation at Separate Treatment Plants
- 2B(ii) Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant

MOM-3 Pump and Treat Central Area
- 3B Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant

MOM-4 Pump and Treat Source Areas and Central Area
- 4B(i) Pretretment and UV/Chemical Oxidation at Separate Treatment Plants
- 4B(ii) Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant

WELLS G&H SITE, WOBURN, MASSACHUSETTS

| REQUIREMENT | REQUIREMENT SYNOPSIS | ACTION TO BE TAKEN TO ATTAIN REQUIREMENT |
|---|---|---|
| o Inland Wetland Orders (302 CMR 6.00)[2] | o Defines wetland areas, establishes encroachment lines along waterways or floodplain areas, and regulates activities in these areas. | o Some pipes connecting central treatment plants will be laid across the river. In these cases, consultation with DEQE regarding proper construction will occur. |
| o Operation and Maintenance and Pretreatment Standards for Waste Water Treatment Works and Indirect Discharges (314 CMR 12.0)[2] | o Insures the proper operation and maintenance of waste water treatment facilities including operation and maintenance, sampling, and discharges. | o Guidelines appropriate for a wastewater treatment facility will be followed. |
| o Wetlands Executive Order (EO 11990)[1] | o Under this Executive Order, federal agencies are required to minimize the destruction, loss or degradation of wetlands, and preserve and enhance natural and beneficial values of wetlands. If no practicable alternative exists impacts must be mititated | o The placement of pipes in wetlands, is necessary to connect the central treatment plants. Therefore, it is consistent with the requirements of the Executive Order. |
| o Floodplains Executive Order (EO 11888)[1] | o Federal agencies are required to reduce the risk of flood loss, to minimize impact of floods, and to restore and preserve the natural and beneficial value of floodplains. | o The placement of pipes in wetlands, below grade, poses no additional flood hazard and meets the requirements of the Executive Order. |
| 4) Location-Specific TBCs | | |
| o EPA Groundwater Protection Strategy | o EPA classifies groundwater into three categories depending on current, past or potential use. This serves as a guide for protection of the resource. | o Wells G&H aquifer is a Class II B aquifer-potentially usable aquifer. At the end of remediation, all MOM alternatives will attain standards for Class IIB aquifers. |

[1]Applicable
[2]Relevant and Appropriate
9428b

TABLE 12

SUMMARY OF PRESENT WORTH COSTS FOR
SOURCE CONTROL ALTERNATIVES

| | Alternative | Total Present Worth (1988) Dollars | | |
|---|---|---|---|---|
| | | $10^{-4}$ Target Level | $10^{-5}$ Target Level | $10^{-6}$ Target** Level |
| SC-1: | No Action* | 799,500 | 799,500 | 799,500 |
| SC-3: | Excavation On-Site Incineration/Backfill On-Site | 7,301,800 | 7,465,900 | 7,468,600 |
| SC-4: | Excavation/Off-Site Incineration/Backfill With Clean Off-Site Soil | 21,597,100 | 22,138,600 | 22,149,700 |
| SC-5: | Excavation/On-Site High Temperature Enhanced Volatilization/Backfill On-Site | 6,424,800 | 6,567,600 | 6,570,300 |
| SC-7: | Excavation/On-Site Supercritical Fluids Extraction/Backfill On-site | 7,372,700 | 7,536,800 | 7,540,100 |
| SC-8: | Excavation/On-Site Enhanced Volatilization/On-Site Incineration/Backfill On-Site | 5,733,100 | 6,136,000 | 6,181,400 |
| SC-9: | Excavation/On-Site Enhanced Volatilization/Off-Site Incineration/Backfill with Treated and Clean Off-Site Soil | 6,386,800 | 8,610,300 | 9,020,900 |
| SC-10: | In Situ Volatilization/Excavation/On-Site Incineration/ Backfill On-Site | 2,285,800 | 3,014,800 | 3,155,300 |
| SC-11 | In Situ Volatilization/Excavation/Off-Site Incineration/ Backfill with Clean Off-Site Soil | 3,111,000 | 5,734,400 | 6,239,700 |

* Present worth analysis based on 30 year period and 5% discount rate for No Action alternative only. No O&M required for all other alternatives. Therefore, present worth equals capital cost.

** Cleanup levels for the Wells G & H Site are based on a $10^{-6}$ target level.

# WELLS G & H

## APPENDIX A
## RESPONSIVENESS SUMMARY

# WELLS G & H SITE

# RESPONSIVENESS SUMMARY

# WOBURN, MASSACHUSETTS

September, 1989

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ATTACHMENT B - TRANSCRIPT OF THE FEBRUARY 27, 1989 INFORMAL PUBLIC HEARING

## PREFACE

The U.S. Environmental Protection Agency (EPA) held a 40-day public comment period from February 10, 1989 to March 21, 1989 to provide an opportunity for interested parties to comment on the Feasibility Study (FS) and the Proposed Plan prepared for the Wells G & H Superfund site in Woburn, Massachusetts. The FS examines and evaluates various options, called remedial alternatives, for addressing soil and groundwater contamination. EPA identified its preliminary recommendation of a preferred alternative for the site cleanup in the Proposed Plan issued on February 1, 1989, before the start of the public comment period.

The purpose of this Responsiveness Summary is to document EPA responses to the comments and questions raised during the public comment period. EPA has considered all of the comments summarized in this document before selecting a final remedial alternative for the contamination at the Wells G & H Superfund site in Woburn, Massachusetts. In addition, based upon public comment on the FS and Proposed Plan, EPA has decided upon a different remedial alternative than was presented in the Proposed Plan. The selected alternative, and the reasons for choosing an alternative that is different from what was originally proposed, are documented in the Record of Decision and are also summarized in the overview.

This Responsiveness Summary is divided into the following sections:

I. Overview - This section briefly outlines the remedial alternatives evaluated in the FS and Proposed Plan, including EPA's initial recommendation of a preferred alternative. This section includes general public reaction to the Proposed Plan and subsequent changes made by EPA to the preferred alternative.

II. Background on Community Involvement and Concerns - A brief history on community interests and concerns regarding the Wells G & H site is presented in this section.

III. Summary of Comments Received During the Public Comment Period and EPA Responses - Written and oral comments from the public, interested parties, and potentially responsible parties (PRPs) on the Feasibility Study (FS) and the Proposed Plan are summarized in this section. EPAs responses are also provided.

IV. Remaining Concerns - Community concerns regarding the design and implementation of EPA's selected remedy are presented in this section.

Attachment A - This attachment provides a list of the community relations activities that EPA has conducted to date at the Wells G & H site.

Attachment B - This attachment provides a transcript of the February 27, 1989 Informal Public Hearing held in Woburn, Massachusetts.

## I. OVERVIEW

Using the information gathered during the Remedial Investigation (RI) -- a study that investigates the nature and extent of contamination at the site -- and the Endangerment Assessment (EA)--a study that assesses the potential risks to human health and the environment associated with the site contamination -- EPA identified several objectives for the cleanup of the Wells G & H site. (See Exhibit 1 for a map of the Wells G & H site.) The objectives are:

1. Restore the aquifer that supplied water to Wells G & H to drinking water standards.

2. Stop the introduction of contaminated groundwater from the source areas to the rest of the aquifer.

3. Stop the leaching of soil contaminants to the groundwater.

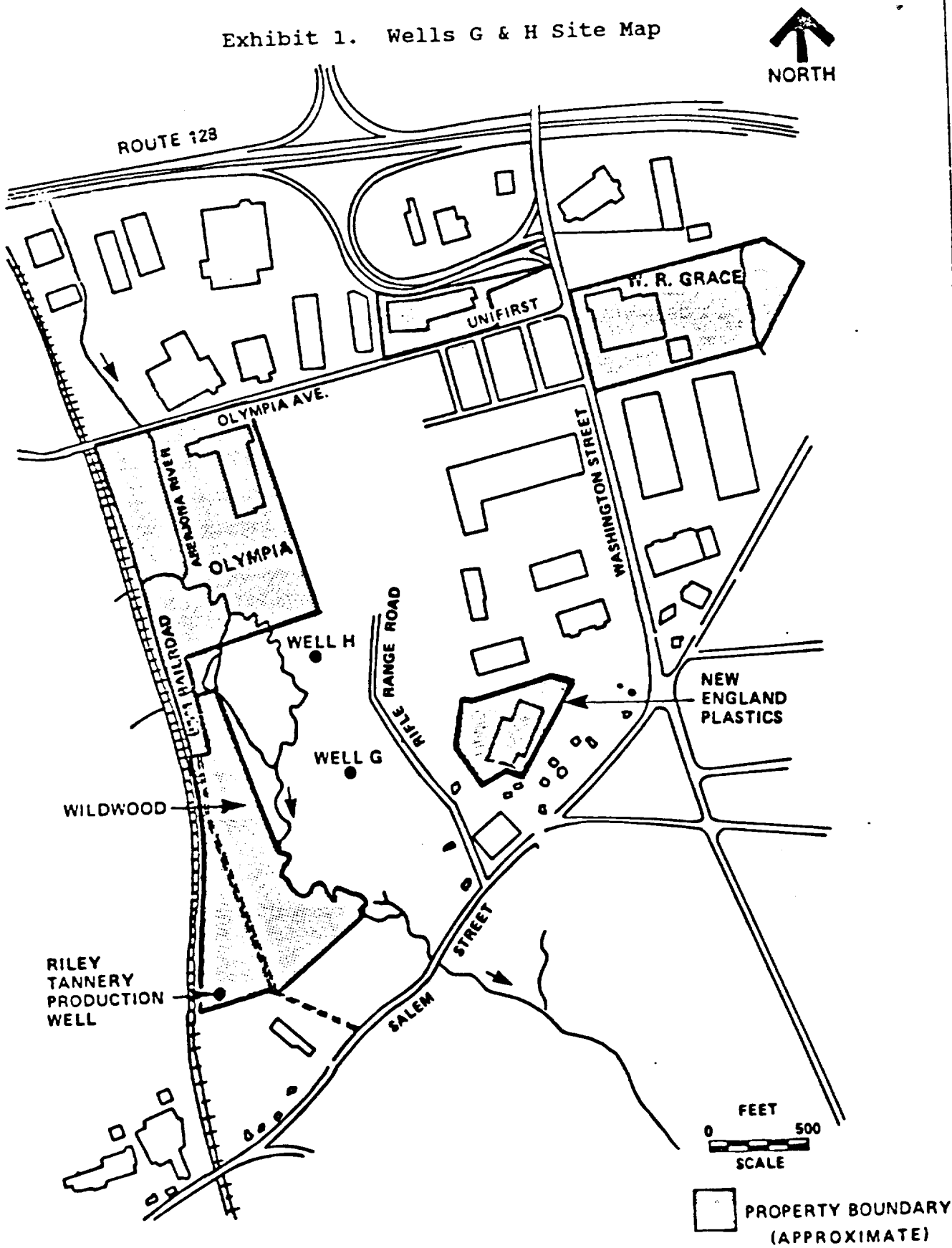
4. Prevent public contact with contaminated groundwater and soil above the cleanup levels.

5. Protect the natural resources in the area, such as the river and wetlands, from becoming further degraded.

6. Prevent further migration of contaminated groundwater off-site.

After identifying the cleanup objectives, EPA developed and evaluated potential cleanup alternatives. This evaluation, or Feasibility Study (FS), describes the alternatives considered for addressing contamination of soil and groundwater, as well as the criteria EPA used to narrow the list to 9 potential soil remediation alternatives and 4 potential groundwater remediation alternatives. The soil and groundwater cleanup alternatives considered by EPA are described briefly below.

Exhibit 1. Wells G & H Site Map



## A. Alternatives Evaluated for Treatment of Soil Contamination

1. Limited action.

The limited action alternative would entail leaving contaminants untreated on-site and monitoring contaminant concentrations and migration through the groundwater beneath the site every year for 30 years. EPA would conduct a more extensive review of the site every five years to determine whether further remedial action is necessary to treat contaminated soil. The limited action alternative would also involve limiting access to the site, limiting site use and the use of groundwater from the site, and conducting public education programs to increase public awareness of the site and restrictions to site use. It is expected that contamination would remain on-site beyond 30 years.

2. Excavation/On-Site Incineration/Backfill On-Site.

This alternative would involve excavating approximately 9,500 cubic yards of contaminated soil at the site and treating the soil in an on-site mobile incinerator. The contaminated soil would be burned at very high temperatures to destroy the contaminants. Because incineration would destroy virtually all of the organic contaminants in the soil, the treated soil would be backfilled to excavated areas.

3. Excavation/Off-Site Incineration/Backfill with Clean Off-Site Soil.

This alternative is similar to Alternative #2, except that contaminated soil would be destroyed at an off-site incineration facility and the excavated areas would be filled with clean off-site soil to regrade the site area.

4. Excavation/On-Site High Temperature Enhanced Volatilization/Backfill On-Site.

This alternative would involve excavating 9,500 cubic yards of contaminated site soils and treating the soils in an on-site mobile treatment unit by high temperature enhanced volatilization. High temperature enhanced volatilization is a type of thermal treatment process that involves mixing the contaminated soil with heated air. This would result in the release and transfer of contaminants such as VOCs, PAHs, PCBs and chlordane from the soil to the air in the unit. The contaminants in the air are then destroyed in a burner. The treated soil would then be backfilled into the excavated areas on-site.

5. Excavation/On-site Supercritical Fluid Extraction/Backfill On-Site.

This alternative would utilize an innovative technology to treat the 9,500 cubic yards of contaminated soil. Contaminated soil from the site would be excavated and mixed with water to create a slurry that would be pumped into a mobile on-site extraction unit. Liquified carbon dioxide introduced to the unit would work as a solvent, dissolving contaminants as it passes over the slurry in the extraction unit under elevated pressure. Treated soil would be backfilled to the excavated areas. The small quantity of extractant containing the contaminants stripped from the soils would be collected and shipped off-site to a commercial incineration facility.

6. Excavation/On-Site Enhanced Volatilization/On-Site Incineration/Backfill On-Site.

This alternative would use enhanced volatilization as described under Alternative #4, except at a lower temperature, to treat approximately 7,600 cubic yards of soil contaminated solely with VOCs. On-site incineration in a mobile unit as described under Alternative #2, would be used to treat approximately 1,900 cubic yards of soil contaminated with a mixture of PAHs, PCBs, VOCs, and pesticides. Because incineration will destroy virtually all of the organic contaminants in the soil, the treated soil would be backfilled to the previously excavated areas.

7. Excavation/On-site Enhanced Volatilization/Off-Site Incineration/Backfill with Treated and Clean Off-Site Soil.

This alternative differs from Alternative #6 only in that soils contaminated with a mixture of organic contaminants would be excavated, and then packaged and shipped off-site for incineration. Since only the soil treated by enhanced volatilization would remain on-site for use as backfill, clean fill would have to be brought in to supplement the treated soils for regrading the excavated areas.

8. In-Situ Volatilization/Excavation/On-Site Incineration/Backfill On-Site.

This alternative is EPA's selected remedy for soil cleanup and is the same preferred alternative presented in the Proposed Plan. In-situ volatilization will be used to treat approximately 7,600 cubic yards of VOC-contaminated soil. Soils contaminated with a mix of PCBs, PAHs, pesticides, and VOCs will be excavated and treated by incineration. Approximately 1,900 cubic yards of soil will be treated by incineration which will permanently destroy virtually all of the contaminants. The treated soils will then be used to backfill excavated areas.

9. In-Situ Volatilization/Excavation/Off-Site Incineration/Backfill With Clean Off-Site Soil.

This alternative is similar to the preferred alternative for soil cleanup, except that the soil with mixed contaminants would be excavated, and then packaged and shipped off-site for incineration. Clean off-site fill would be brought in to regrade the excavated areas.

**B. Alternatives to Address Groundwater Contamination**

1. Limited Action.

A limited action alternative for groundwater would consist of a long term monitoring program with a review every five years to determine whether further remedial action would be necessary to treat contaminated groundwater. Groundwater use would continue to be restricted. The actual time for groundwater remediation to be accomplished under this alternative would be more than 100 years.

2. Pump and Treat Source Areas.

This alternative would involve pumping groundwater from each of the five source areas and treating it by pretreatment and the use of either air stripping or ultraviolet (UV)/chemical oxidation, at separate treatment plants on each of the properties, or at one central treatment plant. Contaminants in the aquifer in the central area of the site would migrate off-site.

3. Pump and Treat Central Area.

This alternative would involve pumping contaminated groundwater solely from the central area of the site for treatment at one central treatment plant. Contaminated groundwater would first be pretreated and then principally treated by either air stripping, UV/chemical oxidation, or carbon adsorption. This alternative would not only treat contaminated groundwater from the central area, but would also intercept a limited amount of contaminated groundwater that flows from the source areas to the central site area.

4. Pump and Treat Source Areas and the Central Area.

This alternative combines groundwater Alternatives #2 and #3 to provide pumping and treatment of contaminated groundwater from all areas of the site, (the five source areas and the central area). Treatment of groundwater could occur at either six separate treatment plants or at one centrally located treatment plant. Under this alternative, groundwater would first be

pretreated and then principally treated by either an air stripper or by UV/chemical oxidation.

## C. General Public Reaction to the Proposed Plan and Subsequent Changes Made by EPA to the Preferred Alternative

The February 1989 Proposed Plan presented EPA's preferred alternative. The preferred alternative involved treating the majority of the soils with in-situ volatilization, and treating the remaining soils with incineration. Remediation of the sludge and debris at the Wildwood property would be defined during the design phase of the project. The withdrawal and treatment of contaminated groundwater would be accomplished by pumping groundwater from the aquifer at each of the five source areas of contamination and from the center of the site near Wells G & H to a central treatment plant. Under this alternative, the groundwater would first be pretreated to remove metals, then sent through an air-stripper to remove VOCs. The Proposed Plan should be consulted for a detailed explanation of the preferred alternative.

Many concerns were raised by the public and PRPs during the public comment period (February 10 - March 21, 1989) regarding EPA's preferred alternative. The community in general supported EPA's efforts to cleanup the aquifer. Local officials and some community groups, however, expressed that they would never support the use of the aquifer as a drinking water supply. Another community group predicted that this concern would fade with time and hoped that the aquifer could be used as a drinking water source in the future.

Three of the PRPs and one citizen expressed preference for individual treatment plants. They were concerned that a central treatment facility would necessitate pumping contaminated groundwater through residential and wetland areas. PRPs were concerned that pumping the central area would effect the level of the Aberjona River, the wetlands area, and also draw contaminants from sediments in the Aberjona River into the central area.

After a careful review of the comments and concerns, EPA elected to modify the preferred alternative for the cleanup of contaminated groundwater at the site. The groundwater remedy presented in the Record of Decision (ROD) for the Wells G & H site involves the treatment of contaminated groundwater at each of the five source areas of contamination. Groundwater will be treated at individual treatment plants instead of a central treatment facility. The central area will not be pumped at this time, but a study of the central area will be conducted to determine the most effective method for addressing contamination in the central area.

The central area and the Aberjona River will be addressed as a separate operable unit after completion of the study. EPA believes that addressing the site as operable units will allow immediate cleanup of the sources of contamination while concurrently evaluating other concerns at the site. The alternative selected to remediate contaminated soil at the site remains the same and involves in-situ volatilization, excavation of soils for on-site incineration and backfilling of the excavated areas with the treated soils. The reader is referred to the ROD for additional discussion.

## II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

The 330-acre Wells G & H Superfund site in located in the City of Woburn, Massachusetts approximately 10 miles north of Boston. Community residents began to complain about poor water quality from Wells G & H soon after the wells were activated in 1964 and 1967, respectively. In June 1975, following sampling results showing high concentrations of minerals and salts in the two wells, the Massachusetts Department of Public Health (MDPH) issued a letter to the City recommending that they look for alternative water supply sources and discontinue use of Wells G & H. The City of Woburn began to investigate water supply treatment options for the two wells.

In early May 1979, Woburn police discovered 184 fifty-five gallon drums of industrial waste abandoned on a vacant lot on Mishawum Road in the vicinity of Wells G & H. These drums were subsequently removed. As part of the investigation that followed the discovery of the drums, Wells G & H were tested for hazardous waste contamination by the Massachusetts Department of Environmental Protection (DEP), formerly Massachusetts Department of Environmental Quality Engineering. Samples from the wells showed high concentrations of volatile organic compounds and other chemicals found in industrial solvents. Wells G & H were immediately shut down in May 1979 and the City of Woburn revived an existing agreement with the Massachusetts Water Resources Authority (MWRA) for additional drinking water. Woburn currently receives the majority of its drinking water from its own Horn Pond Aquifer and the remainder from the MWRA.

Community concern about water quality escalated dramatically when Wells G & H were shut down. In October 1979, two Woburn residents who were concerned that water from the two wells could be the cause of the seemingly high number of childhood leukemia and other cancer cases within the City of Woburn, organized a meeting for those with family members or acquaintances with cancer. More than 30 Woburn residents attended this meeting; as a result of the meeting, it was determined that there appeared to be no less than ten cases of childhood leukemia in the City, many of which were located in one particular neighborhood. The

specific details of these health problems were reported to MDPH and the Centers for Disease Control in Atlanta.

A number of ongoing community efforts resulted from the initial information gathered at the October 1979 meeting and the closure of Wells G & H. In January 1980, a citizens group, known as "For a Cleaner Environment" (FACE) was established. FACE represents community concerns, conducts research on hazardous waste and public health issues, monitors site activities and lobbies State and Federal agencies on numerous site-related issues. In the early 1980s, several members of FACE joined with the Woburn Citizen's Advisory Committee (CAC), a group formed to oversee activities at the Industri-Plex Superfund Site, also in Woburn. The CAC has been working cooperatively with State and Federal agencies to develop and conduct health and environmental studies related to hazardous waste contamination in the Woburn area.

In 1982, the Wells G & H site was added to EPA's National Priorities List (NPL), making it eligible to receive federal funds for investigation and cleanup under the Superfund program. EPA has since conducted several investigations to characterize the nature and extent of contamination at the site. Also in 1982, eight Woburn families of leukemia victims, filed suit against three companies (W.R. Grace, Beatrice, and UniFirst) alleged to be responsible for well contamination.

Over the past decade, several health studies have been conducted in Woburn to determine the extent of health problems and to ascertain the cause of elevated cancer rates and cases of childhood leukemia, e.g., The Woburn Health Study, (commonly referred to as the Harvard study) conducted by the Harvard School of Public Health. As part of the School's Community Health Improvement Program, an outreach program to educate the public on participatory strategies in public health protection, plans were developed to conduct a health survey of the Woburn population to establish whether childhood leukemia and other possible health effects could be associated with contact with the water from Wells G & H.

In 1986, DEP developed a water distribution model to determine which households had consumed drinking water from Wells G & H, and how much drinking water from these wells had been consumed.

While many community members are concerned with the long term health effects that may result from past consumption of contaminated drinking water, others fear that something in

addition to the water from Wells G & H may be responsible for the high incidence of childhood leukemia or that water from Wells G & H may have traveled farther through the city water mains than previously thought.

In June 1984, in an effort to correct the misperception that the municipal water supply was still contaminated, the Woburn Conservation Commission produced a pamphlet entitled "Woburn's Water Supply." This pamphlet, developed with the assistance of FACE, provided information to the community on where Woburn's water originated and how it was distributed and used.

Many residents believe that the responsible parties must pay for both the costs to cleanup the Superfund site and to compensate the families who have suffered as a result of contamination. In 1987, the CAC advised MDPH to conduct additional Woburn-specific studies including: reproductive health; water supply distribution and consumption of drinking water from Wells G & H; and re-analysis of the Harvard School of Public Health Study, the first study that documented a correlation between health problems and consumption of drinking water from Wells G & H.

EPA held a public meeting in November, 1986 to present the results of its recently released Remedial Investigation. Over 80 people attended the meeting during which EPA confirmed that hazardous wastes used by the three companies named in the citizen lawsuit were sources of site contamination. In addition, EPA identified leaking gasoline tanks owned by another company as an additional contamination source. Community concerns expressed at the meeting included expediting negotiations with PRPs to cover cleanup costs, and obtaining the results of EPA's pending EA.

In May 1988, EPA held a special meeting to explain the Feasibility Study process to Woburn residents prior to completing the FS. In conjunction with the release of the FS in February 1989, EPA held a public informational meeting to present EPA's preferred site cleanup alternative. Approximately 30 citizens attended each of the two FS meetings. Local news accounts of the meetings suggested that Woburn residents were well informed about EPA cleanup activities at the site and that many of those who did not attend the Wells G & H meetings had previously received information from EPA at CAC meetings. News articles also stated that many Woburn residents did not want Wells G & H to be restored to meet drinking water quality standards because they would not consume drinking water from these sources.

Participants at the FS meetings expressed concerns about financing site cleanup activities, reliability of groundwater treatment technologies, and potential risks associated with cleanup activities such as soil excavation. Members of the audience urged EPA to maintain ongoing communication with local officials and citizens groups.

The principal community concerns are summarized below:

Long-term Health Effects: Citizens have expressed concern about elevated cancer rates in Woburn, and the possibility that residents will continue to develop serious health problems as a result of exposure to hazardous waste contamination. Citizens have requested that additional health studies be conducted in the City and have asked State and Federal health officials to continue to monitor and evaluate local health problems.

Environmental Monitoring: Woburn residents have indicated support for continued monitoring of water and air quality in the vicinity of drinking water wells supplying local residents with drinking water. In addition, many citizens have expressed a strong desire to have environmental monitoring conducted in local areas where known carcinogens and toxic chemicals are being used (e.g. pesticides, solvents) to avoid further hazardous waste contamination problems.

Future Drinking Water Supply Availability: Many Woburn residents have stated that they will never drink water supplied from Wells G & H. They do not believe that water quality can be "restored" to meet drinking water standards. However, residents are concerned that existing water supply agreements will not keep pace with community needs. Residents want to be informed about water supply options being explored by the City.

Participation in Site Cleanup Decisions: Citizens have stated that they are interested in participating in the decision-making process during the remedial design and remedial action phase of Superfund cleanup. Citizens have stressed that they will not be satisfied with progress reports or site investigation summaries. To this end, in the summer of 1989, FACE submitted a proposal to EPA to obtain a Technical Assistance Grant (TAG). The TAG would allow FACE to hire a consultant to study cleanup options and remedial design alternatives at the Wells G & H site.

Public Image: Citizens have expressed concern about the impacts of publicity about Woburn's Superfund sites and health problems. Citizens have stated that they would like city officials to conduct a public relations campaign about Woburn's safe drinking water supply to educate potential residents and commercial establishments.

## III. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES

This responsiveness summary addresses the comments received by EPA concerning the draft FS and Proposed Plan for the Wells G & H Superfund site in Woburn, Massachusetts. Nineteen sets of written comments were received during the public comment period (February 10 - March 21, 1989): eleven from PRPs, two from individual citizens, one from U.S. Congressman Edward J. Markey, one from FACE, one from the Woburn Conservation Commission and three from the Mystic River Watershed Association. The written comments are part of the Administrative Record for the site and may be viewed at the following information repositories:

Woburn Public Library
45 Pleasant St.
Woburn, Ma 01801
(617)-933-0148

EPA Records Center
90 Canal St.
Boston, MA 02114
(617)-573-5729

In addition to the public comment period, EPA held a public hearing on February 27, 1989 to accept oral comments on the Proposed Plan, the Feasibility Study and other reports related to the site. The transcript of this hearing is included as Attachment B.

In this Responsiveness Summary EPA responds to comments related to remedial action for the site which were submitted during the public comment period. During the public comment period, EPA also received comments regarding individual parties' liability for site response costs. As these comments are not related to the selection of the site remedial action, EPA does not believe it is appropriate to address such comments in the Responsiveness Summary for this ROD.

### A. Citizen and Other Interested Party Comments

These comments, along with EPA's responses, are summarized and organized into the following categories:

1. Soil Contamination
2. Groundwater Contamination
3. Wetlands Issues
4. Miscellaneous Comments

1. Comments Concerning Soil Contamination

Comment 1. Woburn Conservation Commission remarked that the in-situ volatilization treatment might be ineffective for a wetland area when the water table lies at or near the ground surface. The Commission suggested that perhaps this treatment should be carried out in the wetland area when the water table is seasonally low, or that it be supplemented by treatment of groundwater on the site. The Commission also asked whether treatment of the groundwater would leave VOC residues in the saturated soils.

EPA Response: EPA agrees that the treatment will be ineffective at times when the water table lies at or near the ground surface and therefore attempts will be made to perform treatment during low water table periods. With both the on-site groundwater treatment and soil remediation, VOC contamination will be removed to the levels stated in the ROD and FS.

Comment 2. The Woburn Conservation Commission asked what types of pumps, pipes, and couplings are used to prevent leakage of VOCs into the atmosphere in the in-situ soil volatilization system.

EPA Response: All vapor collected from the volatilization system will be sent through a carbon adsorption unit for removal of VOCs. Details will be developed during design in order to secure a continuous seal. Air monitoring will occur to ensure compliance with air quality standards.

Comment 3. The Woburn Conservation Commission asked if EPA is considering a plan to revegetate treated soils.

EPA Response: As discussed in the FS, all areas where soil is removed in wetlands or floodplains will be restored to grade. In the case of removal of plants or trees, all attempts will be made to restore the wetland community and to revegetate bordering areas.

Comment 4. Congressman Markey stated that the volume of soil being treated seems extremely small given the areal extent of the Wells G & H site, being equivalent to just a fraction of an inch spread across the entire site. In addition, the Representative expressed concerns that the data base used to generate the alternatives in the FS was too small.

EPA Response: Soil and groundwater are two of the media at the Wells G & H site that were found to be contaminated. Groundwater contamination is fairly widespread throughout the site while soil

contamination is more limited. Soil sampling was done by a grid method and assumptions had to be made as to the extent of contamination that existed between two points. Additional soil sampling will be conducted during design to refine estimates of the amount of contaminated soil to be removed. This does not imply that the data set used to generate the alternatives in the FS was too small, but rather refers to the need to refine the areas of contamination already found. Data necessary for remedy selection is distinct from data required for remedial design. EPA maintains that the data used to generate the alternatives in the FS was sufficient to select a remedy from the technologies that were considered.

Comment 5. FACE and Citizen Medeiros expressed concerns regarding potential exposure to emissions during soil incineration. FACE expressed concern that emissions from on-site incineration of PCBs and pesticides would endanger residents in nearby neighborhoods and workers in adjacent areas if the incineration process should fail. Medeiros was concerned that the emissions could contain particles of chemical waste.

EPA Response: Testing and pilot scale studies will be done prior to full-scale operation on the incineration process to determine optimum operating parameters and to verify the ability of the process to remove principal organic hazardous constituents (POHCs) and particulates from emissions. Regulations under the Toxic Substances Control Act for PCB incineration require 99.9999% Destruction and Removal Efficiency (DRE), and under RCRA 99.99% for each POHC. System performance will be monitored throughout remediation to insure that emissions comply with all air quality standards. The incinerator will be shut down if noncompliance is discovered.

2. Comments Concerning Groundwater Contamination

Comment 1. FACE stated that they do not support the future use of the aquifer as a drinking water supply for the City of Woburn.

EPA Response: EPAs intention is to restore the aquifer to drinking water standards for a variety of reasons which are set forth in the ROD. If the City of Woburn or the local population does not wish the water to be used for a drinking water supply, that is their prerogative. EPA does not require a town or city to use a certain water supply.

Comment 2. FACE and Woburn Conservation Commission expressed concerns regarding effects of pumping and discharging groundwater. FACE expressed concern that pumping groundwater from six source areas to a central treatment plant would deplete

the aquifer and lower the level of the river when treated water is reinjected into the aquifer south of the treatment plant. FACE suggested that reinjecting the treated water at each of the source areas would be more protective of water levels in the area. Woburn Conservation Commission expressed concerns about erosion that could occur at the Aberjona River if all water was discharged to the river.

EPA Response: The location of the treatment plant(s) does not affect the level of the water in the river or the aquifer. However, the location of the extraction wells, and the area of reinjection of water would. The selected remedy no longer requires a central treatment plant nor pumping of the central area. The discharge locations of each of the five separate source areas may vary. Treated groundwater will be reinjected into the aquifer, released to the Aberjona River, or both. The discharge locations will be determined during the design phase. The effects on the River and aquifer will be considered and minimized.

Comment 3. Citizen Medeiros asked whether there would be monitoring and backup systems to ensure that the water treatment facility discharges only clean water into the river.

EPA Response: Monitoring of effluent from the individual source area groundwater treatment plants will be required before reinjection or disposal to insure that the water quality meets ARARs. The point of discharge for the effluent will be defined during the design phase for each individual plant.

3. Comments Concerning Wetlands Issues

Comment 1. FACE and Citizen Medeiros expressed concern over the possibility of a pipeline carrying contaminated water leaking or breaking and spreading contaminants, particularly in the area under Olympia Avenue through conservation land and wetlands.

EPA Response: As stated in the ROD, EPA now requires separate treatment plants and therefore no piping through the wetlands to a central plant is required.

Comment 2. Woburn Conservation Commission expressed concern that all wetlands impacts associated with this project be minimized as much as possible, and that all performance standards found in 310 CMR 10.00 be adhered to.

EPA Response: EPA shares this concern and will minimize wetlands impacts as it proceeds with the central area study, and

ultimately decides on the remedy for restoration of the central area aquifer.

Comment 3. Woburn Conservation Commission remarked that the central groundwater treatment facility should be located in an upland area, in an effort to preserve wetland resource areas.

EPA Response: Since EPA now requires separate treatment plants at each of the source areas, the placement of a central treatment facility is no longer relevant. Where wetlands may be an issue at the source areas, all treatment facilities will be located in upland areas to the extent possible.

4. Miscellaneous Comments

Comment 1. Congressman Markey expressed concern that EPA's Proposed Plan will not treat all contaminants posing a public health risk at the Wells G & H site, and that a more complete analysis should be provided. The Representative also remarked that the cleanup goals should be to remove all risk not just the majority of risk.

EPA Response: EPA's Endangerment Assessment (EA) evaluated the risk posed by all the contaminants found at the site. The chemicals that presented the greatest risk from different chemical classes and various media were selected as target compounds. Although there are contaminants that exist at the site that are not being removed, these contaminants do not present a health threat under both average and plausible maximum scenarios. It is technically not feasible to remove all risk from the site. EPA's selected remedy will remove the majority of the risk to reduce the risk to a minimal or nonsignificant level.

Comment 2. Woburn Conservation Commission remarked that before the site is removed from the National Priorities List, any separate operable units must be remediated.

EPA Response: Operable units are considered to be components of the larger site. Wells G & H will not be delisted until all operable units have been addressed.

Comment 3. Citizen Medeiros asked that the undeveloped land along Olympia Avenue not be sold to help defray cleanup costs, as was the case with the Industri-Plex site.

EPA Response: The Record of Decision (ROD) does not contemplate the sale of land to defray costs. EPA does plan to seek cleanup or payment from Potentially Responsible Parties (PRPs). However,

EPA has no control over whether a PRP sells land to defray costs of cleanup.

## B. Potentially Responsible Party (PRP) Comments

Comments received from the PRPs, and EPA's responses, are summarized and organized into the following categories:

1. Risk Evaluation
2. Soil Contamination
3. Groundwater Contamination
4. Engineering Issues
5. Legal Issues
6. Miscellaneous Comments

### 1. Comments Concerning Risk Evaluation

Comment 1. Beatrice - The Endangerment Assessment (EA) does not comply with EPA's Superfund Public Health Evaluation Manual. The EA relies on worst-case assumptions that create an inflated risk. The "representative concentration" used to find the "average case", assumes that a chemical was present even when analytical results from a laboratory state that it was not detected. The term "representative concentration" is arbitrary and misleading since it is not representative or the best estimate of concentrations as intended in the Manual.

EPA Response: The EA assesses the average case and plausible maximum case which is consistent with Superfund Public Health Evaluation Manual's (SPHEM's) best estimates and conservative upper bound estimates. It should be recognized that the EA does not present a "worst-case" analysis. The maximum plausible case has been a component of numerous Endangerment Assessments and is necessary to address potential exposure to discrete source areas. In laboratory analysis the precision and the accuracy of the analytical results must be taken into account. The non-detection of certain chemicals does not guarantee the absence of those chemicals. If chemicals are present below the detection limit but above the levels of concern, excluding these chemicals would underestimate the associated risk. Using the detection limit concentration for chemicals with "non-detection" is conservative and may be necessary in the best interest of public health protection. If, on the other hand, chemical concentrations are below both the detection limit and the levels of concern, their exclusion would not significantly impact the risk estimates.

Comment 2. Beatrice - The Endangerment Assessment (EA) gives no basis for assuming its frequencies of exposure. For example, it was assumed an individual would frequent the site 168 days per

year for 6 years. No individual would waste their time trespassing for this length of time.

EPA Response: EPA makes assumptions considered to be conservative and yet reasonable. Frequencies of exposure take into consideration unique site specific conditions. For example it is known that the site had been frequented in the past by young adults with bikes. With reference to the example cited by the commenter, the individual was assumed to frequent the site 168 days/year for 6 years under plausible maximum conditions. As stated in the EA, although the site is currently fenced, it is possible that the fence could be cut and young adults with dirt bikes could ride on the unpaved road at the Wildwood property. Conservative assumptions are employed to limit uncertainty in risk assessment. In a site as complex as Wells G & H, there is a considerable amount of uncertainty generated by site factors, in addition to the normal uncertainty associated with health criteria and exposure parameters. Considering these factors, along with EPA's mandate to protect public health and the environment, any relaxation of the degree of conservatism of the assumptions could result in greater uncertainty and, ultimately, a diminished degree of health protection.

Comment 3. Beatrice - The Endangerment Assessment (EA) uses a 45% absorption factor in the percent PAHs, pesticides, PCBs and phthalates absorbed from ingested soils. A factor of 25% is more appropriate based on a study by Poiger and Schlatter on tetrachlorodibenzoparadioxin 2,3,7,8 TCDD (referred to as TCDD).

EPA Response: Much of the technical information which has been supplied by the commenter is erroneous and indicates bias in selectively citing studies. Investigators (e.g., McConnell, E.E., Science 223, 1077, 1984; Umbreit, T., et al, Science, 232, 497, 1986; Rumbaugh, R.C. et al, Toxicologist, 4:113, 1984) have found the bioavailability of TCDD to range upward to 85%, which is a value considerably higher than both that used in the EA and cited by the commenter. Poigner and Schlatter (1980, referenced in the Endangerment Assessment) presented a range of absorption from 19.3 to 28.9% for TCDD from an aqueous suspension. Gries and Marrow (J. Agri. Food Chem. 23.265, 1985) found that about 45% of TCDD was absorbed from food. In view of the considerable uncertainty as demonstrated by these values, EPA believes that 45% is a reasonable value to use.

Comment 4. Beatrice - The Endangerment Assessment (EA) uses 100% absorption factor for percent inorganic compounds absorbed from ingested soils. A value of 10% would be more reasonable as indicated by the Drinking Water Health Advisory.

EPA Response: The comments concerning oral ingestion of metals indicate a misinterpretation of the meaning and application of the relative absorption factor (RAF) by the commenter. RAF is not the measurement of actual absorption rate. It is the ratio of the actual absorption rate through the medium and the route of the study. It is used in the calculation of reference dose (RfD) for non-carcinogenic effects or cancer potency factor (CPF) for carcinogenic effects. For example, the EA does not assume 100% absorption of inorganic compounds from soil by ingestion. Rather, the EA assumes that the absorption of inorganics from soil by ingestion is the same as that from the study used to derive the RFD or CPF.

Comment 5. Beatrice - The Endangerment Assessment (EA) uses inappropriately high absorption values for the percent of organic compounds absorbed dermally from the skin. Absorption studies indicated that most chemicals were poorly absorbed after topical administration.

EPA Response: EPA believes the commenter has cited references in a selective manner. The commenter's evaluation would lead one to believe that dermal absorption of pesticides was poor. More recent work, however, shows that particular pesticides can be up to 90% absorbed through the skin (Shah, P.V. et al. Jour. Tox. Environ. Health, 21:353, 1987). In addition, certain aromatic hydrocarbons can be absorbed through the skin more readily than water (Brown et al., AJPH, May 1984, 74:479). EPA feels that the weight of evidence and the amount of uncertainty clearly supports the choice of assumptions used in the Endangerment Assessment. EPA also points out that, as noted above, literature exists which supports more extreme values than were used for many of the Endangerment Assessment exposure scenarios, further demonstrating that an overall worst case approach was not taken.

Comment 6. Beatrice - The Endangerment Assessment's (EA's) estimates of fugitive dust emissions are not correctly applied to the exposure model. Three of four variables exceed the requirements for valid situations for use of the equation as described in the Superfund Exposure Assessment Manual.

EPA Response: EPA disagrees with the analysis of the fugitive dust model presented by the commenter. The most recent version of the reference (EPA, 1985, Compilation of Air Pollution Emission Factors, 4th Ed., known as AP.42) makes no reference to "valid" situations. EPA very clearly states that the use of this model will generate a quality rating of "A" if used under the conditions which are called "valid situations" by the commenter. Reasonable extrapolation to other conditions will result in a quality rating of "B". Although a quality rating of "B" is adequate for use in a risk assessment, it will be associated with

more uncertainty than a rating of "A"; therefore, EPA feels justified in using conservative assumptions in conjunction with this model.

Comment 7. UniFirst - Lead is a chemical of potential concern and has been poorly studied at the Wells G & H site. Its presence was detected in the groundwater. The Feasibility Study calculation of daily intake of lead does not include the fact that half of intake may come from food and beverage.

EPA Response: Lead was considered to be a chemical of potential concern at the Wells G & H site. The data base used in the Endangerment Assessment was selected to provide the most accurate representation of potential exposures to groundwater at the site. Lead was only detected once in the central area of the site in the subset of wells considered (S68, S83, S85, S86, S87, and S89). It is likely that data reported by UniFirst for lead detected in Well G and Well H were samples that were not filtered.

Action levels were determined for those chemicals to which exposure would result in a level which exceeded the reference dose for noncarcinogens. Exposure to lead at any of the source areas did not result in this level of exposure. Nonetheless, the soil action level for lead did consider lead in drinking water, although this was not explicitly referred to in the Feasibility Study (FS). The background level referred to all ambient exposures, not only air exposures as was stated in the text of the FS.

Comment 8. Beatrice - The proposed cleanup levels for contaminants in soil and groundwater at the 15 acre Wildwood property are excessively stringent. Beatrice states that EPA assumes that the aquifer should be remediated to drinking water standards. Beatrice states that MCLs are arbitrary because it is unlikely that anyone would operate a drinking water supply well on the 15 acres. Beatrice proposes to apply cleanup standards at the place where the discharge of groundwater will create a risk of exposure to wildlife (the Aberjona River) where the permissible groundwater quality standards can be set as Alternative Concentration Limits (ACLs) that take into account surface water dilution.

EPA Response: With respect to achieving drinking water standards in the aquifer, EPA states in 40 CFR Part 300, National Oil and Hazardous Substances Pollution Contingency Plan; Proposed Rule (Fed. Reg. 53:51394-51520, December 21, 1988) that "it has been the policy of EPA's Superfund program for several years to operate within the framework of EPA's Groundwater Protection Strategy in determining the appropriate remediation for

contaminated groundwater at CERCLA sites." The groundwater at the Wells G & H site has been used as a drinking water source in the past and is classified as a Class II-B groundwater, one that may potentially be used as a drinking water source. EPA states further that, "for groundwater that is or may be used for drinking water (Class I or II), the maximum contaminant levels (MCLs) set under the Safe Drinking Water Act or more stringent promulgated State standards are generally applicable or relevant and appropriate standards" (ARARs). There are six limited circumstances where ARARs may be waived under CERCLA § 121(d)(4). These are:

> i) the remedial action selected is only part of a total remedial action that will attain such level or standard of control when completed;
>
> ii) compliance with such requirement at that facility will result in greater risk to human health and the environment than alternative options;
>
> iii) compliance with such requirements is technically impracticable from an engineering perspective;
>
> iv) the remedial action selected will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, criteria, or limitation, through use of another method or approach;
>
> v) with respect to a State standard, requirement, criteria, or limitation, the State has not consistently applied (or demonstrated the intention to consistently apply) the standard, requirement, criteria, or limitation in similar circumstances at other remedial actions within the State; or
>
> vi) in the case of a remedial action to be undertaken solely under section 104 using the Fund, selection of a remedial action that attains such level or standard of control will not provide a balance between the need for protection of public health and welfare and the environment at the facility under consideration, and the availability of amounts from the Fund to respond to other sites which present or may present a threat to public health or welfare or the environment, taking into consideration the relative immediacy of such threats.

None of these six conditions apply at the Wells G & H site. Thus, EPA is justified in setting action levels that will result in the attainment of drinking water standards in the aquifer throughout the site.

It should be noted that the cleanup standards for treated groundwater are distinct from the cleanup standards to be met in the aquifer. EPA identified Maximum Contaminant Levels (MCLs), under the Safe Drinking Water Act, as cleanup goals for the groundwater to be met in the aquifer. Cleanup standards for treated groundwater will depend upon the point of discharge which will be defined during design. If the effluent is discharged to the aquifer, MCLs would be appropriate. If the effluent is discharged to the Aberjona River, effluent targets will be the Massachusetts Ambient Water Quality Standards (AWQSs).

Comment 9. Beatrice - A proper Endangerment Assessment (EA) of the 15 acre Wildwood property shows minimal risk to human health and only modest risk to wildlife. Residential use of the property is unlikely as is the use of the aquifer as a drinking water supply. Due to this low potential for exposure, risks to human health are vanishingly small.

EPA Response: EA Table 1-1 shows "potential pathways of exposure to contaminants originating at the Wells G & H Site". It indicates that potential for human exposure is low or low to medium under the current condition. However, it also shows that the potential for human exposure to contaminated soil and groundwater is high in the future. In the remediation of Superfund sites, EPA must consider both the current and future exposure scenarios. See comment 10 for a discussion of the probability of future exposure scenarios.

Comment 10. W. R. Grace & Co. and New England Plastic (NEP) - Future use scenarios for the respective properties are not likely, probable or reasonable. The properties are not zoned for residences and it is unlikely that the property will ever be developed for residential purposes. NEP thus maintains there is no risk or future risk involving soil contamination at NEP. W.R. Grace & Co. further states there is no reasonable possibility that a well to supply drinking water will be installed at the Grace property. Grace thus maintains that no complete exposure pathways exist under either current or future use conditions.

EPA Response: EPA cannot control future potential uses of properties within a Superfund site. Considering that the site is a mixed zoning area containing residential (next to W.R. Grace & Co.), light industrial, and commercial areas, it is indeed possible that at some time in the future the properties could be used for residential purposes or for commercial purposes. Under such scenarios, exposure to adults and children may be greater than at present. The same argument applies to the installation

of a private well. EPA must take into consideration present risk as well as any future risk to public health.

Comment 11. Beatrice - All risk from dermal contact from soil and sludge is less than EPA's acceptable range of $10^{-4}$ - $10^{-7}$.

EPA Response: EPA's primary goal is to protect the public health to the extent feasible. Risk from dermal contact from soil and sludge are within the range of $10^{-4}$ to $10^{-7}$ considered for remediation. However, the point of departure is $10^{-6}$.

2. Comments Concerning Soil Contamination

Comment 1. Beatrice - The cleanup levels for soils on the 15 acres are inconsistent with standards at other CERCLA sites in Region I. The Ottati & Goss Site in Kingston, New Hampshire used different soil levels for similar conditions.

EPA Response: Cleanup levels are developed under site specific consideration. Levels also reflect the best information and knowledge available at the time of the cleanup level development. While the methodology used for the cleanup level development should be the same or similar for each site, the ultimate cleanup level may vary from one site to another based on site-specific circumstances.

Comment 2. Olympia - The Proposed Plan does not specifically indicate the amount of soil to be removed from Juniper (Olympia) property. The levels of contaminants on the Juniper property do not warrant soil treatment.

EPA Response: The quantity of soil that will be removed on the Olympia property is written in the FS under the $10^{-6}$ risk range category (Appendix D Table D-5). It is based on cleanup levels established for contaminants which were found on the Olympia property in levels that present a risk to public health. EPA estimates that there is approximately 5 cubic yards of contaminated soil to be removed at the Olympia property. Soil sampling will be conducted during design in order to refine this estimate.

Comment 3. Beatrice - The manner in which contaminated soil volumes were calculated at the Wildwood property is inexact and inappropriate.

EPA Response: EPA acknowledges that the calculated volumes of contaminated soil at the Wildwood property anticipated to require remediation are not exact values. However, the method used to

calculate soil volumes is considered appropriate for the Feasibility Study (FS) evaluation purposes for which it was intended. As identified in the ROD, soil sampling will take place during remedial design in order to refine the soil volumes presented in the FS.

At the Wildwood site, separate volume calculations were made for soil contaminated with VOCs and non-volatile organic contaminants. This was done since different remedial treatment technologies were developed for the two different types of contaminated soil. The VOC contaminated area was based on contamination detected in several borings, including borings #4, #7, #8, #11, #12, #13, #15, A3, A4, A5 and MW-13 (based on the results of the Part II RI and the Supplemental RI). The actual delineation line was based on field observations made during the Supplemental RI fieldwork and the J. J. Riley site activity map prepared by Weston Geophysical Corporation. The VOC area which was used in the volume calculation includes the area encompassing all of the VOC contaminated soil borings in close geographic proximity to each other, plus an area around isolated boring #15. Volume calculations assumed contamination to the four foot water table depth.

Mixed (volatile and non-volatile) contaminated soil volumes are based on contamination detected in borings #1, #5, #9, #10 and A16 from the Part II RI and the Supplemental RI (See Tables D-1 and D-5 of the FS Appendix D). The actual volume delineation line was again based on field observations during the Supplemental RI and the J. J. Riley site activity map. Borings #9, #10 and A16 are in the same area of the property. Boring #1 encompassed area underneath the debris pile. As is discussed in the FS, for VOC contaminated soil borings, the depth of contamination was either estimated from the sampling results where detailed contaminant concentration depth profiles existed, or assumed to be the depth to the water table (approximately 4 feet).

Finally, for subsurface VOC contamination at isolated borings such as boring #15, a 20 foot by 20 foot area of contamination was assumed. This was done in recognition of the fact that the VOC contaminants are relatively mobile and not readily attenuated by soils. Smaller contaminated soil volumes (10 feet by 10 feet) were assumed for surface soils which are predominantly contaminated with non-volatile and relatively non-mobile contaminants.

3. Comments Concerning Groundwater Contamination

Comment 1. W.R. Grace & Co. - The hydrogeological flow model and general approach is not appropriate for application in developing pump and treat alternatives.

EPA Response: The model used, the Prickett Lonnquist Aquifer Simulation Model, provided only two portions of the analysis of the pump and treat alternatives; (1) the minimum pumping rates required to capture the source plumes, and (2) groundwater contours for each of the four pump and treat alternatives. A second approach of removing one plume volume per year was also used to establish pumping rates. The recommended pumping rate was then selected as the larger of either the minimum rate or the rate required to remove one plume volume per year, and a crude estimate of bedrock pumping was added. The recommended pumping rate in the overburden aquifer was then used to produce the groundwater contours for each of the four pump and treat alternatives. Thus, the flow model was not actually used to evaluate the pump and treat alternatives.

In a more classical approach to evaluation of the alternatives, the flow model would have been used to determine groundwater velocities for input into a groundwater transport model. The transport model would have then been used to evaluate clean-up times where absorption/desorption of the contaminant was considered. Because the amount of organic carbon in the overburden aquifer was unknown, and there was little data to evaluate the influence of the bedrock, the classical approach was not followed and a more simplified approach was taken (i.e., the amount of data available did not warrant application of a more sophisticated approach).

The EPA used a simplified approach based on a relationship between the number of flush volumes and the organic carbon content of the overburden to estimate clean-up times. A realistic, yet conservative range of possible overburden organic carbon contents was assumed. This approach yields clean-up times that range from three to over 50 years. Had data on organic carbon content been available, a more exact clean-up time could have been obtained, and had data on the bedrock properties been available, more exact pumping rates could have been obtained. It is recognized that the refinement of clean-up times and pumping rates may alter the estimated costs of clean-up. However, it will not alter the decision that pump and treat is the best mode of remediation at the Wells G & H site. Refinement of pumping rates and clean-up times will be accomplished during the remedial design.

Comment 2. Beatrice - The treatment of the central aquifer area is technically insupportable. The aquifer will never meet drinking water standards due to high background levels of naturally occurring substances. It is arbitrary to impose the cost of treating the groundwater when it will never be potable without further treatment. The more reasonable approach would be to let the aquifer cleanse itself through natural processes in approximately 20 years.

EPA Response: EPA believes the commenter has misinterpreted the time necessary for the central area to clean itself under natural conditions (with only the Riley Well pumping). The cleanup time for the central area under natural conditions is estimated to be 200 to 1000 years (Feasibility Study Appendix C-27) rather than the 20 years stated by the commenter. At this time, the Riley Well has ceased pumping and the ROD no longer calls for immediate pumping of the central area. Since the Riley Well is no longer pumping, the time frame for the aquifer to cleanse itself under natural conditions would be longer than previously stated. See comment 12 in the Engineering Issues section of this Responsiveness Summary for discussion of remediation of naturally occurring substances in the groundwater.

A number of comments were received by the EPA regarding the central area. In light of these comments, EPA has decided to perform a focused study to more fully evaluate the concerns that were raised during the public comment period prior to making a decision on remediation of this area. The objectives of this study are discussed in the ROD.

Comment 3. UniFirst Corp. - The DNAPL problem in the UniFirst property groundwater must be resolved prior to overburden pumping or soil excavation.

EPA Response: EPA agrees that the DNAPL problem in the bedrock at the UniFirst property must be resolved prior to establishment of an effective pump and treat system for the contaminated groundwater in the overburden. The source of contamination, the undissolved DNAPL, must be removed or the overburden aquifer will be recontaminated from the bedrock. The DNAPL problem in the bedrock will be investigated further during design and the results will be used to obtain a better estimate of cleanup times as EPA has stated in the Feasibility Study Appendix C.

Comment 4. UniFirst Corp. - The assumed organic carbon values (less than 0.1-0.5%) used to estimate flushing times are much too large.

EPA Response: The assumed organic carbon values of 0.1% to 0.5% are within the range of values expected for deep unconsolidated river sediments. The sand and gravel deposits were reworked by the ancestral Aberjona River and the finer material (silts and clays) would be expected to have higher concentrations. As the deposition of glacial outwash along the river neared an end, the amount of organic carbon in the upper deposits would also be expected to be higher because they were deposited over a longer time period. As the deposition outwash sediments ended, marshes formed, which deposited a layer of peat along the river

(i.e., very high organic carbon). As noted by the commenter (Cherry, etal, 1989; pp 26) maximum thicknesses of the peat layer have been demonstrated to reach up to 26 feet deep. Meandering of the Aberjona River over the last few thousand years has reworked the upper layer of outwash and peat so that the peat layer is discontinuous. This reworking has likely mixed organic carbon from the peat layer and other near surface soils into the upper layers of the outwash deposits. The mode of deposition of the sediments in the central area has formed a complex system of sediments in which the organic carbon would be expected to range from fractions of a percent to nearly 100 percent.

For these reasons EPA believes that assumption of organic carbon contents lower than 0.1% would result in very optimistic flushing times for removal of volatile organic contaminants. Also, because of the history of these deposits, sampling to arrive at a realistic average value for organic carbon would require the collection of numerous cores to sample the braided deposits which are expected to vary in organic carbon in both vertical and lateral directions.

Finally, it should also be recognized that the flushing time calculation estimates presented in Appendix C of the Feasibility Study, while conservative, are far from being too large, as is shown with respect to certain calculation assumptions. For example, these calculations were based on trichloroethene (TCE) since it is the most widespread volatile halogenated organic groundwater contaminant at the Wells G & H site. However, in certain areas, including the UniFirst property and in central site areas abutting this property, groundwater tetrachloroethene (PCE) concentrations are significantly greater than TCE concentrations. It is well known that PCE possesses a significantly higher organic carbon normalized partition coefficient (Koc) value (364; EPA, 1986)than does TCE (126; EPA, 1986). This implies that PCE is likely to be significantly more difficult to flush out of the aquifer system than TCE and will require longer flushing times. Based on the calculations in Appendix C of the Feasibility Study, PCE might require up to three times as long as TCE to achieve a similar concentration reduction.

In view of this, EPA again believes that the assumption of optimal flushing conditions, including low sediment total organic carbon values would result in overly optimistic predictions of times required for groundwater volatile organic removal.

Comment 5. UniFirst Corp. - Due to the hydraulic connection between the Aberjona River and the aquifer, pumping the central area will result in the introduction of non-VOC contaminants present in the surface water and watershed into the central area. These include coliform, PAHs, and heavy metals. An introduction

of these contaminants will further complicate the remedial attempts and be counter productive to the achievement of stated groundwater goals for the central area.

EPA Response: EPA believes that a more detailed investigation of the central area is warranted before a decision on remediation of that area can be made. As stated in the ROD, a study of the central area will address issues such as the interaction of the Aberjona River and the aquifer, and the impacts of pumping the central area.

Comment 6. UniFirst Corp. - Due to the hydraulic connection between the Aberjona River and the aquifer, pumping the central area will result in the introduction of microorganisms and viruses into the central area.

EPA Response: It is possible that, as the commenter contends, viruses and microorganisms may migrate from the Aberjona River to the central area. As stated in the previous response, the selected remedy no longer calls for pumping of the central area at this time. The hydraulic connection between the Aberjona River and the aquifer will be further evaluated. It should be noted, however, that if this water were to be used as a municipal water supply, it would most likely be required to be filtered prior to distribution.

Comment 7. UniFirst Corp. - The level of radionuclides detected in the groundwater at the Wells G & H site poses a potential hazard with respect to water usage.

EPA Response: From the available data, it is uncertain as to whether the source of the elevated levels at well S22 is anthropogenic or naturally occurring. Given the fact that elevated naturally occurring bedrock formations can act as a source of radionuclides in groundwater, the latter explanation is quite possible. Assuming the radionuclide source is naturally occurring and localized, it may have little site wide impact. This would be further evaluated during remedial design. However, given the close proximity of well S22 to the UniFirst and W. R. Grace Properties, extraction of water from the bedrock could be of potentially greater concern and may impact groundwater treatment at these locations. More detailed evaluation of potential risks from radionuclides would be conducted as part of further evaluations of potential aquifer usage.

Five wells (S72S, S81S, S77S, S84S,and S22) were sampled for radionuclides. Four of the wells, those designated with an S after the well number, were screened in the overburden. Well S22 was screened in the bedrock aquifer. With the exception of

levels in Well S22, all the radionuclide concentrations were below the Maximum Concentration Limits (MCLs).

The water samples used in the Endangerment Assessment were unfiltered water samples. Well S22 was resampled by EPA and the radionuclides were found to be present, primarily in the particulate phase. If the aquifer were used for drinking water purposes, the water would be expected to undergo filtration prior to distribution, thereby reducing the concentrations of the radionuclides to meet drinking water standards. Similarly, because the only well to contain relatively high concentrations of radionuclides was a bedrock well, significantly removed from Wells G & H, it is quite possible that the overburden soils could act as a natural filter if water were pumped from the central area.

Background concentrations of radionuclides for the Woburn area are not available. The concentrations detected at the Wells G & H site can, however, be compared to nationwide concentrations. Radium-226,228 concentrations in municipal water supplies ranged from 0.1 pCi/liter to 25 pCi/liter (EPA, Notice of Proposed Rulemaking Dealing With Radionuclides under the Safe Drinking Water Act. Fed. Reg. 51.34836, Sept. 30, 1986). The radium-226,228 geometric mean and maximum concentrations range from 0.2 pCi/liter to 6.7 pCi/liter. The geometric mean concentration of uranium is 2.4 pCi/liter and the maximum concentration is 4 pCi/liter at Wells G & H. These concentrations fall within the range of national concentrations.

The range of gross alpha particles detected in national samples is less than 15 pCi/liter to 40 pCi/liter, which is within this range. The maximum concentration of gross alpha particles is 350 pCi/liter which is outside this range. National average concentrations were not presented for gross beta particles in the Federal Register notice.

Comment 8. W. R. Grace & Co. - The central area used in the groundwater modeling represents neither the zone of influence nor the zone of contribution.

EPA Response: The EPA agrees with W. R. Grace that the central area represents neither the zone of influence nor the zone of contribution to Wells G & H. It represents portions of both the zone of influence and the zone of contribution. The central area approximates more or less the portion of the site remaining after the source plumes are removed. For that reason it was defined as "the elliptical region most influenced by Wells G & H" (Feasibility Study Appendix C, page c-1).

Comment 9. W. R. Grace & Co. - The hydrogeological flow model was so flawed, it could not be used for evaluation purposes of pump and treat alternatives.

EPA Response: As previously indicated in Comment 1 of this section, a groundwater flow model was used to aid in evaluation of the pump and treat alternatives. The model was used to provide two products. First, the model was used to help calculate the theoretical minimum pumping requirements (based on a criterion that the pumping rate must be large enough to ensure that there was no further expansion of the contaminated groundwater plumes); second, the model was used to enhance understanding of the flow pattern for each pump and treat alternative. These two results from the flow model were then combined with calculations of the number of flush volumes necessary to remove contamination to develop cleanup time estimates for each source plume area and the central area. The combined flow modeling and cleanup time analysis indicates that cleanup times may require up to 50 years and that pumping is recommended at each source plume area and the central area to ensure that there is no further spread of contamination.

In general, the flow model used parallels developed by the USGS, and was calibrated based on the USGS 30-day pumping test. The model uses hydraulic conductivity data developed by USGS and these data were modified where necessary to yield better results. The Aberjona River and the aquifer-river interaction was incorporated into the model using 28 constant head river nodes. The model was found to be representative of site data over short durations, and should not be expected to be accurate for long duration model runs because recharge was not incorporated into it. Because the model was only used to develop minimum pumping rates (to which a safety factor of 3 was applied to account for uncertainties), and to determine groundwater contours for each alternative (both of which could be done in a short duration model run), the EPA believes that it is adequate for this purpose.

As was indicated in the Feasibility Study (FS), it is recognized that the flow model developed for the Wells G & H site has uncertainties and should not be expected to be completely and precisely representative of the hydrogeologic system. The weaknesses of the model were pointed out explicitly in Appendix C of the FS report. For example, the first paragraph of Appendix C states: "Therefore, the modeling and calculations discussed in this appendix are not a basis for design of pump and treat systems." Comments focusing mainly on model uncertainty and accuracy fail to recognize the intended purpose of the model.

As discussed and indicated in Appendix C of the FS, a relatively conservative safety factor was applied to model results wherever necessary. It is acknowledged that with a more accurate and

representative model, more precise and possibly shorter cleanup time frames may result. However, EPA feels that any increased accuracy in flow modeling to support the FS evaluations would be completely outweighed by uncertainties in the effects of bedrock aquifer contamination, contaminant sediment-water interactions in the overburden, and the presence of DNAPL.

Responses to specific comments on the model are provided below:

Response to Comments on the Area to be Modeled

The model locations shown in Figure C-2 of Feasibility Study Appendix C represent exactly where the simulation properties are defined. The modeling area was not misrepresented in any of the simulations. This figure, showing the model grid, was not intended to delineate the simulation boundary.

Response to Comments on the Model Boundary Conditions

Due to an oversight, an inconsistency was not corrected in the final version of Appendix C. The correct version of the text on page C-5 of Appendix C (first paragraph) is provided as follows:

Instead of "Constant head boundary conditions were imposed in the top two layers at the north, east, and west boundaries with the piezometric head ranging from 50 feet to 95 feet", it should read "Constant head boundary conditions were imposed in the top two layers at the west boundaries with the piezometric head ranging from 50 feet to 95 feet".

In addition, the constant head boundary condition was correctly set by using a recharge factor of 10E12. Although the User's manual for PLASM specifies the use of a large number for this factor, it does not mean that you have to use 10E21. For the computer which was used (IBM Personal System/2), using an input of 10E12 has the effect of simulating constant head boundary conditions. In a model test it would not make any difference whether 10E12 or 10E21 is used. The west boundary will always maintain a constant piezometric level.

The uncertainty associated with the model boundary conditions is recognized. The boundary conditions set forth in the model were based on a USGS study (draft USGS report) with certain modifications. If the commenter has more reliable information regarding boundary conditions, and how incorporating such information into the model would alter the results of analyses of the pump and treat alternatives, EPA is receptive to such changes and improvement.

Response to Comments on the Use of the "Calibrated" Model for Actual Simulation

The "calibrated" model was correctly used to evaluate pump and treat alternatives. Using a set of obsolete data (for the "calibrated" model), the commenter has mistakenly pointed out that EPA's consultant "had altered the model during the simulation". The boundary nodes and their recharge rates shown in the commenter's obsolete calibration data (Geotrans, 1989; Figures 4-3 and 4-4) should be replaced by all the boundary nodes and their recharge rates shown in Figure 4-5.

Response to Comments on Model Accuracy

In the data files, the ERROR criteria was deliberately set to 3 feet which is much tighter than necessary so that the maximum number of iterations (in this case, 50 times) would be guaranteed in each numerical calculation. This allowed evaluation of the maximum ERROR generated by the simulation.

Using the commenter's example (Geotrans, 1989; Table 4-2), the maximum error resulting from 50 iterations is 8.4 feet. This ERROR value is considered to be acceptable for the purposes for which the model was used.

Response to Comments on Model Calibration

Two errors related to model calibration were included in the discussion in Appendix C of the FS in the first paragraph on page C-6. First, on line 2, instead of "3-day Pumping Test", it should be "30-day Pumping Test". Second, on line 3, instead of "steady state conditions", it should be "conditions where wells G&H are not pumping".

It should be recognized that a steady state hydrogeological flow condition would not be established in the Wells G & H site due to dynamic hydrologic changes. A steady state simulation was not attempted because recharge was not incorporated into the model. During the processes of model calibration, two simulations were performed: one with Wells G & H pumping, and the other without Wells G & H pumping. Both simulations are under the transient conditions (not steady state conditions), and also both simulations have one well pumping (the Riley Well is pumping even under the non-G&H pumping condition); nevertheless, the input data file for the G&H pumping simulation was named GH1PMP with the connotation of "Pumping" and for the non-G&H pumping simulation GH1SS, for convenience. The terms "Pumping (PMP)" and "Steady State (SS)" were "in-house" terms used, to distinguish the two transient simulations.

Response to Comments on Aquifer Hydraulic Properties

The hydraulic properties at the nodes that represent Wells G & H were imposed in order to yield a model calibration against the USGS 30-day pumping test. It is recognized that these values are not representative of the values derived from the test, which are used for the area surrounding the wells. The aquifer response data during the pumping test are best simulated using these values, and the values could represent deterioration of the wells prior to the test being conducted.

The higher value of hydraulic conductivity at the Riley Well is an artifact of prior model runs where the Riley Well was thought to have been pumping at 650 gpm. This higher value was necessary to simulate the unrealistically high pumping rate. When the actual pumping rate at the Riley Well was found to be 270 gpm the higher hydraulic conductivity at the well was not reduced accordingly. This oversight should not affect the groundwater contours in the vicinity of the Riley Well.

Response to Comment on Simulation Time Frames

At the time that the Work Plan for the FS was written, long term groundwater flow modeling was expected to be done, and there was a possibility that groundwater transport modeling would also be conducted. As work at the site progressed, it became apparent that the data available did not warrant the application of detailed flow and transport modeling. Data on the distribution of organic carbon in the overburden aquifer and on the relationship between the bedrock and the overburden aquifer were inadequate for application of a more sophisticated approach.

The model used was intended only to simulate pumping rates and groundwater contours from short duration model runs (less than 30 days). The model is limited for long term calculations because recharge is not incorporated into it. The EPA agrees that longer term more detailed modeling may be required for the design phase at the Wells G & H site. This modeling should incorporate the bedrock aquifer. Also, a more regional approach may be required to obtain a better understanding of the boundary conditions for site modeling of groundwater flow and contaminant transport.

Response to Comments on Recharge and River Interaction

The model which was used does not incorporate recharge from rainfall. For this reason the model cannot be used to simulate long periods of time. It is recognized that over longer periods of time, rainfall infiltration would have to be added to the model. However, the small error introduced by not incorporating recharge is outweighed by the uncertainty factor of 3 applied to the minimum pumping rates. In addition, the groundwater contours

are insensitive to recharge over the short simulation time periods.

The river recharge/discharge was incorporated into the model using 28 constant head river nodes. Failure to recognize the existence of this feature in the modeling may have stimulated a number of comments on the poor agreement of the model with field conditions.

Response to Comments on the Ability of the Model to Evaluate the W. R. Grace Site

The minimum pumping rate for the W. R. Grace source plume was calculated as the flow through a cross section of the source plume. The fact that the model does not incorporate all of the source plume will not affect flow through this cross section. The simulated minimum value of 9.6 gpm was then multiplied by a factor of 3 to account for uncertainties in the model. This gave a minimum pumping rate of 30 gpm. A second approach of pumping one plume volume per year gave a value of 45 gpm. This number was based on the entire plume area, a thickness of 80 feet, and a porosity of 0.25 percent. The higher value of 45 gpm was then used in the flow model to produce groundwater contours in the vicinity of the source plume. For this simulation the pumping was assumed to take place in only one location near the downgradient tip of the source plume which is well within the modeled area.

Pre-design work including source specific pump tests will be required to refine pumping rates. In addition, more detailed modeling may be required in order to: (1) incorporate the effects of the fractured bedrock, (2) determine the placement of pumping wells, and (3) incorporate site specific features at each source plume area. Modeling would consider only one source plume area at a time (i.e., the W. R. Grace site) in order to more accurately incorporate site specific features (e.g., a thinner, tighter overburden). It is recognized that the value of pumping at each source plume area could change somewhat during the design phase. However, the EPA considers the values used to be adequate for the Feasibility Study analyses of the potential costs of each alternative.

The reversal of gradients discussed by the commenter may have resulted from not incorporating the river/aquifer interaction into the model. As they stated earlier these interactions are extremely important to defining aquifer behavior.

Comment 10. UniFirst Corp. and Beatrice - Pumping the central area aquifer at Wells G & H will dry-up the wetlands.

EPA Response: As stated in the ROD, the selected remedy no longer calls for pumping of the central area at this time. The potential effects of pumping the central area will be evaluated further during conduct of the central area study.

Comment 11. UniFirst Corp. - Pumping rates at the UniFirst property are not correct especially for the overburden.

EPA Response: Values of hydraulic conductivity for the overburden aquifer were taken from the USGS pumping test which was conducted at Wells G & H. The hydraulic conductivity from the test is not likely very representative of glacial deposits farther from the river. Pumping rates at UniFirst will be defined during the design phase and will be based on the results of predesign pump tests and investigations.

Comment 12. New England Plastics (NEP) - NEP property should not be part of the site. USGS pump test failed to establish that NEP is within the zone of contribution of Wells G & H. Groundwater in the overburden aquifer flows from NEP to the southwest and any contaminant plumes are likely to reach the Aberjona River watershed, if at all, downgradient from the site (Wells G & H).

EPA Response: Clearly, under existing conditions, with only the Riley Well pumping, groundwater in the vicinity of the New England Plastics site flows southward toward the Aberjona River and Salem Street. However, as shown by the USGS pumping test and EPA modeling, some of the groundwater at New England Plastics is within the zone of contribution of Wells G & H when they are pumping (Feasibility Study, Appendix C). The shape of the contaminant plume (100 ppb total volatile organics) at New England Plastics is elongate in the direction of Well G which indicates the past influence of pumping of this well on the plume.

Comment 13. New England Plastics (NEP) - EPA studies to date have not adequately considered bedrock groundwater contamination and its significance. The overburden and bedrock aquifers behave differently and should be studied further by EPA.

EPA Response: The EPA study of the Wells G & H site focused largely on contamination in the overburden aquifer. The data available from these two interconnected aquifer systems indicates that much of the migration at each plume area has occurred in the overburden aquifer. The migration in the underlying fractured bedrock is expected to be slower. This slower migration has both positive and negative aspects; the positive aspect is that the spread of contamination is slower while the negative aspect is

that the fractured bedrock will be much more difficult to remediate.

As presented in the ROD, the EPA recognizes the outstanding issues associated with the bedrock. Additional study of the bedrock aquifer will occur both during the predesign phase of the remedy, and during further investigation of the central area.

Comment 14. New England Plastics (NEP) - The extent of bedrock groundwater contamination in upgradient areas of the Wells G & H site has not been adequately considered. Any contamination on NEP property in the deep bedrock can be traced to upgradient sources. The direction of groundwater flow indicates the existence of a bedrock recharge area under the UniFirst and W.R. Grace properties. This documents how VOCs found in W.R. Grace's bedrock and under UniFirst property are migrating into NEP's bedrock.

EPA Response: The EPA, as NEP stated, did not address volatile organics in the fractured bedrock in recharge areas such as UniFirst. As stated in the response to the previous question, the EPA will more thoroughly address the bedrock contamination during the design phase through additional field investigations and more detailed groundwater modeling. Based on existing data, it appears that vertical migration of contaminants into the bedrock has occurred at plume areas which are in recharge areas. However, there is little evidence of significant lateral migration of contaminants in the bedrock aquifer.

Comment 15. New England Plastics - The pump and treat system in the central area may adversely affect contaminant plumes in the source areas.

EPA Response: It is recognized that pump and treat operations should not be initiated in the central area prior to initiation in the source areas. The reason for this is that pumping in the central area will tend to increase the downward gradient in areas further from the river such as Unifirst and W. R. Grace. This increased gradient could cause contaminants in these areas to migrate deeper into the bedrock. However, the data that exists on bedrock contamination indicates that there has been much more lateral spread of contaminants in the overburden than in the bedrock. As already stated, the central area pump and treat system is not a part of this remedy. The effects of pumping the central area will be further investigated as part of the central area study.

Comment 16. Olympia - EPA did not specify where groundwater extraction would occur within the Olympia property.

EPA Response: The exact locations of extraction wells will be determined in the design phase. However, it will most likely be in the vicinity of the area where substantial groundwater contamination with TCE was located.

Comment 17. Cummings Properties Management, Inc. (CPMI) - CPMI objects to the pathway of the proposed pipeline of contaminated water to the central treatment plant.

EPA Response: The ROD no longer calls for a central treatment plant therefore there will be no pipes connecting the 5 source areas or through the CPMI properties.

Comment 18. W.R. Grace - Whitney Barrel and Aberjona Auto Parts should be included in the study area as they are within the zone of contribution to the Riley Well and contaminated groundwater exists beneath these properties.

EPA Response: Based on the USGS Pump Test and RI activities, EPA concluded that Whitney Barrel and Aberjona Auto Parts were not within the zone of contribution to Wells G & H and thus were not included in the site. Whitney Barrel property is presently undergoing remedial investigation under supervision of the Massachusetts Department of Environmental Protection (DEP). Aberjona Auto Parts is currently recognized by the DEP as property to be investigated.

Comment 19. UniFirst - EPA did not consider Massachusetts drinking water regulations that relate to protection of drinking water supplies as applicable or relevant and appropriate requirements (ARARs). The groundwater and aquifers supplying the watershed cannot be adequately protected under Massachusetts drinking water regulations.

EPA Response: As previously stated, EPA's intention is to clean the aquifer to drinking water standards in order to be protective of human health and environment. Authority to distribute and utilize certain water supplies is given to the state and local level and compliance with Massachusetts drinking water regulations must be met before the aquifer will be used for drinking purposes.

Comment 20. New England Plastic (NEP) - The amounts of VOC's in the overburden groundwater on NEP property are de minimis.

EPA Response: The overburden and bedrock groundwater on NEP property contain contaminants in concentrations warranting remediation and therefore will be pumped and treated. The exact

volumes and rates will be defined during the design stage. Approximate pumping rates can be found in the ROD Section X.

4. Comments Concerning Engineering Issues

Comment 1. W. R. Grace & Co. and UniFirst Corp. - The Feasibility Study (FS) is biased toward a central groundwater treatment facility concept employing air stripping. The FS fails to adequately consider the engineering advantages of individualized treatment.

EPA Response: The FS was not biased toward a central treatment facility concept. In the FS an extensive screening of potential groundwater treatment alternatives was undertaken in a manner consistent with the Agency guidelines as stated in Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. (Draft March, 1988; Interim Final October, 1988). In response to public comments concerning the central area treatment plant, EPA has opted for five separate treatment plants instead of a central facility, and is deferring decision on remediating the central area until completion of further study of the central area. EPA agrees that there are individualized treatment and pretreatment alternatives such as carbon adsorption and UV/chemical oxidation which could be appropriate for specific source areas. EPA also agrees, as stated in the FS, that certain cost reductions such as those achieved through reduction in pretreatment usage are appropriate.

EPA recognized that given the complexity of the Wells G & H site, many additional groundwater treatment alternatives could have been formulated. These include a multitude of alternatives involving various combinations of site specific technologies and treatment trains, such as those proposed by several commenters. In addition, there could exist a variety of alternatives involving intermediate treatment facility combinations involving treatment plant sharing and partial combining of waste streams. It was, however, well beyond the scope of the FS to systematically evaluate all of these alternatives in detail. Focus was, therefore, placed on detailed evaluation of those alternatives offering the most fundamental differences in the conceptual approaches to remediating the site while simultaneously holding the greatest promise of successfully addressing FS screening guidance criteria.

Following initial screening of potentially appropriate groundwater treatment technologies, a total of 19 Management of Migration (MOM) alternatives (in addition to 11 soil remediation alternatives) were identified for further screening on the basis of effectiveness, implementability and cost. These MOM alternatives were summarized in FS Table 3-5 which is attached.

As indicated in Table 3-5, these MOM alternatives fell into one of the following five major treatment approach categories:

- o MOM-1 No Action
- o MOM-2 Pump and Treat at Source Areas
- o MOM-3 Pump and Treat at Central Area
- o MOM-4 Pump and Treat at Source Areas and Central Area
- o MOM-5 Pump and Treat at Southern Boundary Areas

These categories were deliberately selected to differ widely in the extent of groundwater volatile organic remediation to be conducted, the technologies to be used, and in the geographical locations within the overall site area from which groundwater would be extracted. As indicated in Table 3-5, alternatives within each of the five principal categories include consideration of three different volatile organic treatment technologies (air stripping, carbon adsorption and UV/chemical oxidation). The MOM alternatives considered these technologies in conjunction with both separate treatment facilities and a combined central treatment facility.

It should be noted that the three treatment technologies which were considered (air stripping, carbon adsorption, and UV/chemical oxidation) are, in fact, the same technologies which have been argued by UniFirst as appropriate for volatile organic cleanup at the other four source areas.

The 19 MOM alternatives were subjected to an alternative screening consistent with Agency guidelines including those contained in Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites (USEPA, 1986). As previously indicated, screening factors included effectiveness, implementability, cost, and potential cleanup time frames. Based on this screening, MOM-5 alternatives involving treatment at the southern boundary of the site were not recommended for further consideration in view of the potentially lengthy remediation times required, as calculated in Appendix C of the FS. In addition, MOM-2 and MOM-4 treatment alternatives utilizing activated carbon were not recommended for detailed evaluation due to concerns that the technology would not be the potentially most appropriate or effective to apply to the more highly contaminated site groundwater, including those at the Wildwood property. Due to this factor and the potentially high groundwater flows to be treated in alternatives using central treatment facilities, air stripping was considered to be a more appropriate technology. In addition, from a cost perspective screening evaluations indicated carbon adsorption to be slightly more expensive than air stripping. Therefore, on a site-wide basis carbon adsorption was not considered to offer distinct advantages over air stripping.

The purpose of the FS alternative screening process is to reduce as appropriate the number of alternatives being considered and to focus the detailed screening on those remedial alternatives considered most appropriate based on the nine FS evaluation criteria. Therefore, based on the reasons previously discussed, carbon adsorption alternatives were not carried forward for more detailed analysis.

A relatively large number of MOM alternatives (12) were carried forward into the detailed evaluation. Those alternatives which were retained for detailed evaluation included MOM-2 and MOM-4 alternatives involving both separate treatment at source areas as well as treatment at a central facility. In addition, alternatives involving air stripping or UV/chemical oxidation were retained for detailed consideration.

In the detailed evaluation of the remaining 12 alternatives, the FS does not specifically recommend any single alternative; nor are the remaining alternatives ranked. However, based upon the detailed screening, the following technical engineering conclusions were reached and identified:

- A single central treatment facility was likely to be more economical than a suite of five facilities at each source area and a sixth facility in the central area.

- Air stripping would be an appropriate treatment technology for the groundwater volatile organics at the site and would be more cost-effective than UV/chemical oxidation. In addition, air stripping is a more proven technology with respect to application at Superfund sites.

TABLE 3 - 5

LIST OF ALTERNATIVES FOR DETAILED ANALYSIS

Source Control Alternatives (SC)

SC-1 No Action (Source Control)

SC-3 Excavation/On-Site Incineration/Backfill On-Site

SC-4 Excavation/Off-Site Incineration/Backfill with Clean Off-Site Soil

SC-5 Excavation/On-Site High Temperature Enhanced Volatilization/Backfill On-Site

SC-7 Excavation/On-Site Supercritical Fluid Extraction/ Backfill On-Site

SC-8 Excavation/On-Site Enhanced Volatilization/On-Site Incineration/Backfill On-Site

SC-9 Excavation/On-Site Enhanced Volatilization/Off-Site Incineration/Backfill With Treated and Clean Off-Site Soil

SC-10 In Situ Volatilization/Excavation/On-Site Incineration/ Backfill On-Site

SC-11 In Situ Volatilization/Excavation/Off-Site Incineration/ Backfill With Clean Off-Site Soil

Management of Migration Alternatives (MOM)

MOM-1 No Action (Management of Migration)

MOM-2 Pump and Treat Source Areas

-2A(i) Pretreatment and Air Stripping at Separate Treatment Plants

-2A(ii) Pretreatment and Air Stripping at a Central Treatment Plant

-2B(i) Pretreatment and UV/Chemical oxidation at Separate Treatment Plants

-2B(ii) Pretreatment and UV/Chemical oxidation at a Central Treatment Plant

MOM-3 Pump and Treat Central Area

-3A Pretreatment and Air Stripping at Central Treatment Plant

TABLE 3-5 (Cont'd)

LIST OF ALTERNATIVES FOR DETAILED ANALYSIS

| | |
|---|---|
| -3B | Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant |
| -3C | Pretreatment and Carbon Adsorption at a Central Treatment Plant |
| MOM-4 | Pump and Treat Source Areas and Central Area |
| -4A(i) | Pretreatment and Air Stripping at Separate Treatment Plants |
| -4A(ii) | Pretreatment and Air Stripping at a Central Treatment Plant |
| -4B(i) | Pretreatment and UV/Chemical Oxidation at Separate Treatment Plants |
| -4B(ii) | Pretreatment and UV/Chemical Oxidation at a Central Treatment Plant |

Comment 2. W. R. Grace & Co. and UniFirst Corp. - The Feasibility Study (FS) includes unnecessary pretreatment prior to required groundwater treatment. This inclusion overstates separate source area treatment costs.

EPA Response: It was stated in the FS that pretreatment prior to air stripping may not be required at all properties and that this issue would be further evaluated during the remedial design. During evaluations of pretreatment technologies, vendors strongly recommended that pretreatment for iron be included in air stripping treatment designs at all locations where groundwater iron concentrations approached or exceeded 1 ppm. High groundwater iron concentrations will reduce air stripper efficiency through iron precipitation and possible air stripper plugging. Iron precipitation may also present potential problems to other treatment technologies. For UV/chemical oxidation systems, iron precipitation can increase water turbidity and reduce system efficiency. For carbon adsorption systems, iron precipitation can reduce efficiency and increase the need for backwashing.

Detailed site specific dissolved iron concentration data for each of the source areas is somewhat limited. Available data indicate that groundwater dissolved iron concentrations are quite variable throughout the site area. Concentrations exceeding 1.0 ppm have been detected in samples from the Olympia, Wildwood and central areas (NUS, 1986; Ebasco, 1988). Lower levels have been generally reported for the UniFirst and W. R. Grace site areas. However, iron concentrations in excess of 1.0 ppm have been reported in central area sampling wells including well S81 in relatively close proximity to the UniFirst property (NUS, 1986).

Depending upon the final locations of site extraction wells developed during remedial design, water containing high iron concentrations could, therefore, be a concern in many areas of the site. In addition, FS guidance for cost evaluations recommend that estimates be in a +50% to -30% range to avoid significant underestimates of remediation costs. Therefore, a conservative posture was adopted in the FS and pretreatment was included at all sites for comparison of alternatives. However, a cost sensitivity comparison of MOM alternatives with and without pretreatment was included in the FS (Table 4-42) and is attached. The results of this analysis confirmed that the removal of pretreatment does, in fact, significantly reduce overall treatment costs.

The potential cost impacts of reductions in pretreatment have been further examined in refined cost calculations for the MOM-2 and MOM-4 treatment scenarios using assumptions in which pretreatment may be required in certain areas but not in others. In Table E-1, (see attached) costs are presented to include pretreatment prior to air stripping only at the Olympia, Wildwood

and central areas of the site. Pretreatment has not been included at the W. R. Grace, UniFirst and New England Plastics sites. In conjunction with elimination of pretreatment processes at the latter three locations, labor requirements have been reduced, as indicated.

Finally, it should be recognized that in certain site areas, remedial design evaluations may determine the appropriateness of pretreatment for chemical constituents other than iron. For example, one commenter (UniFirst Corp., 1989) has indicated the possible appropriateness of pretreatment for lead at the Olympia property.

TABLE 4-42

COST OF MANAGEMENT OF MIGRATION ALTERNATIVES WITH AND WITHOUT PRETREATMENT

| | Cost with Pretreatment (1988 Million Dollars) | | | | | Cost Without Pretreatment (1988 Million Dollars) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Alternative | Capital | Annual O&M | | | Present Worth | Capital | Annual O&M | | | Present Worth |
| MOM-2A(i) | 8.1 | 3.7 | (1-30 yrs) | | 65.2 | 6.5 | 2.1 | (1-30 yrs) | | 38.8 |
| MOM-2A(ii) | 4.6 | 1.5 | (1-30 yrs) | | 27.4 | 3.5 | 0.7 | (1-30 yrs) | | 14.3 |
| MOM-2B(i) | 10.3 | 5.1 | (1-30 yrs) | | 89.1 | 7.6 | 2.7 | (1-30 yrs) | | 49.1 |
| MOM-2B(ii) | 5.4 | 2.5 | (1-30 yrs) | | 44.2 | 4.1 | 1.8 | (1-30 yrs) | | 31.8 |
| MOM-3A | 3.1 | 1.4 | (1.30 yrs) | | 24.2 | 1.2 | 0.6 | (1-30 yrs) | | 10.4 |
| MOM-3B | 3.3 | 1.6 | (1-30 yrs) | | 28.2 | 1.9 | 0.8 | (1-30 yrs) | | 14.2 |
| MOM-3C | 2.8 | 1.6 | (1-30 yrs) | | 26.9 | 1.6 | 0.7 | (1-30 yrs) | | 12.4 |
| MOM-4A(i) | 11.4 | 5.1 | (1-10 yrs) | 3.7 (11-30 yrs) | 79.1 | 7.9 | 2.7 | (1-10 yrs) | 2.1 (11-30 yrs) | 39.6 |
| MOM-4A(ii) | 7.0 | 2.3 | (1-10 yrs) | 1.6 (11-30 yrs) | 37.1 | 4.7 | 1.0 | (1-10 yrs) | 0.9 (11-30 yrs) | 15.6 |
| MOM-4B(i) | 13.7 | 6.7 | (1-10 yrs) | 5.1 (11-30 yrs) | 104.8 | 9.6 | 3.6 | (1-10 yrs) | 2.8 (11-30 yrs) | 52.8 |
| MOM-4B(ii) | 8.5 | 3.8 | (1-10 yrs) | 2.9 (11-30 yrs) | 60.2 | 5.8 | 2.6 | (1-10 yrs) | 1.9 (11-30 yrs) | 37.2 |

Note: (1) Present worth analysis based on 5 percent discount rate.

(2) Present worth analysis for all alternatives except MOM-4A(i), MOM-4A(ii), MOM-4B(i) and MOM-4B(ii) based on 5 percent discount rate and 30 year period. In case of MOM-4A(i), MOM-4A(ii), MOM-4B(ii) the central area will be pumped for 10 years with the objective of achieving MCLs.

TABLE E-1

COST COMPARISON OF MIGRATION ALTERNATIVES

WITH AND WITHOUT PRETREATMENT[1]

AIR STRIPPING TECHNOLOGY

| ALTERNATIVE | CAPITAL | ANNUAL O&M | PRESENTWORTH |
|---|---|---|---|
| MOM-2A(i)<br>(5 separate plants) | 7.1 | 1.8 (1-30 yr) | 34.1 |
| MOM-2A(ii)<br>(1 central plant) | 3.7 | 1.1 (1-30 yr) | 20.0 |
| MOM-4A(i)<br>(6 separate plants) | 10.1 | 2.8 (1-10 yr)<br>1.8 (1-10 yr) | 45.0 |
| MOM-4A(ii)<br>(1 central plant) | 6.1 | 1.8 (1-10 years)<br>1.2 (11-30 years) | 29.2 |

NOTES:

(1) The present worth analysis is based on 5 percent discount rate. The central area would be pumped for 10 years with the objective of achieving MCLs and the source areas for 30 years. (Dollars in millions).

Pretreatment has been assumed for the Wildwood, Olympia and central areas but not for the W. R. Grace, Unifirst and New England Plastics areas.

The labor requirements for sites without pretreatment have been assumed to be one man per 8 hour shift, 365 days per year, ($30/hour). Where pretreatment is required two men per 8 hour shift, 365 days per year have been assumed.

Comment 3. UniFirst Corp. - Cost estimations for separate source area treatment facilities were overestimated. There are several cost estimation factors which may ultimately result in reduced estimated costs for individual source area treatment facilities. Issues which involve lowering costs for five separate treatment facilities and a sixth treatment facility for the central area are the following:

- increased equipment sharing,
- reduced labor estimations,
- reduced site preparation costs, and
- reduced sampling costs.

EPA Response: EPA agrees that there are cost estimation factors which may result in reduced costs for the individual source area treatment facilities. While sharing of equipment such as trailers between sites certainly is possible, EPA could not in the Feasibility Study (FS) evaluation process assume such cooperation among all parties potentially involved in cleanup. In addition, the cleanup time schedule for each property may be different, particularly in the case of several separate treatment plants. It was, therefore, assumed that similar numbers of trailers would be needed for each treatment plant to be constructed and operated.

EPA agrees that some reductions in the labor requirements for treatment plant operation presented in the FS may be feasible. Labor requirements for treatment plant operation will generally depend more on the amount of equipment to be operated and monitored than on the size of the equipment. In the FS it was assumed that more attention would be required to operate a treatment plant at a Superfund site than a conventional water treatment plant. This was due in part to health and safety concerns and potential problems associated with possible spills of contaminated groundwater at unattended facilities. Conventional water treatment plants usually have a 24 hour operator.

The extent to which the labor requirements in the FS may be reduced is dependent upon assumptions regarding several factors including the need for pretreatment, the extent of facility automation, and the extent of chemical analysis performed by treatment plant staff.

Labor requirements developed in the FS assumed extensive in-plant chemical analyses. However, for discussion purposes reduced labor requirements have been included in cost estimates prepared for the individualized site treatment technologies proposed by some commenters. (These are included in the next comment).

Based upon review, for FS evaluation purposes it appears feasible to reduce labor requirements to one staff member, eight hours per day, daily, for sites not requiring pretreatment and two staff members eight hours per day, daily, for sites requiring pretreatment. Given that the recommended process requires monitoring several operations, as well as considerable in-plant chemical monitoring and testing, two staff members is considered an appropriate assumption where pretreatment is used. Further evaluations of treatment plant labor requirements would be conducted during remedial design evaluations.

EPA acknowledges that some savings in site preparation costs may be effected at certain locations. However, within the FS it was not feasible to specify with certainty the exact locations of individual treatment facilities.

With respect to sampling, individual treatment facilities would have to conduct their own groundwater sampling to determine the effectiveness of their remediation efforts. Therefore, groundwater sampling was specified for each treatment plant.

It should be noted that while EPA recognizes that the cost estimates could be refined, the EPA believes that they were adequate for the comparative analysis of the FS.

Comment 4. UniFirst Corp. and W. R. Grace & Co. - Certain technologies should be retained for individual sites based on waste stream characteristics. Individualized treatment technology costs were overestimated in the Feasibility Study (FS).

EPA Response: EPA agrees that at certain source locations treatment technologies such as carbon adsorption or UV/chemical oxidation may be viable alternatives to air stripping for the removal of volatile organics. EPA has incorporated flexibility into the ROD in regard to the specific treatment technology to be employed at each source location.

From a cost perspective, EPA agrees that reductions can be made to reduce the expense of individualized treatment plants by using air stripping as in MOM 2A(i).

The approximate total present worth cost for the six separate facilities estimated in Table E-2 (within the +50% and -30% FS guidance) is $46.2 million. This compares with an estimated cost of $29.2 million for the single central air stripping treatment facility of MOM 4A(ii) presented in Table E-1 (see comment 2 in this section) using comparable labor requirement assumptions.

In Table E-2 it has been assumed that UV/chemical oxidation would be used at the W. R. Grace site, carbon adsorption at the

UniFirst, New England Plastics and Olympia sites, and air stripping at the Wildwood and central areas. It has also been assumed that pretreatment would not be required at the W. R. Grace, UniFirst, and New England Plastics sites. Other cost reductions claimed by certain commenters for individual source area treatment such as sharing of trailers and use of existing buildings have not been included. Evaluation of the feasibility of site specific factors at this level of detail is necessarily a remedial design function.

TABLE E-2

COST CALCULATION FOR SEPARATE SOURCE AREA AND
CENTRAL AREA TREATMENT FACILITIES (MOM-4Ai) EMPLOYING
INDIVIDUALIZED TREATMENT FACILITIES

| AREA | TREATMENT | PRETREATMENT | CAPITAL COST | ANNUAL O&M COST | PRESENT WORTH COST |
|---|---|---|---|---|---|
| W. R. Grace | UV/Chemical Oxidation | No | 812,500 | 287,200 (1-30 yrs) | 5,227,300 (1-30 yrs) |
| Unifirst | Carbon Adsorption | No | 758,100 | 330,400 (1-30 yrs) | 5,837,000 (1-30 yrs) |
| Wildwood | Air Stripping | Yes | 2,625,300 | 802,200 (1-30 yrs) | 14,956,700 (1-30 yrs) |
| N.E. Plastics | Carbon Adsorption | No | 657,200 | 172,700 (1-30 yrs) | 3,311,900 (1-30 yrs) |
| Olympia | Carbon Adsorption | Yes | 897,500 | 353,300 (1-30 yrs) | 6,328,400 (1-30 yrs) |
| | Subtotal | | 5,750,600 | 1,945,800 | 35,661,300 |
| Central Area | Air Stripping | Yes | 2,926,400 | 985,500 (1-10 yrs) | 10,536,400 (1-10 yrs) |
| TOTAL PRESENT WORTH | | | 8,677,000 | 2,931,300 (1-10 yrs)<br>1,945,800 (11-30 yrs) | 46,197,700 |

NOTE: (1) Present worth analysis based on 5 percent discount rate.

(2) Labor costs for facilities without pretreatment are based on one man per 8-hour day, 365 days/yr.

Labor cost for facilities with pretreatment are based on two men per 8-hour day, 365 days/yr and $30/hr.

Comment 5. W. R. Grace & Co. - The Feasibility Study (FS) significantly overestimates costs required for separate source treatment of groundwater at this property.

EPA Response: EPA concurs that the costs associated with the implementation of a treatment system at the W. R. Grace site can be reduced over those used in the FS. The principal cost savings (if appropriate) would be through the elimination of pretreatment (and associated reductions in labor requirements) which was identified in the FS as a possible cost savings to be confirmed during the remedial design. Several other proposed cost savings have been identified in comments received and may be appropriate.

A detailed review of proposed cost savings at this site is included in Table E-3. For comparison purposes Tables 5-2 and 5-3 submitted to EPA from Canonie Environmental, for W.R. Grace & Co. (Geotrans, 1989) are also attached. However, as is indicated therein, many of the proposed savings require evaluating the site at a level of detail which is beyond the scope of the FS and would have to be performed during remedial design efforts.

TABLE E-3

COMMENTS ON W. R. GRACE COST ESTIMATES
FOR SOURCE AREA COLLECTION AND TREATMENT
CAPITAL COSTS

Site Preparation

EPA agrees that if the site is paved, site clearing will not be necessary. Therefore, site preparation costs would be essentially zero. (This would be a remedial design cost evaluation activity).

Support Facilities

EPA agrees that five trailers for support facilities may not be necessary. However, the $3,000 estimated by Canonie appears to be too low. By sharing trailers it may be possible to reduce the number to two trailers, i.e., $64,200. By using existing buildings additional savings may be realized. (This would be a remedial design cost evaluation activity).

Pumping (Excavation)

The suitability of existing recovery wells and protection requirements for pumping stations can only be determined in the design phase. Assuming that existing wells are suitable the $70,000 estimate seems reasonable. (This would be a remedial design cost evaluation activity).

Equalization Tank

The equalization time proposed by EPA is four hours versus Canonie's 30 minutes. EPA does not think 30 minutes is sufficient for equalization.

Chemical/Feed; Storage System; Chemical Coagulation/Flocculation/Clarification and Sludge Handling System; Filtration (dual media)

Pretreatment may or may not be required. The limited available information indicates that pretreatment may not be required at the Grace property.

Filtration (Fabric Filter)

If no pretreatment is required this may be suitable.

UV/Chemical Oxidation Unit

EPAs cost estimate is $118,000 versus the Canonie estimate of $110,000. There is no significant difference.

TABLE E-3 (Cont'd)

Vapor Phase Activated Carbon Absorber

The Vent-Sorb units proposed by Canonie are suitable if no pretreatment is required. These are disposable carbon units.

Treated Groundwater Discharge System

The Canonie estimate of $70,000 using PVC pipe seems reasonable versus EPA's $80,000 for carbon steel pipe. However, if breakage is a concern carbon steel would be more appropriate.

Control Building

The Canonie estimate of $100,000 is reasonable provided no pretreatment is required.

Construction Indirects

The $50,000 estimated by Canonie is reasonable if no pretreatment is required.

Utilities

The $25,000 estimate made by Canonie is appropriate provided existing service is available and suitable. (This would be a remedial design cost evaluation activity).

Treatability Study

The $15,000 estimate made by Canonie is only appropriate for a limited treatability study. EPA estimates $50,000 to conduct studies detailed enough to obtain sufficient remedial design information.

Contingency

EPA uses 21% versus Canonie's 10%. 10% may be appropriate for a detailed cost estimate but it is too low for an FS type cost estimate.

Engineering

EPA and Canonie agree on a 10% factor.

Legal & Administrative

Canonie's estimate has no provision for these factors. EPA provides 5% which is appropriate.

TABLE E-3 (Cont'd)

O&M COSTS

Monitors

Groundwater Sampling - EPA and Canonie agree.

Laboratory Analysis

EPA's estimate of $16,000 for groundwater analysis is to monitor the effectiveness of remediation while Canonie provides for treatment plant influent and effluent analysis $27,400. EPA assumed that these analyses will be done by operators on site to obtain quick results for treatment plant operation.

Report

Canonie agrees with EPA.

Power

Canonie agrees with EPA.

Equalization Tank

Power for one pump - EPA's $400 versus Canonie's $300. The difference is not significant.

Chemical Feed/Storage; Recarbonation System; Filtration System

These are pretreatment costs. Pretreatment requirement would have to be confirmed in the design phase.

Filtration System

Canonie's estimate of $25,700 is appropriate provided no pretreatment is required.

Oxidation Chamber

EPA's estimate is $59,100 versus Canonie's $53,600 - the difference is not significant.

Vapor Phase Activated Carbon Absorbers

Not required if no pretreatment is needed and UV/oxidation is used.

TABLE E-3 (Cont'd)

Carbon Make Up

Canonie's estimate is appropriate if no pretreatment is needed, and UV/oxidation is used. Vent-sorb units are disposable.

Sludge Off-Site Disposal

Not necessary if no pretreatment is required.

Labor

Canonie's estimate of one person at 45 hours/week is too low. EPA recommends a minimum of one person for eight hours per day and 56 hours a week assuming pretreatment is not required. (Note: At this level of effort additional non-labor costs such as off-site laboratory analyses could be required.)

Maintenance Cost

EPA and Canonie agree.

Contingency

EPA and Canonie agree.

TABLE 5-2

W.R. GRACE PROPOSED TREATMENT UNIT
UV/CHEMICAL OXIDATION
CAPITAL COSTS

| Component | Description | FS Cost Estimate | General Comments | Grace Cost Estimate |
|---|---|---|---|---|
| Site Preparation | Site clearing of trees, bushes, and debris, and a 1,000 sy area of crushed stone for parking of equipment. | $ 14,000 | No site preparation necessary. Area adjacent to Cryovac Facility is paved. | $ -0- |
| Support Facilities | Consist of four office trailers for the EPA/DE, Engineers, Health and Safety, Contractor, and one contractor equipment trailer. | 156,000 | Construction of on-site treatment unit could be completed in less than three months. Trailer rental (2). | 3,000 |
| Pumping (Extraction) | Installation of two, 6-inch-diameter wells, 20 ft. deep, and one 6-inch-diameter well, 100 ft. deep with pumps, pipeline, and building for pumping station. | 111,000 | No building necessary for pumping station. Two recovery wells are present on-site. | 70,000 |
| Equalization Tank | One 16,000-gallon in-ground carbon steel tank with a discharge pump. | 37,000 | Tank sized to handle four hours of flow is excessive; 2,000-gallon above-ground tank acceptable. | 7,500 |
| Chemical Feed/ Storage System | Includes a hydrated lime storage bin with a lime solution feed tank and pump. A polymer storage and feed tanks with a feed pump. | 15,000 | Pretreatment for removal of inorganics is not required to achieve required VOC removal efficiencies. | -0- |
| Chemical Coagulation/ Flocculation/Clarification and Sludge Handling System | A 15-ft. upflow solids-contact type clarifier complete with drive mechanism, mixers, flocculation and settling zone, and a sludge transfer pump. | 76,000 | Pretreatment for removal of inorganics is not required to achieve required VOC removal efficiencies. | -0- |

TABLE 5-2
(Continued)

W.R. GRACE PROPOSED TREATMENT UNIT
UV/CHEMICAL OXIDATION
CAPITAL COSTS

| Component | Description | FS Cost Estimate | General Comments | Grace Cost Estimate |
|---|---|---|---|---|
| Recarbonation System | A 700-gallon reinforced concrete with $CO_2$ diffuser. A bulk $CO_2$ storage tank and refrigeration unit. | 34,000 | Pretreatment for removal of inorganics is not required to achieve required VOC removal efficiencies. | $ -0- |
| Filtration | A 5-ft. diameter by 8-ft. deep dual media pressure filter with a backwash pump and automatic controls A 2,000-gallon filtered water collection tank. | 43,000 | Fabric filter after oxidation unit. | 15,000 |
| UV/Chemical Oxidation Unit | Oxidation chamber (stainless steel) with feed pump and piping. A chemical feed system with storage tank (100-gallon stainless steel) and metering pump. | 118,000 | | 110,000 |
| Vapor Phase Activated Carbon Adsorber | One, 3-ft. diameter by 4-ft. high carbon adsorption regeneration with automatic controls and in-situ regeneration option. | 150,000 | Vent-Sorb units to be used for equalization tank, oxidation unit is pressurized. | -0- |
| Treated Ground Water Discharge System | 800 lf of 3-inch-diameter carbon steel. | 80,000 | PVC pipe substituted for carbon steel pipe. | 70,000 |
| Control Building | | 186,000 | 25 ft. x 40 ft. building (Butler building). Possibility of using existing building. | 100,000* |

TABLE 5-2
(Continued)

W.R. GRACE PROPOSED TREATMENT UNIT
UV/CHEMICAL OXIDATION
CAPITAL COSTS

| Component | Description | FS Cost Estimate | General Comments | Grace Cost Estimate |
|---|---|---|---|---|
| Construction Indirects | | 80,000 | Controls and instrumentation, | 50,000 |
| Utilities | | 155,000 | Using Grace's existing power service | 25,000 |
| Treatability Study | | 50,000 | | 15,000 |
| Total Direct Construction Costs | | $1,305,000 | Subtotal | $465,500 |
| Contingency (21 Percent) | | 274,000 | Contingency (10 Percent) | 46,600 |
| Engineering (10 Percent) | | 130,500 | Engineering (10 Percent) | 46,600 |
| Legal & Administrative (5 Percent) | | 65,300 | | |
| TOTAL | | $1,774,800 | TOTAL | $558,700 |

TABLE 5-3

W.R. GRACE PROPOSED TREATMENT UNIT
UV/CHEMICAL OXIDATION
ANNUAL O&M COSTS

| Cost Component | Basis of Estimate | FS Annual O&M Cost Estimate | Year | General Comments | Grace Cost Estimate |
|---|---|---|---|---|---|
| **Monitoring** | | | | | |
| Ground Water Sampling | 2 persons @ $30/hr<br>40 hrs per year | $ 2,400 | 1-30 | | $ 2,400 |
| Laboratory Analysis | 20 water samples/yr<br>@ $800/sample | 16,000 | 1-30 | Need to monitor treatment effluent biweekly, monthly influent samples; 26 biweekly effluent @ 300, 12 monthly influent @ 300 | 27,400 |
| Report | 1 person @ $60/hr<br>50 hrs/yr | 3,000 | 1-30 | | 3,000 |
| **Pumping (Extraction)** | | | | | |
| Power | At $0.10/kW-hr<br>Total 1.6 HP<br>29 kW-hr/day | 1,100 | 1-30 | | 1,100 |
| **Equalization Tank** | | | | | |
| Power for 1 Pump | At $0.10/kW-hr<br>Total 0.7 HP<br>12 kW-hr/day | 400 | 1-30 | 0.5 hp @ $0.10/kW-hr. | 300 |

TABLE 5-3
(Continued)

W.R. GRACE PROPOSED TREATMENT UNIT
UV/CHEMICAL OXIDATION
ANNUAL O&M COSTS

| Cost Component | Basis of Estimate | FS Annual O&M Cost Estimate | Year | General Comments | Grace Cost Estimate |
|---|---|---|---|---|---|
| Chemical Feed/Storage System | | | | | |
| Lime Usage | 23 T/yr @ $75/T | 1,700 | 1-30 | Not necessary. | -0- |
| Polymer Usage | 1,138 lbs/yr @ $2/lb | 2,300 | 1-30 | Not necessary. | |
| Recarbonation System | | | | | |
| Power for 1 Pump | At $0.10/kW-hr<br>Total 0.8 HP<br>14 kW-hr/day | 500 | 1-30 | Not necessary. | -0- |
| Carbon Dioxide Usage | 28 T/yr<br>@ $500/T | 14,000 | 1-30 | Not necessary. | |
| Filtration System | | | | | |
| Power for 1 Pump | At $0.10/kW-hr<br>Total 0.8 HP<br>14 kW-hr/day | 500 | 1-30 | Filter fabric, 24 rolls @ $300/roll<br>Disposal of 24 drums @ $750/drum. | 25,700 |



CanonieEnvironmental

TABLE 5-3
(Continued)

W.R. GRACE PROPOSED TREATMENT UNIT
UV/CHEMICAL OXIDATION
ANNUAL O&M COSTS

| Cost Component | Basis of Estimate | FS Annual O&M Cost Estimate | Year | General Comments | Grace Cost Estimate |
|---|---|---|---|---|---|
| Chemical Feed System (Hydrogen Peroxide) | | | | | |
| Hydrogen Peroxide | 9.5 lbs/day @ $0.75/lb | 2,600 | 1-30 | | 2,600 |
| Hydrogen Peroxide Pump | @ $0.10 kW-hr Total 0.1 HP 2 kW-hr/day | 100 | 1-30 | | 100 |
| Pump to Feed Oxidation Chamber | @ $0.10/kW-hr Total 0.8 HP 15 kW-hr/day | 500 | 1-30 | | 500 |
| Oxidation Chamber | @ $0.10/kW-hr 1,620 Kw-hr/day | 59,100 | 1-30 | $0.10/kW-hr 1,440 Kw-Hr/day | 52,600 |
| Vapor Phase Activated Carbon Adsorbers | | | | | |
| Fuel Cost | | 4,000 | 1-30 | | -0- |
| Carbon Makeup | 800 lbs/yr @ $0.75/lb | 600 | 1-30 | Vent-Sorb units to treat air stream from equalization tank. | 10,000 |



CanonieEnvironmental

TABLE 5-3
(Continued)

W.R. GRACE PROPOSED TREATMENT UNIT
UV/CHEMICAL OXIDATION
ANNUAL O&M COSTS

| Cost Component | Basis of Estimate | FS Annual O&M Cost Estimate | Year | General Comments | Grace Cost Estimate |
|---|---|---|---|---|---|
| Sludge Off-Site Disposal | 300 tons/yr @ $125/ton | 37,500 | 1-30 | Not necessary. | -0- |
| Labor | 6 men @ $30/hr<br>8 hrs/day | 525,600 | 1-30 | One plant person @ 45 hrs/wk. | 70,200 |
| Maintenance Cost<br>(Building and Equipment) | 8 Percent of Capital Cost | 142,200 | 1-30 | | 44,700 |
| Contingency | 5 Percent of Annual O&M | 30,500 | 1-30 | | 12,100 |
| TOTAL ANNUAL O&M COST | | 847,500 | 1-30 | | 252,700 |

Note: All cost estimates rounded up to nearest hundred.

Comment 6. W. R. Grace & Co. - Vinyl chloride and vapor phase carbon are not compatible. Therefore, UV/chemical oxidation should be the best option for groundwater treatment at the W. R. Grace site.

EPA Response: EPA does not agree that vinyl chloride and vapor phase carbon are incompatible. However, it does agree that removal of vinyl chloride from the air stream by vapor phase activated carbon requires careful monitoring of the carbon unit. Relatively frequent regeneration of vapor phase activated carbon may also be required.

EPA concurs that UV/chemical oxidation may be appropriate for treatment at the W. R. Grace property. However, UV/oxidation has not been applied at a full scale level to treat contaminated groundwater at Superfund sites. In the absence of confirmatory data, air stripping followed by vapor phase carbon adsorption was considered to be the most proven and overall best technology option for the Wells G & H site.

Comment 7. W. R. Grace & Co. - Separate treatment plants are more appropriate than a central treatment plant for the following reasons:

(a) Pipelines carrying contamination across roads & wetlands & properties are undesirable.

(b) Pipes may break or leak.

(c) Difficult river crossings would be required.

(d) A monitoring system or double containment system to prevent/detect leakage would be required.

(e) Individual treatment plants are faster to implement.

EPA Response: As stated before, in response to public comment, EPA has decided to change the remedy to call for five separate treatment facilities instead of one central treatment plant.

Comment 8. UniFirst - The combining of waste streams to one central treatment facility is not cost effective because it dilutes highly contaminated waste streams and mixes unique contaminants of concern.

EPA Response: Although a central treatment facility may be more cost effective, EPA is now calling for five separate facilities in response to the many concerns that were raised during the public comment period. EPA agrees that separate facilities offer

the advantage of treating unique contaminants on a site specific basis.

Comment 9. UniFirst Corp. - The Feasibility Study (FS) overestimates the appropriate groundwater extraction pumping rate for the overburden at this property and overestimates the size and cost of the treatment facility required.

EPA Response: The respective sizes of the treatment facilities for each source area at the site were based on the pumping rates presented in Appendix C of the FS. The uncertainties associated with these pumping rates are clearly acknowledged in Appendix C. As indicated therein, more refined pumping rates and treatment facility sizes would be developed during the remedial design, as appropriate. EPA acknowledges that a reduction in treatment facility size could reduce estimated costs. The impact of a possible reduction in treatment facility size at this property on cost would depend upon the type of treatment utilized. For air stripping, an assumed 20 gpm facility (if appropriate) would be anticipated to generate capital and O&M costs roughly similar to those developed for the New England Plastics property. Minor modifications relating to site preparation would be required. Use of these figures does not dramatically alter the calculations presented in Table E-1 (Comment 2 in this section).

Comment 10. UniFirst Corp. - Although several of the source areas contain levels of contamination which can be treated with aqueous phase activated carbon adsorption, such treatment is rejected due to "high concentrations of volatile organics in the contaminated groundwater".

EPA Response: EPA agrees that some source areas contain levels of contamination which can be treated with aqueous phase activated carbon adsorption. As stated in the ROD, EPA will consider proposals for implementation of alternative treatment technologies that can be demonstrated to be equally or more effective than air stripping. As stated in comment 1 in this section, detailed evaluations on a site specific basis were beyond the scope of the Feasibility Study.

Comment 11. UniFirst Corp. - The treatability study done on contaminated groundwater served only to confirm choices of treatment technologies selected prior to the commencement of the study. Only the combined waste stream was studied and no examination of the treatability of the individual source area waste streams was performed.

EPA Response: EPA disagrees that the treatability study was done "on the combined waste stream". The treatability study was done

on contaminated groundwater samples from two distinct source areas, i.e., groundwater from the Wildwood and UniFirst areas. Wildwood and UniFirst groundwater samples were selected for the treatability study because Wildwood groundwater has trichloroethene (TCE) as the major contaminant whereas UniFirst groundwater has tetrachloroethene (PCE) as the principal contaminant. The other source areas have concentrations of one or the other or both of these constituents present at generally lower concentrations.

EPA does concur that, ideally, treatability studies should be conducted on individual waste streams and that additional treatability studies may be appropriate for each of the waste streams to be treated. Additional treatability studies will be conducted during the remedial design phase.

Comment 12. Beatrice - The use of MCLs for manganese and iron is wrong. They are naturally occurring groundwater contaminants and have always exceeded these standards. There is no engineering reason why manganese needs to be treated since it will not hinder the efficiency of air strippers. EPA violates CERCLA § 104(a)(3) which prohibits remedial action to address the release of a naturally occurring substance in its unaltered form, or altered solely through naturally occurring processes or phenomena, from a location where it is naturally found.

EPA Response: EPA agrees that iron and manganese are naturally occurring groundwater constituents. EPA also agrees that groundwater treated to remove volatile organics and subsequently discharged to the Aberjona River would not necessarily have to meet MCLs for iron and manganese. Such discharges would, however, have to substantively comply with NPDES discharge permit limitations.

The naturally occurring high concentrations of iron and manganese do not render the aquifer an undesirable drinking water source. Many sources of groundwater require treatment to remove naturally occurring substances so that they are potable and can be used for a public water supply. Iron and manganese (particularly iron) reductions are also required for effective volatile organic treatment plant operation. According to vendor information, iron concentrations as low as 1.0 mg/l would adversely affect air stripper packing and operation. Groundwater iron concentrations at the Wildwood site are relatively high. The average groundwater iron concentration at the Wildwood property is approximately 3.8 mg/l (filtered), which is well above the 1.0 mg/l level recommended by air stripping vendors. Therefore, pretreatment is recommended based on available data.

Comment 13. Beatrice - Samples taken from the Wildwood property for the treatability study were not representative. Samples for the treatability study were taken from monitoring wells, not pumping wells. The samples from wells BOW14 and BSSW6 were mixed in strange ratios.

EPA Response: EPA disagrees that samples taken from the Wildwood property for the treatability study were not representative. Wells BSSW6 and BOW14 were selected to extract groundwater from the contaminated plume area. The composite ratio was selected in order to mix the groundwater samples and achieve a composite VOC concentration representative of the entire plume at Wildwood. Production wells at Wildwood and the Riley Well are located away from the major contaminated plume. Pumping at these wells would have resulted in spreading of the contaminated plume. Extraction wells for use in remediation will have to be located to extract most efficiently the most highly contaminated segments of the plume and minimize any spread of the plume.

Comment 14. UniFirst Corp. and W. R. Grace & Co. - Pretreatment options such as green sand should be considered as an alternative pretreatment technology to chemical precipitation.

EPA Response: Although it is possible to remove iron and manganese on zeolite exchange media (such as green sand), this practice is usually restricted to individual water sources in which iron and manganese concentrations are low, generally less than 0.5 mg/l. This is due to the fact that accumulations of precipitates of these metals may cause the exchange medium to lose its exchange capacity.

Green sand filtration may be applicable at W. R. Grace and UniFirst properties, but does not appear to be appropriate for the Wildwood area. Due to the iron concentration limitation described above, chemical precipitation was considered in the Feasibility Study (FS) to be more appropriate for site wide application. However, ion exchange was retained as a possible polishing step, if necessary.

If, based on remedial design evaluations, green sand filtration is used as a pretreatment method it will have to be regenerated after the exchange capacity is exhausted. The disposal of regeneration chemicals would also have to be considered.

Finally, it is recognized that other pretreatment technologies could be considered for use at certain properties of the Wells G & H site. However, as discussed in Comment 1 in this section, a detailed evaluation of all pretreatment options considered on a property specific basis was beyond the scope of the FS. Various pretreatment options would be considered during remedial design as appropriate.

Comment 15. UniFirst Corp. - Pilot scale and full scale air stripping operations rarely achieve 99.9% removal for many volatile contaminants. Further, even if this level of removal efficiency was possible, it would not meet the proposed ARARs for some compounds. Applying 99.9% removal to the total average VOC concentration at Wildwood, TCE at Wildwood would not meet target levels. To meet ARARs at Wildwood, a polishing step of aqueous phase carbon after air stripping would be necessary.

EPA Response: It is technically feasible to design an air stripper to achieve greater than 99.9% removal efficiency. TCE is one of the most easily strippable volatile organic compounds. The air stripping column for the Wildwood property was conceptually sized with 30 ft packing compared to 15 ft of packing for the other properties. This was done due to the high VOC concentrations in groundwater at Wildwood property. If necessary, the air strippers at Wildwood could be staged to achieve required effluent concentration (i.e. two 15 ft packed columns in series)

The conceptual sizing of the air stripping columns was based, in part, on the treatability study results presented in Table 4-17 of Appendix D of the Supplemental RI (Ebasco, 1988). As noted therein, model calculations indicate that an air stripper column height of 28.4 feet should be appropriate to reduce aqueous phase TCE concentrations to 1.0 ppb.

Comment 16. Beatrice - Treatability tests have not been performed to evaluate incineration as a treatment technology for soils at the Wildwood property.

EPA Response: A treatability test for incineration of soil on the Wildwood property is not needed. Incineration is a proven technology for organic contaminated soil. However, there will be a test burn to optimize the treatment parameters such as retention time, operating temperature, etc. The levels of volatile metals (arsenic, lead, etc.) present in the soils at Wildwood are low and are not anticipated to present a problem with respect to atmospheric emissions.

Comment 17. Beatrice - The location of an incinerator on the Wildwood property is inappropriate due to wetlands and floodplain concerns.

EPA Response: A mobile incinerator unit would preferably be located outside of the floodplain. Analyses performed in the FS indicate that there should be sufficient space to operate a mobile incinerator at the Wildwood property outside of the floodplain.

Comment 18. W.R. Grace & Co. - It does not make sense to treat extracted groundwater to drinking water standards prior to discharge to the Aberjona River.

EPA Response: The requirements for surface water discharge are determined by a detailed assessment of Federal and State Applicable or Relevant and Appropriate Regulatory requirements (ARAR's). The stated discharge limitations must be adhered to unless variance is agreed to by both parties. This regulatory posture is mandated by the provisions of Superfund Amendments and Reauthorization Act (SARA) and the National Contingency Plan (NCP).

EPA agrees that treated groundwater discharged to the Aberjona River would not necessarily have to meet drinking water standards. Discharges would be required to comply with NPDES discharge permit limitations. However, drinking water standards must ultimately be met in the aquifer, and for any treated groundwater that was to be reinjected into the aquifer.

5. Comments Concerning Legal Issues

Comment 1. Olympia - Under SARA, the drinking water standards do not have to be restored "as quickly as possible" as a remedial action objective.

EPA Response: The ROD remedial action, in response to public comments, differs from the remedial action in the proposed plan. The selected remedial action will not remediate all site groundwater as quickly as the proposed remedy because of the additional study being done in the central area. Nonetheless, EPA is committed to prompt restoration of the groundwater to drinking water standards, in light of SARA's requirement in 42 U.S.C. § 9632(b), that the Site remedial action be protective of human health and environment.

Comment 2. Beatrice - EPA should consider the findings and conclusions reached in Anderson v. W.R. Grace & Co. which found that there was no evidence to find that contaminants from the 15 acres of property abutting the Aberjona River now owned by Wildwood Conservation Corporation contaminated Wells G & H.

EPA Response: EPA has considered extensive data regarding the contamination of Wells G & H including Remedial Action Master Plan for East Woburn, Area of Influence and Zone of Contribution to Superfund Site Wells G & H, Woburn, Massachusetts, Wells G & H Site, Remedial Investigation Report, Part I, Woburn, Massachusetts, Wells G & H Remedial Investigation, Part II, Final Supplemental Remedial Investigation for Feasibility Study, Wells G & H Site, and Final Supplemental Remedial Investigation for

Feasibility Study, Wells G & H Site, Woburn, Massachusetts. Based on these studies, EPA determined that the 15 acres is within the zone of contribution to Wells G & H.

Comment 3. New England Plastic (NEP) - EPA failed to provide a statement of the basis and purpose of the selected action as called for under CERCLA as amended by SARA. EPA's action violates 42 U.S.C. § 9613.

EPA Response: EPA states on pages 8-20 of the Proposed Plan its basis for the preferred remedy. The section "EPA Criteria for Evaluating Alternatives", pages 18-20 provides analysis of the evaluation of alternatives and the rationale for proposal of the preferred alternative.

Comment 4. New England Plastic (NEP) - EPA's preferred response action does not comply with SARA § 121(a) and (b) because it is not: (1) cost effective; (2) a permanent solution; and (3) protective of human health and the environment.

EPA Response: The preferred alternative, as proposed, was consistent with CERCLA, protective of human health and the environment, cost effective, and a permanent solution. The preferred alternative also met various other statutory requirements and response objectives considered. The preferred alternative was changed to the remedy selected in the ROD in response to public comment. See Sections X and XI in the ROD for a discussion of the selected remedy and the statutory determinations.

Comment 5. W.R. Grace & Co. - The primary purpose of the Proposed Plan is to provide immediate access to drinking water to a potential populace for reasons unrelated to the Superfund program. Such action would be arbitrary and capricious.

EPA Response: Immediate treatment of the central area is no longer part of the selected remedy. Nonetheless, remediation of the aquifer remains a valid objective pursuant to CERCLA and would not be deemed arbitrary and capricious. Under EPA Groundwater Classification System [EPA Groundwater Protection Strategy (GWPS)], the Aberjona River Aquifer is classified as Class II B. Class II B aquifers are potential drinking water sources and guidelines for protection are established by GWPS based on the aquifers characteristics of vulnerability, use, and value. See ROD Section V (B) for further discussion.

Comment 6. W.R. Grace & Co. and UniFirst - To the extent EPA has discussed or received comments from the MWRA or DEP regarding the

water supply policy of the Commonwealth of Massachusetts in relation to its selection of the remedy, EPA is required to include such comments in the Administrative Record. The proposed remedy if selected would therefore be an arbitrary and capricious action by the agency.

EPA Response: Rationale for choosing the proposed remedial action is properly documented in the Proposed Plan and other administrative documents. The Administrative Record contains sufficient information upon which the proposal is based. Inclusion in the Administrative Record of all internal deliberative memoranda is not required under CERCLA.

6. Miscellaneous Comments

Comment 1. Olympia questioned why there had been no attempt by EPA to address the source of Weyerhauser contamination.

EPA Response: The contamination in the groundwater found at the Weyerhauser property is indicative of a gasoline spill which would not fall under the jurisdiction of CERCLA. The DEP is currently involved in addressing this issue.

Comment 2. Cummings Properties Management, Inc. (CPMI) requests that further information be provided to the public as to why the area in which the drums were found that sparked the original investigation, has not been included in the site. CPMI further requests that all other areas that have been found to be sources of contamination be included in the site.

EPA Response: EPA has used groundwater monitoring information as an indication of sources of contamination. In this case, EPA did not find any significant groundwater contamination nearby this property and therefore did not pursue it as a source of contamination to the aquifer.

Comment 3. CPMI specifically objects to EPA's characterization of the Wells G & H site as a single site. They suggest EPA should at least classify each of the five currently identified source areas as individual sites impacting the surrounding areas.

EPA Response: The site placed on the National Priorities List (NPL) consists of Wells G & H and includes all areas of contaminated groundwater that affect Wells G & H when the wells are pumping. EPA believes the NPL listing is appropriate to achieve the objectives of remediation of contaminated areas influencing Wells G & H. EPA does not plan to change the listing.

Comment 4. Massachusetts Rifle Association (MRA) objects to any intrusion onto MRA land imposed by the cleanup plan. MRA would be willing to negotiate on a cleanup plan and wishes that particular portions of MRA property be left undisturbed. They further stated that they would like to be compensated for any intrusion by any and all responsible parties.

EPA Response: Since the management of migration (MOM) portion of the remedy had been changed, the ROD no longer calls for pumping groundwater to one central treatment plant. While EPA will not enter property unnecessarily, proper implementation of the cleanup will require activity on properties in the site area. EPA access is authorized under Section 104 (e) of CERCLA. Finally, regarding the issue of compensation to MRA by responsible parties, EPA response would be inappropriate and would not be part of such discussions.

## IV. REMAINING CONCERNS

During the public comment period, at the public informational meeting on February 9, 1989 and at the informal public hearing held in Woburn on February 27, 1989, local residents, officials, and PRPs raised issues that will be of concern as the site moves into the remedial design and implementation phase. These issues and concerns are summarized below, along with EPA comments on how the Agency intends to address these concerns.

Comment 1. FACE recommended that further studies be conducted to identify the extent to which heavy metals have contaminated sediments in the Aberjona River and suggested exploring the possibility that these contaminants have migrated along the Aberjona River from the Industri-Plex Superfund site.

EPA Response: As stated in the ROD Section IV, the Aberjona River will be addressed as part of another operable unit.

Comment 2. FACE suggested that EPA work with the City of Woburn to establish an Aquifer Protection District to restrict and prohibit the use of hazardous materials which could cause further contamination.

EPA Response: EPA has already promulgated extensive regulations in the handling of hazardous waste throughout the United States. The Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6901 et. et seq., establishes a system for handling hazardous waste which is designed to protect human health and the environment from such contaminants. Regulations promulgated pursuant to RCRA can be found at 40 C.F.R. Parts 260-271. Specifically, 40 C.F.R. 264, Subpart F establishes requirements for monitoring the groundwater to detect and respond to the

presence of contaminants. As EPA believes the RCRA system is appropriate to protect against further contaminations in the Wells G & H area, EPA will not be establishing an aquifer protection district pursuant to this ROD. EPA remains willing however to work with the City of Woburn on matters related to Wells G & H.

Comment 3. Citizen McAveeney recommended that the following actions be considered to supplement remediation efforts: strict time parameters established; community representation for resolution; area business involvement; and a weekly status report provided to the public.

EPA Response: During design phase all citizens will be kept apprised of ongoing process through the usual methods of fact sheets and press releases. Meetings at FACE headquarters (or with any other group that invites EPA) can occur on as regular a basis as is agreed upon. Time parameters will be included in the consent decree or Administrative Orders.

Comment 4. Woburn Conservation Commission and Citizen Medeiros suggested that the maintenance, monitoring and prevention of vandalism to the treatment system needs to be addressed in the design phase.

EPA Response: EPA agrees with these issues and they will be addressed in the design process.

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# ATTACHMENT A

## COMMUNITY RELATIONS ACTIVITIES
## CONDUCTED AT THE
## WELLS G & H SITE
## IN WOBURN, MASSACHUSETTS

ATTACHMENT A

COMMUNITY RELATIONS ACTIVITIES
CONDUCTED AT THE
WELLS G & H SITE
IN WOBURN, MASSACHUSETTS

Community relations activities conducted to date for remedial activities at the Wells G & H Superfund site include:

- November 1984 - EPA issued a press release to announce the initiation of field work to determine the nature, source and extent of contamination at the Wells G & H site.

- November 1985 - EPA released a Community Relations Plan describing citizen concerns about the site, and presenting a program to address those concerns and to keep citizens informed about and involved in site activities.

- March, 1986 - EPA issued a fact sheet to inform the public of the Remedial Investigation (RI) being conducted to establish the source and extent of contamination at the Wells G & H site.

- October 30, 1986 - EPA issued a press release announcing the availability of the Wells G & H RI report.

- November, 1986 - EPA issued a fact sheet to present the results and conclusions of the RI report.

- November 13, 1986 - EPA held a public informational meeting to explain the results of the RI and to present preliminary results of the Endangerment Assessment (EA).

- October, 1987 - EPA issued a fact sheet to describe plans for completing the RI and for developing the cleanup options for the Feasibility Study (FS).

- May, 1988 - EPA issued a fact sheet to describe the steps in the FS process and the opportunities for public involvement in the selection of a cleanup plan for the site.

- May 2, 1988 - EPA issued a press release announcing that EPA would hold an informal meeting to discuss the purpose of the FS.

- May 12, 1988 - EPA held an informal meeting to present the purpose of the FS and to discuss the FS process.

- December, 1988 - EPA issued a fact sheet to summarize Supplemental RI activities and their results, and to explain the purpose and results of the EA.

- December 14, 1988 - EPA issued a press release announcing the availability of the EA, and the Supplemental RI which further characterizes soil and groundwater contamination at the site.

- February 1, 1989 - EPA issued a press release announcing the completion of the draft FS and Proposed Plan. The release stated that EPA would hold a public meeting on February 9 on the FS and Proposed Plan.

- February 9, 1989 - EPA held a public informational meeting to present the FS and Proposed Plan.

- February 10, 1989 - EPA initiated a 40-day public comment period on the FS and EPA's preferred alternative for the Wells G & H site.

- February 27, 1989 - EPA conducted an informal public hearing on the remedial alternatives evaluated in the FS.

- April 26, 1989 - EPA issued a press release announcing that EPA would test air in homes near the Wells G & H site in response to concerns that indoor air contamination could result from vapors from contaminated groundwater beneath homes.

- August 25, 1989 - EPA issued a press release to announce the findings of the indoor air study conducted in Woburn, MA. EPA found no health threat from indoor air at homes near the Wells G & H site.

ATTACHMENT B

TRANSCRIPT OF THE FEBRUARY 27, 1989 INFORMAL PUBLIC HEARING

UNITED STATES OF AMERICA

ENVIRONMENTAL PROTECTION AGENCY

In the Matter of:

PUBLIC HEARING ON STUDIES RE:

WELLS G AND H SUPERFUND SITE
WOBURN, MASSACHUSETTS

Monday
February 27, 1989

Woburn City Hall
10 Common Street
Woburn, Massachusetts

The above-entitled matter came on for hearing, pursuant to Notice, at 7:45 o'clock p.m.

BEFORE:

RICHARD CAVAGNERO
Chief
Superfund Section
Environmental Protection Agency

BARBARA NEWMAN
Site Manager
Environmental Protection Agency

1 P R O C E E D I N G S

2 [7:45 p.m.]

3 MR. CAVAGNERO: My name is Richard
4 Cavagnero and I am the Chief of the Superfund Section
5 of EPA. With me, on my right, is Barbara Newman who is
6 the Site Manager for the Wells G and H site.
7 The purpose of this hearing tonight is to
8 formally accept oral comments, or written if you so
9 desire, on a number of studies EPA has done at the
10 Wells G and H site, including the remedial
11 investigation report, dangerment assessment,
12 feasibility study and the proposed plan for the
13 remediation of the site.
14 I would first like to describe the format
15 of the hearing tonight. Barbara will give you a brief
16 overview of the proposed plan, five to ten minutes to
17 refresh your memory. As many of you know, I guess, we
18 were out here on February 9th for an informational
19 meeting, at which Barbara and her contractors gave you
20 a detailed presentation of the proposed plan. And,
21 again, she will recap that before we take oral
22 comments.
23 Following Barbara's overview, we will
24 accept any oral comments you wish to make for the
25 record. Those of you wishing to comment should have

already filled out these little index cards. If you haven't already, please fill one out and give them to Diane Ready with the red sweater in the back.

If you don't have a copy, there are extra copies of the proposed plan on the table, as you enter the door.

And, I will be calling on people wishing to make statements in the order in which they filled out the form. Presently, we have three people, so I don't think we will have to put a time limit on their comments.

After all the comments have been heard, we will close the formal hearing. And, again, the purpose of the hearing is for EPA to receive any comments so that we can take them into consideration when we make our final decision on the remedy.

In the proposed plan, on page 2, is an address if you want to submit written comments in addition to or instead of your oral comments. We definitely want to receive them. They need to be in, postmarked no later than March 21st, which is the close of the comment period.

All the oral comments we receive tonight, and any written comments which we receive prior to March 21st, will be responded to when we come out with

a decision on the cleanup for the site in a document called The Record of Decision. Part of this document will include something called The Responsiveness Summary, wherein EPA will respond in writing to all comments which were received, both in writing and orally.

Are there any comments or questions on the format of the hearing?

[No response from audience]

MR. CAVAGNERO: Okay.

Well, with that, I guess we will start the formal hearing. We have three commentors. The first one is the Honorable John Rabbitt, Mayor of Woburn.

And I would ask you to come up to this mic so that the transcriber can get it down clearly.

MR. RABBITT: Thank you, Barbara.

In terms of the overall objectives of the Administration -- I have to speak for my administration, I can't speak for future administrations -- we do agree and we appreciate the fact that the EPA is coming up with a proposal to clean up the aquifer.

There have been a lot of misunderstandings with respect to my position with respect to my position of the aquifer and what we have done and what we have

not done.

First of all, I would like to make it clear for the record that the wells in the aquifer, the G and H wells, are still intact. Is there any disagreement with that, that the wells are there?

MS. NEWMAN: Based on what you say.

MR. RABBITT: Okay, thank you.

The wells are there, the pipes are in the ground, we never touch the wells.

Number two is, we do agree. The City of Woburn, the Administration, would like to see the aquifer cleaned up.

However, I think where we have a very, very basic disagreement is the fact that, personally, and as long as I'm the Chief Administrator of the city, I will never support reopening those wells, based on the history of the aquifer itself, and based on the total uncertainty of what has happened to some of the children in the area.

I would also like to, for statement purposes, make the fact that it has been said that the City of Woburn has closed down those wells because of the fact that-- we don't want them reopened because of the fact that it's a cheap -- we are using cheap water now from the MDC. Well, anyone who knows the economics

of water realizes that MDC water is not cheap. We definitely expend less money producing our own water then we would if we purchased the water -- as we purchase water from MDC.

At this particular time, we purchase probably about twenty five, twenty six percent of our water from MDC, and the rest of it is produced on our own wells.

But, I do appreciate an opportunity to speak in front of you. We do appreciate your coming in and proceeding to clean up the aquifer; however, based on the history of the field, this -- meaning myself -- will never support the reopening of the wells.

Thank you, very much.

MS. NEWMAN: Excuse me. I just want to ask you a question for clarification.

MR. RABBITT: Sure.

MS. NEWMAN: When you say never support the reopening of the wells, is that for drinking water purposes or for any other use; for remedial purposes or just in general?

MR. RABBITT: Oh, no. For testing purposes, for cleaning up, oh, certainly, we would support a -- I'm really talking about drinking water or water for human consumption. And I don't think you

could convince anyone in the City of Woburn that this aquifer will ever be cleaned to a point -- you know, I have a lot of concerns, such as the peat is still in the ground, will the peat ever be clean? Will the peat ever, you know, will that still give off carcinogenics?

You know, just a lot of things that, if the aquifer is so contaminated, I think you are talking about twenty to fifty years of cleanup. I'm not going to be around fifty years -- possibly be around twenty years -- but, even in twenty years, I don't think I would drink any water or I would support anyone drinking any water from that aquifer.

Thank you.

MS. NEWMAN: Thank you.

MR. CAVAGNERO: Thank you.

Next, we have John Marlowe, Chairperson of FACE, For A Clean Environment.

MR. MARLOWE: I have a prepared statement here.

Before I get into that, the best indication of the time element between 1979 and 1989, where we are coming to the end of the road, is that I didn't need glasses ten years ago.

FACE is a grassroot environmental organization which was formed in 1979 when Wells G and

1 H were closed because of volatile organic
2 contamination. When the EPA identified the
3 Industriplex site as one of the largest hazardous waste
4 sites in the country, and when the original cluster of
5 childhood leukemia was identified in Woburn, FACE began
6 a ten year ordeal of monitoring the investigation and
7 cleanup process.
8 Through the years, we have worked closely
9 with EPA and DEQE to encourage the investigation and
10 cleanup of the hazardous waste sites. We have also
11 worked with the Mass. Department of Public Health, the
12 US Centers for Disease Control, and Harvard University
13 on investigations of the high rate of childhood and
14 adult leukemia in Woburn.
15 We have enjoyed a close working
16 relationship with the EPA. Although we have not always
17 been in agreement, and we have frequently become
18 impatient with the slowness of the Superfund process,
19 we have found that the lines of communication have been
20 open and the EPA has been responsive to our concerns.
21 We are in the process of applying for a
22 Technical Assistance Grant, under the provisions of
23 Superfund, which will provide us with the advice of
24 technical experts in the review of design plans for the
25 remediation of the Wells G and H site. We look forward

to continuing the productive and open working relationship with the EPA which we have had in the past.

The following are comments specific to the Feasibility Study for the cleanup of the Wells G and H.

Future water supply potential: We certainly applaud the EPA's recommendation to restore the aquifer to drinking water quality. However, we do not, and can not, support the use of the aquifer as a drinking water supply for the City of Woburn.

While we recognize that the technology exists to remove contaminants from water, we believe that it is only possible to treat contaminants which can be identified through currently available testing procedures.

The cause of the high rate of leukemia in Woburn has not been established. Until we have adequate explanation for the cause of the leukemia and proof that the groundwater in the Wells G and H area is not the cause, we can not support the use of this water as a drinking water supply.

Area wide ground and surface water investigation: Recent EPA studies have identified high levels of heavy metals such as arsenic, lead, and mercury in the sediments in the Aberjona River near the

wells. The Feasibility Study does not make recommendations for the treatment of contaminated sediments.

We recommend that further studies be conducted to identify the extent of heavy metal contamination in the area. Since the identified metals are among those found on the Industriplex site to the north, further studies should explore the possibility that they have migrated along the Aberjona River from the Industriplex site.

Plans for treatment of contaminated groundwater: We have a number of concerns about the construction of a central treatment plant to remove volatile organics from the groundwater. Pumping contaminated groundwater from the five source areas and from Wells G and H, and transporting it through a series of pipes to a central treatment plant will cause extensive destruction to wetlands in an area where contamination and development have already endangered natural conditions.

Further, we are concerned that pumping groundwater from six source areas to a central treatment plant will deplete the aquifer and lower the level of the river when treated water is reinjected into the aquifer south of the treatment plant. We

suggest that pumping and treating groundwater in the six source areas and reinjecting it on each site would be more protective of water levels in the area and would further serve to flush contamination from bedrock.

Emissions from the incineration of contaminated soils: We realize that it would not be cost effective to remove contaminated soils from the site and incinerate or dispose of them offsite. However, we are concerned that emissions from onsite incineration of PCBs and pesticides could endanger residents in nearby neighborhoods and workers in adjacent industrial areas if the incineration process should fail at any time.

Institutional controls: The Feasibility Study makes no mention of the use of institutional controls to protect the study area from further degradation. We suggest that the EPA work with the City of Woburn to establish an Aquifer Protection District to restrict and prohibit the use of hazardous materials which could further contaminate Wells G and H.

I thank you, as the Chairperson of FACE, for having the opportunity to speak, and certainly as a lifelong resident of fifty years of the City of Woburn,

this has probably been the most difficult time of any administration, whether it be Mayor Rabbitt's or all the previous ones, regarding this issue.

It's been said that all of us have watched Woburn splashed on national televisions for many different reasons on this specific issue. The EPA, in many cases, has done their best. From a personal point of view, I think more could have been done earlier, a ten year span is much too long.

And I would suggest to those in control of the EPA to use this as a model and let all the mistakes be made here so that in the future, you can see what was done, some sort of a capsulization should be done of all the difficult problems we have had here, why it took ten years to get to the point we are today, so that future members and future people that sit in the position you are in now will be able to determine and shortcut any potential procedure problems.

Thank you.

MR. CAVAGNERO: Thank you.

Herbert Meyer, from the Mystic River Watershed Association.

MR. MEYER: I appreciate the opportunity to make some comments.

1 I have a suggestion that the Superfund
2 Section of Remedial Projects, which Ms. Newman chairs,
3 uses her Community Relation staff to make it the eyes
4 and ears of her remedial projects. It notices that the
5 residents and the administration of the City which is
6 affected is doing and not doing. So, the Community
7 Relations staff would regularly report to her if the
8 city or town was not familiar with the Superfund
9 program can remain in touch with her regularly.
10 Then, a point about the cheap and pure
11 Quabbin water which Woburn, like many other cities or
12 towns, are using. This is based on an obsolete
13 Massachusetts law which forbids that towns and cities
14 which are at a ten mile distance from the State House
15 are not permitted to use their own water, but have to
16 buy and recieve water of, now, Water Resource
17 associated water.
18 And we would suggest that the city contact
19 the state senators and representatives in the House to
20 replace that obsolete law by a law which is in accord
21 with the present thinking about using groundwater as
22 long as it is good.
23 The Superfund remedial project section is
24 committed to clean up the aquifer. Therefore, we feel
25 that it would be pointless for the City of Woburn to

not want to use the Wells G and H ever, if not for drinking water, they can certainly be used for other purposes.

The Woburn Aquifer is magnificent and should be restored to its original good quality. According to a 1982 map of the United States Geological Service, the aquifer, both in North Woburn and East Woburn, and the rest of the aquifer in Woburn have the potential for over twenty eight million gallons a day, which is a substantial percentage of the total groundwater within the metropolitan Boston area.

Therefore, since we are running short of water and will be unable to cover our water consumption by the year 2020, it would be in the interest of saving money for an increased production of groundwater by using the Connecticut River, or by other means, much longer. And, therefore, it would save the state -- who is already in financial trouble -- the necessity to increase the treatment of, for instance, the Connecticut River water for our purposes.

Thank you.

MR. CAVAGNERO: I have to apologize for a little lapse here. I was going to have Barbara go over the proposed plan first, before we took the comments, and for some reason I went right to the comments. So,

we are going to have Barb now recap the proposed plan, for five or ten minutes, after which we will take additional comments if you have any or close the hearing.

MS. NEWMAN: Okay.

Hopefully, this recap will inspire some more comments.

For those of you who weren't at the meeting on February 9th, I'm just going to give you a brief overview of what the proposed plan was. There are two parts to it; a groundwater component and a soil component.

For the groundwater component, EPA recommends extracting groundwater from five source areas at the Well G and H site. These source areas are properties belonging to W. R. Grace and Company, Unifirst Corporation, Olympia Nominee Trust, Wildwood Corporation and New England Plastics. And, also extracting water from the center of the aquifer, which is the area in between these companys and around Wells G and H, and pumping that water all to one centrally located treatment plant in the center of the site, and treating the water.

First, pretreating it to remove the high iron and manganese levels in the water, which can

1 sometimes foul up further treatment processes, and then
2 air stripping it, which is a technology that blows air
3 through the water and removes the volatile organic
4 contaminants from the water and moves them into the
5 air. The clean waters, then, can be discharged back
6 into the aquifer and into the river.
7 And then the volatile organic contaminants
8 are in the air. They are then sent through a carbon
9 filter which absorbs these contaminants onto the
10 filter, and then the filter is cleaned every so often
11 and the contaminants are virtually destroyed at the
12 end.
13 The objective is to reach drinking water
14 standards for most of the contaminants, the volatile
15 contaminants that are in the water. This would-- We
16 predict that this will be done within ten years for the
17 central area, as long as the source areas are continued
18 to be pumped. And we predict that-- But pumping the
19 source areas, it could take anywhere from twenty to
20 fifty years to get those areas themselves, because
21 their levels are much higher than the center area, down
22 to drinking water standards.
23 For soil, we recommend -- there are two
24 different technologies, a combination of two
25 technologies. On the Wildwood Conservation Corporation

1 property, there is an area of just volatile
2 contamination in the soil that is kind of discrete and
3 can be separated.
4 And for this, we propose using an in situ
5 vacuum extraction technology, which basically is a --
6 it's a technology where you install wells into the
7 ground and suck out the air from the soil. And the air
8 that's contaminated with the volatiles is then vacuumed
9 through a carbon filter which also absorbs these
10 contaminants. It does not require excavation of the
11 area. Some parts of the Wildwood Conservation
12 Corporation property have wetlands and some of those
13 wetlands are contaminated in the soil. So, this would
14 not require excavation of the area.
15 And then the second component is
16 incineration. We propose bringing a mobile incinerator
17 on the site, excavating contaminated soil from several
18 of the properties that are contaminated, bringing it
19 into the incinerator and then replacing the clean soil
20 back outside.
21 That should take approximately fifteen
22 months once we are out there at the site. That does
23 not include the time for bidding, for contractors and
24 designing the implementation.
25

The total cost for the remedy comes to approximately forty million three hundred thousand dollars, with it costing thirty seven million one hundred thousand dollars for the groundwater remedy and three million two hundred thousand dollars for the soil remedy.

MR. CAVAGNERO: Thank you, Barbara.

We will take any --

MS. NEWMAN: Did you say somebody was writing a comment, though, on a card?

Do you want to read this?

MR. CAVAGNERO: Sure.

MS. NEWMAN: This is for the record, too.

MR. CAVAGNERO: Paul A. Medeiros, Marietta Street, Woburn, Mass.

"I would like to be assured that the undeveloped land along Olympia Ave. is not sold to help defray cleanup costs, as was the case with the Industriplex site."

MS. NEWMAN: The undeveloped land along Olympia Avenue? Along the railroad track?

SPEAKER: Across from Unifirst.

MS. NEWMAN: Across from Unifirst. It belongs to the rifle range, that land? Does that belong to the rifle range, property?

1 MR. RABBITT: The rifle range, I don't
2 think they acquired the -- are they one of the
3 properties involved in there?
4 MR. CAVAGNERO: Okay.
5 We have the Reverend Bruce A. Young.
6 REVEREND YOUNG: It wasn't my intention to
7 speak tonight, and I speak as a resident and not as a
8 member of any organization.
9 I am compelled to speak, however, by some
10 of the things that have been mentioned already, what
11 the Mayor has said and what Dr. Meyer has said and what
12 Jack Marlowe said. And I want to add my comments to
13 speak in opposition to the suggestion that the Aberjona
14 aquifer ever be used for productive purposes to put the
15 water back on line for drinking water purposes.
16 I think what's happened is -- Jack alluded
17 the fact this goes back to 1979 -- I think here, in
18 1989, the public is much more informed and much more
19 knowledgable about environmental concerns and
20 technology and engineering than we were ten years ago.
21 The country has made vast strides so that now, as part
22 of a public service on your nightly national news -- I
23 know ABC does a segment now on the environment about
24 once a week.
25

1 And so, I think you will find that the
2 general public, in 1989, unlike what we were in 1979,
3 is no longer mesmerized by claims that the technology
4 that will be employed is state of the art. We used to
5 think that was pretty exciting stuff and that we were
6 on the cutting edge of some wonderful things. We have
7 seen state of the art technology and we are not
8 impressed, in many cases, with what happened.
9 Acton has been used as an example of
10 treatment of contaminated water. In a similar way, as
11 I understand it, in a way that's not dissimilar from
12 what's being proposed here.
13 In talking with one of the Water
14 Commissioners in Acton a couple of years ago, he
15 confided that there had been a time when there was a
16 breakdown in the system, and that for several hours the
17 plant was not operating as it should have been, it was
18 not working properly, and that error went undetected
19 for several hours, all of which time, the water was not
20 being purified, as the public had reason to believe.
21 And so, very close at hand, we have an incident where
22 sophisticated technology didn't work.
23 We also have heard the horror stories of
24 the landfill liner down in New Jersey that was
25 guaranteed to last for forty years and it didn't make

1 three years. Here in Woburn, we tried out a latex
2 cover out on the Industriplex site. That latex cover
3 was supposed to last for several years and didn't get
4 through the winter.
5 The simple truth is that, in spite of your
6 best of intentions -- and I take them to be sincere,
7 honest, good intentions -- the fact of the matter is
8 that, in spite of the good intentions that you have,
9 you are going to have a hard time overcoming fear and
10 distrust. That's hard to earn and it's hard to get.
11 And, at this point, I'm not sure that the
12 people of Woburn will ever feel comfortable or -- I
13 shouldn't say all the people in Woburn, but many of the
14 people of Woburn, a vast number, will ever feel
15 comfortable trusting in technologies and in systems
16 when they have seen others fail and betray them.
17 And so, I think we have to respect that,
18 even though it may just be a perception rather than a
19 reality. We are dealing with some things that have to
20 be dealt with on the perception level as well.
21 Thank you.
22 MR. CAVAGNERO: Thanks.
23 MS. NEWMAN: Thank you.
24 MR. CAVAGNERO: Thank you all for coming.
25 If there's no further-- Yes?

MR. STOLLER: May I make a comment?

MS. NEWMAN: Sure, come on up.

Will you just tell who you are when you start?

MR. STOLLER: My name is Mark Stoller, and I'm with W. R. Grace.

I have a few brief comments.

The EPA remedy calls for source control and we agree with that, but we think the source control and treatment is appropriate at each site and not in the valley.

The EPA approves -- Grace has already submitted plans, we can be pumping and treating groundwater in an environmentally sound manner on our property this year instead of 1992, 1993 or later, as proposed by EPA.

Two years ago we did submit plans for a pilot test on our property. And last year, we installed groundwater pumping wells in anticipation of being able to proceed.

We think that this option would eliminate the need for constructing a network of pipelines to carry contaminated water throughout East Woburn, including through wetland areas. And furthermore, with treatment at our site we will know what it is that's in

1 the water we are treating.

2 Down in the valley system, as proposed,

3 would place anyone who operates it in a situation

4 where, since much of the water will come from the

5 river, we will -- or anybody who operates it -- will

6 not be in a position to know what is in the water until

7 it is in the wells.

8 We urge all other identified areas to

9 commit themselves to source control and onsite

10 treatment. And we believe, with that commitment, that

11 we can proceed in a quick and efficient manner to deal

12 with the problem.

13 Thank you.

14 MS. NEWMAN: Anybody else?

15 [No response from the audience]

16 MR. CAVAGNERO: Okay, again, thank you for

17 your attendance.

18 The comment period does close on March

19 21st, and if you would like to make additional or

20 written comments, you can send them to Barbara Newman's

21 attention at the EPA in Boston. The address is in the

22 proposed plan. And we will, again, be working --

23 Barbara will be working hard on the Record of Decision,

24 which we hope to finalize somewhere around the May

25 timeframe.

1 Again, thank you for coming tonight.

2 MS. NEWMAN: Thank you.

3 (The public hearing closed at 8:20 p.m.)

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CERTIFICATE OF REPORTER AND TRANSCRIBER

This is to certify that the attached proceedings before: RICHARD CAVAGNERO

in the Matter of:

PUBLIC HEARING ON

WELLS G AND H SUPERFUND SITE
WOBURN, MASSACHUSETTS

Place: Woburn, Massachusetts

Date: February 27, 1989

were held as herein appears, and that this is the true, accurate and complete transcript prepared from the notes and/or recordings taken of the above titled proceeding.

Laura Madi
Reporter

3/13/89
Date

Laura Madi
Transcriber

3/13/89
Date

# WELLS G & H

## APPENDIX B
## ADMINISTRATIVE RECORD INDEX

# INTRODUCTION

This document is the Index to the Administrative Record for the Wells G & H National Priorities List (NPL) site. Section I of the Index cites site-specific documents, and Section II cites guidance documents used by the EPA staff in selecting a response action at the site.

The Administrative Record is available for public review at EPA Region I's Office in Boston, Massachusetts, and at the Woburn Public Library, 45 Pleasant Street, Woburn, MA 01801. Questions concerning the Administrative Record should be addressed to the EPA Region I site manager.

The Administrative Record is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).

# SECTION I

# SITE-SPECIFIC DOCUMENTS

ADMINISTRATIVE RECORD INDEX
for the
Wells G & H NPL Site

## 1.0 PRE-REMEDIAL

### 1.2 Preliminary Assessment

1. "Preliminary Site Assessment of Edward C. Whitney and Son," Ecology and Environment, Inc. (August 6, 1980).
2. "Preliminary Site Assessment of Metropolitan District Commission Septage Receiving Station," Ecology and Environment, Inc. (August 6, 1980).
3. "Preliminary Site Assessment of Surface Coatings, Inc. (Raffi & Swanson, Inc.)," Ecology and Environment, Inc.(August 6, 1980).
4. "Preliminary Site Assessment of Woburn Steel Drum, Inc.," Ecology and Environment, Inc. (August 6, 1980).
5. "Preliminary Site Assessment of Woburn Sanitary Landfill," Ecology and Environment, Inc.(August 6, 1980).
6. "Preliminary Site Assessment of Ritter Trucking Company, Inc.," Ecology and Environment, Inc. (August 6, 1980).
7. "Preliminary Site Assessment of New England Resins & Pigments," Ecology and Environment, Inc. (August 6, 1980).
8. "Preliminary Site Assessment of Aberjona Auto Parts," Ecology and Environment, Inc. (October 27, 1980).
9. "Preliminary Site Assessment for Whitney Barrel Company, Inc.," Ecology and Environment, Inc. (November 3, 1980).
10. "Preliminary Site Assessment for Independent Tallow Company Inc.," Ecology and Environment, Inc. (November 3,1980).
11. "Preliminary Site Assessment of John J. Riley Tannery," Ecology and Environment, Inc. (November 12,1980).
12. "Preliminary Site Assessment of Unifirst Corporation," NUS Corporation (September 24, 1985).

### 1.3 Site Inspection

1. "Site Inspection and Safety Plan for Raffi & Swanson, Inc. (Surface Coatings, Inc.)," Ecology and Environment, Inc. (August 14, 1980).
2. "Site Inspection and Safety Plan for Woburn Sanitary Landfill," Ecology and Environment, Inc. (August 15, 1980).
3. "Site Inspection and Safety Report for New England Resins and Pigments," Ecology and Environment, Inc.(August 28, 1980).
4. "Site Inspection Report of Surface Coatings, Inc. (Raffi & Swanson, Inc.)," Ecology and Environment, Inc.(September 16, 1980).
5. "Site Inspection Report for Woburn Steel Drum, Inc.," Ecology and Environment, Inc. (September 16, 1980).

## 1.3 Site Inspection (cont'd)

6. "Site Inspection Report for E.C. Whitney and Son, Inc.," Ecology and Environment, Inc.(September 16, 1980).
7. "Site Inspection Report for Ritter Trucking Company, Inc.," Ecology and Environment, Inc. (September 16, 1980).
8. "Site Inspection Report of Metropolitan District Commission Septage Receiving Station," Ecology and Environment, Inc. (September 17, 1980).
9. "Site Inspection Report of Woburn Sanitary Landfill," Ecology and Environment, Inc. (September 17, 1980).
10. "Site Inspection Plan of John J. Riley Company (a Division of Beatrice Foods)," Ecology and Environment, Inc. (November 13, 1980).
11. "Site Inspection Report of Aberjona Auto Parts," Ecology and Environment, Inc. (November 26, 1980).
12. "Site Inspection Report of John J. Riley Company (a Division of Beatrice Foods)," Ecology and Environment, Inc. (December 1, 1980).
13. "Site Inspection Report of Whitney Barrel Company, Inc.," Ecology and Environment, Inc. (December 16, 1980).
14. "Site Inspection Report of Atlantic Gelatin," Ecology and Environment, Inc. (December 17, 1980).
15. "Aberjona Auto Parts Draft Site Inspection Report," Ecology and Environment, Inc. (September 19, 1985).

## 1.7 Correspondence Related to Proposal of a Site to the NPL

1. Letter from L. Fucarile, Ecology and Environment, Inc. to W. Grandin, Metropolitan District Commission (December 4, 1980).

## 1.18 FIT Technical Direction Documents (TDD's) and Associated Records

1. "Inventory of Wells in the Woburn, Massachusetts Area," Ecology and Environment, Inc. (June 2, 1980).
2. "Site Entry Plan for Whitney Barrel Company, Inc.," Ecology and Environment, Inc. (November 4, 1980).
3. "Site Entry Plan of Atlantic Gelatin," Ecology and Environment, Inc. (November 19, 1980).
4. "Chlorinated Solvent Contamination of the Groundwater," Ecology and Environment, Inc. (March 8, 1982).
5. "Evaluation of the Hydrogeology and Groundwater Quality of East and North Woburn, Volumes I-IV," Ecology and Environment,Inc. (June 25, 1982). NOTE: Oversize "Surface Contour Maps 1-4" from Volume I are available for review at EPA Region I, Boston, Massachusetts.

## 2.0 REMOVAL RESPONSE

### 2.1 Correspondence

1. Letter from R.G. Bell, Jr., Clean Harbors, Inc. to Juniper Development (February 24, 1986).
2. Set of EPA Region I Meeting Notes, Olympia Nominee Trust Meeting (August 20, 1986).
3. Letter from R.J. Ankstitus, US EPA to L. Massery, Cooley, Manion, Moore & Jones (February 11, 1987).
4. *EPA Region I* Attendance List, Unifirst Corporation Meeting (April 21, 1987).
5. Set of EPA Region I Meeting Notes, Unifirst Corporation Meeting (April 21, 1987).
6. Set of EPA Region I Meeting notes, (B. Newman) Unifirst Corporation Meeting (April 21, 1987).
7. Internal EPA Region I Letter from B. Newman to R. Cavagnero, D. Lang, L. Evans, D. Delaney (April 22, 1987).
8. Set of EPA Region I Meeting Notes, Unifirst Corporation Meeting (July 7, 1987).
9. Set of Barbara Newman EPA Region I Meeting Notes, Unifirst Corporation (July 7, 1987).
10. Letter from J. Bates, Goodwin, Procter & Hoar to P. Boxell, EPA Region I (September 22, 1987).
11. Set of EPA Region I Telephone Notes, EPA Region I/Jeff Bates, Goodwin, Procter & Hoar.

### 2.3 Sampling and Analysis Data

1. "Report of Analysis," Clean Harbors of Natick, Inc. (October 29, 1985).
2. "Polychlorinated Biphenyl and Pesticide Analysis in Sediment and Soil - Olympia Trust Realty, Woburn, MA" (via Internal EPA Region I Letter from M. Lee to R. Ankstitus) (January 28, 1987).

### 2.5 On-Scene Coordinator Report

1. "Technical Assistance Team Report for January - February, 1986," Roy F. Weston, Inc. (February 25, 1986).
2. "Juniper Realty Drum Site Private Responsible Party Cleanup," Roy F. Weston, Inc. (May 29, 1986).

## 3.0 REMEDIAL INVESTIGATION (RI)

### 3.1 Correspondence

1. Letter from V.A. Forte, Cryovac Division, W.R. Grace & Company to M. Hohman, EPA Region I and W. St. Hillaire, Massachusetts Department of Environmental Quality Engineering (April 28, 1983).
2. EPA Region I Meeting Notes, Interstate Uniform Company Meeting (May 13, 1983).
3. EPA Region I Attendance List, Meeting with Environmental Research & Technology, Inc., Goodwin, Procter & Hoar, Interstate Uniform, and the Massachusetts Department of Environmental Quality Engineering (May 18, 1983).
4. Letter from W.J. Cheeseman, Foley, Hoag & Eliot to L. Stiller Rikleen, EPA Region I (May 18, 1983). Concerning response to the order issued by EPA Region I on May 9, 1983.
5. Letter from W.J. Cheeseman, Foley, Hoag & Eliot to L. Stiller Rikleen, EPA Region I (June 1, 1983). Concerning Addendum to the Work Plan.
6. Set of EPA Region I Telephone Notes, EPA Region I/J. Bates, Goodwin, Procter & Hoar (June 10, 1983).
7. Set of EPA Region I Telephone Notes/J. Bates, Goodwin, Procter & Hoar (October 31, 1983).
8. Letter from L. Stiller Rikleen, EPA Region I to W.J. Cheeseman, Foley, Hoag & Eliot (January 11, 1984).
9. Letter from L. Stiller Rikleen, EPA Region I to M. J. Rodburg, Lowenstein, Sandler, Brockin, Kohl, Fisher, Boylan & Meaner (January 30, 1984).
10. "Technical Oversight of Beatrice Well Emplacement," Internal NUS Corporation Memo (August 6, 1984).
11. Letter from W.J. Cheeseman, Foley, Hoag & Eliot to L. Stiller Rikleen, EPA Region I (August 8, 1984).
12. Letter from L. Hogan, Environmental Research & Technology, Inc. to D. Delaney, EPA Region I (January 18, 1985).
13. Letter from D. Chin, EPA Region I to R.W. Simonds, City of Woburn Department of Public Works (July 9, 1985).
14. Letter from M. Stoler, W.R. Grace & Company to D. Delaney, EPA Region I (July 19, 1985). Concerning Sanitary System layout for Cryovac Plant.
15. Letter from J.P. Imse, Weston Geophysical Corporation to D. Delaney, EPA Region I (September 30, 1985).
16. Letter from J. Stewart, Lowenstein, Sandler, Brochin, Kohl, Fisher, Boylan & Meanor to D. Delaney, EPA Region I (November 8, 1985). Concerning comments on the Wells G & H Aquifer Pump Test.
17. Letter from J.H. Guswa, GeoTrans to Mark Stoler, W.R. Grace and Company (December 7, 1987). Concerning attached letter report regarding the Cryovac Plant sanitary system.

## 3.1 Correspondence (cont'd)

18. Letter from R.C. Niles, W.R. Grace & Company to L. Evans and R. Chalpin, EPA Region I (February 5, 1986).
19. Letter from R.M. Nugent, Woodward-Clyde Consultants to D. Delaney, EPA Region I (February 19, 1986).
20. Set of EPA Region I Notes to File (September 17, 1986). Concerning information for work at Cryovac site.
21. Letter from M. Stoler, W.R. Grace & Company to B. Newman, EPA Region I (July 31, 1987).
22. Letter from B. Newman, EPA Region I to D. Porteous, EPA Region I (August 19, 1987). Concerning Request for Assistance.
23. Letter from M. Stoler, W.R. Grace & Company to B. Newman, EPA Region I (September 25, 1987).
24. Letter from J. Cleary, Ebasco Services, Inc. to B. Newman, EPA Region I (October 22, 1987). Concerning modification to W.R. Grace & Company Sampling Plan.
25. Internal EPA Region I Letter from B. Newman to D. Porteous (Regarding Request for Assistance) (October 30, 1987).
26. Letter from B. Newman, EPA Region I to M. Stoler, W.R. Grace & Company (November 2, 1987).
27. Letter from M. Stoler, W.R. Grace & Company to B. Newman, EPA Region I (December 8, 1987).
28. Letter from Barbara Newman, EPA Region I to Julio Olimpio, United States Geological Survey (February 18, 1988). Concerning zone of contribution of the Riley well.
29. Letter from Julio Olimpio, United States Geological Survey to Barbara Newman, EPA Region I (March 2, 1988). Concerning clarification of zone of contribution of the Riley well.
30. Letter from Julio Olympio, United States Geological Survey to Barbara Newman, EPA Region I (December 20, 1988). Concerning new survey data in the vicinity of Wells G & H.
31. Memorandum from Stan Rydell, EPA Region I to Barbara Newman, EPA Region I (January 19, 1989). Concerning the analysis and comparison of the results of radionuclide tests on Well #S22 at the site.

## 3.2 Sampling and Analysis Data

1. Sampling and Analysis Data, Tighe & Bond Consulting Engineers (February 19, 1986).
2. Internal EPA Region I letter from E.J. Kim to B. Newman (transmittal of Unifirst Corporation Sample Results) (July 2, 1987).
3. Internal EPA Region I letter from E.J. Kim to B. Newman (November 20, 1987). Concerning Unifirst Corporation overview and split sampling with ERT contractors.

### 3.2 Sampling and Analysis Data (cont'd)

4. Technical Reports for GeoTrans by Environmental Testing and Certification, for sample dates October 28, 29, 30; November 3; and December 22, 1987. (W.R. Grace & Company's results from split sampling with Ebasco, Fall 1987) [via transmittal letter from Mark Stoler, W.R. Grace & Company to Gretchen Muench, EPA Region I (January 12, 1989)].
5. Letter from E.J. Kim, EPA Region I to B. Newman, EPA Region I (January 5, 1988). Concerning Unifirst Corporation sample results from November 30, 1987.
6. Letter from E.J. Kim, EPA Region I to B. Newman, EPA Region I (January 26, 1988). (Transmittal of VOA split sampling with ERT results from October 28, 1987).
7. Letter from D. Granz, EPA Region I to B. Newman, EPA Region I (February 26, 1988). Concerning Unifirst Corporation - Gas Chromatography-Mass Spectrometry analysis of extractable organics in municipal and industrial discharges.
8. Set of Sampling and Analysis Data, Roy F. Weston, Inc. (March 16, 1988).
9. "Residential Indoor Air Sampling Results, Wells G & H Superfund Site, Woburn, Massachusetts," EPA Region I (June 1989).
10. "Soil Sampling of the Wells G & H Superfund Site" (W.R. Grace & Company and Olympia Nominee Trust), EPA Region I (July/August 1989). NOTE: Data Validation Packages are available for review at EPA Region I, Boston, Massachusetts.

* *Other Sampling and Analysis Data for the Remedial Investigation may be reviewed, by appointment only, at EPA Region I, Boston, Massachusetts.*

### 3.4 Interim Deliverables

1. "Geophysical Survey W.R. Grace Site," International Exploration, Inc. for GeoEnvironmental Consultants, Inc. (April 1983).
2. "Field Investigations and Remedial Measures Interim Report," GeoEnvironmental Consultants, Inc. (August 1983).
3. "Assessment of Ground Water Contamination Potential at Interstate Uniform Services Corporation," Environmental Research & Technology, Inc. (October 1983).
4. "Field Investigations and Remedial Measures Phases I-III Final Report," GeoEnvironmental Consultants, Inc. (May 1984). NOTE: Oversize "Topographic Plan of Land in Woburn, MA" Plates I-II are available for review at the EPA Region I, Boston, Massachusetts.
5. "Summary of Monitoring Program Unifirst Corporation," Environmental Research & Technology, Inc. (via transmittal letter from J.C. Bates, Goodwin, Procter & Hoar to D. Delaney, EPA Region I, August 22, 1984) (August 15, 1984).

### 3.4 Interim Deliverables (cont'd)

6. "Evaluation and Recommendations for Alternatives Concerning Additional Investigation of Ground-Water Contamination," Environmental Research & Technology, Inc. (via transmittal letter from R.K. Schnoor, Goodwin, Procter & Hoar to J. Owens, EPA Region I, September 24, 1984) (September 24, 1984).
7. "Phase II Groundwater Investigation J.J. Riley Site," Woodward-Clyde Consultants (November 1, 1984).
8. "Field Investigations and Remedial Measures Phase VI - Field Descriptions," GeoEnvironmental Consultants, Incorporated (August 1985).
9. Letter from J. Loitherstein, Coffin & Richardson Consulting Engineers to D. Delaney, EPA Region I (November 5, 1985). Concerning Coffin & Richardson's planned test program to determine the integrity of the sanitary system at the Cryovac Plant site.
10. "Subsurface Investigation and Observation Well Installation Aberjona River, Wells G & H Site," Atlantic Testing Laboratories, Limited (December 2, 1985).
11. "Final Field Operations Plan Supplemental Remedial Investigation/Feasibility Study," EBASCO Services Inc. (August 1987).
12. "Area of Influence and Zone of Contribution to Superfund Site Wells G and H," U.S. Geological Survey (1987). NOTE: Oversize "Area of Influence Plates 1-6" are available for review at EPA Region I, Boston, Massachusetts.

### 3.5 Applicable or Relevant and Appropriate Requirements

1. Letter from D. D'Amore, Division of Water Supply, Massachusetts Department of Environmental Quality Engineering to B. Newman, EPA Region I (June 23, 1987). Concerning Applicable DWS ARAR's.

### 3.6 Remedial Investigation (RI) Reports

1. "Wells G & H Site Remedial Investigation Report Part I Volumes I-IV," NUS Corporation Superfund Division (October 17, 1986). NOTE: Oversize Volume II Plates 1-9 are available for review at EPA Region I, Boston, Massachusetts.
2. "Wells G & H Remedial Investigation Part II Final Report," Alliance Technologies Corporation (November 1986).
3. "Review of EPA Report Titled Wells G & H Site Remedial Investigation Report," GeoTrans, Inc. (8 volumes) (July 1987).

### 3.6 Remedial Investigation (RI) Reports (cont'd)

4. "Final Supplemental Remedial Investigation for Feasibility Study" (includes Appendices A-F), Ebasco Services Incorporated (December 1988). Note: Oversize maps of "Monitoring Well Locations" and "Volatile Organic Compounds in Groundwater 1987" are available for review, by appointment only, at EPA Region I, Boston, Massachusetts.

### 3.7 Work Plans and Progress Reports

1. "Field Investigations and Remedial Measures Supplemental Workplan," GeoEnvironmental Consultants, Inc. (April 1984). NOTE: Oversize map "Topographic Plan of Land in Woburn, MA Phase IV" is available for review at EPA Region I, Boston, Massachusetts.
2. "Scope of Work for a Remedial Investigation at Wells G & H Site," NUS Corporation Superfund Division (October 19, 1984).
3. "Remedial Investigation Phases VI-VIII Work Plan," GeoEnvironmental Consultants, Inc. (June 25, 1985).
4. "Work Plan USGS Assistance of EPA Region I Wells G and H, Woburn, Massachusetts," US Department of the Interior (via transmittal letter from J. Olimpio, U.S. Department of the Interior to D. Gagne, EPA Region I) (December 9, 1985).
5. "Final Work Plan Supplemental Remedial Investigation/ Feasibility Study," Ebasco Services Inc. (September 1987).
6. "Review Comments Regarding EPA Final Work Plan Supplemental Remedial Investigation/Feasibility Study," GeoTrans, Inc. (February 1988). [via transmittal letter from Mark Stoler, W.R. Grace & Company to Gretchen Muench, EPA Region I (February 17, 1988)].

### 3.9 Health Assessments

1. "Toxicological Profile for Tetrachloroethylene," Agency Toxic Substances and Disease Registry (ATSDR) (December 1987).
2. "Toxicological Profile for Trichloroethylene," Agency for Toxic Substances and Disease Registry (ATSDR) (January 1988).

### 3.10 Endangerment Assessments

1. "Endangerment Assessment for the Wells G & H Site" (includes Appendices A-F), Clement Associates, Incorporated for Ebasco Services Inc. (December 1988).

## 4.0 FEASIBILITY STUDY (FS)

### 4.1 Correspondence

1. Cross-Reference: Letter from Gretchen Muench, EPA Region I to Wildwood Conservation Corporation, Riley Leather Company, Inc., and Wedel Corporation c/o Mary Ryan, Nutter, McClennan & Fish (January 5, 1989). Concerning Riley Leather Company, Incorporated plans to cease operation some time this month. [Filed and cited as entry number 143 in 11.9 PRP Specific Correspondence.]
2. Telephone Notes between Gretchen Muench, EPA Region I and Mark Stoler, W.R. Grace & Company (January 8, 1989).
3. Telephone Notes between Gretchen Muench, EPA Region I and Jeff Bates, UniFirst Corporation (January 8, 1989).
4. Letter from Mark Stoler, W.R. Grace & Company to Gretchen Muench, EPA Region I (February 10, 1989). Concerning request for back-up documents from the Feasibility Study Report.
5. Letter from John Zannos, EPA Region I to Mark Stoler, W.R. Grace & Company (March 1, 1989). Concerning response to W.R. Grace & Company's letter of February 10, 1989 requesting back-up documentation from Feasibility Study.
6. Telephone Notes between Gretchen Muench, EPA Region I and Attorney for the Massachusetts Rifle Association (March 15, 1989).
7. Telephone Notes between Gretchen Muench, EPA Region I and Jeff Bates, UniFirst Corporation (March 17, 1989).
8. Telephone Notes between Gretchen Muench, EPA Region I and Neil Glick, New England Plastics (March 20, 1989).
9. Telephone Notes between Gretchen Muench, EPA Region I and Jay Stewart, Beatrice Foods (March 1989).

### 4.4 Interim Deliverables

1. "Wells G&H Wetlands Assessment Final Report," Alliance Technologies Corporation (March 25, 1986). NOTE: Oversize "Location of Wetland Areas Plate 1" (February 1987) is available for review at EPA Region I, Boston, Massachusetts.
2. Letter from Pi-Yun Tsai, EPA Region I to Barbara Newman, EPA Region I (August 25, 1988). Concerning development of soil cleanup levels for lead.

### 4.5 Applicable or Relevant and Appropriate Requirements(ARARs)

1. Letter from Jay Naparstek, Massachusetts Department of Environmental Quality Engineering to Barbara Newman, EPA Region I (January 19, 1989). Concerning identification of State ARARs.

## 4.6 Feasibility Study (FS) Reports

1. "Draft Final Feasibility Study Report, Wells G & H Site" (includes Appendices A-D), Ebasco Services, Incorporated (January 1989).

*Comments on the Feasibility Study received by EPA Region I during the formal public comment period on the Feasibility Study and Proposed Plan are filed and cited in 5.3 Responsiveness Summaries.*

2. "PLASM Groundwater Flow Model" (discussed in Appendix C of the Feasibility Study Report), Ebasco Services, Incorporated (February 1989). Computer disk is available for review, by appointment only, at EPA Region I, Boston, Massachusetts.
3. Letter and data package from Lewis Horzempa, Ebasco Services Incorporated to Barbara Newman, EPA Region I (March 22, 1989). Concerning transmittal of Feasibility Study back-up cost calculations.
4. "Economic Evaluation of Trichloroethylene Removal from Contaminated Ground Water by Packed Column Air Stripping," Michael D. Cummins, USEPA [via transmittal letter from Lewis Horzempa, Ebasco Services Inc. to Barbara Newman, EPA Region I (March 23, 1989)]. Concerning "FS Air Stripping Efficiency Evaluations."

## 4.9 Proposed Plans for Selected Remedial Action

1. Letter from Barbara Newman, EPA Region I to Jay Naparstek, Massachusetts Department of Environmental Quality Engineering (December 7, 1988). Concerning transmittal of the Proposed Plan for the Wells G & H Superfund Site.
2. Letter from Barbara Newman, EPA Region I to Rodine DeRice, Massachusetts Department of Environmental Quality Engineering (December 7, 1988). Concerning transmittal of the Proposed Plan for the Wells G & H Superfund Site.
3. "Proposed Plan for the Wells G & H Site," ICF Technology, Incorporated for Ebasco Services Inc. (February 1989).

*Comments on the Proposed Plan received by EPA Region I during the formal public comment period on the Feasibility Study and Proposed Plan are filed and cited in 5.3 Responsiveness Summaries.*

## 5.0 RECORD OF DECISION

### 5.2 Applicable or Relevant and Appropriate Requirements (ARARs)

1. Memorandum from Karina Thomas, Envirosphere Company to the File (January 6, 1989). Concerning previous evaluations of the Land Disposal Restrictions' (LDR) impact on the Wells G & H Site.

### 5.3 Responsiveness Summaries

1. Cross-Reference: Responsiveness Summary is Appendix A of the Record of Decision [Filed and cited as entry number 1 in 5.4 Record of Decision (ROD)].

*The following citations indicate documents received by EPA Region I during the formal public comment period.*

2. Comments Dated February 8, 1989 from William J. Murphy, Woburn Conservation Commission on the Proposed Plan for cleanup of Wells G & H Superfund Site.
3. Comments Dated February 14, 1989 from Herbert Meyer, Mystic River Watershed Association, Inc. on the Proposed Plan and the Feasibility Study (FS) Meeting for Wells G & H Superfund Site in the Woburn Town Hall on February 9, 1989.
4. Comments Dated February 16, 1989 from Kenneth McAveeney, Woburn Resident on the Proposed Plan.
5. Comments Dated February 27, 1989 from Herbert Meyer, Mystic River Watershed Association, Inc. on the Woburn meeting of February 9, 1989 on the Wells G & H Superfund Site.
6. "Public Hearing on the Feasibility Study for the Wells G & H Superfund Hazardous Waste Site in Woburn, MA," For A Cleaner Environment, Inc. (February 27, 1989). Concerning comments specific to the Feasibility Study for the cleanup of the Wells G & H site.
7. Comments Dated March 6, 1989 from Herbert Meyer, Mystic River Watershed Association, Inc. on update of letter from February 14 after the Public Hearing on the remedial plan for the Wells G & H Superfund site in the Woburn City Hall on February 27, 1989.
8. Comments Dated March 11, 1989 from Paul A. Medeiros, Woburn Resident on the proposed cleanup of Wells G & H.
9. Comments Dated March 21, 1989 from James L. McKeown, Cummings Properties on EPA's Proposed Cleanup Plan for Wells G & H Superfund Site.
10. Comments Dated March 21, 1989 from Mark Stoler, W.R. Grace & Company on the EPA Feasibility Study and Proposed Plan for Woburn Wells G & H.

11. Comments Dated March 21, 1989 from Louis N. Massery, Cooley, Manion, Moore & Jones, P.C. (Attorney for George Whitten, Olympia Nominee Trust, and Juniper Development) on EPA's proposed plan for cleanup at the Wells G & H site.
12. Comments Dated March 21, 1989 from Colburn T. Cherney, Ropes & Gray (Attorney for Charrette Corporation) on suggestion that Charrette Corporation is inappropriately designated as a Potentially Responsible Party.
13. Comments Dated March 21, 1989 from George B. Henderson, II, Nutter, McClennen & Fish (Attorney for John J. Riley, Jr., John J. Riley Company, Inc., and Wildwood Conservation Corporation) on the proposed cleanup plan for Wells G & H Superfund Site.
14. Comments Dated March 21, 1989 from Edward J. Markey, U.S. House of Representatives on EPA's proposed cleanup plan for Wells G & H Superfund Site in Woburn, Massachusetts.
15. Comments Dated March 21, 1989 from Jeffrey C. Bates and Christopher P. Davis, Goodwin, Procter & Hoar (Attorneys for UniFirst Corporation) on legal comments concerning EPA's proposed remedy for Woburn Wells G & H.
16. Comments Dated March 21, 1989 from Jeffrey C. Bates, Goodwin, Procter & Hoar (Attorney for UniFirst Corporation) on two additional sets of UniFirst comments on EPA's proposed remedy for Woburn Wells G & H.
17. Comments Dated March 21, 1989 from James Stewart, Lowenstein, Sandler, Kohl, Fisher & Boylan (Attorney for Beatrice Foods Company) on the Proposed Plan for cleanup of Wells G & H Site -Woburn, Massachusetts.
18. Comments Dated March 21, 1989 from Edward F. George, Jr., Rome & George (Attorney for the Massachusetts Rifle Association) on response of MRA to EPA cleanup plan of February 1989.
19. "Technical Report on the Woburn, Massachusetts Wells G & H Site (includes Appendices 1 - 25)," John A. Cherry, Ph.D., Martin L. Johnson, Ph.D. P.E., Rudolph J. Jaeger, Ph.D., DABT and ENSR Consulting and Engineering, The Johnson Company, Inc., Environmental Medicine, Inc. (March 1989).
20. "Review Comments Regarding the U.S. Environmental Protection Agency, January 1989, Draft Final Feasibility Study Report, Wells G & H Site, Woburn, Massachusetts," prepared for W.R. Grace & Company by GeoTrans, Inc. (March 1989).
21. Comments Dated March 21, 1989 from Franklin G. Stearns, Brown, Rudnick, Freed & Gesmer (Attorney for New England Plastics Corporation) on the EPA cleanup plan for Wells G & H Superfund Site [via letter transmitting correction of comments (April 25, 1989)].

### 5.4 Record of Decision (ROD)

1. "Wells G & H Record of Decision - ROD Decision Summary," EPA Region I (September 14, 1989).

## 9.0 STATE COORDINATION

### 9.1 Correspondence

1. Letter from J. Vetere, Massachusetts Water Resources Authority to B. Newman, EPA Region I (June 12, 1987). Concerning the Wilmington extension sewer.
2. Set of EPA Region I Telephone Notes, B. Newman, EPA Region I/R. Cleary, Massachusetts Department of Environmental Quality Engineering (October 20, 1987).
3. Meeting Notes, EPA Region I and Massachusetts Water Resources Authority (March 10, 1988).
4. Letter from Barbara Newman, EPA Region I to Rodine DeRice, Massachusetts Department of Environmental Quality Engineering (May 10, 1988). Concerning groundwater divide at site and EPA Region I's recommendation to add sites to list of State's planned investigations.
5. Letter from Daniel S. Greenbaum, Massachusetts Department of Environmental Quality Engineering to Merrill Hohman, EPA Region I (September 21, 1988). Concerning State's position regarding proposed remedial alternatives.
6. Letter from Barbara Newman, EPA Region I to Jay Naparstek, Massachusetts Department of Environmental Quality Engineering (October 24, 1988). Concerning EPA's request for State to explain attainment of State ARARs.
7. Letter from Barbara Newman, EPA Region I to Jay Naparstek, Massachusetts Department of Environmental Quality Engineering (December 7, 1988). Concerning list of contaminants and target levels.
8. Letter from Richard Cavagnero, EPA Region I to Robert Bois, Massachusetts Department of Environmental Quality Engineering. Concerning agreement between EPA Region I and the State to coordinate efforts.
9. Letter from Barabara Newman, EPA RegionI to Jay Naparstek, Massachusetts Department of Environmental Quality Engineering (April 3, 1989). Concerning transmittal of complete set of all comments received on the Proposed Plan, Feasibility Study and Remedial Investigation.

## 10.0 ENFORCEMENT

### 10.1 Correspondence

1. Letter from B. Newman and L. Gollins Evans, EPA Region I to R. Cavagnero, EPA Region I (October 23, 1986).

### 10.7 Administrative Orders

1. Administrative Order, Beatrice Foods, Inc. (May 9, 1983).
2. Administrative Order, Interstate Uniform Services, Corporation (May 9, 1983)
3. Administrative Order, W.R. Grace & Company; Cryovac, Inc. (May 9, 1983).
4. Administrative Order, W.R. Grace & Company (June 13, 1983).
5. Administrative Consent Order, Interstate Uniform Services, Corporation (September 29, 1983)
6. Administrative Order and Agreement, Beatrice Foods, Inc. (September 30, 1983).
7. Administrative Order, Wildwood Conservation Corporation (With letter attached transmitting Administrative Order from M. Hohman, EPA Region I to J.J. Riley, Wildwood Conservation Corporation, December 13, 1985) (December 12, 1985).
8. Amended Administrative Order, Wildwood Conservation Corporation (January 27, 1986).
9. Administrative Order, George D. Whitten, Charles D. Whitten, and Amy Whitten, as Trustees of the Olympia Nominee Trust (February 7, 1986).
10. Administrative Order, George D. Whitten, Charles D. Whitten, and Amy Whitten, as Trustees of the Olympia Nominee Trust (February 17, 1987).
11. Administrative Order by Consent, Unifirst Corporation (With letter attached transmitting consent order from M. Hohman, EPA Region I to A.A. Croatti, Unifirst Corporation, September 25,1987) (September 28, 1987).

### 10.11 PRP Enforcement Work Plans

1. Scope of Work, Beatrice Foods (through the services of Woodward-Clyde Consultants) (via transmittal letter from M. Rodburg, Lowenstein, Sandler, Brochin, Kohl, Fisher, Boylan and Meanor Counsellors at Law to L. Stiller Rikleen, EPA Region I) (August 10, 1983).
2. "Unifirst Corporation Monitoring Well Sampling Work/QA Plan Short Form," EPA Region I (November 17, 1987).
3. Letter from J.T. Lawson, Environmental Research & Technology, Inc. to B. Newman, EPA Region I (December 21, 1987).

### 10.11 PRP Enforcement Work Plans (cont'd)

4. "Additional Investigation of Unifirst Corporation," Environmental Research & Technology, Inc.

## 11.0 POTENTIALLY RESPONSIBLE PARTY (PRP)

### 11.3 Contractor Work Plans and Progress Reports

1. Letter from S. Gaudet, Environmental Research & Technology, Inc. to B. Newman, EPA Region I (Regarding ERT's deep bedrock aquifer test and map of elevations from recently installed wells) (February 23, 1988). NOTE: Oversize "Sketch of Wells on Olympia Avenue Woburn, MA" (February 10, 1988) is available at EPA Region I, Boston, Massachusetts.

### 11.8 Site-Specific Contractor Deliverables

1. "Summary of Investigation - UniFirst Site - Woburn, Massachusetts," ERT for UniFirst Corporation (February 1988). (via transmittal letter from Jeffery Lawson, ERT to Barbara Newman, EPA Region I) (February 17, 1988).

### 11.9 PRP-Specific Correspondence

ADAP

1. Request for Information from EPA Region I to ADAP (May 10, 1983).
2. Answers to EPA Request for Information, ADAP (May 31, 1983).

ABERJONA AUTO PARTS, INC.

3. Request for Information from EPA Region I to Aberjona Auto Parts Inc. (December 31, 1987).
4. Answers to EPA Request for Information, Aberjona Auto Parts Inc. (January 27, 1988).

ALLIED VAN LINES

5. Request for Information from EPA Region I to Allied Van Lines (May 10, 1983).
6. Answers to EPA Request for Information, Allied Van Lines (May 17, 1983).

ARLWOOD, INC.

7. Request for Information from EPA Region I to Arlwood, Inc. (May 10, 1983).
8. Answers to EPA Request for Information, Arlwood, Inc.(August 5, 1983).

BEATRICE FOODS COMPANY

9. Request for Information from EPA Region I to Beatrice Foods Company (June 15, 1986).

## 11.9 PRP-Specific Correspondence (cont'd)

BEATRICE FOODS COMPANY (cont'd)

10. Answers to EPA Request for Information, Beatrice Foods Company (June 30, 1986).
11. Request for Information from M. Hohman, EPA Region I to D. Kelly, Beatrice Foods Corporation (February 22, 1988).
12. Letter from Neil Jacobs, Hale and Dorr (Attorney for Beatrice Foods Company) to Gretchen Muench, EPA Region I (March 9, 1988). Concerning EPA's request for information.
13. Letter from Neil Jacobs, Hale and Dorr (Attorney for Beatrice Company) to Gretchen Muench, EPA Region I (March 14, 1988). Concerning transmittal of a copy of the response to EPA's Request for Information.
14. Answers to EPA Request for Information, Beatrice Foods Company (March 14, 1988).
15. Notice of Potential Liability from EPA Region I to Beatrice Company (April 20, 1988).
16. Supplementary discovery information required of Beatrice Company submitted to EPA on February 22, 1989 by Mary Ryan (Nutter, McClennen & Fish) on behalf of the John J. Riley Company, Inc., the Wildwood Conservation Corporation, and the Wedel Corporation.

BRISTOL TERMINALS

17. Letter from Merrill Hohman, EPA Region I to Bristol Terminals, Incorporated (February 3, 1989). Concerning Notice of Potential Liability.

BRODIE INC.

18. Answers to EPA Request for Information, Brodie Inc. (June 10, 1983).

CHARRETTE, INC.

19. Request for Information from L. Sutton, EPA Region I to Charrette, Inc. (May 10, 1983).
20. Answers to EPA Request for Information, Charrette, Inc. (June 10, 1983).
21. Request for Information from EPA Region I to Charrette, Inc. (August 18, 1987).
22. Answers to EPA Request for Information from J.M. Balding, Charrette, Inc. to M. Hohman, EPA Region I (August 25, 1987).
23. Answers to EPA Request for Information, Charrette Inc. (August 1987). NOTE: Oversize "Plumbing Site Plan" is available for review at EPA Region I, Boston, Massachusetts.
24. Letter from Merrill Hohman, EPA Region I to Mark Balding, Charrette Inc. (February 3, 1989). Concerning Notice of Potential Liability.

## 11.9 PRP-Specific Correspondence (cont'd)

CHARRETTE, INC. (cont'd)

25. Letter from Colburn T. Cherney, Ropes & Gray (Attorney for Charrette Inc.) to Barbara Newman, EPA Region I (February 9, 1989). Concerning response to the correspondence dated February 3, 1989 from Merrill S. Hohman, EPA Region I.

CONTINENTAL METAL PRODUCTS COMPANY, INC.

26. Request for Information from P. Keough, EPA Region I to Continental Metal Products Company, Inc. (June 10, 1983).

CONTINENTAL METAL PRODUCTS COMPANY, INC.

27. Answers to EPA Request for Information, Continental Metal Products Company, Inc. (June 21, 1983).

CREST BUICK

28. Request for Information from L. Sutton, EPA Region I to Crest Buick (May 10, 1983).
29. Answers to EPA Request for Information, Crest Buick (May 23, 1983).

CUMMINGS PROPERTIES

30. Request for Information from EPA Region I to Cummings Properties (July 31, 1987).
31. Answers to EPA Request for Information, Cummings Properties (August 28, 1987). NOTE: Oversize "Drainage and Sewer System Plans" attachment 6-15 are available for review at EPA Region I, Boston, Massachusetts.
32. Letter from Merrill Hohman, EPA Region I to Cummings Properties Management, Incorporated (February 3, 1989). Concerning Notice of Potential Liability.

DONALD M. MANZELLI, INC.

33. Request for Information from L. Carothers, EPA Region I to Donald M. Manzelli Inc. (January 15, 1982).
34. Answers to EPA Request for Information, Donald M. Manzelli Inc. (January 30, 1982).

ECONOMICS LABORATORY, INC.

35. Request for Information from P. Keough, EPA Region I to Economics Laboratory Inc. (June 10, 1983).
36. Answers to EPA Request for Information, Economics Laboratory, Inc. (July 15, 1983).

GERARD REALTY COMPANY

37. Letter from Merrill Hohman, EPA Region I to Gerard Realty Company (February 3, 1989). Concerning Notice of Potential Liability.

HAMILTON/AVNET ELECTRONICS

38. Request for Information from L. Sutton, EPA Region I to Hamilton/Avnet Electronics (May 10, 1983).
39. Answers to EPA Request for Information, Hamilton/Avnet Electronics (May 17, 1983).

## 11.9 PRP-Specific Correspondence (cont'd)

HEMINGWAY TRANSPORT, INC.

40. Request for Information from L. Sutton, EPA Region I to Hemingway Transport, Inc. (May 10, 1983).
41. Answers to EPA Request for Information, Hemingway Transport, Inc. (June 9, 1983).
42. Letter from Merrill Hohman, EPA Region I to Hemingway Transport, Incorporated (c/o Herbert Kahn, Trustee in Bankruptcy) (February 3, 1989). Concerning Notice of Potential Liability.

INGERSOLL-RAND COMPANY

43. Letter from Merrill Hohman, EPA Region I to Ingersoll-Rand Company (February 3, 1989). Concerning Notice of Potential Liability.

INDEPENDENT TALLOW COMPANY, INC.

44. Request for Information from P. Keough, EPA Region I to Independent Tallow Company, Inc. (June 10, 1983).
45. Answers to EPA Request for Information, Independent Tallow Company, Inc. (June 30, 1983).

JOHN J. RILEY COMPANY

46. Letter from J.J. Riley, Jr., John J. Riley Company to L. Benevides, Massachusetts Department of Environmental Quality Engineering (April 22, 1983).
47. Letter from D.A. Huebner, EPA Region I to J.J. Riley, John J. Riley Company, Inc. (January 20, 1984).
48. Letter from J.J. Riley, Jr., John J. Riley Company, Inc. to W.F. Cass, Massachusetts Department of Environmental Quality Engineering (January 25, 1984).
49. Answers to EPA Request for Information from M.K. Ryan, Nutter, McClennen & Fish to B. Newman, EPA Region I (Regarding J.J. Riley Company) (October 14, 1986).
50. Request for Information from M. Hohman, EPA Region I to J.J. Riley, John J. Riley Company, Inc. (November 1986).
51. Answers to EPA Request for Information from M.K. Ryan, Nutter, McClennen & Fish to B. Newman or G. Ruta, EPA Region I (includes 8 exhibits) (December 12, 1986). Concerning the John J. Riley Company Inc.
52. Request for Information from M. Hohman, EPA Region I to J.J. Riley, John J. Riley Company (October 13, 1987).
53. Answers to EPA Request for Information, John J. Riley Company, Inc. (November 13, 1987).
54. Answers to EPA Request for Information, John J. Riley Company, Inc. (November 23, 1987). NOTE: Oversize "Map of Proposed Structure" is available for review at EPA Region I, Boston, Massachusetts.
55. Letter from Merrill Hohman, EPA Region I to John J. Riley, John J. Riley Company Incorporated (February 3, 1989). Concerning Notice of Potential Liability.

## 11.9 PRP-Specific Correspondence (cont'd)

JUNIPER DEVELOPMENT GROUP

56. Letter from Merrill Hohman, EPA Region I to George Whitten, Juniper Development Group (February 3, 1989). Concerning Notice of Potential Liability.

RILEY LEATHER COMPANY

57. Letter from C. Sheehan, Riley Leather Company, Incorporated to D. Delaney, EPA Region I (December 11, 1987).
58. Request for Information from B. Newman, EPA Region I to C. Sheehan, Riley Leather Company, Incorporated (May 16, 1988).
59. Answers to EPA Request for Information from C. Sheehan, Riley Leather Company, Incorporated to B. Newman, EPA Region I (May 25, 1988).

MASSACHUSETTS RIFLE ASSOCIATION

60. Letter from Merrill Hohman, EPA Region I to President, Massachusetts Rifle Association (February 3, 1989). Concerning Notice of Potential Liability.

McKESSON DRUG COMPANY

61. Request for Information from P. Keough, EPA Region I to McKesson Drug Company (June 10, 1983).
62. Answers to EPA Request for Information, McKesson Drug Company (July 6, 1983).

MURPHY'S WASTE OIL SERVICES, INC.

63. Request for Information from M. Hohman, EPA Region I to J. Murphy, Murphy's Waste Oil Services Inc. (December 31, 1987).
64. Answers to EPA Request for Information from R. Backman, Wright and Moehrke Counsellors at Law to Barbara Newman, EPA Region I (regarding Murphy's Waste Oil Services Inc.) (January 22, 1988).

NEW ENGLAND PLASTICS CORPORATION

65. Request for Information from P. Keough, EPA Region I to New England Plastics Corporation (June 10, 1983).
66. Answers to EPA Request for Information, New England Plastics Corporation (July 6, 1983).
67. Request for Information from M. Hohman, EPA Region I to New England Plastics Corporation (July 22, 1987).
68. Answers to EPA Request for Information, New England Plastics Corporation (August 1987).
69. Notice of Liability from EPA Region I to New England Plastics Corporation (April 20, 1988).
70. Request for Information from EPA Region I to R. Kearin, New England Plastics Corporation (May 5, 1988).
71. Letter from Franklin G. Stearns, Brown, Rudnick, Freed & Gesmer (Attorney for New England Plastics Corporation) to Mark Stein, EPA Region I (November 3, 1988). Concerning confirmation of scheduled contracting work to connect wastewater discharge to the MWRA sewer system for the week of November 14, 1988.

## 11.9 PRP-Specific Correspondence (cont'd)

NORTHERN RESEARCH & ENGINEERING CORPORATION

72. Request for Information from P. Keough, EPA Region I to K. Ginwall, Northern Research & Engineering Corporation (June 10, 1983).
73. Answers to EPA Request for Information, Northern Research & Engineering Corporation (June 24, 1983).
74. Letter from Merrill Hohman, EPA Region I to Northern Research and Engineering Corporation (February 3, 1989). Concerning Notice of Potential Liability.

NUNES BROTHERS TRUCKING COMPANY

75. Request for Information from M. Hohman, EPA Region I to Nunes Trucking Company (July 22, 1987).
76. Answers to EPA Request for Information, Nunes Brothers Trucking Company and Warehouse (September 3, 1987).

OLYMPIA NOMINEE TRUST

77. Request for Information from EPA Region I to G. Whitten, C. Whitten, A. Whitten, Olympia Nominee Trust (July 22, 1987).
78. Answers to EPA Request for Information, Olympia Nominee Trust (September 11, 1987).
79. Notice of Potential Liability from EPA Region I to Olympia Nominee Trust (April 20, 1988).
80. Letter from Merrill Hohman, EPA Region I to George Whitten (c/o Lou Massery, Esq., Cooley, Manion, Moore & Jones) (February 3, 1989). Concerning Notice of Potential Liability.

PIHER CORPORATION

81. Request for Information from L. Sutton, EPA Region I to Piher Corporation (May 10, 1983).
82. Answers to EPA Request for Information, Piher Corporation (June 7, 1983).

POWER PRODUCTS INC.

83. Request for Information from L. Sutton, EPA Region I to Power Products Inc. (May 10, 1983).
84. Answers to EPA Request for Information, Power Products Inc. (June 27, 1983).

PROSPECT TOOL AND DIE COMPANY, INC.

85. Letter from W.T. Grandin, Massachusetts Metropolitan District Commission to R. Benger, Prospect Tool & Die Company, Inc. (December 10, 1981).
86. Request for Information from M. Hohman, EPA Region I to Prospect Tool and Die Company, Inc. (July 22, 1987).
87. Answers to EPA Request for Information, Prospect Tool & Die Company, Inc. (August 27, 1987).
88. Notice of Potential Liability from EPA Region I to Prospect Tool and Die Company, Inc. (April 20, 1988).

## 11.9 PRP-Specific Correspondence (cont'd)

SALADA TEA

89. Request for Information from L. Sutton, EPA Region I to Salada Tea (May 10, 1983).
90. Answers to EPA Request for Information, Salada Tea (August 19, 1983).

THOMAS E. HOGAN, INC.

91. Request for Information from L. Sutton, EPA Region I to Thomas E. Hogan, Inc. (May 10, 1983).
92. Answers to EPA Request for Information, Thomas E. Hogan, Inc. (June 15, 1983).

UNIFIRST CORPORATION

93. Request for Information from M. Hohman, EPA Region I to A. Croatti, UniFirst Corporation (January 29, 1987).
94. Answers to EPA Request for Information, UniFirst Corporation (February 19, 1987).
95. Answers to EPA Request for Information, UniFirst Corporation (supplement) (February 25, 1987).
96. Memo from B. Newman, EPA Region I to R. Cavagnero, D. Lang, L. Evans, & D. Delaney, EPA Region I (April 22, 1987).
97. Set of EPA Region I Telephone Notes, B. Newman, EPA Region I/J. Lawson, Environmental Research & Technology, Inc. (regarding Unifirst Corporation) (May 26, 1987).
98. Set of EPA Region I Telephone Notes, B. Newman, EPA Region I/J. Lawson, Environmental Research & Technology, Inc. (regarding Unifirst Corporation) (June 1, 1987).
99. Letter from J.T. Lawson, Environmental Research & Technology, Inc. to D. Delaney, EPA Region I (regarding Unifirst Corporation) (June 26,1987).
100. Set of EPA Region I Meeting Notes, B. Newman, EPA Region I, Unifirst Corporation (July 7,1987).
101. Letter from J.T. Lawson, Environmental Research & Technology, Inc. to B. Newman, EPA Region I (regarding Unifirst Corporation) (November 16, 1987).
102. Set of EPA Region I Telephone Notes, B. Newman EPA Region I/J. Lawson, Environmental Research & Technology, Inc. (regarding Unifirst Corporation) (December 11, 1987).
103. Letter from Gretchen Muench, EPA Region I to Jeffrey C. Bates, Goodwin, Procter & Hoar (Attorney for UniFirst Corporation) (December 31, 1987). Concerning follow-up to recent conversation and letter from ERT dated December 21, 1987.
104. Set of EPA Region I Telephone Notes, B. Newman EPA Region I/J. Lawson, Environmental Research & Technology, Inc. (regarding Unifirst Corporation) (January 21, 1988).
105. Letter from J.T. Lawson, Environmental Research & Technology, Inc. to B. Newman, EPA Region I (regarding Unifirst Corporation) (January 28, 1988).

## 11.9 PRP-Specific Correspondence (cont'd)

UNIFIRST CORPORATION (cont'd)

106. Letter from J.T. Lawson, Environmental Research & Technology, Inc. to J. Bridge, GeoTrans (regarding Unifirst Corporation) (January 29, 1988).
107. Request for Information from M. Hohman, EPA Region I to A. Croatti, Unifirst Corporation (February 22, 1988).
108. Letter from J.H. Guswa, GeoTrans to J.T. Lawson, Environmental Research & Technology, Inc. (regarding Unifirst Corporation) (February 25, 1988).
109. Letter from J.T. Lawson, Environmental Research & Technology, Inc. to B. Newman, EPA Region I (regarding Unifirst Corporation) (March 16, 1988).
110. Letter from Nancer Ballard, Goodwin, Procter & Hoar (Attorney for Aldo Croatti Family Partnership/UniFirst Corporation) to Gretchen Muench, EPA Region I (March 17, 1988). Concerning confirmation of two week extension from EPA on request for information from Aldo Croatti Family Partnership/UniFirst Corporation.
111. Letter from L.M. Hogan, Environmental Research & Technology Inc. to B. Newman, EPA Region I (transmittal of Soil Analysis Report from Unifirst Corporation) (March 22, 1988).
112. Answers to EPA Request for Information from R. Croatti, Unifirst Corporation to B. Newman, EPA Region I (April 11, 1988).
113. Notice of Potential Liability from EPA Region I to Croatti Family Partnership (April 20, 1988).
114. Notice of Potential Liability from EPA Region I to Unifirst Corporation (April 20, 1988).
115. Letter from J. Bates, Goodwin, Procter & Hoar to G. Muench, EPA Region I (transmittal of comments on the Agency for Toxic Substances and Disease Registry's draft toxicological profile for tetrachloroethylene) (July 6, 1988).

UNITED TRUCK LEASING CORPORATION

116. Request for Information from M. Hohman, EPA Region I to R. Abrams, United Truck Leasing Corporation (July 22, 1987).
117. Answers to EPA Request for Information, United Truck Leasing Corporation (August 7, 1987).

W.R. GRACE & COMPANY

118. Request for Information from L. Carothers, EPA Region I to V.A. Forte, W.R. Grace & Company (January 15, 1982).
119. Answers to EPA Request for Information, W.R. Grace & Company (February 5, 1982).
120. Answers to EPA Request for Information, W.R. Grace & Company (January 21, 1986).
121. Set of EPA Region I Meeting Notes, W.R. Grace & Company Meeting (September 14, 1987).
122. EPA Region I Attendance List, W.R. Grace & Company Pump Test Meeting (February 24, 1988).

## 11.9 PRP-Specific Correspondence (cont'd)

W.R. GRACE & COMPANY (cont'd)

123. Set of EPA Region I Meeting Notes, W.R. Grace & Company Pump Test Meeting (February 24, 1988).
124. Notice of Potential Liability from EPA Region I to W.R. Grace & Company, Incorporated (April 20, 1988).
125. Letter from J.A. Cherry and J.H. Guswa, GeoTrans to B. Newman, EPA Region I (regarding W.R. Grace & Company and Unifirst Corporation) (June 24, 1988).
126. Letter from M. Stoler, W.R. Grace & Company to B. Newman, EPA Region I (includes comments on the Agency for Toxic Substances and Disease Registry (ATSDR) toxicological profile for trichloroethylene) (June 27,1988).

WATERBED WAREHOUSE/WATERREST PRODUCTS

127. Request for Information from EPA Region I to Waterbed Warehouse (May 10, 1983).
128. Answers to EPA Request for Information, Waterrest Products, Inc. (May 25, 1983).

WEDEL CORPORATION

129. Request for Information from M. Hohman, EPA Region I to J. Riley, Wedel Corporation (March 24,1988).
130. Letter from Mary K. Ryan, Nutter, McClennan & Fish (Attorney for Wedel Corporation and Riley Leather Company) to Gretchen Muench, EPA Region I (April 21, 1988). Concerning extension of response time to May 6, 1988 for EPA's most recent information request.
131. Answers to EPA Request for Information, Wedel Corporation and Riley Leather Company (May 6, 1988).
132. Letter from M. Gretchen Muench, EPA Region I to Mary Ryan, Nutter, McClennan and Fish (Attorney for Wildwood Conservation Corporation, Riley Leather Company, Incorporated and Wedel Corporation) (January 5, 1989). Concerning Riley Leather Company, Incorporated's plans to cease operation and EPA's need to continue production well operations.

WEYERHAEUSER COMPANY

133. Letter from EPA Region I to Weyerhaeuser Company (July 31, 1987).
134. Answers to EPA Request for Information, Weyerhaeuser Company (September 15, 1987). NOTE: Oversize "Plan of Land" is available for review at the EPA Region I, Boston, Massachusetts.

WHITNEY BARREL COMPANY

135. Answers to EPA Request for Information, Whitney Barrel Company (February 16, 1988).
136. Letter from Merrill Hohman, EPA Region I to Ruth Whitney, Whitney Barrel Company, Incorporated (February 3, 1989). Concerning Notice of Potential Liability.

## 11.9 PRP-Specific Correspondence (cont'd)

WILDWOOD CONSERVATION CORPORATION

137. Request for Information from M. Hohman, EPA Region I to J. Riley, Wildwood Conservation Corporation (September 17, 1987).
138. Answers to EPA Request for Information, Wildwood Conservation Corporation (October 5, 1987).
139. Answers to EPA Request for Information, Wildwood Conservation Corporation and John J. Riley Company, Inc. (November 11, 1987).
140. Answers to EPA Request for Information, Wildwood Conservation Corporation (November 20, 1987).
141. Answers to EPA Request for Information, Wildwood Conservation Corporation (November 23, 1987).
142. Notice of Potential Liability from EPA Region I to Wildwood Conservation Corporation (April 20, 1988).

WOBURN, City of

143. Letter from Merrill Hohman, EPA Region I to Mayor John Rabbitt, City of Woburn (February 3, 1989). Concerning Notice of Potential Liability.

WOBURN ASSOCIATES

144. Letter from Merrill Hohman, EPA Region I to Woburn Associates, Incorporated (February 3, 1989). Concerning Notice of Potential Liability.

WOBURN FOREIGN MOTORS

145. Letter from EPA Region I to Woburn Foreign Motors (May 10, 1983).
146. Answers to EPA Request for Information, Woburn Foreign Motors (June 16, 1983).

## 11.10 PRP-Specific Evidence-Government Agency Documents

1. "Industrial User Permit Application" Form, Metropolitan District Commission (completed by New England Plastics Corporation) (December 17, 1981).
2. "General Information" Form (Consolidated Permits Program), US EPA (completed by New England Plastics Corporation) (January 28, 1987).
3. "Application for Permit to Discharge Wastewater" Form, US EPA (Completed by New England Plastics Corporation) (February 23, 1987).

## 11.11 PRP-Specific Evidence

1. Certificate of Laboratory Analysis, Camp, Dresser & McKee, Inc. (August 12, 1986).
2. Certificate of Laboratory Analysis, Camp, Dresser & McKee (January 2, 1987).

### 11.14 Title Searches

1. "Wells G & H Title Searches Woburn, MA Final Site Report," Planning Research Corporation (February 1987). NOTE: Oversize "Site Parcel Boundary Map" available for review at the EPA Boston, Massachusetts.

### 11.16 Scopes of Work

1. Letter from J.T. Lawson, Environmental Research & Technology, Inc. to D. Delaney, EPA Region I (February 10, 1987). Concerning Unifirst Corporation.
2. Letter from J.T. Lawson, Environmental Research & Technology, Inc. to B. Newman, EPA Region I (January 7, 1988). Concerning aquifer test means and objectives, Unifirst Corporation site.
3. Letter from J.H. Guswa, GeoTrans to B. Newman, EPA Region I (February 8, 1988). Concerning W.R. Grace & Company pumping tests.

## 13.0 COMMUNITY RELATIONS

### 13.1 Correspondence

1. Letter from G. Latowsky, For A Cleaner Environment to Barbara Newman, EPA Region I (May 31, 1988). Concerning release of the Feasibility Study.
2. Letter from Mary Kay Voytilla, EPA Region I to Felix Glovasky, Woburn Resident (June 29, 1989). Concerning the results of the indoor air survey conducted by EPA during the week of April 24, 1989.
3. Letter from Mary Kay Voytilla, EPA Region I to Paul Medeiros, Woburn Resident (June 29, 1989). Concerning the results of the indoor air survey conducted by EPA during the week of April 24, 1989.
4. Letter from Mary Kay Voytilla, EPA Region I to John and Sophie Morrison, Woburn Residents (June 29, 1989). Concerning the results of the indoor air survey conducted by EPA during the week of April 24, 1989.
5. Letter from Mary Kay Voytilla, EPA Region I to Felix Glovasky, Woburn Resident (August 1, 1989). Concerning the transmittal of EPA's findings from the "Residential Indoor Air Sampling Report" of June 1989.
6. Letter from Mary Kay Voytilla, EPA Region I to Paul Medeiros, Woburn Resident (August 1, 1989). Concerning the transmittal of EPA's findings from the "Residential Indoor Air Sampling Report" of June 1989.

## 13.1 Correspondence (cont'd)

7. Letter from Mary Kay Voytilla, EPA Region I to John and Sophie Morrison, Woburn Residents (August 1, 1989). Concerning the transmittal of EPA's findings from the "Residential Indoor Air Sampling Report" of June 1989.

## 13.2 Community Relations Plan

1. Letter from P.A. Brady, Woburn Conservation Commission to D. Prybyla, EPA Region I (December 13, 1985). Concerning comments on the Draft Community Relations Plan.
2. Letter from G. Latowsky, For A Cleaner Environment to D. Prybyla, EPA Region I (January 21, 1986). Concerning comments on the Draft Community Relations Plan.
3. "Community Relations Plan," NUS Corporation (April 1986).

## 13.3 News Clippings/Press Releases

1. Press Release Issued by EPA Region I (November 7, 1984).
2. Press Release Issued by EPA Region I (February 10, 1986).
3. Press Release Issued by EPA Region I (October 1986).
4. Press Release Issued by EPA Region I (February 18, 1987).
5. Press Release Issued by EPA Region I (October 1, 1987).
6. News clipping announcing the availability of the Administrative Record for Public Review, Woburn Daily Times Chronicle - Woburn, Massachusetts (October 12, 1988).
7. "Environmental News," Concerning EPA's announcement of the release of the Supplemental Remedial Investigation (RI) and the Endangerment Assessment, EPA Region I (December 14, 1988).
8. "Environmental News," Concerning EPA's announcement of the Proposed Cleanup Plan, EPA Region I (February 1, 1989).
9. "The United States Environmental Protection Agency Invites Public Comment on the Feasibility Study and Proposed Plan for the Wells G & H Superfund Site in Woburn, Massachusetts," Daily Times Chronicle (February 2, 1989).
10. EPA Environmental News - "EPA Testing Air In Homes Near Wells G & H Site," EPA Region I (April 26, 1989).
11. Public Notice - "Woburn Residential Survey Questionnaire Wells G & H Superfund Site," EPA Region I (April 1989). [Cross-Reference: Completed Residential Survey Questionnaires may be found in Appendix A of the report entitled "Residential Indoor Air Sampling Results, Wells G & H Superfund Site Woburn, Massachusetts." Filed and cited as entry number 9 in 3.2 Sampling and Analysis Data.]
12. Press Release - "EPA Finds No Health Threat From Indoor Air at Homes Near Wells G & H Site," EPA Region I (August 25, 1989).

### 13.4 Public Meetings

1. Transcript, Public Hearing on Studies Re: *Wells G & H Superfund Site, Woburn, Massachusetts* (February 27, 1989).

### 13.5 Fact Sheets

1. EPA Region I Fact Sheet (March 1986).
2. EPA Region I Fact Sheet (November 1986).
3. EPA Region I Fact Sheet (October 1987).
4. EPA Region I Fact Sheet (May 1988).
5. "Superfund Program Fact Sheet," EPA Region I (December 1988).

## 16.0 NATURAL RESOURCE TRUSTEE

### 16.1 Correspondence

1. Letter from Barbara Newman, EPA Region I to Ken Carr, U.S. Department of the Interior, Fish and Wildlife Service (December 5, 1988). Concerning request that DOI determine if a Covenant Not to Sue for Natural Resources Damages should be evaluated in any possible settlement.
2. Letter from Barbara Newman, EPA Region I to Ken Finkelstein, National Oceanic and Atmospheric Administration (December 5, 1988). Concerning request that NOAA determine if a Covenant Not to Sue for Natural Resources Damages should be evaluated in any possible settlement.

### 16.3 Natural Resource Trustee Release

1. Letter from William Patterson, U.S. Department of the Interior, Office of Environmental Project Review to Barbara Newman, EPA Region I (December 23, 1988). Concerning a Covenant Not to Sue on the Wells G & H site.
2. Letter from Bruce Blanchard, U.S. Department of the Interior, Office of Environmental Project Review to Gene Lucero, USEPA, Headquarters. Concerning request that DOI determine whether any resources under its trusteeship are or have been affected by hazardous substances releases from the Wells G & H site.

## 17.0 SITE MANAGEMENT RECORDS

### 17.7 Reference Documents

1. U.S. Environmental Protection Agency, Office of Water, Application of Interim Sediment Criteria Values at Sullivan's Ledge Superfund Site (April 11, 1988).

### 17.8 State and Local Technical Records

1. Set of Well Sampling Data, Lawrence Experiment Station Massachusetts Department of Public Health Woburn (November 1, 1963 through March 2, 1964).
2. "Contract for Constructing Gravel Packed Wells, Etc.," Whitman & Howard, Inc., Engineers (May 1964).
3. "Report in Relation to Test Well Work East Woburn Area," Whitman & Howard, Inc., Engineers (May 1964).
4. Letter from L. M. Pittendreigh, Whitman & Howard, Inc., Engineers to E. F. Gill, Mayor of Woburn (May 19, 1964).
5. Pumping Test Report, Whitman and Howard, Consulting Engineers (July 13, 1964).
6. Letter from D. M. Erickson, Layne New England Company to T. J. Mernin, City of Woburn (February 28, 1977). Concerning Emergency Overhaul of H Well.
7. Letter from G.R. Allan, Dufresne-Henry Engineering Corporation to Water Study Committee, City Council, Town of Woburn (March 29, 1977). Concerning Progress Report "G" Well.
8. "Report on East Side Water Problem Wells G & H," Dufresne-Henry Engineering Corporation (January 1978).
9. "Final Report in Relation to East Side Wells," Dufresne-Henry Engineering Corporation (via transmittal letter from L. Pittenreigh, Dufresne-Henry Engineering Corporation to A. Wall, City of Woburn) (January 26, 1978).
10. "Report of Overhaul "G" Well March 1978," American Artesian Well Company (March 1978).
11. Internal City of Woburn Letter from T. Mernin to B. Cleaver (February 15, 1980). Concerning map and pumping schedule.
12. Internal City of Woburn Letter from T. Mernin to B. Cleaver (February 25, 1980).
13. Memorandum from Brian Kelleher, Massachusetts Department of Environmental Quality Engineering to File (May 13, 1980). Concerning meeting with representatives of John Riley Company.
14. Letter from P. Brady, Woburn Conservation Commission to J. Riley, Riley Leather Company (June 4, 1980).
15. Letter from J.E. Pellerin, Massachusetts Department of Environmental Quality Engineering to Raymond Donlan (June 27, 1980). Concerning Atlantic Gelatin Sample Analysis.

## 17.8 State and Local Technical Records (cont'd)

16. "Report: Woburn Atlantic Gelatin, Division of General Foods, Water Supply Survey, Cross Connection Survey," David Erekson, Jr. Sanitary Engineer (August 7, 1980).
17. Letter from R. Slein, Massachusetts Department of Environmental Quality Engineering to John J. Riley Company (August 29, 1980).
18. Special Analysis, Department of Environmental Quality Engineering (September 22, 1980).
19. Set of Well Sampling Data, Massachusetts Department of Environmental Quality Engineering (September 25, 1980).
20. "Metropolitan District Commission Septage Receiving Station Report," GTE Laboratories (October 3, 1980).
21. Letter From S.M. Lord, Massachusetts Division of Water Pollution Control to Beatrice Food (October 10, 1980).
22. Letter from W.J. St. Hilaire, Massachusetts Department of Environmental Quality Engineering to J.J. Riley, Jr., John J. Riley Company (October 15, 1980).
23. Letter from President of New York Urban Servicing Company, Inc. to S.M. Lord, Massachusetts Division of Water Pollution Control (October 23, 1980).
24. Letter from W.T. Grandin, Metropolitan District Commission to L. Fucarile, Ecology and Environment, Inc. (November 26, 1980).
25. Memorandum from M. Snow, Massachusetts Department of Environmental Quality Engineering to A. Ferullo, MDC, H. Brown, DHW, B. Cleary, DAQC, G. McCall, Water Supply, R. Leighton, EPA, P. Hogan, DWPC. (Regarding Maps of the Mystic River Watershed) (December 30, 1980).
26. Memorandum from Brian Kelleher, Massachusetts Department of Environmental Quality Engineering to Sabin Lord and Vic Karaian, Massachusetts Department of Water Pollution Control (February 11, 1981). Concerning authority of State Department of Water Pollution Control to regulate onsite disposal of tannery sludges.
27. Memorandum from J.M. Jannetti, Massachusetts Department of Environmental Quality Engineering to W. Cashins, Massachusetts Division of Water Pollution Control (June 24, 1981).
28. Letter from R. Chalpin, Massachusetts Department of Environmental Quality Engineering to D. Portius, EPA Region I (August 23, 1982).
29. "Gas Chromatography-Mass Spectrometry Analysis of Purgeable Organics," Massachusetts Department of Environmental Quality Engineering (September 3, 1982).
30. Internal Massachusetts Department of Environmental Quality Engineering Memorandum from R. Cleary/H. Waldorf to File (September 17, 1982).
31. Notes to File, Robert Cleary, Massachusetts Department of Environmental Quality Engineering (December 10, 1982). Concerning inspections at Cummings Office Park Tower.

## 17.8 State and Local Technical Records (cont'd)

32. Letter from H. Waldorf, Massachusetts Department of Environmental Quality Engineering to K. Marschner, New Hampshire Bureau of Hazardous Waste Management (January 19, 1983).
33. Massachusetts Department of Environmental Quality Engineering Inspection - Trip Summary Sheet (April 6, 1983). Concerning inspection of John J. Riley Company.
34. Letter from J.W. Rabbitt, Mayor of Woburn to M. Hohman, EPA Region I (February 20,1986).
35. Letter from D.F. Mahoney, Woburn Board of Health to J.E. Whitney, Whitney Barrell Company (February 25, 1986).
36. Letter from R. Chalpin, Massachusetts Department of Environmental Quality Engineering to G. Weyerhaeuser, Weyerhaeuser Corporation (June 24, 1986). Concerning Groundwater Contamination Notice Of Responsibility Pursuant To M.G.L. Chapter 21E.
37. Letter from R. Chalpin, Massachusetts Department of Environmental Quality Engineering to D.C. Nicholson, Weyerhaeuser Company (August 17, 1986). Concerning groundwater contamination.
38. "Supplemental Information for Test Boring Logs," Wehran Engineering Consulting Engineers (January 28,1987).
39. Letter from W. Kingston, Juniper Development to R. DeRice, Massachusetts Department of Environmental Quality Engineering (transmittal of "Groundwater Sampling and Analysis Report," Goldberg-Zoino & Associates, Inc., January 14, 1987) (April 1, 1987).
40. "Site Investigation Report for the Weyerhaeuser Site," Wehran Engineering Corporation for the Massachusetts Department of Environmental Quality Engineering (July 1987).
41. Letter from R. Chalpin, Massachusetts Department of Environmental Quality Engineering to J.E. Whitney, Whitney Barrel Company (July 8, 1987).
42. Letter from R. Chalpin, Massachusetts Department of Environmental Quality Engineering to D. Nicholson, Weyerhaeuser Company (September 11, 1987).
43. Letter from R. Chalpin, Massachusetts Department of Environmental Quality Engineering to Mrs. J.E. Whitney, Whitney Barrel Company (September 11, 1987).
44. "Site Investigation Whitney Barrel Site, Work and Cost Plan," E.C. Jordan Company (October 1987).
45. Letter from A. Desmarias, Jason. M Cortell Associates, Inc. to R. DeRice, Massachusetts Department of Environmental Quality Engineering (December 31, 1987). Concerning Scope of Work.

### 17.8 State and Local Technical Records (cont'd)

46. Memorandum from Christopher S. Zarba, USEPA to Jane Downing, EPA Region I (April 11, 1988). Concerning "Interim Sediment Criteria Values for Nonpolar Hydrophobic Organic Compounds."
47. Letter from R. Bois, Massachusetts Department of Environmental Quality Engineering to B. Newman, EPA Region I (April 13, 1988).
48. "Summary of Massachusetts Drinking Water Quality Monitoring Program," Massachusetts Department of Environmental Quality Engineering, Division of Water Supply (August 31, 1988).

## 19.0 RCRA RECORDS

### 19.1 Correspondence

1. Letter from S.M. Knight, CRYOVAC to EPA Region I (October 10, 1980). Concerning notification of hazardous waste activity.
2. Internal EPA Region I Memorandum from G.A. Lucero to M. Deland (September 15, 1983).

### 19.4 RCRA Facility Inspection Reports

1. "RCRA Inspection Checklist," US EPA (Regarding Atlantic Gelatin) (December 20, 1980).
2. "RCRA Inspection Checklist," US EPA (Regarding Interstate Uniform Services, Inc.).

### 19.6 Notification of Hazardous Waste Activity

1. "Acknowledgement of Notification of Hazardous Waste Activity", W.R. Grace & Company, Inc. (September 26, 1980).

# SECTION II

# GUIDANCE DOCUMENTS

## GUIDANCE DOCUMENTS

EPA guidance documents may be reviewed at EPA Region I, Boston, Massachusetts.

### General EPA Guidance Documents


1. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Community Relations in Superfund: A Handbook (Interim Version) (EPA/HW-6), September 1983.

2. U.S. Environmental Protection Agency. Office of Ground-Water Protection. Groundwater Protection Strategy, August 1984.

3. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Guidance on Remedial Investigations Under CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) (EPA/540/G-85/002), June 1985.

4. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Guidance on Feasibility Studies Under CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) (EPA/540/G-85/003), June 1985.

5. Memorandum from Gene Lucero to EPA (August 28, 1985) (discussing community relations at Superfund Enforcement sites).

6. National Oil and Hazardous Substances Pollution Contingency Plan, Code of Federal Regulations (Title 40, Part 300), 1985.

7. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Draft Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites (OSWER Directive 9283.1-2), September 20, 1986.

8. Comprehensive Environmental Response, Compensation, and Liability Act of 1980, amended October 17, 1986.

9. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Superfund Public Health Evaluation Manual (OSWER Directive 9285.4-1), October 1986.

10. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Interim Guidance on Superfund Selection of Remedy (OSWER Directive 9355.0-19), December 24, 1986.

General EPA Guidance Documents (cont'd)


11. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Data Quality Objectives for Remedial Response Objectives (EPA/540/G-87/003), March 1987.

12. Letter from Lee M. Thomas to James J. Florio, Chairman, Subcommittee on Consumer Protection and Competitiveness, Committee on Energy and Commerce, House of Representatives (May 21,1987) (discussing EPA's implementation of the Superfund Amendments and Reauthorization Act of 1986).

13. Memorandum from J. Winston Porter to Addressees ("Regional Administrators, Regions I-X; Regional Counsel, Regions I-X; Director, Waste Management Division, Regions I,IV,V,VII,and VIII; Director, Emergency and Remedial Response Division, Region II; Director, Hazardous Waste Management Division, Regions III and VI; Director, Toxics and Waste Management Division, Region IX; Director, Hazardous Waste Division, Region X; Environmental Services Division Directors, Region I, VI, and VII") (July 9, 1987) (discussing interim guidance on compliance with applicable or relevant and appropriate requirements).

14. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Additional Interim Guidance for Fiscal Year 1987 Record of Decisions (OSWER Directive 9355.0-21), July 24, 1987.

15. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Community Relations in Superfund: A Handbook (Interim Version) (EPA/540/G-88/002), June 1988.

16. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA/540/C-89/004) (OSWER Directive 9355.3-01), October 1988.

# WELLS G & H

## APPENDIX C
## STATE CONCURRENCE LETTER

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Quality Engineering
Bureau of Waste Site Cleanup
One Winter Street, Boston, Mass. 02108

Daniel S. Greenbaum
Commissioner

September 9, 1989

Paul Keough
Acting Regional Administrator
U.S. EPA
JFK Federal Building
Boston, MA 02203

RE: Woburn - Concurrence with ROD for Wells G&H Federal Superfund Site - Source Control Operable Unit #1

Dear Mr. Keough:

The Department of Environmental Protection (The Department), formerly the Department of Environmental Quality Engineering, has reviewed the preferred remedial action alternative recommended by EPA for source control measures at the Wells G&H federal Superfund site. The Department concurs with the selection of the preferred alternative for source control measures.

The Department has evaluated EPA's preferred alternative for consistency with M.G.L. Chapter 21E as amended in November 1988. The Department has determined that the preferred alternative, incineration and in-situ volatilization for contaminated soils and groundwater recovery and treatment at the source areas, is consistent with the overall permanency requirements of M.G.L. Chapter 21E. Chapter 21E encourages implementing remedies on portions of a site to address pressing hazards. A determination that a permanent solution will be achieved can not be made, however, until it has been demonstrated that a selected remedial measure or combination of measures will meet the Total Site Risk Limits as defined in the Massachusetts Contingency Plan for the entire Wells G&H site. This, of course, cannot occur until remedial measures are selected for all contaminated areas of the site.

The Department has reviewed the ARAR's identified for the Commonwealth and believes the proposed remedy will meet these. This will continue to be evaluated as remedial design progresses and during implementation and operation. In addition, we will continue to identify ARAR's during remedial alternative evaluation of subsequent operable units at the Wells G&H site.

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As stated in the ROD, the central area is to be addressed as a separate operable unit. The proposed plan released by EPA in February of this year included remedial measures for the central area as well as the source areas. Comments received from the public and potentially responsible parties questioned the feasibility of the preferred alternative for the central area resulting in its exclusion from this operable unit.

While the source control ROD calls for a study of the central area, the Department would like to reiterate its position, as fully set forth in its letter of September 1, 1989 to Ms. Voytilla, on the central area and the proposed study. It is the Department's position that the purpose of the study is to evaluate the feasibility of the remedial alternative originally called for in the proposed plan. If determined to be feasible, that remedy should be implemented. If it is determined that the preferred remedy is not feasible, then other technologies should be evaluated. In any case, the purpose of the study is not to determine whether remediation is warranted as that has already been established.

The Department looks forward to working with EPA in implementing the preferred alternative for source control and developing additional remedial measures for the remainder of the site. If you have any questions or require additional information please contact Jay Naparstek at 292-5697 or Rodene DeRice at 935-2160.

Very truly yours,

Daniel S. Greenbaum,
Commissioner
Department of Environmental Protection

cc: Richard Chalpin, NERO
Nancy Preis, Dept. of the Attorney General