NH PLATING
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#4303

DECLARATION FOR THE RECORD OF DECISION

New Hampshire Plating Company Superfund Site
Merrimack, New Hampshire

STATEMENT OF PURPOSE

This decision document presents the selected remedial action for the New Hampshire Plating Company Superfund Site (Site) located in Merrimack, New Hampshire, which was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 USC § 9601 et seq., as amended, and to the extent practicable, the National Oil and Hazardous Substances Contingency Plan (NCP), 40 CFR Part 300 et seq., as amended. The Director of the Office of Site Remediation and Restoration has been delegated the authority to approve this Record Of Decision (ROD).

The State of New Hampshire has concurred on the selected remedy.

STATEMENT OF BASIS

This decision is based on the Administrative Record which has been developed in accordance with Section 113(k) of CERCLA and which is available for public review at the Merrimack Public Library in Merrimack, New Hampshire and at the US EPA - Region I Office of Site Remediation and Restoration Records Center in Boston, Massachusetts. The Administrative Record Index (Appendix C to the ROD) identifies each of the items comprising the Administrative Record upon which the selection of the remedial action is based.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to the public health or welfare or to the environment.

DESCRIPTION OF THE SELECTED REMEDY

This ROD sets forth the selected remedy for the New Hampshire Plating Company Site, which involves in-place treatment of metal-contaminated soil by chemical fixation, natural attenuation of contaminated groundwater in the overburden aquifers, and institutional controls to allow for acceptable re-development and prevent future ingestion of contaminated groundwater. The selected remedy is a comprehensive approach which addresses all current and potential future risks caused by soil and groundwater contamination at the Site. The remedial measures will prevent leaching of metal-contaminants to groundwater, eliminate unacceptable exposure to sensitive ecosystems, prevent the ingestion and direct contact with contaminated groundwater, and allow for restoration of the Site to beneficial uses.

The selected remedy includes these major components:

1. treatment of approximately 40,000 yd^3 of metal-contaminated soil by in-place chemical fixation;

2. consolidation and backfilling of all treated soil in former lagoons 1 and 2;

3. crushing, testing and treating the storage-cell material, as necessary, on-site using the chemical fixation process and placing treated material in former lagoons 1 and 2;

4. placing two feet of clean soil over the treated materials in the lagoons 1 and 2 area;

5. re-grading and vegetation of the Site using appropriate wetland-type plants and grasses and assuring adequate flood-storage capacity;

6. restoration of contaminated groundwater in the shallow and deep overburden aquifers by natural attenuation;

7. establishing a groundwater monitoring network consistent with New Hampshire's Groudwater Protection Strategy (GMZ);

8. installing two well clusters in the Town of Litchfield for long-term monitoring;

9. establishing institutional controls including both land-use and groundwater use restrictions;

10. mitigation of unavoidable impacts to on-site wetlands through the preservation of the Grassy Pond area in Litchfield and an additional wetland area to be determined in the Town of Merrimack.

DECLARATION

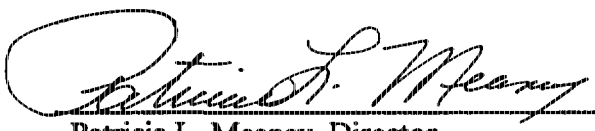
The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate for this remedial action and is cost-effective. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technology,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

The selected remedy is a comprehensive approach which include both source control and management of migration components. The source control portion of the remedy includes on-

site treatment of metals-contaminated soil by chemical fixation and removal, testing and on-site placement of solidified material presently contained in a temporary storage-cell. Land-use restrictions or other appropriate institutional controls will be employed to limit future use of the property to commercial or industrial development and prevent excavation of treated material. Off-site wetland preservation will be employed to compensate for unavoidable impacts to the on-site wetlands. The management of migration portion of the remedy relies on natural attenuation to restore the contaminated groundwater to its beneficial uses. Treatment will not be utilized to restore the contaminated groundwater because it was determined not to be warranted or cost effective considering the conditions at the Site. Active groundwater restoration does not afford a significant cleanup time advantage and, with institutional controls to prevent consumption of groundwater in the interim, the selected remedy is as protective of public health as active restoration.

The overall estimated net-present worth cost of the selected remedy is $9,905,400.

OSWER Directive 9355.7-02 states that five-year reviews will be conducted at sites where cleanup levels will take five or more years to achieve (policy review) or where institutional controls are necessary to achieve protectiveness (statutory review). Since the management of migration portion of the remedy will require more than five years to complete, and groundwater and land-use restrictions are necessary, a review will be conducted within five years after commencement of this remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.



9/28/98

Patricia L. Meaney, Director
Office of Site Remediation and Restoration
US EPA - Region 1

Date

RECORD OF DECISION

US Environmental Protection Agency
Region I

New Hampshire Plating Superfund Site

CERCLIS No. NHD001091453

Merrimack, New Hampshire

September 1998

New Hampshire Plating Site
Record of Decision

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I. SITE NAME, LOCATION AND DESCRIPTION

Location and Description

The New Hampshire Plating Company Superfund Site (NHP Site or Site) is located in the Town of Merrimack (Hillsborough County) in south central New Hampshire. Figure 1 depicts the general location of the Site. The Site encompasses approximately 13 acres, of which 3.5 acres comprise the Operations Area where the former New Hampshire Plating Company conducted its operations. The Site is bounded to the east by the Boston and Maine Railroad right-of-way and the Jones Chemical, Inc.; to the south by Wright Avenue; to the west by the F. & S. Transit Mix Company; and to the north by the National School Bus Service Company, and the New England Telephone and Telegraph Company. South of Wright Avenue is an undeveloped lot owned by the City of Manchester YMCA.

Geographical and Topographical Overview

Three major surface water bodies exist in the vicinity of the Site. The Merrimack River, located approximately 500 feet east of the NHP Site, flows from north to south along the eastern boundary of the study area. Horseshoe Pond, an oxbow lake located in a former channel of the Merrimack River, is a recreational water body located on the southern boundary of the study area, approximately 600 feet south of the Site. The east-flowing Souhegan River joins the Merrimack River approximately 1200 feet north of the Site.

The Site is situated in an area with mixed land use, including light industries, commercial businesses, and a few private residential dwellings. Most of the commercial and industrial facilities are situated far from each other, and the properties are generally only moderately developed. Figure 2 depicts the Site and some of the adjoining properties.

Several features located within the NHPC property include: the Operations Area, which encompasses the former NHPC building (demolished in 1994); a parking lot; the solidified material storage cell (the monolith); the pugmill area; and the lagoon system, which encompasses Lagoons 1, 2, 3, and 4, and the Northern and Southern Wetland and adjacent embankments and uplands. The lagoon system was a former wetland of approximately three acres. A majority of the site (approximately 10.3 acres) is located within the 100-year floodplain. These key Site features are depicted in Figure 3.

The land surface generally slopes downward from the Site to the southeast. The lowest topographic features on the Site property are the former lagoons and wetland areas (at approximately 110 feet mean sea level (MSL)). The Merrimack River is the lowest feature of the study area at approximately 90 feet MSL.

The study area lies within the drainage basin of the Merrimack River and its tributaries. Surface water from Horseshoe Pond flows into the Merrimack River through an outlet stream at the southeastern end of the pond. Surface drainage within the study area is controlled primarily by topographic features. Because the study area is predominantly unpaved, much of the surface water infiltrates directly into the subsurface soils during light and moderate precipitation periods.

The subsurface soils encountered during the Remedial Investigation (RI), in order from ground surface to bedrock, generally consist of alluvial sand deposits over glacio-lacustrine, glacial outwash, and glacial till deposits. The lower permeability glacio-lacustrine deposits were observed in the subsurface soils across much, but not all, of the study area. A bedrock trough,

between the former NHP building and Horseshoe Pond, oriented in an approximate north-south direction, extends across the southern portion of the study area. The bedrock surface rises steeply in all directions away from the central bedrock low area. Bedrock cores collected during the RI indicated that the dominant rock types encountered in the study area were granite and granitic gneiss with some schist.

During the Remedial Investigation, three water bearing formations were identified in the study area:

- an unconfined shallow overburden aquifer that is generally situated between 5 and 40 feet below ground surface, and is bounded at depth by lower permeability glacio-lacustrine soils;

- a deep overburden aquifer that is generally below the glacio-lacustrine soil unit within the glacial outwash sand deposits. This aquifer is semi-confined by upper (glacio-lacustrine) and lower (bedrock) hydraulic boundaries of less permeable formations over most of the study area, except where the glacio-lacustrine soils are absent. It ranges between 10 and 75 feet thick across the study area, showing a general trend of thinning toward downgradient locations adjacent to the Merrimack River; and

- a bedrock aquifer that generally includes the entire bedrock section beneath the study area.

Groundwater within the shallow and deep overburden aquifers predominantly flows in a southeasterly and easterly direction toward the Merrimack River. Horizontal flow within the bedrock aquifer appears to be in an easterly direction toward the Merrimack River.

Upward vertical gradients were generally observed between these aquifers in the southern and eastern portions of the study area. Downward vertical gradients occur in the northern and western portions of the study area between the shallow and deep overburden aquifers.

A more complete description of the Site can be found in Section 3.0 of the Draft Final Remedial Investigation Report for the New Hampshire Plating Company, Volume 1.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

A. Land Use and Response History

NHPC operated an electroplating facility on the site from 1962 to 1985. The metals used in the electroplating process included cadmium, zinc, chromium, copper, lead, nickel, tin, gold, silver, aluminum, iron, and manganese. NHPC also used chlorinated organic solvents for de-greasing including: trichloroethylene (TCE); 1,1,1-trichloroethane (TCA); and tetrachloroethylene (PCE). Cyanide was also used as part of the electroplating process. Chlorinated solvent use was reportedly discontinued during the latter part of the 1970s.

Treated and untreated wastes and wastewater were discharged through a gravity-drained underground discharge pipe into unlined waste lagoons located approximately 325 feet north of the building. These lagoons occupy wetlands that developed naturally in a series of meander scars formed by the Merrimack River. Wastes were discharged directly into a primary infiltration lagoon (Lagoon 1). The lagoon system was constructed to allow the discharged wastes to overflow from the primary lagoon into a secondary infiltration lagoon (Lagoon 2) and

into subsequent overflow lagoons (Lagoons 3 and 4) during periods of high discharge from the facility. Approximately 35,000 to 60,000 gallons of wastewater were generated and discharged to the lagoons each day.

In 1980, NHPC notified the EPA that it was a hazardous waste disposal facility in accordance with the Resource and Conservation Recovery Act (RCRA) Section 3001 regulations and continued to operate under an interim permit. As the result of inspections conducted by EPA and the New Hampshire Department of Environmental Services (NHDES) between 1982 and 1985, NHPC received several Notices of Violation/Orders of Abatement for failure to comply with RCRA transportation, storage, and disposal requirements, and for inadequate treatment of its cyanide wastewater prior to discharge. Operations at NHPC ceased in November 1985.

In June 1987, the NHDES initiated interim remedial measures at the site. Wastes including plating solutions, cyanide salts, and other materials were removed from the NHPC building. Sludge and sediment were also removed from the building floors and disposed of at an approved off-site facility. The NHDES also treated sludge and process wastewater in Lagoon 1 with approximately 127 tons of lime and 800 gallons of a sodium hypochlorite solution.

EPA initiated an emergency removal action in October of 1989. After a preliminary study in the fall of 1990 and spring of 1991, EPA performed a limited on-site removal action. Approximately 13,600 tons of sludges and soils were excavated, solidified on-site in an ash/mortar mixture, and encapsulated in a high density polyethylene (HDPE) solidified material storage cell at a location immediately north of the former NHPC building. Currently, this solidified monolith mass remains on site. An additional 5,000 tons of soil were disposed off site at a secured landfill. As the last step of the removal action, approximately 5,600 cubic yards of untreated soils excavated from the overflow lagoon areas were placed in Lagoon 1. The soils were covered with an HDPE cap and approximately 2 feet of clean fill. The other excavated lagoons were covered with between 1 to 2 feet of clean fill.

EPA also conducted a Non-Time-Critical Removal Action (NTCRA) at the NHPC building site in November and December of 1994. Laboratory wastes left in the NHPC building were packed in drums and shipped off site for disposal; asbestos-containing materials were removed; process equipment and the building were decontaminated; the building, floor slab, and foundation were demolished; an underground storage tank was removed; the exposed soils were characterized; and the building footprint was graded and covered with a geomembrane. Both non-hazardous and hazardous materials generated during the building removal were disposed of off site.

A more complete description of the Site history can be found in Section 2.0 of the Draft Final Remedial Investigation Report for the New Hampshire Plating Company, Volume 1.

B. Enforcement History

EPA initiated cost recovery activities during initial removal actions. On August 30, 1989, EPA sent General Notice letters to the following persons who were identified as owners or operators at the Site: 1) Mr. Aldo Bracci and Mrs. Ida D. Bracci; 2) NHPC; and, 3) Mr. Jack O. Labovitz (through his attorney) to notify them of their potential liability as owners and or operators, and invited them to perform proposed activities. On May 31, 1996, EPA notified Mr. Randall Bracci, son of Aldo Bracci, of his potential liability as an operator at the Site. Mr. Aldo and Mrs. Ida Bracci and Mr. Randall Bracci responded that they would like to help with the removal but were

financially unable. Mr. Labovitz was unresponsive. NHPC is no longer in operation and has no known assets. In 1985, the last tax return for NHPC was filed and all on-site operations ceased. In 1991, NHPC was dissolved.

Adjacent businesses were also investigated to determine if they generated wastes which contributed to the extent of groundwater contamination. It was subsequently determined that the only PRPs are the former owner/operators. Their liability is clear and has been well documented. However, a cost-recovery case was determined to not be viable because the PRPs were insolvent and did not have the financial ability to contribute significantly to past or future expenditures. The Bracci's sued their insurance company for coverage but lost the case. There are no transporters or generators associated with the Site.

A decision not to pursue costs was documented in a Cost-Recovery Closeout Memorandum approved by the Office of Site Remediation and Restoration Division Director on December 30, 1996. The Cost-Recovery Closeout Memorandum contains extensive detail on the PRP search efforts completed by OSRR and financial ability-to-pay analysis conducted by OES. This decision applies to all past and future costs.

III. COMMUNITY PARTICIPATION

Throughout the Site's history, community concern has been present in varying degrees of involvement. EPA has kept the community and other interested parties apprised of the Site activities through informational meetings, fact sheets, press releases and public meetings.

On February 26, 1993, EPA released a community relations plan which outlined a program to address community concerns and keep citizens informed about and involved in activities during remedial activities. On June 13, 1990, EPA held an informational meeting at the Merrimack Court House to describe plans for completing emergency removal activities and placing the Site on the National Priorities List to perform a Remedial Investigation and Feasibility Study. On June 9, 1993, EPA held an informational meeting at the Merrimack Court House to discuss ongoing Remedial Investigation activities and present a schedule for completion.

On January 15, 1998, EPA made the Administrative Record, including the Remedial Investigation Report, Feasibility Study Report and Proposed Plan, available for public review at EPA's offices in Boston and at the Merrimack Public Library. The Administrative Record Index is attached in Appendix C and contains a complete listing of all documents used to support this ROD. EPA published a notice and brief analysis of the Proposed Plan in four local newspapers; the Village Crier, the Nashua Telegraph, the Manchester Union Leader and the Broadcaster between January 5 and 7, 1998, and made the plan available to the public at the Merrimack Public Library.

On January 15, 1998, EPA held an informational meeting to discuss the results of the Remedial Investigation and the cleanup alternatives presented in the Feasibility Study and to present the Agency's Proposed Plan. Also during this meeting, the Agency answered questions from the public. From January 16 to February 14, 1998, the Agency held a thirty (30) day public comment period to accept community feedback on the alternatives presented in the Feasibility Study and the Proposed Plan and on any other documents previously released to the public. On January 28, 1998, the Agency held a formal public hearing to discuss the Proposed Plan and to accept any

oral comments. A transcript of this hearing and the comments and the Agency's written response to comments are included in the attached Responsiveness Summary (Appendix B).

IV. SCOPE AND ROLE OF RESPONSE ACTION

As discussed in Section II.A above, several removal actions have been performed at the Site to stabilize conditions. The remedial action authorized by this ROD addresses the remaining contaminated soil and groundwater and is the final response action anticipated for the NHP Site.

The selected remedy was developed by combining components of different source control and management of migration alternatives to obtain a comprehensive approach for Site remediation. In summary, the remedy provides for the on-site treatment of about 40,000 cubic yards of metal contaminated soils by chemical fixation. Treated soils will be consolidated and deposited into former Lagoons 1 and 2. The temporary storage unit (monolith) materials will be crushed, mixed with the treated soils and placed in former Lagoons 1 and 2. The backfilled areas will be covered with 18 inches of off-site fill and six inches of top soil. Excavated areas will be regraded using existing remaining materials. All disturbed areas will be re-vegetated with wetland-type vegetation. Former lagoon areas were previously functioning wetlands.

Since the entire lagoon system will require significant excavation and grading and treated materials will remain on-site, restoration of on-site wetlands is not possible. Therefore, off-site mitigation will be performed to compensate for unavoidable impacts to the 2.8 acre wetland.

With the source area remediated, metal and volatile organic compound (VOC) contamination in groundwater will attenuate. A New Hampshire Groundwater Management Zone will be established to define a monitoring program and ensure public awareness of the contamination. Institutional controls will include groundwater and land use restrictions.

This approach will eliminate leaching to groundwater, address unacceptable risks to burrowing animal species, and restore the groundwater quality to acceptable levels.

V. SUMMARY OF SITE CHARACTERISTICS

Section 1.0 of the Feasibility Study (FS) contains an overview of the Remedial Investigation. The significant findings of the Remedial Investigation are summarized below.

The contaminants detected within the NHP Site study area correspond to the known plating effluent constituents. These contaminants include metals (cadmium, zinc, chromium, lead, nickel, copper, and tin), chlorinated solvents, (PCE, TCE and its degradation products), and cyanide. Low levels of semivolatile organic compounds (SVOCs) were also infrequently detected, but are not believed to be associated with facility operations.

A. Sources of Contamination

The historic sources of metals, cyanide, and VOCs at the Site are:

- effluent from the discharge trenches within the building;
- effluent from the overflow pipes along the north wall of the building;

- discharge of effluent to Lagoon 1;
- overflow of effluent from Lagoon 1 into Lagoons 2, 3, and 4; and
- overflow of effluent from the lagoons to adjacent wetlands and soils.

The results of the Remedial Investigation conclude that the current residual sources of metal and cyanide contamination are:

- surface and subsurface soils in the Lagoon 1 area;
- surface and subsurface soils in the embankments and basins of Lagoons 2, 3, and 4; the Southern Wetland; the Northern Wetland; and the Lagoon 4 overflow areas; and
- to a lesser extent, subsurface soils in the building area.

Lagoon 1 soils contain the highest levels of metal contamination in the study area and are the largest residual source of groundwater contamination.

Several VOCs, semi-VOCs and pesticides were sporadically detected throughout the study area but were determined to be at concentrations well below a level of concern and are not contributing sources of groundwater contamination. No residual source of VOC contamination was found in on-site soils except that, subsurface soils below the water table in the Lagoon 1 area are likely desorbing chlorinated VOC contamination to the groundwater. Cadmium and other metals and chlorinated VOCs in groundwater are migrating east and southeast in the shallow overburden aquifer and are likely discharging to the Merrimack River.

A more detailed discussion of the Remedial Investigation results by media follows.

B. Soils

To provide a better understanding of metal contamination remaining in on-site soils, the 13.9 acre study area was subdivided into specific known or suspected source areas as presented below. These areas are generally described as the former operations area, the former lagoon areas and wetland areas. Refer to attached Figure 3 to locate the specific areas presented below. The metals detected above background concentrations were cadmium, chromium, copper, lead, nickel, tin, and zinc. Cyanide was also detected. Arsenic, beryllium, cadmium, chromium, cyanide, lead, manganese and nickel were subsequently concluded to be the contaminants of concern for soils.

Cadmium was generally detected more frequently and at higher concentrations than any of the other metals and was subsequently determined to be the most toxic contaminant. Therefore, the discussion below focuses primarily on cadmium. Estimates of contaminated soil volumes are based on cadmium. The remedial action implemented for cadmium-based volumes of soil will adequately address the risks presented by other contaminants. The entire site lies within the 100 year floodplain. Refer to attached Table 1 for a summary of soil analytical results.

Former Operations Area

This area refers to parcel 1 and includes the former building and related parking area and the area currently covered by the solidified material storage cell or monolith.

Residual levels of metals in soils were found along the northern side of the former building, where the overflow pipes discharged through the building wall. Contamination was generally higher in the surface soil (0 - 1'), and decreased with depth. The highest level of *cadmium* detected was *172 mg/kg* from a location beneath the former discharge trench, where plating effluent exited the building.

Detectable levels of cyanide were found in 21 soils samples taken from the building area. The highest level of *cyanide* detected was *87.7 mg/kg*.

In total, an estimated *5,926 cubic yards* of contaminated soils are present in the former building area to an average depth of 10 feet.

VOC field screening results indicated the presence of TCE; trans-1,2-dichloroethene (T-DCE); TCA; PCE; and benzene around the building; and TCE in the vicinity of the former septic system. No appreciable levels of VOCs in soil samples were detected by laboratory analysis.

The extent of contamination present underneath the solidified material storage cell, if any, could not be evaluated during the RI. The former discharge pipe passed through this area and as a result, could have released contamination. Therefore, these soils will be tested for contaminants of concern as part of the selected remedy and may result in an increase soil volume requiring remediation from this area.

Former Lagoon Areas

This area refers to the four former discharge lagoons (1, 2, 3, and 4) on parcel 2, which were the subject of a major EPA emergency removal action in 1990 to 1991 (see attached Figure 3). That action included the removal of contaminated soils and sludges from the lagoon areas. An average of two feet of clean fill was regraded over the entire lagoon area following the removal. Prior to their use for effluent discharge by NHPC, these lagoons constituted a significant portion of a much larger wetland area which joined the northern and southern wetland areas remaining on-site. The northern and southern wetland areas were not part of the original lagoon system and were not remediated during the EPA removal action.

Each of the four lagoons were separated by berms and would sequentially receive discharge from Lagoon 1 to Lagoon 4 as the system reached capacity. The contaminated soil volume estimates below include the affected bermed areas and adjacent embankments.

Lagoon 1

High concentrations of cadmium and zinc were detected in Lagoon 1 soils, with generally the highest levels of *cadmium (623 mg/kg)* in subsurface soils from the embankments and from the backfilled soils. Their presence in the lagoon embankments suggests that plating effluent may have infiltrated these areas in a lateral pattern. Their presence in the surface soils suggests that plating effluent from the lagoon periodically overflowed to perimeter areas. Metal contamination, detected in both surface and subsurface soils in the southwest corner of the

Lagoon 1 area, indicates that plating effluent overflowed and/or infiltrated laterally southwest of the former lagoon to the topographically lower Southern Wetland area.

Metals present in the formerly remediated and filled portion of the Lagoon 1 area indicates that their concentrations in the contaminated soil fill are generally homogeneous. The concentrations decrease with depth below the contaminated fill in soil samples that entirely penetrate the undisturbed soils beneath the fill.

Cyanide was detected in 11 of 13 soil samples; 10 were collected within the contaminated fill soils. The highest level of *cyanide* detected was *59.9 mg/kg*.

In total, an estimated *8,416 cubic yards* of contaminated soils are present in the former Lagoon 1 area to an average depth of 10 feet.

Although some VOCs were detected during field screening of Lagoon 1 soils, no appreciable site-related chlorinated VOCs were detected in laboratory samples from any of the lagoons.

Lagoon 2

The lateral distribution of cadmium and zinc reveals that both surface and subsurface soils in the former lagoon 2 and its embankments have been contaminated. *Cadmium* concentrations ranged from *8 to 733 mg/kg*, with the highest levels detected in the southeastern and northwestern corners of the former lagoon.

High concentrations of cadmium and zinc were found within 0 to 6 feet below ground surface in the embankment area soils. Within the formerly remediated and filled portion of the Lagoon 2 area, concentrations generally decreased with depth below the fill. High concentrations of metals were encountered in the shallow subsurface soil beneath the fill. In general, metal concentrations decreased to non-detection within 0 to 2-feet depth below the fill, although high target metal concentrations were found at several sampling locations, in subsurface soils up to 8 feet below the fill.

Detectable concentrations of *cyanide* were found in eight of eleven soil samples, with *74.6 mg/kg* the highest level detected.

In total, an estimated *10,271 cubic yards* of contaminated soils are present in the former Lagoon 2 area to an average depth of 6 feet.

Lagoons 3 and 4 and Lagoon 4 Overflow Area

The characteristics of Lagoons 3 and 4 were determined to be sufficiently similar; therefore they are jointly discussed. The Lagoon 4 overflow area is located in a low lying area on the eastern side of the former lagoon system near the site boundary with Jones Chemical, Inc. Surface soils in the southwest corner and along the western side of the overflow area have been affected by metals from NHPC waste disposal operations. In the overflow area, metal concentrations decrease to non-detectable concentrations below the 1 foot depth.

Cadmium concentrations detected ranged from *6 to 1,277 mg/kg*, with the highest concentration detected in shallow subsurface soils located beneath the clean fill near the embankment that

separates Lagoon 2 from Lagoons 3 and 4. This concentration is the highest level of cadmium found anywhere within the NHPC property.

High concentrations of the metal contaminants of concern were also detected in the embankment surface soils. High concentrations of target metals in the soil berm that separates Lagoons 3 and 4 from the Northern Wetland reveals that overflow of lagoon effluent occurred between Lagoons 3 and 4, and the topographically lower Northern Wetland.

Metals are present at shallow depths in both the embankment and interior of the Lagoon 3 and 4 area.

Cyanide was found in 11 of the 20 soil samples. The highest level of *cyanide* detected in Lagoons 3 and 4 was *247 mg/kg*.

In total, an estimated *10,361 cubic yards* of contaminated soils are present in the former Lagoon 3 and 4 and Lagoon 4 overflow areas. The average depth of contaminated soils is 5.5 feet in Lagoons 3 and 4 and 1 foot in the Lagoon 4 overflow area.

Wetland Areas

The two remaining wetland areas on site, the northern and southern wetlands, were not part of the original lagoon system. However, these wetland areas were affected by effluent discharge when the storage capacity of the lagoon system was periodically exceeded, resulting in overflow to the topographically lower northern and southern wetlands.

Southern Wetland Area

Overflow from the former lagoon system has contaminated the surface and shallow subsurface soils throughout the southern wetland area. High metal concentrations in the surface soils along the western edge of the wetland also indicate that past vehicle decontamination activities performed during the EPA removal action may have contributed to the area's metal contamination.

High concentrations of cadmium and zinc were found in surface soils within the southern wetland area, with *cadmium* concentrations ranging from *12 to 728 mg/kg*. The highest cadmium concentrations were detected in surface soils in the eastern and northern portions of the wetland. Sample locations along the northern side of the wetland and within the roadway area also indicated high concentrations of cadmium and zinc in the soils beneath the crushed stone road base fill.

Other target metals detected were not widespread except for chromium and tin. Cadmium and zinc decreased to lower concentrations at depths greater than 4 feet below ground surface for most of the soil boring locations in the wetland area.

Cyanide was detected in seven of ten soil samples collected, with the highest level of *509 mg/kg*. This surface soil sample contained the highest detected level of cyanide on-site.

In total, an estimated *3,715 cubic yards* of contaminated soils are present in the southern wetland area to an average depth of 8.5 feet.

Northern Wetland Area

Overflow effluent from the former lagoon system delivered metals to shallow soils throughout the area. *Cadmium* concentrations ranged from *7 to 286 mg/kg*, all in surface soil.

SVOCs were sporadically detected in the Northern Wetland. These contaminants were found at low levels and are believed to have originated in storm water runoff west of the site.

Cyanide was detected in nine of twelve soil samples. The highest level of *cyanide* detected was *21.5 mg/kg*.

In total, an estimated *2,621 cubic yards* of contaminated soils are present in the northern wetland area to an average depth of 2 feet.

C. Groundwater

Contaminated groundwater has migrated under adjacent properties and is generally bound by the NHPC property boundary to the north and west, Horseshoe Pond to the south and the Merrimack River to the east. Known off-site properties effected by contaminated groundwater are the YMCA, Jones Chemical, New England Pole, Techwood Systems, Inc. and Lot 22. Groundwater in this area exceeds Maximum Contaminant Levels (MCLs).

In summary, eight VOCs were detected in groundwater at concentrations which exceed MCLs. These include: TCE; 1,1-dichloroethene (DCE); PCE; vinyl chloride (VC); TCA; cis- and trans-1,2-dichloroethene (C&T DCE); 1,2-dichloroethane (1,2-DCA); and chloroform. Five metals were also detected in the groundwater above the established MCLs, including cadmium, nickel, chromium, arsenic, and lead. TCE and cadmium were the contaminants that most frequently exceeded their respective MCLs of 5 ug/L.

Groundwater contamination was detected in all three aquifers. However, the levels of contamination in the deep overburden were significantly less than in the shallow overburden, while the bedrock aquifer was relatively unaffected. Metal contamination is present only in the shallow overburden aquifer.

To provide a better understanding of groundwater contamination which has originated from the site, the discussion below is by aquifer: shallow overburden, deep overburden and bedrock. Figure 4 presents the portions of the overburden aquifer where contaminants were detected in excess of MCLs. Attached Table 2 contains a summary of groundwater analytical results.

Shallow Overburden Aquifer

Two VOCs (TCE and DCE) were detected above their MCLs within the northern half of the YMCA property situated to the south of the former operations area; six VOCs (TCE, DCE, PCE, TCA, C&T DCE, and VC) were detected above their MCLs within the former operations area; and five VOCs (TCE, DCE, PCE, TCA, and VC) were detected above their MCLs downgradient of the former operations area. The highest level of VOC contamination (*7500 ug/L of TCE*) was found at well MW-217S, within the former operations area, immediately adjacent to Lagoon 1. VOC levels decrease with distance from the Lagoon 1 area.

One well located on the western side of the YMCA property had a cadmium level exceeding MCLs. Twelve wells in the former operations area had elevated concentrations of cadmium, nickel, arsenic, lead, and chromium. Samples from seven monitoring wells located in the downgradient portions of the NHPC study area indicated cadmium, nickel, and chromium at elevated concentrations. The highest level of metal contamination (*1,290 ug/L of cadmium*) was found at well OHM-3, on the Jones Chemical, Inc. property, immediately downgradient of Lagoon 1.

In total, there is an estimated *3,343,620 cubic feet* of contaminated groundwater in the shallow overburden aquifer.

Deep Overburden Aquifer

Only TCE was detected in excess of its MCL in two deep overburden monitoring wells within the YMCA property south of the former operations area. Monitoring well MW-106, located adjacent to Horseshoe Pond on the southern portion of the YMCA property, had the highest concentration of *TCE (220 ug/L)* observed in the deep overburden aquifer within the NHPC study area. Four deep overburden monitoring wells in the former operations area indicated VOC concentrations exceeding MCLs. TCE and chloroform were the only VOCs detected at elevated concentrations from these wells. Five of six wells downgradient of the former operations area revealed TCE and C&T-DCE at levels above MCLs.

None of the deep overburden aquifer wells yielded groundwater samples with metals exceeding MCLs.

In total, there is an estimated *14,074,930 cubic feet* of contaminated groundwater in the deep overburden aquifer.

Bedrock Aquifer

One VOC (*TCE at 180 ug/L*) was detected above its MCL in well MW-106R, adjacent to Horseshoe Pond on the southern side of the YMCA property. TCE was also detected at elevated concentrations in bedrock wells within the former operations area. The results of the chemical analyses for three wells downgradient of the former operations area indicated the presence of TCE above its MCL in only one of them.

None of the bedrock aquifer wells yielded groundwater samples with metal levels in excess MCLs.

D. Surface Water and Sediments

Surface water and sediment samples were collected and analyzed for VOCs, SVOCs, metals and cyanide from Horseshoe Pond and the Merrimack River. Based on results, it does not appear that detectable concentrations of site contaminants are discharging to Horseshoe Pond or the Merrimack River. No contaminants were detected in either surface water body. Several sediment samples contained detectable concentrations of VOCs, SVOCs and metals; however, the risk assessment concluded that these levels were below a level of human health or ecological concern.

Horseshoe Pond

VOCs were not detected in any of the surface water samples; however, VOCs were detected in five of the seven sediment samples. Four VOCs detected in these samples include: 2-butanone (methyl ethyl ketone (MEK)); acetone; TCA; and carbon disulfide. Based on the absence of these compounds in groundwater which would act as the migration pathway between the site and the pond, it does not appear that these sediment VOCs are related to the former site operations.

The only sediment sample analyzed for SVOCs was collected on the eastern shore; it contained several polynuclear aromatic hydrocarbons (PAHs) typically associated with fuels, oils, and other petroleum-related compounds and is not a site-related contaminant. One phthalate was also detected in the sample.

Sediment samples containing arsenic, chromium, copper, nickel, and zinc were detected at concentrations approximately 25 to 40% above background levels in two samples. Based on the absence of these metals in groundwater between the site and Horseshoe Pond, it does not appear that sediment metals are related to the former site operations.

Merrimack River

VOCs were not detected in any of the surface water or sediment samples. Chromium was detected in one sediment sample, however, no other metals were present.

A complete discussion of site characteristics can be found in Sections 3.0 and 4.0 of the Draft Final Remedial Investigation Report.

VI. SUMMARY OF SITE RISKS

A Baseline Human Health and Ecological Risk Assessment (RA) was performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the Site. The human health risk assessment followed a four step process: 1) contaminant identification, which identified those hazardous substances which, given the specifics of the Site, were of significant concern; 2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure; 3) toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances, and 4) risk characterization, which integrated the three earlier steps to summarize the potential and actual health risks posed by hazardous substances at the Site, including carcinogenic and non-carcinogenic risks. The results of the human health risk assessment for the New Hampshire Plating Superfund Site are discussed below, followed by the conclusions of the ecological risk assessment.

Human Health Risk Assessment

Forty-five (45) contaminants of concern (COCs), listed in Tables 3 and 4 of this Record of Decision for soil and groundwater respectively, were selected for evaluation in the human health risk assessment. These contaminants constitute a representative subset of the more than one-hundred (100) contaminants identified in soil, groundwater and/or sediments at the Site during the Remedial Investigation. The forty-five (45) contaminants of concern were selected to

represent potential site related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment. A summary of the health effects of each of the contaminants of concern can be found in Section 6.2.2 of the human health risk assessment contained in the Draft Final Remedial Investigation Report.

Potential human health effects associated with exposure to the contaminants of concern were estimated quantitatively or qualitatively through the development of several hypothetical exposure pathways. These pathways were developed to reflect the potential for exposure to hazardous substances by media based on the present uses, potential future uses, and location of the Site.

The New Hampshire Plating Site is located in a predominately industrial area. Although commercial uses are most common, some residential and undeveloped lots do exist in the immediate area. This mixed land-use required the risk assessment to consider residential, trespasser and industrial scenarios to fully evaluate exposure pathways for various media. The following is a brief summary of the exposure pathways evaluated. A more thorough description can be found in Section 6.4.3 of the human health risk assessment.

Soil Exposure Pathways

Potential current and future trespassing, future residential and future worker scenarios were evaluated for exposure to contaminated soils. Potential exposures evaluated were incidental ingestion of soil and dermal absorption of contaminants. Ingestion was evaluated for a 15 kg child (1-6 years) who may ingest 200 mg/day of soil over 150 days/year for 6 years. Trespasser, residential and industrial ingestion was evaluated for a 70 kg adult who may ingest 100 mg/day of soil over 52 to 150 days/year for 10 to 25 years. Absorption was also evaluated for the above pathways. The hazard indices in the baseline risk assessment and FS were re-calculated as shown in Table 5 using the revised dermal adherence factor of 0.23. The dermal factor used in the baseline risk assessment was 1.0. This resulted in slightly lower hazard indices. This change does not effect cleanup goals.

Groundwater Exposure Pathways

The potential risks from future residential use of contaminated groundwater were evaluated. Ingestion of groundwater for 350 days/year over 30 years was assumed. Small children (15 kg) were assumed to ingest 1 liter/day and adults (70 kg) were assumed to ingest 2 liters/day.

Sediment Exposure Pathway

Potential risks under current and future trespassing and future recreational land use were evaluated. Potential exposures evaluated were incidental ingestion of soil and dermal absorption of contaminants. It was assumed that older children (40 kg body weight and 6-12 years old) and adults (70 kg body weight) may incidentally ingest 100mg/day of contaminated sediment for 24 days/year.

There are no exposure pathways for surface water or air since these media were not impacted by the release. For each pathway evaluated, a central tendency (CT) or average and a reasonable maximum exposure (RME) estimate were generated corresponding to exposure to the average and the maximum concentration detected in that particular medium.

Human Health Risk Assessment Conclusions

Excess lifetime cancer risks were determined for each exposure pathway by multiplying the exposure level with the chemical specific cancer factor. Cancer slope factors have been developed by EPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds. That is, the true risk is unlikely to be greater than the risk predicted. The resulting risk estimates are expressed in scientific notation as a probability (e.g., 1×10^{-6} for 1/1,000,000) and indicate (using this example), that an average individual is not likely to have greater than a one in a million chance of developing cancer over 70 years as a result of site-related exposure as defined to the compound at the stated concentration. Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances, such as are present at the Site.

The hazard index was also calculated for each pathway as EPA's measure of the potential for non-carcinogenic health effects. A hazard quotient is calculated by dividing the exposure level by the reference dose (RfD) or other suitable benchmark for non-carcinogenic health effects for an individual compound. Reference doses have been developed by EPA to protect sensitive individuals over the course of a lifetime, and they reflect a daily exposure level that is likely to be without an appreciable risk of an adverse health effect. RfDs are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. The hazard quotient is often expressed as a single value (e.g., 0.3) indicating the ratio of the stated exposure as defined to the reference dose value (in this example, the exposure as characterized is approximately one third of an acceptable exposure level for the given compound). The hazard quotient is only considered additive for compounds that have the same or similar toxic endpoint and the sum is referred to as the hazard index (HI). (For example: the hazard quotient for a compound known to produce liver damage should not be added to a second whose toxic endpoint is kidney damage).

Table 5 depicts the carcinogenic and non-carcinogenic risk summary results for present and potential future exposure to soil contaminants corresponding to the central tendency (CT) and the reasonable maximum exposure (RME) scenarios. The results are presented for each of the target areas of the Site identified in Section V above. Tables 6-10A through 6-19B in Volume 2 of the Draft Final Remedial Investigation Report depict the CT and RME results for each contaminant of concern.

Attached Table 6 depicts the carcinogenic and non-carcinogenic risk summary results for present and potential future exposure to groundwater contaminants corresponding to the central tendency (CT) and the reasonable maximum exposure (RME) scenarios. Tables 6-20A through 6-23D in Volume 2 of the Draft Final Remedial Investigation Report depict the CT and RME results for each contaminant of concern.

The following bullets best summarize the results of the baseline human health risk assessment for the Site:

- For soils, carcinogenic risk estimates are within or less than EPA's acceptable risk range of 1×10^{-4} to 1×10^{-6}. Non-carcinogenic risk estimates for cadmium exceed EPA's hazard index benchmark (acceptable threshold) of 1.0 for an RME receptor assuming industrial or trespasser land-use scenarios at Lagoons 3 and 4.

- For groundwater, several volatile organic compounds (VOCs) and inorganics (metals) exceed Federal maximum contaminant levels (MCLs), primarily in the shallow overburden aquifer. Under potential future use, if groundwater were ingested, the carcinogenic risk estimates range from 1.4×10^{-2} to 1.7×10^{-3}. Hazard indices for non-carcinogenic risks range from 140 for the RME scenario to 99 for the CT scenario.

- For Horseshoe Pond and Merrimack River sediments, the RME carcinogenic risk estimate for a recreational user was 2×10^{-6}. The hazard index for all non-carcinogenic risk estimates is less than the benchmark of 1.0. These results indicate that no adverse effects are present from dermal contact with or inadvertent ingestion of sediments.

Baseline Ecological Risk Assessment

Cadmium was selected as the contaminant of concern based on its toxicity and high bioaccumulation potential. Cadmium also had a high frequency of detection and was generally co-located with other contaminants. Potential ecological risks associated with exposure to cadmium in lagoon soils were evaluated for several target species. No exposure pathways were evaluated for other media based on the limited presence of either habitat or contaminants as explained in Section 7.0 of the Draft Final Remedial Investigation Report.

Five indicator species were selected for the ecological risk assessment, and a conceptual food web model was prepared to represent the bioaccumulation pathway at the site. The food web model was the basis for the calculation of cadmium soil concentrations above which adverse effects on the indicator species are expected to occur.

Of the five indicator species, the short-tailed shrew was found to be at the greatest risk of adverse effects from cadmium concentrations in the soil. For this indicator species, cadmium concentrations above 5.6 mg/kg in 0' - 2' deep soils would be expected to have a detrimental impact.

The ecological risk assessment concluded that site soils throughout the wetlands-lagoons system pose probable adverse ecological effects due to cadmium contamination.

Overall Risk Assessment Conclusion

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment. Soil and groundwater both require remediation to address public health or ecological risk concerns. The basis for soil remediation is to address existing unacceptable ecological threats to local species and eliminate ongoing contribution to groundwater contamination through leaching of metal contaminants to soil. The basis for groundwater remediation is unacceptable human health risks and exceedances of MCLs.

VII. DEVELOPMENT AND SCREENING OF ALTERNATIVES

A. Statutory Requirements/Response Objectives

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 all federal and more stringent state environmental standards, requirements, criteria or limitations, unless a waiver is invoked; a requirement that EPA select a remedial action that is cost-effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a preference for remedies in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances is a principal element over remedies not involving such treatment. Response alternatives were developed to be consistent with these Congressional mandates.

Based on preliminary information relating to types of contaminants, environmental media of concern, and potential exposure pathways, remedial action objectives were formed to aid in the development and screening of alternatives to mitigate existing and future potential threats to public health and the environment.

The remedial action objectives for soil are:

- minimize contaminant leaching from soils that would result in groundwater contamination exceeding MCLs, state ambient groundwater quality standards (AGQS), or acceptable human-health based levels; and

- prevent contact by ecological receptors with soils having contaminant concentrations exceeding the ecological risk-based performance remedial goals (PRGs).

The remedial action objectives for groundwater are:

- prevent ingestion of groundwater containing contaminants at concentrations exceeding drinking water criteria;

- minimize off-site migration of contaminants in the groundwater; and

- minimize discharge of contaminated groundwater to the Merrimack River.

B. Technology and Alternative Development and Screening

CERCLA and the NCP set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a range of alternatives were developed for the site.

With respect to source control, the FS developed a range of alternatives in which treatment that reduces the toxicity, mobility, or volume of the hazardous substances is a principal element. This range included an alternative that removes or destroys hazardous substances to the maximum extent feasible, eliminating or minimizing to the degree possible the need for long term management. This range also included: alternatives that treat the principal threats posed by the site but vary in the degree of treatment employed and the quantities and characteristics of the treatment residuals and untreated waste that must be managed; alternative(s) that involve little or no treatment but provide protection through engineering or institutional controls; and a no action alternative.

With respect to groundwater response action, the FS developed a limited number of remedial alternatives that attain site specific remediation levels within different time frames using different technologies and a no action alternative.

As discussed in Section 2.5 of the Feasibility Study Report, several soil and groundwater treatment technologies were identified, assessed and screened based on implementability, effectiveness, and cost. These technologies were combined into source control (SC) and management of migration (MOM) alternatives. Section 3.0 of the Feasibility Study Report presents the development of SC and MOM alternatives through the combination of technologies identified in the previous screening process and consistent with Section 300.430(e) (3) of the NCP. Generally, the purpose of the initial screening process is to narrow the number of potential remedial actions for further detailed analysis while preserving a range of options. Each formulated alternative is then evaluated and screened again to assemble the final alternatives for detailed analysis. As discussed in Section 3.4 of the Feasibility Study Report, this tiered alternative screening approach was not necessary since, in an effort to streamline the FS, only a limited number of alternatives were initially developed based on acceptable technologies. Refer to attached Table 7A for a summary of the five source control alternatives and Table 7B for a summary of the three management of migration alternatives which were presented for detailed analysis.

VIII. DESCRIPTION OF ALTERNATIVES

This Section provides a narrative summary of each alternative evaluated.

A. Source Control (SC) Alternatives Analyzed

The source control alternatives analyzed for the Site include: No-Action (SC-1); Excavation, Consolidation and Capping (SC-2); Excavation, Solidification and Off-site Disposal (SC-3); Excavation and Off-site Disposal (SC-4); and Chemical Fixation and On-site Backfilling (SC-5).

SC-1 No-Action

The No Action Alternative is developed as a baseline case. The only activities that would be conducted under this alternative are minimal long-term monitoring of groundwater to evaluate potential soil contaminant leaching and migration. The purpose of the alternative is to evaluate the overall ecological receptor and environmental protection provided by the NHPC Site in its present state. Under this alternative, no remedial actions would be taken to reduce or minimize contaminant leaching or protect ecological receptors. No measures would be implemented to prevent potential exposures of biota to contaminated lagoon soils. The solidified monolith would remain on site and would not be addressed. Because the monolith would remain in place, approximately half of the NHPC property would not be suitable for future reuse.

- Contaminants would remain in place and continue to migrate to groundwater.
- Minimal groundwater monitoring would be performed.
- No institutional controls would be established.

- ESTIMATED NET-PRESENT WORTH COST IS: **$714,100**

* This alternative is a baseline against which other cleanup alternatives are compared. It is not protective and does not meet applicable or relevant and appropriate requirements (ARARs).

SC-2 Consolidation and Capping

Soils which exceed PRGs for groundwater leaching and ecological risk and which fail TCLP, or other suitable leaching test, would be excavated from the former building area, Lagoons 1, 2, 3 and 4, and the Northern and Southern wetlands. Closure and post-closure plans would be prepared to comply with RCRA hazardous waste surface impoundment closure requirements in case not all contaminated subsurface soils can be practicably excavated. Excavated soils would be consolidated into lagoons 1 and 2, which would be lined in compliance with RCRA hazardous waste regulations. The temporary storage area would be crushed and added to the consolidated soil. Consolidated areas would be lined and capped and a leachate detection system established to meet RCRA closure requirements.

Since the lagoon system represents a 2.8 acre wetland area and remediation impacts are unavoidable, mitigation would be performed through the preservation of off-site wetlands. Institutional controls would be established to restrict excavation through the cap and limit land-uses to industrial applications.

- 41,300 yds^3 of soil would be excavated and capped in the former lagoons 1 and 2 area.
- The temporary holding cell storage material (7,875 yds^3) would be crushed, consolidated with the treated soil and capped.
- The liner and cap would conform with RCRA Subtitle C requirements.
- The former building and holding cell excavated areas would be backfilled with clean material and vegetated to prevent erosion.
- The former lagoons 3 and 4 and the northern and southern wetland areas would be backfilled with a minimal amount of clean material (<1') and vegetated to provide adequate storm water retention.
- Threatened off-site wetlands will be purchased to mitigate on-site loss.
- The Site lies within the 100 year floodplain. Flood storage capacity would be maintained through engineering controls (i.e., excavate pug-mill area).
- Institutional controls will be established to restrict activities to commercial/industrial on Parcel 1 and eliminate excavation through the cap on Parcel 2.

- ESTIMATED TIME FOR REQUIRED CONSTRUCTION IS: **24 to 30 months**
- ESTIMATED TIME REQUIRED TO ACHIEVE PRGs IS: **24 to 30 months**
- ESTIMATED NET-PRESENT WORTH COST IS: **$7,267,800**

SC-3 Excavation, Solidification and Off-Site Disposal

Alternative SC-3 features excavation of contaminated soils, on-site solidification of soils to stabilize metals, and off-site disposal in a solid waste landfill. Alternative SC-3 would reduce contaminant leaching to groundwater (thus protecting human health), and prevent potential ecological receptor exposures. The soils containing contaminants in excess of PRGs for groundwater leaching and ecological risks and which fail TCLP, or other suitable leaching test, would be excavated from the former building area, the lagoons, and wetlands, and staged on site for treatment. Closure and post-closure plans would be prepared to comply with RCRA hazardous waste surface impoundment closure requirements in case not all contaminated

subsurface soils can be practicably excavated. Cadmium and other metals would be solidified in a soil-cement matrix to immobilize the metals and minimize the leaching of these contaminants. After solidification, the treated soils would be sent off site for disposal. The solidified soil-cement matrix would be cured as a soil-like material rather than as a monolithic mass to facilitate subsequent handling and backfilling. Materials resistant to treatment would be sent off-site for disposal. The existing monolith would be demolished, crushed and sent off-site.

The area encompassed by the existing Northern and Southern Wetlands, and Lagoons 1, 2, 3, and 4 would be restored on-site as wetlands. Institutional controls would be established to limit land-uses to industrial applications and preserve the restored wetland.

- 41,300 yds^3 of soil would be excavated and solidified.
- The treated soil would be disposed off-site at a Subtitle D solid waste facility. Some materials may require disposal at a Subtitle C facility.
- The temporary holding cell storage material (7,875 yds^3) would be crushed and disposed at a Subtitle C or D facility, as appropriate.
- The former building and holding cell excavated areas would be backfilled with clean material and vegetated to prevent erosion.
- The former lagoons 1, 2, 3 and 4 and the northern and southern wetland areas would be backfilled, graded and vegetated to restore to a natural wetland condition.
- The Site lies within the 100 year floodplain. Flood storage capacity would be maintained through re-creation of the wetland area.
- Institutional controls would be established to restrict activities to commercial/industrial on Parcel 1 and preserve the wetland area on Parcel 2.

- ESTIMATED TIME FOR REQUIRED CONSTRUCTION IS: **29 to 35 months**
- ESTIMATED TIME REQUIRED TO ACHIEVE PRGs IS: **29 to 35 months**
- ESTIMATED NET-PRESENT WORTH COST IS: **$23,693,000** (assumes all disposal is at a Subtitle D facility)

SC-4 Excavation and Off-Site Treatment and Disposal

Alternative SC-4 features the excavation and off-site disposal of contaminated soils in a suitable treatment, storage and disposal (TSD) facility. Alternative SC-4 is similar to SC-3; the primary difference is that under SC-4, treatment would be conducted at the TSD facility rather than on site. Based on the leachability of metals from the site soils, solidification at the TSD facility would be required prior to land disposal. Alternative SC-4 would reduce or minimize contaminant leaching to groundwater, thus protecting human health, and prevent potential ecological receptor exposures to contaminants. The soils containing contaminants in excess of PRGs for groundwater leaching and ecological risk and which fail TCLP, or other suitable leaching test, would be excavated from the former building area, the lagoons, and wetlands and staged on site, loaded into trucks, and shipped off site for treatment and disposal. Closure and post-closure plans would be prepared to comply with RCRA hazardous waste surface impoundment closure requirements in case not all contaminated subsurface soils can be practicably excavated.

The monolith would be demolished and sent off-site for disposal at a Subtitle C or D facility, as appropriate. Treatment should not be necessary since solidification has already been performed. The excavated areas would be backfilled with clean fill and regraded. The area encompassed by

the existing Northern and Southern Wetlands and the lagoon system would be restored as wetlands. Institutional controls would be established to limit land-uses to industrial applications and preserve the restored wetland.

- 41,300 yds^3 of soil would be excavated and treated and disposed off-site.
- The excavated soil would be transported to an off-site TSD facility. The TSD would treat and/or dispose the soil as appropriate.
- The temporary holding cell storage material (7,875 yds^3) would be crushed and transported to a Subtitle D facility for solid waste disposal. Some material may require shipment to the TSD facility for off-site treatment.
- The former building and holding cell excavated areas would be backfilled with clean material and vegetated to prevent erosion.
- The former lagoons 1, 2, 3 and 4 and the northern and southern wetland areas would be backfilled, graded and vegetated to restore to a natural wetland condition.
- The Site lies within the 100 year floodplain. Flood storage capacity would be maintained through re-creation of the wetland area.
- Institutional controls would be established to restrict activities to commercial/industrial on Parcel 1 and preserve the wetland area on Parcel 2.

- ESTIMATED TIME FOR REQUIRED CONSTRUCTION IS: **29 to 35 months**
- ESTIMATED TIME REQUIRED TO ACHIEVE PRGs IS: **29 to 35 months**
- ESTIMATED NET-PRESENT WORTH COST IS: **$37,323,400**

SC-5 Chemical Fixation and On-site Backfilling

Alternative SC-5, selected source control remedy for the Site, features in-place chemical fixation, on-site backfilling of treated soils, and off-site compensatory wetlands restoration. Under Alternative SC-5, metal contaminants leaching to groundwater would be reduced or minimized through chemically altering the soluble metals into stable and much less soluble mineral forms, thus rendering the metals unleachable and protecting human health and the environment. Treated soils from all excavated areas of the Site would be used to backfill the Lagoons 1 and 2 areas. They would be covered with a two-foot permeable soil cover and revegetated to prevent erosion and potential exposure of biological receptors to the treated soils (if bioavailability of metals in the treated soil is not reduced). Lagoons 3 and 4 and the Northern and Southern Wetlands would be backfilled with a minimal amount of clean soil and used as storm water retention basins that would have adequate capacity to address runoff from a 100-year storm event.

The soils containing contaminants in excess of PRGs for groundwater leaching and ecological risk and which fail TCLP, or other suitable leaching test, would be treated in place with reagents in approximately 12-inch lifts, mixed, allowed to cure for approximately 24 hours, and would then be excavated and stockpiled on-site temporarily. Soils from the former building area, the lagoons, and the Northern and Southern Wetlands would be treated. The monolith would be demolished, tested for RCRA leaching characteristics, treated if needed, and used as on-site backfill. Additional treatment of the monolithic materials is not anticipated because contaminated soils were previously solidified.

After confirmation of treatment effectiveness (through leaching tests including TCLP, SPLP, or MEP), all treated materials would be backfilled into Lagoon 1 (and a portion of Lagoon 2, as needed) and covered. Closure and post-closure plans would be prepared to comply with RCRA

hazardous waste surface impoundment closure requirements in case not all contaminated subsurface soils can be practicably excavated. An on-site treatability study would be necessary to determine the appropriate reagent mixture and confirm the effective reduction in leaching and bioavailability of metals from treated soils.

Since the lagoon system represents a 2.8 acre wetland area and remediation impacts are unavoidable, mitigation would be performed through the preservation of off-site wetlands. Institutional controls would be established to restrict excavation through the cap and limit land-use to industrial applications.

- 41,300 yds^3 of soil would be treated in-place, excavated and placed in the former Lagoons 1 and 2 areas. The treated material will be covered with a permeable two-foot soil cover to establish vegetation.
- The temporary holding cell storage material (7,875 yds^3) would be crushed, treated as necessary and placed with the treated soil in former Lagoons 1 and 2.
- The former building and holding cell excavated areas would be backfilled with clean material and vegetated to prevent erosion.
- The former Lagoons 3 and 4 and the Northern and Southern Wetland areas would be backfilled with a minimal amount of clean material (<1') and vegetated to provide adequate storm water retention.
- Threatened off-site wetlands will be purchased to mitigate on-site loss.
- The Site lies within the 100 year floodplain. Flood storage capacity would be maintained through engineering controls (i.e. excavate pug-mill area).
- Institutional controls will be established to restrict activities to commercial/industrial on Parcel 1 and eliminate excavation through the soil cover on Parcel 2.

- ESTIMATED TIME FOR REQUIRED CONSTRUCTION IS: **23 to 29 months**
- ESTIMATED TIME REQUIRED TO ACHIEVE PRGs IS: **23 to 29 months**
- ESTIMATED NET-PRESENT WORTH COST IS: **$9,134,000**

B. Management of Migration (MOM) Alternatives Analyzed

Management of Migration (MOM) alternatives address contaminants that have migrated in groundwater from the original source of contamination. At the New Hampshire Plating Site, contaminants have migrated from the on-site lagoons and building source areas, under adjacent properties and to the Merrimack River east of the Site. The contaminants have also spread south to Horseshoe Pond. The contaminants are present primarily in the shallow overburden aquifer. The MOM alternatives evaluated for the Site include a no-action alternative (GW-1), a limited action alternative (GW-2) and a treatment and containment alternative (GW-3).

Consistent with EPA's Groundwater Use and Value Determination Guidance (April 3, 1996), NHDES determined that groundwater in the vicinity of the Site is of medium to high value. A copy of the Groundwater Use and Value Determination for this Site is attached in Appendix D. The Site and surrounding area are served by the Merrimack Village District public water supply distribution system. There are no drinking water wells in the vicinity of the Site. This use and value determination replaces the former groundwater classification system.

Based on information contained in the NHDES' Groundwater Use and Value Determination Report (January 12, 1998) and the results of modeling performed in the Feasibility Study, EPA

concluded that, for the development of remedial alternatives, extraction and treatment for the purpose of containment (GW-3) was adequate and that full aquifer restoration through extraction and treatment was unwarranted.

GW-1 No-Action

The No Action Alternative was developed as a baseline case. Under this alternative, no source control action would be taken at the NHPC Site to reduce or mitigate soil contaminant leaching to groundwater. Without source control, the groundwater quality would not be expected to return to acceptable levels through dilution and natural geochemical attenuation in a reasonable amount of time since soil contaminants would continually contribute to groundwater contamination. No institutional controls for the protection of human health would be provided. The only activities conducted would be minimal long-term monitoring of groundwater to evaluate contaminant migration.

- Only minimal groundwater monitoring performed.
- No institutional controls established.

- ESTIMATED TIME FOR DESIGN AND CONSTRUCTION IS: **n/a**
- ESTIMATED TIME REQUIRED TO ATTAIN PRGs IS: **700+ years**
- ESTIMATED NET-PRESENT WORTH COST IS: **$751,400**

* This alternative is a baseline against which other cleanup alternatives are compared. It is not protective and does not meet ARARs.

GW-2 Limited Action

GW-2 Limited Action, the selected management of migration alternative for the Site, involves little or no treatment, but provides protection of human health by preventing or controlling potential exposures to contaminated groundwater through institutional controls. Limited Action would only be implemented in conjunction with one of the Source Control alternatives (SC-2, 3, 4 or 5). With source control in place, the groundwater quality would gradually return to acceptable levels (groundwater quality that would meet federal and state standards) through dilution and natural geochemical attenuation. A comprehensive long-term surface and groundwater monitoring program would be implemented to evaluate contaminant status and migration. Surface water bodies to be monitored include the Merrimack River and Horseshoe Pond.

- Implemented in conjunction with Source Control.
- Contaminant levels would be reduced through natural attenuation mechanisms.
- A comprehensive surface and groundwater monitoring program would be established.
- Institutional Controls (i.e., deed restrictions, zoning regulations) would be established to prevent consumption of groundwater containing unacceptable levels of contaminants.
- A Groundwater Management Zone would be established in compliance with the State's Groundwater Protection Rules (Env-Ws 410).

- ESTIMATED TIME FOR DESIGN AND CONSTRUCTION IS: **n/a**
- ESTIMATED TIME REQUIRED TO ATTAIN PRGs IS: **26 to 58 years**
- ESTIMATED NET-PRESENT WORTH COST IS: **$771,400**

GW-3 Containment by Extraction

Under this treatment alternative, a groundwater extraction system would be installed: to hydraulically contain groundwater leaving the NHPC source areas; to limit further contaminant migration in the shallow overburden, the deep overburden, and bedrock aquifers; and to limit the continued discharge of contaminated groundwater into the Merrimack River. It is anticipated that groundwater containment would be implemented in conjunction with one of the Source Control alternatives (SC-2, 3, 4 or 5).

Groundwater containment would be accomplished using four shallow overburden and two deep overburden extraction wells, situated on the NHPC eastern property boundary, to capture contaminated overburden groundwater at an estimated combined average of 50 gallons per minute (gpm) pumping rate. The results of aquifer tests performed as part of a pre-design investigation would be used to design and install the extraction system.

Groundwater collected by the extraction wells would be transferred to a treatment system for removal of metals and volatile organic compounds. Groundwater would be treated to attain the more stringent of federal maximum contaminant levels or state ambient groundwater quality standards. Based on available space at the Site, the western section of the site (the former pug mill area) is a viable location for the treatment system. A surface and groundwater monitoring program would be implemented to evaluate contaminant status and migration. Surface water bodies to be monitored include the Merrimack River and Horseshoe Pond. Institutional controls (i.e., deed restrictions, zoning regulations) would be established to prevent consumption of groundwater containing unacceptable levels of contaminants. Because extraction and containment will retard groundwater flow and impede dilution, GW-3 will require more time to achieve acceptable standards in the off-site portions of the plume than full natural attenuation (GW-2).

- Assumes implementation in conjunction with Source Control.
- Groundwater contaminant levels on-site would be reduced through treatment. Contaminant levels off-site would be reduced through natural attenuation mechanisms
- Groundwater monitoring would be performed.
- Institutional Controls would be established.
- A Groundwater Management Zone would be established in compliance with the State's Groundwater Protection Rules (Env-Ws 410).

- ESTIMATED TIME FOR DESIGN AND CONSTRUCTION IS: **12 to 18 months**
- ESTIMATED TIME REQUIRED TO ATTAIN PRGs IS: **40 to 112 years**
- ESTIMATED NET-PRESENT WORTH COST IS: **$5,644,200**

IX. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 121(b)(1) of CERCLA presents several factors that, at a minimum, EPA is required to consider in its assessment of alternatives. Building upon these specific statutory mandates, the National Contingency Plan (NCP) articulates nine evaluation criteria to be used in assessing the individual remedial alternatives.

A detailed analysis was performed on the alternatives using the nine evaluation criteria in order to select a remedy for the New Hampshire Plating Site. The following is a summary of the

comparison of each source control's and management of migration alternative's strengths and weaknesses with respect to the nine evaluation criteria. These criteria are summarized as follows:

Threshold Criteria

The two threshold criteria described below must be met in order for the alternatives to be eligible for selection in accordance with the NCP.

1. **Overall protection of human health and the environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

2. **Compliance with applicable or relevant and appropriate requirements (ARARS)** addresses whether or not a remedy will meet all of the ARARs or other Federal and State environmental laws and/or provide grounds for invoking a waiver.

Primary Balancing Criteria

The following five criteria are utilized to compare and evaluate the elements of one alternative to another for those that meet the threshold criteria.

3. **Long-term effectiveness and permanence** addresses the criteria that are utilized to assess alternatives for the long-term effectiveness and permanence they afford, along with the degree of certainty that they will prove successful.

4. **Reduction of toxicity, mobility, or volume through treatment** addresses the degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the site.

5. **Short term effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup goals are achieved.

6. **Implementability** addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7. **Cost** includes estimated capital and Operation and Maintenance (O&M) costs, as well as present-worth costs.

Modifying Criteria

The modifying criteria are used as the final evaluation of remedial alternatives after EPA has received public comment on the RI/FS and Proposed Plan.

8. **State acceptance** addresses the State's position and key concerns related to the preferred alternative and other alternatives, and the State's comments on ARARs or the proposed use of waivers.

9. **Community acceptance** addresses the public's general response to the alternatives described in the Proposed Plan and RI/FS report.

A detailed assessment of each Source Control and Management of Migration alternative relative to the nine criteria can be found in Sections 4.1 and 4.3 of the Feasibility Study.

Following the detailed analysis of each individual alternative, a comparative analysis, focusing on the relative performance of each alternative against the nine criteria, was conducted. The full comparative analysis can be found in Table 8 for Source Control alternatives and Table 9 for Management of Migration alternatives, which are attached.

The section below presents the nine criteria and a brief narrative summary of each alternative's strengths and weaknesses according to the detailed and comparative analysis. Only those alternatives which satisfied the first two threshold criteria were balanced and modified using the remaining seven criteria. Alternatives which best satisfy each of the five balancing criteria are shown in bold print.

Source Control Alternatives

1. Overall protection of human health and the environment - Alternatives SC-2, 3, 4 and 5 all meet this threshold criteria through a combination of physical treatment and institutional controls. Alternative SC-1 was eliminated from further consideration.

2. Compliance with applicable or relevant and appropriate requirements (ARARS) - Alternatives SC-2, 3, 4 and 5 all meet this threshold criteria and do not require waivers.

3. Long-term effectiveness and permanence - Alternative SC-2 would be effective in reducing leaching of contaminants and, with proper maintenance, is a reliable technology. Alternative SC-3 would also be effective in reducing leaching of contaminants, is a reliable technology and would require less maintenance than SC-1. Alternative SC-4 would enjoy the highest level of effectiveness and permanence since contaminated soils would be removed from the Site. Alternative SC-5 would also be effective in reducing leaching of contaminants and is expected to require no maintenance. SC-5 is an innovative technology which is expected to be reliable based on performance at similar sites.

4. Reduction of toxicity, mobility, or volume through treatment - Alternative SC-2 does not involve treatment, therefore there would be no reduction of toxicity or volume. However, reduction of mobility is expected since a RCRA cap would be used to eliminate water infiltration. Alternative SC-3 would result in a reduction of contaminant mobility, but not toxicity. Some increase in volume would occur. Alternative SC-4 involves off-site disposal. Reduction of toxicity, mobility or volume would be similar to alternative SC-2 if the material were sent to a RCRA Subtitle C facility without further treatment. Reduction of toxicity, mobility or volume would be similar to alternative SC-3 if the material were sent to a TSDF for treatment (most likely by solidification) and then disposed in a solid waste landfill. Alternative SC-5 would enjoy the highest level of reduction in toxicity, mobility or volume since mobility would be reduced or eliminated; there is no increase, and possibly a decrease in volume; and there is evidence to support a reduction in toxicity. Comprehensive testing will be performed to verify the reduction in toxicity.

5. Short term effectiveness - Alternative SC-2 would require 24-30 months to achieve PRGs. Potential exposures to workers and the community during remediation would be minimized through engineering controls. Alternative SC-3 would require 29-35 months to achieve PRGs. Potential exposures to workers and the community during remediation would be greater than SC-2 but would be minimized through engineering controls. Alternative SC-4 would require 29 to 35 months to achieve PRGs. Damage to wetlands would occur during implementation of all source control alternatives and would require on-site (SC-3, SC-4) or off-site (SC-2, SC-5) mitigation action. Potential exposures to workers and the community during remediation would be similar to SC-3 and would be minimized through engineering controls. Alternative SC-5 would enjoy the highest level of short-term effectiveness (by a narrow margin over SC-2) since, similar to SC-2, potential exposures to workers and the community during remediation would be relatively low and SC-5 would require slightly less time to implement, 23 to 29 months.

6. Implementability - Alternative SC-2 is readily implementable. Deed restrictions would be necessary and may be difficult to obtain since ownership of the property is in question. Alternatives SC-3 and SC-4 would enjoy the highest level of implementability since both services are widely available and no deed restrictions would be necessary. Alternative SC-5 is an innovative technology and is expected to be readily implementable, though only a limited number of vendors are known to provide this service. Also, deed restrictions would likely be necessary unless a reduction in toxicity could be verified.

7. Cost - Alternative SC-2 would be the least expensive at an estimated net-present worth cost of $7,267,800. Alternative SC-3 would cost an estimated $23,693,000. Alternative SC-4 would be most expensive at an estimated cost of $37,323,400. Alternative SC-5 would be about 20% more expensive than SC-2 at an estimated cost of $9,134,000.

8. State Acceptance - The State has expressed support for the proposed alternative SC-5 (Chemical Fixation) based on its ability to effectively treat soils in a cost-effective manner. Although alternative SC-2 (Landfilling) would be less expensive, the State expressed concerns with the long-term integrity of the landfill, its proximity to the Merrimack River and its location in a 100-year floodplain. State acceptance will be assured through issuance of a concurrence letter from the State prior to approval of this document by EPA.

9. Community Acceptance - During the public comment period, the only concern raised for the proposed alternative, SC-5, was exposure to dust that would be generated during remedial actions. However, any of the proposed remedial actions would require excavation and may generate dust. Engineering controls will be used to minimize dust and air monitoring will be performed to assure no exposure. There were no other comments on the proposed source control alternative.

Management of Migration Alternatives

1. Overall protection of human health and the environment - Alternative GW-2 would meet this threshold criteria through the use of institutional controls. Alternative GW-3 would meet this threshold criteria through a combination of physical treatment and institutional controls. Alternative GW-1 was eliminated from further consideration.

2. Compliance with applicable or relevant and appropriate requirements (ARARS) - Alternatives GW-2 and GW-3 would meet this threshold criteria without waivers.

3. Long-term effectiveness and permanence - Alternatives GW-2 and GW-3 are equally effective and each would require a significant amount of time to reduce contaminant concentrations to acceptable levels. The primary mechanism for reduction under alternative GW-2 would be natural attenuation processes (i.e., flushing). Both alternatives would rely on institutional controls to prevent exposures to potential contaminants. Alternative GW-3 would rely on physical treatment processes to contain and reduce contamination in the plume area beneath the site. The treatment processes are expected to be highly reliable with proper maintenance. Institutional controls may include deed restrictions, zoning requirements, Env-Ws 410 requirements or a combination of the above, as deemed necessary by EPA and the State. Long-term monitoring would be implemented to evaluate the effectiveness of natural attenuation for both alternatives. Since contamination would remain at the site in groundwater at unacceptable levels, five-year reviews are necessary for both alternatives.

4. Reduction of toxicity, mobility, or volume through treatment - Alternative GW-2 does not involve treatment and there would be no reduction in mobility or volume. Through natural attenuation, reduction in toxicity is expected over time. Alternative GW-3 relies on a combination of treatment and natural attenuation and therefore would result in some reduction in toxicity, mobility and volume.

5. Short term effectiveness - Alternative GW-2 would require 26 to 58 years to achieve RAOs. Alternative GW-3 would require 40 to 112 years to achieve RAOs. Since alternative GW-2 only involves monitoring, there would be no risk to the community or environment. Short term risks to workers would be controlled through use protective clothing during monitoring activities. For alternative GW-3, engineering controls would be implemented to minimize the potential for unacceptable exposure to the community or environment from construction and operation of the treatment plant. Short term risks to workers would be controlled through use protective clothing during monitoring activities. Overall, alternative GW-2 provides the best overall short-term effectiveness.

6. Implementability - Alternative GW-2 would be readily implementable. Institutional controls are expected to be readily obtained. Only typical sampling and laboratory equipment would be necessary to implement the monitoring program. In addition to the above components, alternative GW-3 would require construction and operation of a treatment system. Services to construct, operate and monitor the treatment system are expected to be widely available.

7. Cost - Alternative GW-2 would be the least expensive at an estimated net-present worth cost of $771,400. Alternative GW-3 would cost an estimated $5,644,200.

8. State Acceptance - The State has expressed support for the proposed alternative, GW-2 (Limited Action), since it is protective of human health and the environment and is cost-effective. State acceptance will be assured through issuance of a concurrence letter from the State prior to approval of this document by EPA.

9. Community Acceptance - During the public comment period, the Merrimack Village District (MVD) expressed concern with selection of alternative GW-2. The MVD issued several strong letters requesting that EPA actively remediate groundwater so that it may be used to

support installation of a new community well for the town. EPA and NHDES met with the MVD to discuss this issue and agreed to perform additional hydrologic and remediation evaluations. Based on these evaluations, EPA has concluded that the town's goal to install a municipal well in the immediate area of the site cannot be satisfied in the requested time frame (8 years). EPA has evaluated a potential alternative well site that may meet the MVD's requirements. EPA's evaluation and conclusions were presented to the Merrimack Village District in a letter report from EPA's consultant dated May 28, 1998. The report and transmittal letter are attached in Appendix E. The Merrimack Village district has not responded to the report. Alternative GW-2 remains EPA's preferred alternative.

X. THE SELECTED REMEDY

The selected remedy for the New Hampshire Plating Superfund Site is a comprehensive approach that includes both source control and management of migration components.

Alternative SC-5 is the selected source control alternative for remediation of soils. Alternative SC5 features in-place chemical fixation, on-site backfilling of treated soils, and off-site compensatory wetlands restoration. Under Alternative SC5, metal contaminants leaching to groundwater will be reduced to acceptable levels through chemically altering the soluble metals into stable and much less soluble mineral forms, thus protecting human health and the environment. The treated soils will be used to backfill excavated areas in lagoons 1 and 2. Excavated areas outside lagoons 1 and 2 will be re-graded using remaining soils to the extent possible. Minimal clean fill will be added as necessary. The treated soils backfill area will be covered with a two foot permeable soil cover and revegetated to prevent erosion and potential exposure of biological receptors to the treated soils (if bioavailability of metals in the treated soil is not reduced). The backfilled lagoons and wetlands will be used as storm water retention basins that will have adequate capacity to address runoff from a 100-year storm event. Land-use restrictions will be implemented to limit future development to commercial/industrial uses and assure that the clean soil cover over the treated material on parcel 2 is not breached.

Alternative GW-2 is the selected management of migration alternative for remediation of groundwater. Alternative GW2 does not involve treatment, but provides protection of human health by preventing or controlling potential exposures to contaminated groundwater through institutional controls. With source control in place, the groundwater quality will gradually return to acceptable levels (i.e., will meet federal and state standards) through dilution and natural geochemical attenuation. The activities that will be conducted under the GW2 alternative are institutional controls, long-term monitoring of groundwater to evaluate contaminant status and migration, and a review of site conditions and risks every 5 years. GW2 will not in itself minimize off-site contaminant migration or discharge of contaminated groundwater to the Merrimack River, but in combination with source control, it will address these objectives. The institutional controls proposed include:

- Establishing a Groundwater Management Zone (GMZ) pursuant to the New Hampshire Code of Administrative Rule Env-Ws 410.26; and

- Attaching restrictions, or notices as appropriate, to deeds of the NHPC property and the properties within the designated GMZ; or

- Enacting local ordinances to prohibit the potable use of untreated contaminated groundwater underlying the Site and within the GMZ.

The remedial components are more fully described in section D below.

A. Soil Cleanup Levels

Based upon data developed in the RI and the Baseline Risk Assessment, remedial measures to address human health risks associated with possible exposure to source soils are not warranted because present and future potential risks are within EPA's acceptable carcinogenic risk range and generally below a Hazard Index of one for non-carcinogens. Under the reasonable maximum exposure scenario, the non-carcinogenic risk would exceed a hazard index of 1 in Lagoons 3 and 4 as a result of potential exposure to cadmium. The hazard index in Lagoons 3 and 4 is less than three, which does not by itself provide sufficient basis for remedial action. However, area soils are a source of release of inorganic contaminants to groundwater. Additionally, the levels of inorganic contaminants in the top two feet of soil present an unacceptable ecological risk. Therefore, the soil remedial action is based on protection of groundwater and ecological receptors. In addressing these goals, the incremental risks to human health from exposure to site soils will also be mitigated.

Protection of Groundwater

On-site soils are a source of release of inorganic contaminants to groundwater. This phenomenon has resulted in groundwater contaminant levels which exceed MCLs and may result in an unacceptable risk to those who ingest contaminated groundwater. Therefore, cleanup levels for soils were established to protect the aquifer from soil leachate. The Excel-Crystal Ball Transport (ECTran) model was used by EPA's consultant to estimate residual soil levels that are not expected to impair future groundwater quality. The interim cleanup levels for groundwater (presented below) were used as input into the ECTran model and are based on MCLs and State AGQS. Table 10 summarizes the soil cleanup levels required to protect the aquifer, and therefore public health, and were developed for the groundwater contaminants of concern detected above interim groundwater cleanup levels. Cadmium is the most toxic and frequently detected soil contaminant throughout the Site and will be used as an indicator to determine attainment of clean-up levels. The clean-up levels for cadmium range from 1.78 to 6.42 mg/kg, depending on the location of specific source areas as follows: NHPC former building area is 3.30 mg/kg; Lagoon 1 and the southern wetland area are 6.42 mg/kg; Lagoon 2 is 2.55 mg/kg; Lagoons 3 and 4 are 2.42 mg/kg; and the northern wetland area is 1.78 mg/kg. Location specific soil clean-up levels were developed for the contaminants of concern to account for variation in flow paths, hydrogeologic conditions and contaminant concentrations.

Untreated soils which remain in place (i.e., soils below applicable clean-up levels) will be tested for RCRA leaching characteristics using the appropriate leaching test; TCLP, SPLP or MEP, to confirm that the residual soil contaminant levels do not exceed RCRA leaching standards.

Ecological Risk

EPA determined that an active wildlife habitat is present throughout the former lagoon area. An ecological risk assessment evaluated potential effects to the local wildlife habitat resulting from exposure to inorganic contaminants present in soils. A conceptual food-web model was prepared

to evaluate the bioaccumulation pathways of five indicator species (red fox, short-tailed shrew, green-backed heron, american robin and green frog). Cadmium was chosen as the sole contaminant of concern for all ecological receptors based on its relative toxicity and bioaccumulation potential. The ecological risk assessment only evaluated potential exposures within the top two feet of soil. The general assumption was made that ecological receptors are not likely to be directly exposed to native soil beneath the zero to two foot depth interval. The ecological risk assessment concluded that exposure to cadmium soil concentrations above **5.6 mg/kg** in the top two feet of soil would result in detrimental impacts to the short-tailed shrew. This clean-up level applies to soil throughout the former lagoon area.

These cleanup levels in soil are consistent with ARARs for groundwater, attain EPA's risk management goal for remedial actions, and have been determined by EPA to be protective. The cleanup levels must be met at the completion of the remedial action at the points of compliance which, for protection of groundwater, include all soil from ground surface to the groundwater table throughout the former lagoon area, the northern and southern wetland areas and the former building area and, for protection of ecological receptors, includes the top two feet of soil throughout the former lagoon area and the northern and southern wetland areas.

B. Interim Groundwater Cleanup Levels

Interim cleanup levels have been established in groundwater for all organic and inorganic contaminants of concern identified in the Baseline Risk Assessment found to pose an unacceptable risk to either public health or the environment. Interim cleanup levels have been set based on the ARARs (e.g., Drinking Water Maximum Contaminant Level Goals (MCLGs) and State Ambient Groundwater Quality Standards (AGQSs)) as available, or other suitable criteria described below. Because the aquifer under the Site is a medium to high value aquifer, which is a potential source of drinking water, MCLs and non-zero MCLGs established under the Safe Drinking Water Act are ARARs. Periodic assessments of the protection afforded by remedial activities will be made as the remedy is being implemented and at the completion of the remedial action. When the Interim Ground Water Cleanup Levels have been achieved and have not been exceeded for a period of three consecutive years, a risk assessment shall be performed on the residual groundwater contamination to determine whether the remedial action is protective. This risk assessment of the residual groundwater contamination shall follow the current EPA procedures in effect at that time and will assess the cumulative carcinogenic and non-carcinogenic risks posed by ingestion of groundwater. If, after review of the risk assessment, the remedial action is not determined to be protective by EPA, the remedial action shall continue until either protective levels are achieved, and are not exceeded for a period of three consecutive years, or until the remedy is otherwise deemed protective. These protective residual levels shall constitute the final cleanup levels for this Record of Decision and shall be considered performance standards for any remedial action.

Table 11 summarizes the Interim Cleanup Levels for carcinogenic and non-carcinogenic contaminants of concern identified in groundwater.

All Interim Groundwater Cleanup Levels and final groundwater clean-up levels, if any, must be met at the completion of the remedial action in all impacted wells. These wells are located within the State defined conceptual Groundwater Management Zone depicted in Figure 5. EPA has estimated that these levels will be obtained within 26 to 58 years after completion of the source control component.

C. Description of Remedial Components

1. Source Control

As the selected source control alternative for remediation of soils, alternative SC-5 features in-place chemical fixation, excavation, on-site backfilling of treated soils, and off-site compensatory wetlands restoration. In-place chemical fixation is an innovative technology which has been extensively tested and used to successfully remediate other federal and state sites. However, because this is a relatively new technology, a field scale pre-design study will be performed to assure the technology is capable of treating the soil to the necessary remedial clean-up goals, determine if the preferred in-place application process is effective, develop the appropriate reagent and application rate, and evaluate the bioaccumulation potential of treated soils. It is anticipated that the pre-design study will be performed on a portion of lagoon 1 soils and will require 3 to 6 months to complete. The components of the overall source control remedial action include:

- completion of a field-scale pre-design study;
- sequential application of the treatment reagent in 1-foot lifts throughout the building area, lagoon area and northern and southern wetland areas down to the water table (about 41,300 cubic yards of soil will be treated);
- excavation of the treated soil for temporary on-site storage (air monitoring to be performed for worker and adjacent property owner safety);
- backfilling of all treated soil in the lagoons 1 and 2 areas;
- grading of all other excavated areas using existing soils to the extent practical;
- use of 18 inches of clean fill and 6 inches of loam to cover treated materials with a 2-foot buffer to address potential ecological concern and re-vegetate (note that the cover may be reduced to six inches if results from the pre-design study demonstrate that the treated material has no bioaccumulation potential, and note that clean fill may be used from the on-site pugmill area to help retain flood storage capacity); and
- revegetation of the building area with grasses and the remaining wetland areas (northern, southern, Lagoon 3 and Lagoon 4) with appropriate wetland type vegetation.

2. Solidified Material Storage Cell

An EPA emergency removal action was performed on the site from 1990 to 1992. Approximately 13,600 tons of sludge and contaminated soil were excavated from the four lagoon areas, solidified on-site and encapsulated in a high-density polyethylene solidified material storage cell (SMSC). The SMSC was intended as an interim measure and does not meet RCRA or State closure requirements. It is estimated that the SMSC contains about 8,000 cubic yards of treated material. The following remedial actions will be performed on the SMSC as part of source control:

- the SMSC will be crushed into small diameter fragments using a procedure such as a bucket-mounted jack hammer (air monitoring to be performed for the safety of workers and adjacent property owners);

- the crushed fragments will be grouped in a pile and tested by TCLP at an established frequency. If the fragments pass TCLP, they will be placed in the lagoons 1 and 2 area as backfill to be mixed with the treated soil. If the fragments fail TCLP, they will be placed in a separate pile for later treatment using the chemical fixation process. Following application of the chemical fixation process, the fragments will be re-tested using TCLP. If the fragments still fail TCLP, they will be grouped for off-site disposal at an appropriate Subtitle C facility.

- The extent of contamination present underneath the SMSC, if any, could not be evaluated during the RI. The former discharge pipe passed through this area and as a result, could have released contamination. Therefore, these soils will be tested for contaminants of concern as part of the selected remedy and may result in an increase soil volume requiring remediation from this area.

3. Wetland Mitigation

Because the areas to be treated and excavated under the source control component are wetlands, excavation and associated activities will be performed to minimize adverse impacts to the wetland areas. All source control alternatives considered in the FS, except for no action, would require excavation of contaminated soil from wetland areas.

EPA has determined that, for this Site, there are no practicable alternatives to the treatment and excavation components of the selected remedy that would achieve Site goals but would have less, short-term adverse impacts to the ecosystem. Therefore, measures will be performed to mitigate these impacts. Lagoons 3 and 4 and the northern and southern wetlands will be backfilled with minimal clean soil, revegetated with appropriate wetland-type vegetation, and used as storm-water retention basins that would have adequate capacity to address run-off from a 100-year storm event. Restoration or creation of new wetlands on-site would require that treated soils be sent off-site at a cost of approximately $8 million dollars and are not practical due to limited space and the desire to return the front parcel of the site to productive light-industrial use consistent with local zoning. As such, EPA has and will perform the following activities:

- Off-site wetland mitigation will be performed in coordination with DES, US Fish & Wildlife, the Nature Conservancy and the local conservation commissions. EPA and DES jointly agreed to purchase and preserve an ecologically rare and significant wetland in the adjacent Town of Litchfield. Areas upland to the wetland, known as Grassy Pond, were purchased by DES in May 1998 under an agreement with EPA which allowed for reimbursement of 90% of the State's costs once this ROD was complete. The urgency to purchase the Grassy Pond upland properties resulted from construction by the property owner, which would otherwise have caused irreparable damage to the wetland prior to completion of this ROD. A wetland delineation for Grassy Pond was completed prior to the acquisition. The acquisition cost was $1.39 million;

- In addition, a second wetland acquisition will occur in the Town of Merrimack. This wetland acquisition is necessary to address concerns raised by the Town of Merrimack that the Grassy Pond acquisition would not benefit the local community since it is on the other side of the

Merrimack River and is not accessible. With respect to off-site wetland mitigation, there is a general requirement that the mitigation property be located in the same watershed as the affected site. In this case, the Grassy Pond wetland is in the same watershed as the Site. However, separation by the river is a valid concern. Negotiations on the unnamed wetland (referred to as the Naticook Road Wetland) will begin after the ROD is completed. The appraised property value is $110,000. If negotiations fail, EPA will work with the Town to identify an alternative wetland of equal ecological and monetary value;

- EPA will prepare a final wetland mitigation report to demonstrate that the preservation measures adequately satisfy the objectives of the Wetland Executive Order and Section 404 of the Clean Water Act.

4. Management of Migration

Alternative GW-2 is the selected management of migration alternative for remediation of groundwater. Alternative GW2 does not involve treatment, but provides protection of human health by preventing or controlling potential exposures to contaminated groundwater through the use of institutional controls. With source control in place, the groundwater quality will gradually return to acceptable levels (i.e., will meet federal and state standards) through dilution and natural geochemical attenuation. The activities that will be conducted under the GW2 alternative include:

- annual monitoring of selected wells within the Groundwater Management Zone (GMZ). Approximately 40 existing monitoring wells will be selected by EPA and DES and sampled throughout the plume for all contaminants of concern. All monitoring wells will be sampled using the low-flow field method (where possible) and applicable EPA analytical methods. EPA quality control methods will be followed such as collection of trip blanks, duplicates, etc. and a completeness check of all analytical results (i.e., tier I validation). There are no known existing potable supply wells within the plume area. The Merrimack Village District requested agency assistance to determine a possible location of a new municipal well in the immediate vicinity, but outside the GMZ, that would not be affected by site-related contamination. If a municipal well is installed in a mutually agreeable area outside the GMZ and is later found to be impacted by site-related contamination, EPA and DES will evaluate options to isolate the plume from the well;

- installation of two monitoring well couplets on the opposite side of the Merrimack River in the Town of Litchfield. These wells will be installed in the shallow and deep overburden and will be used to determine if site-related contamination extends beyond the Merrimack River. Exact well locations will be jointly determined by EPA, DES and the Town of Litchfield. These well couplets will be sampled initially for all COCs. If the results are non-detect, then annual sampling will commence for VOCs only. If VOCs are later detected, then inorganic contaminants of concern will also be monitored;.

- monitoring of up to six residential wells across the Merrimack River in the Town of Litchfield. Exact locations are to be determined. These wells will be used to determine if site-related contamination extends beyond the Merrimack River. These wells will be sampled for VOCs only. If VOCs are present, then inorganic contaminants of concern will be added. All wells which are non-detect will be re-sampled once every five years (prior to

the required five-year review). Wells with any site-related contamination will be monitored quarterly;

- annual sampling of surface water from three points on the Merrimack River and three points on Horseshoe Pond. The three river monitoring points will represent upgradient, cross-gradient and downgradient locations. The three Horseshoe Pond monitoring points will be taken along the shore front adjacent to the YMCA property. Sample locations will be replicated to the extent practical. Samples will be analyzed for all COCs. After completion of the first two annual events, sample frequencies may be reduced to once every five years (prior to the required five year review) if results are non-detect.

The long-term monitoring program may be modified in scope and frequency as deemed necessary by EPA and DES and consistent with the goals of the management of migration remedial action.

5. Institutional Controls

Alternative GW2 will not in itself minimize off-site contaminant migration or discharge of contaminated groundwater to the Merrimack River, but in combination with source control, it will address these objectives. The institutional controls proposed include:

- establishing a GMZ pursuant to the New Hampshire Code of Administrative Rule Env-Ws 410.26;

- attaching restrictions, or notices as appropriate, to deeds of the NHPC property and the properties within the designated GMZ (at this time, it appears deed notices will be acceptable for all impacted properties within the GMZ since an active public water supply is in use) or enacting local ordinances to prohibit the potable use of untreated contaminated groundwater underlying the Site and within the GMZ;

- attaching restrictions to the deed of parcel 1 (the former building area) to assure the future property use remains industrial/commercial;

- attaching restrictions to the deed of parcel 2 (the former lagoon area) to assure the remaining wetlands are undisturbed and to limit any future use of the treated-backfilled portion of parcel 2 to activities which do not result in excavation below the two foot clean-fill layer.

Consistent with EPA guidance, EPA will review the Site at least once every five years after initiation of remedial action (Five-Year Review) at the Site to assure that the remedial action continues to protect human health and the environment.

XI. STATUTORY DETERMINATIONS

The remedial action selected for implementation at the New Hampshire Plating 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 utilizes 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 permanently reduce the risks posed to human health and the environment by eliminating, reducing or controlling exposures to human and environmental receptors through treatment, engineering controls, and/or institutional controls; more specifically, active soil treatment will eliminate ecological risks and reduce contaminant leaching to groundwater such that attenuation mechanisms will return the groundwater to acceptable drinking water standards. Institutional controls will eliminate use of the groundwater as a potable source until standards are attained.

Moreover, the selected remedy will achieve potential human health risk levels that attain the 10^{-4} to 10^{-6} incremental cancer risk range and a level protective of noncarcinogenic endpoints. The selected remedy is protective of sensitive ecological receptors and will comply with ARARs. When the Interim Ground Water Cleanup Levels identified in the ROD have been achieved and have not been exceeded for a period of three consecutive years, a risk assessment shall be performed on the residual ground water contamination to determine whether the remedial action is protective. This risk assessment of the residual groundwater contamination shall follow EPA procedures and will assess the cumulative carcinogenic and non-carcinogenic risks posed by ingestion of groundwater. If, after review of the risk assessment, the remedial action is not determined to be protective by EPA, the remedial action shall continue until protective levels are achieved and have not been exceeded for a period of three consecutive years, or until the remedy is otherwise deemed protective. These protective residual levels shall constitute the final cleanup levels for this Record of Decision and shall be considered performance standards for any remedial action.

B. The Selected Remedy Attains ARARs

This remedy will attain all applicable or relevant and appropriate federal and state requirements (ARARs) that apply to the Site. Since wastes (i.e., contaminated soil) are being moved within the same "area of contamination" (AOC) and will be treated in-place such that hazardous constituents will not migrate, Land Disposal Restrictions (LDRs) do not apply.

A discussion of which requirements are applicable or relevant and appropriate may be found in the FS Report at pages 4-53 to 4-55 for the source control alternative and pages 4-82 to 4-83 for the management of migration alternative. A brief narrative summary of the ARARs follows. Refer to attached Tables 12A, 12B, and 12C for a comprehensive presentation of all Source Control ARARs and other policies, criteria and guidances to be considered (TBCs) and Tables 13A and 13B for a comprehensive presentation of all Management of Migration ARARs and other policies, criteria and guidances to be considered (TBCs).

The selected source control and management of migration remedial actions (SC5-W and GW2) will comply with all chemical, action and location-specific ARARs.

Chemical-Specific ARARs

Specifically, maximum contaminant levels (MCLs), State ambient groundwater quality standards (AGQSs), New Hampshire Surface Water Quality Standards and New Hampshire Primary Drinking Water Criteria were used to determine appropriate soil clean-up levels based on

acceptable leachate. The more stringent of these standards and criteria were used to establish groundwater clean-up levels for the Site.

Location-Specific ARARs

Off-site wetlands preservation will be performed to satisfy the requirements of the Protection of Wetlands Executive Order 11990, the Clean Water Act Dredge and Fill Regulations and New Hampshire Criteria and Conditions for Fill and Dredge in Wetlands. Following completion of the source control remedial action, the Site will be graded and vegetated to retain adequate flood storage capacity and prevent erosion consistent the Floodplain Management Executive Order 11988 and RCRA Floodplain Restrictions. New Hampshire Siting Regulations for Hazardous Waste Facilities will be attained since the treated soils will no longer exhibit hazardous characteristics prior to their placement on-site.

Action-Specific ARARs

The source control remedial action will comply with RCRA General Facility Standards, RCRA Preparedness and Prevention Requirements, RCRA Groundwater Monitoring Requirements, RCRA Surface Impoundment Closure Requirements, and other various RCRA requirements concerning the handling of hazardous materials through operator training, inspections and design of a adequate treatment and monitoring programs. The source control remedy will also comply with State standards including fugitive dust control, emergency procedures, design and monitoring requirements and general operation, environmental and health requirements. A Groundwater Monitoring Zone (GMZ) and associated sampling plan will be established under the New Hampshire Groundwater Protection Rules.

The following policies, criteria, and guidances will also be considered (TBCs) during the implementation of the source control and management of migration remedial actions:

- EPA Risk Reference Doses (RfDs);
- EPA Human Health Assessment Cancer Slope Factors (CSFs);
- EPA Health Advisories, Human Health and Ecological Risk Assessment Guidances;
- EPA Final Groundwater Use and Value Determination Guidance;
- NHDES Contaminated Sites Risk Characterization and Management Policy;
- EPA Memorandum, "Policy on Floodplains and Wetland Assessments for CERCLA Actions," August 6, 1985;
- Memorandum of Agreement (MOA) Between EPA and the US Dept. of the Army; and
- Guidance on Flexibility of the 404(b)(1) Guidelines.

C. The Selected Remedial Action is Cost-Effective

In the Agency's judgment, the selected remedy is cost effective, i.e., the remedy affords overall effectiveness proportional to its costs. In selecting this remedy, once EPA identified alternatives that are protective of human health and the environment and that attain, or, as appropriate, waive ARARs, EPA evaluated the overall effectiveness of each alternative by assessing the relevant three criteria in combination with long term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short term effectiveness. The relationship of the overall effectiveness of the selected remedy was determined to be proportional to its costs. The costs of this remedial alternative are:

	Source Control (SC5-W)	Management of Migration (GW2)	Total Costs
Capital Cost	$7,434,600	$20,000	$7,454,600
O & M Cost	$262,750	$56,500	$319,250
Present Worth Cost	$9,134,000	$771,400	**$9,905,400**

This remedial approach represents the most cost-effective combination of source control and management of migration alternatives. Source control alternative SC2 (capping) would be approximately $1.8 million less expensive than SC5. However, SC2 would require a waiver from applicable Federal and State ARARs, would not satisfy the Agency's statutory preference for treatment, and was opposed by the NHDES because of concerns with long-term maintenance of a landfill in close proximity to the Merrimack River. Other source control alternatives would be far more expensive with no additional protection. Alternative GW2 is the least expensive management of migration alternative. Although GW2 does not employ active treatment, it is protective of public health and the environment through the use of available institutional controls. Active restoration of the aquifer would reduce the overall time frame for achievement of groundwater clean-up levels. In addition, the cost of this approach would exceed $5 million dollars with no increase in the level of protectiveness. The impacted area is served by a public water supply distribution system.

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

Once the Agency identified those alternatives that attain or, as appropriate, waive ARARs and that are protective of human health and the environment, EPA identified which alternative utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This determination was made by deciding which one of the identified alternatives provides the best balance of trade-offs among alternatives in terms of: 1) long-term effectiveness and permanence; 2) reduction of toxicity, mobility or volume through treatment; 3) short-term effectiveness; 4) implementability; and 5) cost. The balancing test emphasized long-term effectiveness and permanence and the reduction of toxicity, mobility and volume through treatment; and considered the preference for treatment as a principal element, the bias against off-site land disposal of untreated waste, and community and state acceptance. The selected remedy provides the best balance of trade-offs among the alternatives.

With the exception of alternatives SC1 and GW1 (no action), all alternatives were determined to be protective of public health and the environment and would attain (or be able to waive) ARARs. Source control alternatives SC2 - SC5 and management of migration alternatives GW2 and GW3 were compared using the five balancing criteria above. In general, the combination of alternatives SC5 and GW2 best satisfy these criteria and was chosen as the recommended alternative. There is no opposition to the source control remedial alternative (SC5); however, the local water distributor (the Merrimack Village District) would prefer active groundwater remediation since they would like to use the impacted aquifer as a future potential public water supply source. EPA and DES agree that use of this aquifer as a public water supply resource is unlikely, even in a post remedial state, since the entire area is in an industrial zone and active businesses with various existing and potential environmental concerns are present. Also, active

groundwater treatment would not significantly reduce the amount of time required to achieve remedial goals. GW2 is protective of public health and is a more cost-effective approach. If the Merrimack Village District installs a municipal supply well in a mutually agreeable, and legally permissable, area outside the Groundwater Management Zone, and the supply well later becomes impacted by Site-related contaminants, EPA and DES may evaluate options to isolate the plume from the well. Options could include the installation of physical barriers or other appropriate methods to contain or isolate the plume from the supply well. The probability of this scenario occurring appears to be extremely low. Options have not been evaluated. Refer to the attached Responsiveness Summary for more detail.

The treatment of soil in alternative SC5 is irreversible, except under a significant pH drop in the environment from the typical level of about 6 down to the 2 - 3 range, which is highly unlikely; SC5 will result in a reduction is toxicity and mobility and will not increase the overall volume of materials (as does the more traditional solidification process); SC5 is an in-place technology which should result in fewer dust concerns and will only take about 2 years to implement; SC5 is readily implementable; and SC5 is the second least expensive alternative. All source control alternatives require an unavoidable impact to on-site wetlands. Alternative GW2 is as effective and permanent as alternative GW3 (both require institutional controls); GW2 does not result in any reduction in mobility however, toxicity and volume will be reduced through attenuation mechanisms following successful completion of the source control alternative; GW2 will not result in any potential impact to the community, and, although it will require 28 to 56 years to achieve clean-up standards, this is not significantly longer than active aquifer restoration; GW2 is readily implementable; and GW2 is millions of dollars less than active aquifer restoration.

E. The Selected Remedy Satisfies the Preference for Treatment Which Permanently and Significantly Reduces the Toxicity, Mobility or Volume of the Hazardous Substances as a Principal Element

The principal element of the selected source control remedy is chemical fixation. This element addresses the primary threat at the Site, contamination of groundwater through continued leaching of excessive levels of metals and potential exposure of sensitive ecological receptors. The selected remedy satisfies the statutory preference for treatment as a principal element by treating the metal-contaminated soil to levels which will not exceed acceptable leaching criteria (i.e., TCLP, SPLP or MEP). Although the management of migration portion of the remedy relies on natural attenuation to achieve groundwater clean-up standards, the overall remedy is effective only through the active treatment of the source area.

XII. DOCUMENTATION OF NO SIGNIFICANT CHANGES

EPA presented a Proposed Plan (preferred alternative) for remediation of the Site on January 8, 1998. The preferred alternative presented was a combination of source control alternative SC5-W and management of migration alternative GW2 including the following components:

- treating metal-contaminated soil by chemical fixation;
- redepositing the treated soil in lagoons 1 and 2;
- demolishing, testing and treating (as necessary) the temporary storage unit and mixing it with the treated soil in lagoons 1 and 2;
- covering and revegetating treated areas;
- constructing or preserving an off-site wetland;

- performing long-term monitoring to confirm natural attenuation of groundwater;
- and establishing a Groundwater Management Zone and land-use restrictions.

Public and State comment did not result in any significant changes to the Proposed Plan. However, the following minor modifications to the preferred alternative were necessary.

1. EPA and DES jointly selected wetland preservation as the appropriate, off-site wetland mitigation action. Upland areas to a rare and highly valuable wetland, Grassy Pond, have been acquired in the adjacent Town of Litchfield at a total cost of **$1.39 million.** Swift acquisition of the Grassy Pond upland areas was necessary to cease ongoing construction which would have resulted in the eventual destruction of this wetland. In addition, to satisfy concerns raised by the Town of Merrimack, an additional wetland area will be preserved in the Town of Merrimack at an approximate cost of $100k to $300k. Once the second acquisition is complete, a Wetland Mitigation Report will be prepared which will demonstrate that these preservations satisfy the Clean Water Act and the Wetlands Executive Order. This approach is consistent with the proposed mitigation options and will not result in an increased cost to this component of the remedy.

2. Two monitoring well clusters will be installed and approximately six residential wells will be added to the proposed long-term groundwater monitoring program to evaluate conditions across the Merrimack River in the Town of Litchfield. Exact locations are to be determined. These wells will be used to confirm our conclusion that site-related contamination does not extend beyond the Merrimack River. The addition of these monitoring points is within the original scope of the monitoring program and will not result in a significant impact to the proposed budget.

XIII. STATE ROLE

The State of New Hampshire Department of Environmental Services has reviewed the various alternatives and has indicated its support for the selected remedy. The State has also reviewed the Remedial Investigation, Risk 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 State of New Hampshire concurs with the selected remedy for the New Hampshire Plating Site. A copy of the declaration of concurrence is attached as Appendix A.

FIGURES

SCALE 1:24 000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET

U.S.G.S. Nashua North Quadrangle, New Hampshire, 7.5 Minute Series, 1968, Photorevised 1985; and U.S.G.S. South Merrimack Quadrangle, New Hampshire, 7.5 Minute Series, 1968, Photorevised 1985. (Based on Fig. 1-1, RI Report, HNUS & REC. 1996).

SITE LOCUS MAP	FIGURE 1
FEASIBILITY REPORT	
NEW HAMPSHIRE PLATING CO., MERRIMACK, NH	

DRAWN BY:	D.W. MACDOUGALL	REV.:	0
CHECKED BY:	D. BYRNE	DATE:	NOVEMBER 5, 1997
SCALE:	AS SHOWN	ACAD NAME:	W:\DWG\NHPC\SUPRFUND\FIG_1-1

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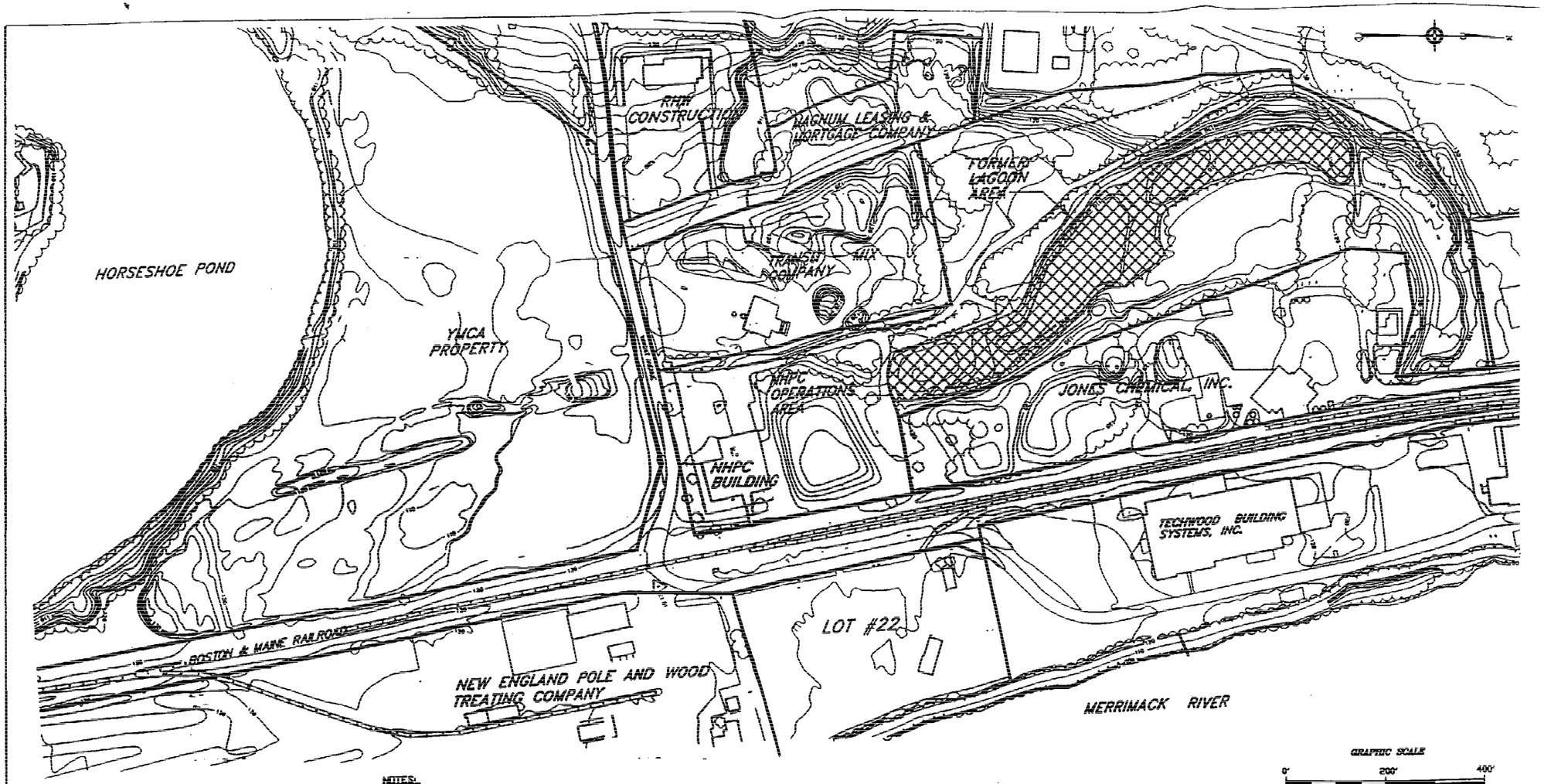

GRAPHIC SCALE

0' 200' 400'

1 INCH = 200 FEET

LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE LOCATION OF FORMER NHPC WASTE LAGOONS

NOTES:

1. PROPERTY BOUNDARIES APPROXIMATED FROM TOWN OF MERRIMACK ASSESSORS MAP.
2. BASE MAP USED TO CREATE ALL SITE MAPS PREPARED BY PHOTO SCIENCE, INC., GAITHERSBURG, MD., OCTOBER 1992.
3. BASED ON FIG. 1-2, RI REPORT, HMM CORPORATION AND RAYTHEON ENGINEERS & CONSTRUCTORS, APR., 1996

STUDY AREA LOCATION MAP

FEASIBILITY STUDY

NEW HAMPSHIRE PLATING CO., MERRIMACK, NH

DRAWN BY:	R.G. DEWSNAP	REV.:	0
CHECKED BY:	B. CONLEY	DATE:	NOVEMBER 7, 1997
SCALE:	1" = 200'	FILE NO.:	W:\DWG\NHPC\FS\FIG_1-2.DWG

FIGURE 2

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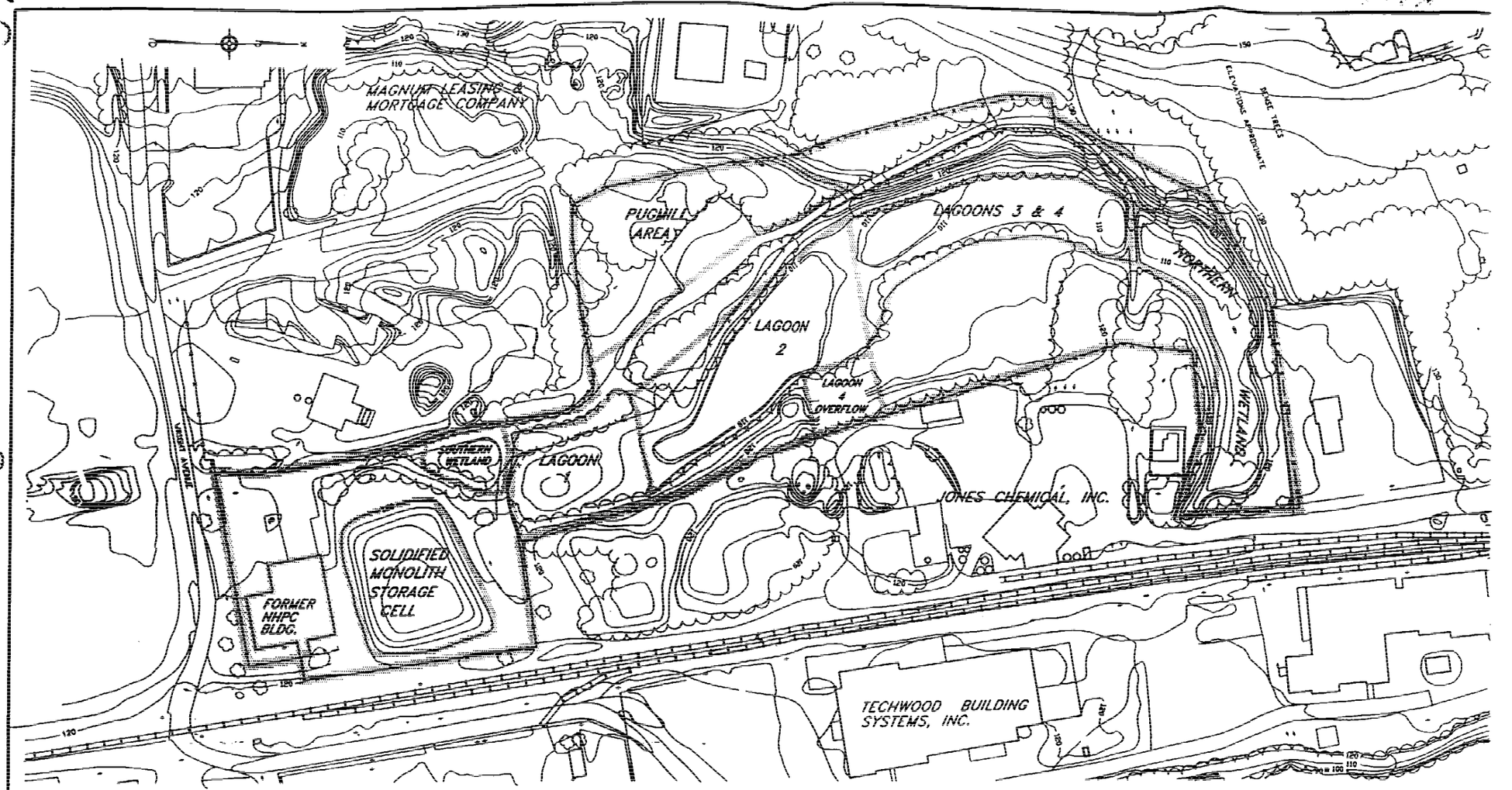

LEGEND

—120— ELEVATION CONTOUR LINE, MSL

APPROXIMATE BOUNDARY OF KEY SITE FEATURES

NOTES:

1. BASE MAP PREPARED BY PHOTO SCIENCE, INC., GAITHERSBURG MARYLAND, OCTOBER, 1992.
2. ALL LOCATIONS TO BE CONSIDERED APPROXIMATE.
3. REFERENCE DRAWING: FIG. 1-2, STUDY AREA LOCATION MAP, DRAFT FINAL, REMEDIAL INVESTIGATION REPORT, HNUS CORPORATION & RAYTHEON ENGINEERS AND CONSTRUCTORS, APRIL, 1996.

GRAPHIC SCALE

0' 150' 300'

1 INCH = 150 FEET

KEY SITE FEATURES			
FEASIBILITY STUDY			
NEW HAMPSHIRE PLATING CO. SITE, MERRIMACK, NH			
DRAWN BY:	R. G. DEWSNAP	REV.:	2
CHECKED BY:	D. BYRNE	DATE:	DECEMBER 3, 1997
SCALE:	1" = 150'	FILE NO.:	[illegible]

FIGURE 3

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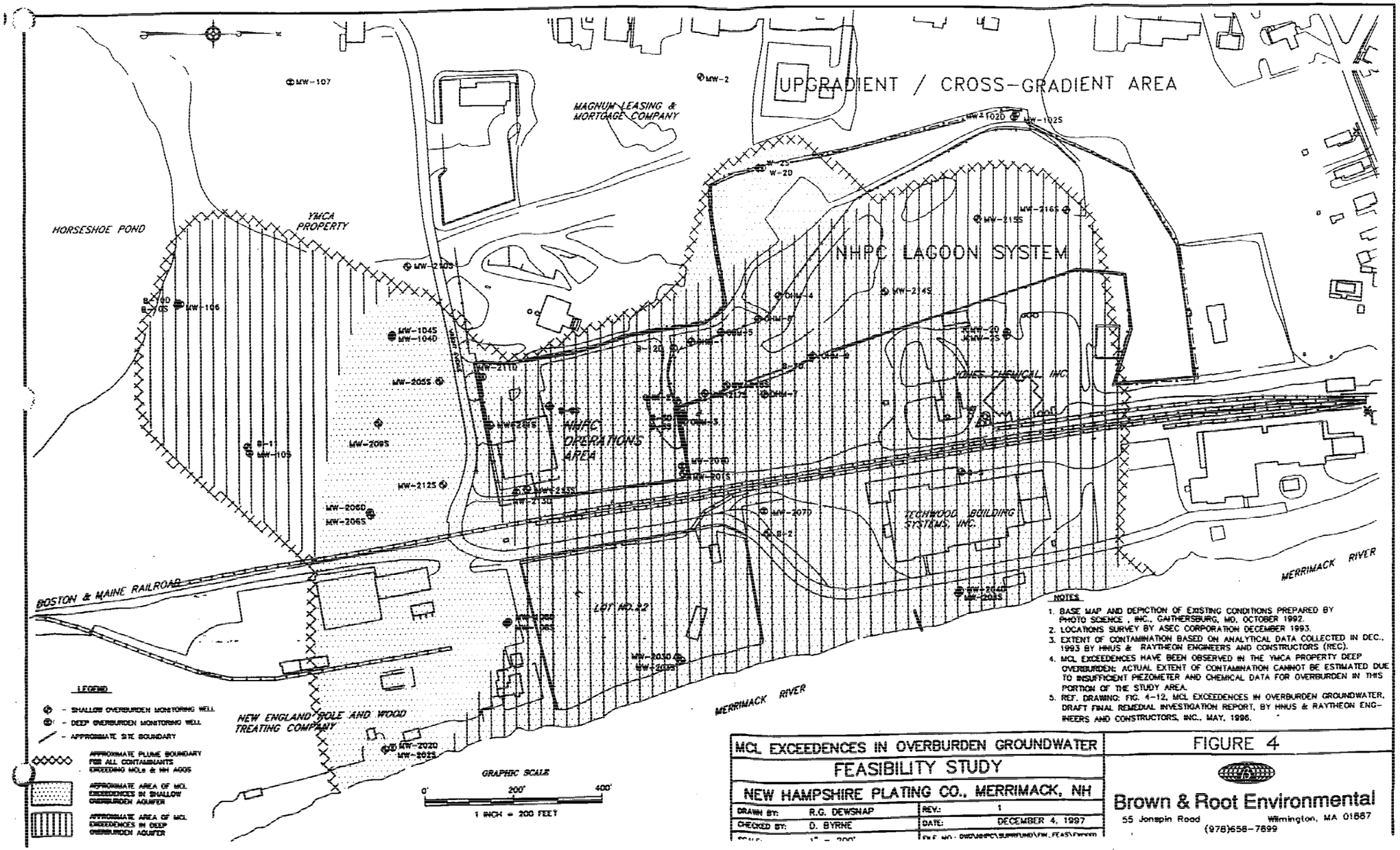

MCL EXCEEDENCES IN OVERBURDEN GROUNDWATER		FIGURE 4
FEASIBILITY STUDY		
NEW HAMPSHIRE PLATING CO., MERRIMACK, NH		
DRAWN BY: R.G. DEWSNAP	REV.: 1	
CHECKED BY: D. BYRNE	DATE: DECEMBER 4, 1997	

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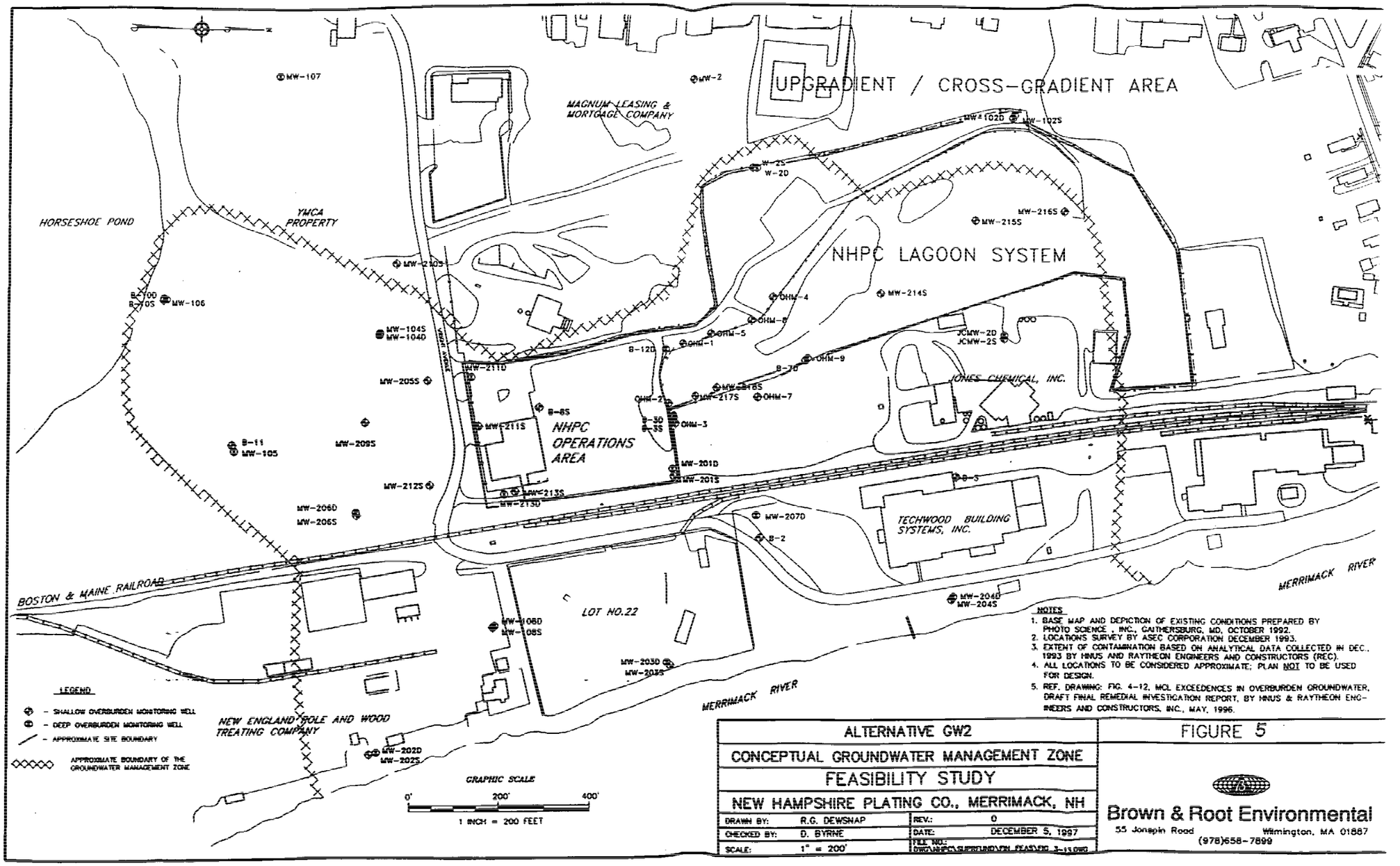

NOTES

1. BASE MAP AND DEPICTION OF EXISTING CONDITIONS PREPARED BY PHOTO SCIENCE, INC., GAITHERSBURG, MD, OCTOBER 1992.
2. LOCATIONS SURVEY BY ASEC CORPORATION DECEMBER 1993.
3. EXTENT OF CONTAMINATION BASED ON ANALYTICAL DATA COLLECTED IN DEC., 1993 BY HNUS AND RAYTHEON ENGINEERS AND CONSTRUCTORS (REC).
4. ALL LOCATIONS TO BE CONSIDERED APPROXIMATE; PLAN NOT TO BE USED FOR DESIGN.
5. REF. DRAWING: FIG. 4-12, MCL EXCEEDENCES IN OVERBURDEN GROUNDWATER, DRAFT FINAL REMEDIAL INVESTIGATION REPORT, BY HNUS & RAYTHEON ENGINEERS AND CONSTRUCTORS, INC., MAY, 1996.

ALTERNATIVE GW2			FIGURE 5
CONCEPTUAL GROUNDWATER MANAGEMENT ZONE			
FEASIBILITY STUDY			
NEW HAMPSHIRE PLATING CO., MERRIMACK, NH			
DRAWN BY:	R.G. DEWSNAP	REV.:	0
CHECKED BY:	D. BYRNE	DATE:	DECEMBER 5, 1997
SCALE:	1" = 200'	TITLE NO.:	DWG\NHPC\SUPERFUND\FIN_FEAS\FIG 5-13.DWG

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TABLES

TABLE 1
SUMMARY OF SOIL ANALYTICAL RESULTS
NEW HAMPSHIRE PLATING SITE

Parameter	No. of Positive Detections/ No. of Samples Collected[1]	Range of Positive Detections [Average][2]	Background Concentration Range [Average][2]	Location of Maximum Positive Detection
VOLATILE ORGANIC CHEMICALS (ug/kg)				
Acetone	8/22	15.0-120.0 [59.3]	ND	NHP-S-L2-D120-4
Methylene chloride	3/3	71-110 [84]	NA	NHP-S-NWA-C2-1
SEMIVOLATILE ORGANIC CHEMICALS (ug/kg)				
Acenaphthene	1/22	120 [120]	ND	NHP-S-NWA-C1-1
Benzo(a)anthracene	2/22	180-260 [220]	ND	NHP-S-NWA-C1-1
Benzo(b)fluoranthene	7/22	95-900 [454]	ND	NHP-S-SWA-01-1
Benzo(g,h,i)perylene	2/22	150-190 [170]	ND	NHP-S-NWA-C1-1
Chrysene	5/22	120-440 [230]	ND	NHP-S-NWA-C1-1
Di-n-butyl phthalate	14/22	53-790 [344]	380	NHP-S-JCR-03-1
Fluoranthene	6/22	100-710 [300]	ND	NHP-S-NWA-C1-1
Phenanthrene	2/22	130-260 [195]	ND	NHP-S-NWA-C1-1
Benzo(a)pyrene	4/22	110-650 [330]	ND	NHP-S-SWA-01-1
Indeno(1,2,3-cd)pyrene	2/22	180-250 [215]	ND	NHP-S-NWA-C1-1
Pyrene	5/22	150-470 [256]	ND	NHP-S-NWA-C1-1
INORGANICS (mg/kg)				
Aluminum	81/81	2270-16900 [11051]	13300	NHP-SL-L2-E400-2
Antimony	7/81	2.7-3.5 [3.1]	ND	NHP-SL-L3-L200-0
Arsenic	80/81	2.3-11.5 [5.3]	6.3	NHP-SL-L2-F275-4
Barium	22/81	26.3-43.0 [33.6]	42.8	NHP-SL-NW-TN375-0
Beryllium	81/81	0.23-1.40 [0.71]	0.96	NHP-SL-L3-LN125-2
Cadmium	413/772	1.9-1277.0 [162.4]	ND	NHP-SL-I-275-0
Calcium	64/81	338-3890 [1291]	1250	NHP-SL-L1-B550-0
Chromium	110/402	10.9-403.0 [119.6]	16.2	NHP-SL-DD-525-0
Cobalt	79/81	2.8-8.6 [4.6]	5.7	NHP-SL-HN450-1
Copper	98/402	4.1-139.0 [36.6]	11.2	NHP-SL-BD-SB4-2
Cyanide	46/74	0.65-509.0 [41.73]	ND	NHP-S-SWA-01-1

TABLE 1
SUMMARY OF SOIL ANALYTICAL RESULTS
NEW HAMPSHIRE PLATING SITE

Parameter	No. of Positive Detections/ No. of Samples Collected[1]	Range of Positive Detections [Average][2]	Background Concentration Range [Average][2]	Location of Maximum Positive Detection
Iron	81/81	3870-18500 [10740]	14900	NHP-SL-L2-G375-1
Lead	95/403	2.8-3742.0 [84.3]	ND	NHP-SL-Bn-475-4
Magnesium	81/81	821-3370 [2330]	2820	NHP-SL-HN450-1
Manganese	69/81	64.1-309.0 [128]	215	NHP-SL-HN450-1
Mercury	4/73	0.05-0.10 [0.07]	ND	NHP-SL-NW-TN375-0
Nickel	90/402	7.5-214.0 [49.3]	10	NHP-SL-L2-CN575-0
Potassium	81/81	610-1450 [993]	1350	NHP-SL-L1-AAN625-4
Selenium	10/81	0.45-0.95 [0.61]	ND	NHP-SL-NW-TN375-0
Silver	18/81	0.93-5.60 [2.45]	ND	NHP-SL-L3-I175-2
Sodium	10/81	51.5-1070.0 [380.7]	ND	NHP-SL-L2-C525-3
Tin	14/324	52-657 [181]	ND	NHP-SL-DD-525-0
Vanadium	81/81	6.4-34.9 [20.0]	23.7	NHP-SL-L2-D425-4
Zinc	448/772	16.8-6490.0 [563.6]	43.8	NHP-SL-I-275-0
PESTICIDES/PCBs (ug/kg)				
Aroclor-1254	1/22	81 [81]	ND	NHP-S-BLD-03-1
4,4'-DDT	1/22	11.0 [11.0]	ND	NHP-S-JCR-01-1

Notes:

(1) The data presented on this table include both Phase I and Phase II results, and only positive detects are listed.
(2) Arithmetic average of positive detections.
NA Not Analyzed
ND Not Detected

TABLE 2
SUMMARY OF GROUNDWATER RESULTS
NEW HAMPSHIRE PLATING COMPANY

Parameter	No. of Positive Detections/ No. of Samples Collected[1]	Range of Positive Detections [Average][2] (ug/L)	Background Concentration Range [Average][2] (ug/L)	Location of Maximum Positive Detection
VOLATILE ORGANIC CHEMICALS				
1,1,1-Trichloroethane	80/124	0.8-3330.0 [145.9]	ND	NHP-GW-MW218S-262
1,1-Dichloroethane	49/124	0.4-3500.0 [189]	ND	NHP-GW-B3S-020
1,1-Dichloroethene	46/124	0.6-1100.0 [68.9]		NHP-GW-B3S-020
1,1-Dichloropropene	1/9	0.8 [0.8]	ND	NHP-GW-JCMW2S-033
1,2,4-Trimethylbenzene	1/9	0.4 [0.4]	ND	NHP-GW-W1-013
1,2-Dichlorobenzene	1/16	0.4 [0.4]	ND	NHP-GW-JCMW4D-036
1,2-Dichloroethane	7/124	0.5-53.0 [9.5]	ND	NHP-GW-B3S-020
1,2-Dichloroethene (Total)	47/123	1.1-530 [23.4]	ND	NHP-GW-MW217S-260
2-Butanone	1/124	0.4 [0.4]	ND	NHP-GW-JCMW4D-036
Benzene	1/124	1.8 [1.8]	ND	NHP-GW-MW213S-244
Bromoform	1/124	1.1 [1.1]	ND	NHP-GW-JCMW6-037
Carbon disulfide	4/124	1.1-2.8 [1.7]	ND	NHP-GW-B3D-267
Carbon tetrachloride	1/124	0.3 [0.3]	ND	NHP-GW-JCMW4D-036
Chloroform	50/124	1.2-200.0 [14.3]	ND	NHP-GW-MW201D-249
cis-1,2-Dichloroethene	5/9	1.0-22.0 [10.7]	ND	NHP-GW-B7S-023
Dibromochloromethane	1/124	1.6 [1.6]	ND	NHP-GW-JCMW6-037
Dichlorobromomethane	3/124	1.4-3.6 [2.3]	ND	NHP-GW-MW201D-249
Ethane, Tri(chloro-fluoro)	7/8	2.6-60.0 [14.3]	No background data	NHP-GW-MW218S-262
Ethylbenzene	1/124	1.7 [1.7]	ND	NHP-GW-JCMW2S-206
Methyl isobutyl ketone	10/111	1.2-76.0 [15.9]	ND	NHP-GW-OHMW3-030
Methylene chloride	2/18	1.2-2.4 [1.8]	ND	NHP-GW-JCMW4D-036
Tetrachloroethene	24/123	0.3-540 [46.2]	ND	NHP-GW-MW204S-264
Toluene	6/124	0.3-64.0 [16.5]	1.4 [1.4]	NHP-GW-B3S-020
trans-1,2-Dichloroethene	1/9	0.9 [0.9]	ND	NHP-GW-B7S-023

TABLE 2
SUMMARY OF GROUNDWATER RESULTS
NEW HAMPSHIRE PLATING COMPANY

Parameter	No. of Positive Detections/ No. of Samples Collected[1]	Range of Positive Detections [Average][2] (ug/L)	Background Concentration Range [Average][2] (ug/L)	Location of Maximum Positive Detection
Trichloroethene	95/124	1.0-7500.0 [183.2]	ND	NHP-GW-MW217S-260
Trichlorofluoromethane	5/123	1.0-310.0 [76.7]	ND	NHP-GW-B3S-LF-D-104
Vinyl chloride	10/124	0.6-23.0 [6.4]	ND	NHP-GW-OHM9-257
Xylenes (Total)	3/118	1.3-6.9 [3.2]	ND	NHP-GW-JCMW2S-206
SEMIVOLATILE ORGANIC CHEMICALS				
Bis(2-ethylhexyl)phthalate	8/17	1.0-11.0 [3.3]	1.0 [1.0]	GW-MW7R-025
Pentachlorophenol	1/17	1.0 [1.0]		GW-B3S-020
INORGANICS				
Aluminum	51/75	54-25,100 [1,076]	74-428 [185]	NHP-GW-MW102S-212
Arsenic	10/75	5-230 [48]	ND	NHP-GW-MW218S-262
Cadmium	45/75	1-1290 [157]	1 [1]	NHP-GW-OHM3-116
Chromium	31/75	10-1200 [86]	ND	NHP-GW-JCMW2S-206
Cyanide	6/54	39.5-232 [93.8]	ND	NHP-GW-MW213D-243
Iron	57/75	51-45,700 [4129]	204 [12.5]	NHP-GW-MW102S-212
Lead	4/77	8-16 [11.5]	ND	NHP-GW-MW102S-212
Manganese	68/75	10-1330 [288]	12-432 [132]	NHP-GW-B10S-204
Nickel	33/75	20-826 [221]	ND	NHP-GW-JCMW2S-206
Sodium	75/75	3040-192,000 [56,487]	10,300-128,000 [55,057]	NHP-GW-MW201D-249
Zinc	27/75	56-1310 [227]	63-112 [87]	NHP-GW-JCMW2S-206

Notes:

[1] Based on Phase II results; only positive detects are reported.
[2] Arithmetic average of positive detections.

TABLE 3
CONTAMINANTS OF CONCERN FOR SOILS

NEW HAMPSHIRE PLATING COMPANY SITE, MERRIMACK, NH

Contaminant of Concern	Protection of Human Health (1)	Protection of Groundwater (2)	Protection of Ecological Rec.
Arsenic	X	X	--
Beryllium	X	--	--
Cadmium	X	X	X
Chromium	--	X	--
Cyanide	--	X	--
Lead	--	X	--
Manganese	--	X	--
Nickel	--	X	--

NOTES:

X Indicates the basis for selection of the contaminant as a COC.

(1) Human health COC selected if risk assess. results for carc. risk >1E-06 or non-carc. risk HQ >1.0.

(2) Groundwater protection COC selected if detected RI conc. > MCL or AGQS; or risk assess. results indicate groundwater conc. posing carc. risk > 1E-06 or non-carc. risk HQ > 1.0.

TABLE 4

CONTAMINANTS OF CONCERN FOR GROUNDWATER
NEW HAMPSHIRE PLATING COMPANY SITE, MERRIMACK, NH

Contaminant of Concern	Human Health Risk (1)	Exceeds SDWA MCL	Exceeds NH AGQS
Arsenic	X	X	X
Cadmium	X	X	X
Chromium	X	X	X
Cyanide	---	X	X
Lead	NA	X	X
Manganese	X	---	---
Nickel	X	X	X
1,1,1-Trichloroethane	X	X	X
1,1-Dichloroethene	X	X	X
1,2-Dichloroethene	X	X	X
1,2-Dichloroethane	X	X	X
Chloroform	X	X	X
Trichloroethene	X	X	X
Tetrachloroethene	X	X	X
Vinyl Chloride	X	X	X

NOTES:

X - Indicates the basis for selection of the contaminant as a COC

(1) Selected as human health COC if risk assess results indicate carc. risk > 1E-06 or non-carc. risk HQ > 1.0.

SDWA MCL - Federal Safe Drinking Water Act Maximum Contaminant Levels

HN AGWQS - New Hampshire Ambient Groundwater Quality Standards [Env-Ws 410.05, Feb. 1993]

NA - Not Available

TABLE 5

SUMMARY OF RISK ASSESSMENT RESULTS FOR SOILS
NEW HAMPSHIRE PLATING COMPANY SITE

Area of Concern	Land Use Scenario	Carcinogenic Risk Results		Noncarcinogenic Risk Results	
		Summary Results (Cancer Risk)	Predominant COCs (Cancer Risk Greater than 10^{-4}, 10^{-5}, 10^{-6})	Summary Results (Hazard Index)	Predominant COCs (HI greater than unity)
Lagoon 1	Trespass	RME - 7.1×10^{-7} CT - 3.5×10^{-7}	Greater than 1×10^{-6}: Arsenic	0.36 0.24	Cadmium
	Industrial	RME - 3.3×10^{-6} CT - 1.7×10^{-6}		0.82 0.43	
Lagoon 2	Trespass	RME - 1.2×10^{-6} CT - 6.2×10^{-7}	Greater than 1×10^{-6}: Arsenic	0.25 0.18	Cadmium
	Industrial	RME - 3.3×10^{-6} CT - 1.7×10^{-6}		0.34 0.67	
Lagoon 3/4	Trespass	RME - 8.9×10^{-7} CT - 4.4×10^{-7}	Greater than 1×10^{-6}: Arsenic	2.73 0.78	Cadmium
	Industrial	RME - 3.4×10^{-6} CT - 1.7×10^{-6}		0.75 0.16	
Northern Wetlands	Trespass	RME - 9.3×10^{-7} CT - 4.7×10^{-7}	Greater than 1×10^{-6}: Arsenic	0.14 0.09	None
	Industrial	RME - 3.6×10^{-6} CT - 1.8×10^{-6}		0.31 0.10	
Southern Wetland	Trespass	RME - 1.0×10^{-6} CT - 5.1×10^{-7}	Greater than 1×10^{-6}: Arsenic	0.36 0.24	Cadmium
	Industrial	RME - 3.5×10^{-6} CT - 1.7×10^{-6}		0.81 0.41	
NHPC Building Area	Residential (Phase I)	RME - 1.1×10^{-5} CT - 1.7×10^{-6}	Greater than 1×10^{-6}: Arsenic Beryllium	1.22 0.77	Cadmium
	Residential (Phase II;12/94)	RME - 4.1×10^{-10} CT - 3.4×10^{-8}		0.15 0.10	

Area of Concern	Land Use Scenario	Carcinogenic Risk Results		Noncarcinogenic Risk Results	
		Summary Results (Cancer Risk)	Predominant COCs (Cancer Risk Greater than 10^{-4}, 10^{-5}, 10^{-6})	Summary Results (Hazard Index)	Predominant COCs (HI greater than unity)
NHPC Building Area (cont'd)	Trespass (Phase I)	RME - 8.7×10^{-7} CT - 4.1×10^{-7}	Greater than 1×10^{-6}: Arsenic Beryllium (Cont'd)	0.27 0.21	
	Trespass (Phase II;12/94)	RME - 1.4×10^{-11} CT - 6.9×10^{-12}		0.03 0.03	
	Industrial (Phase I)	RME - 3.8×10^{-6} CT - 1.7×10^{-6}		0.60 0.47	
	Industrial (Phase II;12/94)	RME - 1.1×10^{-10} CT - 5.7×10^{-11}		0.07 0.08	
Jones Chemical Area	Residential	RME - 5.0×10^{-6} CT - 8.0×10^{-6}	Greater than 1×10^{-5}: Arsenic Greater than 1×10^{-6}: Beryllium	0.23 0.12	None
	Trespass	RME - 3.8×10^{-6} CT - 1.9×10^{-6}		0.05 0.04	
	Industrial	RME - 1.6×10^{-5} CT - 7.8×10^{-6}		0.86 0.03	

Notes:

RME - Reasonable Maximum Exposure
CT - Central Tendency Exposure

TABLE 6

SUMMARY OF RISK ASSESSMENT RESULTS FOR GROUNDWATER
NEW HAMPSHIRE PLATING COMPANY SITE

Area Of Concern	Carcinogenic Risk Results		Noncarcinogenic Risk Results		COCs Exceeding Federal Primary Maximum Contaminant Levels
	Summary Results	Predominant COCs (Cancer risk estimate greater than 1×10^{-4}, 1×10^{-5}, or 1×10^{-6})	Summary Results	Predominant COCs (HI greater than unity)	
Background	NA	NA	RME Receptor: 2.4 CT Receptor: 1.7	• Manganese	None
On Site and Wells Affected by the Site	RME Receptor: 1.4×10^{-2} CT Receptor: 1.7×10^{-3}	Greater than 1×10^{-5}: • 1,2-DCA • Chloroform Greater than 1×10^{-4}: • 1,1-DCE • TCE • PCE • VC • Arsenic	RME Receptor: 140 CT Receptor: 99	• 1,1-DCE • 1,2-DCE, total • PCE • TCE • Arsenic • Cadmium • Manganese • Nickel • Chloroform	• 1,1,1-TCA • 1,1-DCE • 1,2-DCE • 1,2-DCA • Chloroform • PCE • TCE • VC • Arsenic • Cadmium • Chromium • Nickel

Notes:

COC - Chemical of concern
RME - Reasonable maximum exposure
CT - Central tendency exposure
HI - Hazard Index
1,1-DCE - 1,1-Dichloroethene
1,2-DCE - 1,2-Dichloroethene
1,2-DCA - 1,2-Dichloroethane
1,1,1-TCA - 1,1,1-Trichloroethane
TCE - Trichloroethene
PCE - Tetrachloroethene
VC - Vinyl chloride

TABLE 7A
SUMMARY OF SOURCE CONTROL ALTERNATIVES, REMEDIATION COSTS, AND TIME TO ACHIEVE CLEAN-UP GOALS
NEW HAMPSHIRE PLATING CO. SITE

Alternative	Volume of Cont. Soils to be Addressed (cubic yard)	Estimated Net Present Worth Cost	Leach/Flush of Soils Time to Achieve MCLs at Waste Unit Edge (years) (a)	Leach/Flush of Soils Time to Achieve MCLs at Edge of Merrimack River (years) (b)
1. No Action	41,000 CY	$714,000	> 1000	700
2. Excavation, Consolidation, and Capping	41,000 CY	$5,331,600 (c)	0, always below MCLs	0, always below MCLs
3. Excavation, Onsite Solidification, Offsite Disposal, and Wetlands Restoration	41,000 CY	$22,585,200 (d)	0.0000	0.0000
4. Excavation, Offsite Disposal, and Wetlands Restoration	41,000 CY	$36,215,600 (d)	0.0000	0.0000
5. Chemical Fixation, Onsite Backfilling, and Offsite Wetlands Restoration	41,000 CY	$7,197,800 (c)	0.0000	0.0000

NOTES:

a) These values represent the time required for soil contaminant levels to diminish to levels where the leachate from the areas of concern (Lagoons 1- 4, the Northern and Southern Wetlands, or the building area) leaching into groundwater, do not exceed MCLs or risk-based values. The time required represents the duration after the remedial action has been completed.

b These values represent the time required for soil contaminant levels to diminish to levels where the leachate from the areas of concern (Lagoons 1- 4, the Northern and Southern Wetlands, or the building area) leaching into groundwater, and mixing and attenuated by groundwater, do not exceed MCLs or risk-based values at the Merrimack River's edge.

c) Add $1,936,200 for off-site wetlands mitigation

d) Add $1,107,800 for on-site wetlands mitigation

TABLE 7B
SUMMARY OF MANAGEMENT OF MIGRATION ALTERNATIVES, REMEDIATION COSTS, AND TIME TO ACHIEVE CLEAN-UP GOALS
NEW HAMPSHIRE PLATING CO. SITE

Alternative	PRG	Vol. of Cont. Groundwater to be Addressed (d) (cu ft)	Estimated Net Present Worth Cost	GW Flushing Time to Achieve MCLs at Waste Unit Edge (years) [TCE/Cd]	GW Flushing Time to Achieve MCLs at River's Edge (years) [TCE/Cd]
GW1: No Action (a)	MCLs and NH AGQS	17,418,600 (d)	$751,400	~26/>1000	~26/700
GW2: Institutional Controls and Monitoring (b)	MCLs and NH AGQS	17,418,600	$771,400	~26/54 (e)	~26/58 (g)
GW3: Extraction, Treatment, and Discharge (c)	MCLs and NH AGQS	17,418,600	$5,644,200	~38/184 (f)	~40/112 (h)

NOTES:

a) No source control remedial actions are anticipated with GW1.
b) Assumes that a source control remedial action (that achieves PRG-W or PRG-ER in soils), which would be implemented with GW2 to minimize contaminant leaching from soils into groundwater.
c) Assumes that GW3 is implemented independent of any source control action, and is principally a hydraulic containment action that prevents the offsite migration of groundwater contaminants. This alternative is not meant to address the portion of the plume already downgradient of the site.
d) Estimated combined shallow and deep overburden aquifer groundwater for TCE plume in excess of MCL.
e) Estimated number of years for contaminated groundwater underlying the site to diminish to MCLs.
f) Estimated number of years for contaminated groundwater underlying the site to diminish to MCLs, which is longer than GW2's because the pumping and treating under GW3 would reduce the flushing of the contaminated portion of the aquifer.
g) Estimated number of years for contaminated groundwater plume to diminish to MCLs at edge of Merrimack River.
h) Estimated number of years for contaminated groundwater plume to diminish to MCLs at edge of Merrimack River, which is longer than GW2's because the pumping and treating under GW3 would reduce the flushing of the contaminated portion of the aquifer.

TCE - Trichloroethene
Cd - Cadmium

TABLE 8

COMPARATIVE ANALYSIS OF SOURCE CONTROL ALTERNATIVES
NEW HAMPSHIRE PLATING COMPANY SITE, MERRIMACK, NH

ALTERNATIVES	ALTERNATIVE SC1: NO ACTION	ALTERNATIVE SC2: EXCAVATION, CONSOLIDATION, CAPPING, AND INSTITUTIONAL CONTROLS	ALTERNATIVE SC3: EXCAVATION, SOLIDIFICATION, OFF-SITE DISPOSAL, AND WETLANDS RESTORATION	ALTERNATIVE SC4: EXCAVATION, OFF-SITE DISPOSAL, AND WETLANDS RESTORATION	ALTERNATIVE SC5: CHEMICAL FIXATION, ON-SITE BACKFILLING, OFF-SITE WETLANDS RESTORATION
CRITERION: OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT					
Protection of Human Health	Leaching of soil contaminants to groundwater remain unmitigated, would not be protective of human health. Eventual deterioration of existing soil/HDPE cover (Lagoon 1) would result in increased metals leaching. Long-term monitoring would indicate changes in site conditions that may pose risks.	Cover system would reduce or minimize contaminant leaching to groundwater, and would be protective of human health in the long term. Wetlands would be lost during remediation. Long-term monitoring would indicate changes in the cover system's effectiveness or site conditions that may pose risks.	Excavation, on-site treatment, off-site disposal would prevent continued contaminant leaching to groundwater in the long term, and would protect human health.	Excavation and off-site disposal would prevent continued contaminant leaching to groundwater in the long term, and would protect human health.	In-place chemical fixation would prevent continued contaminant leaching to groundwater in the long term, and would protect human health. Long-term monitoring required since contaminated soils remain on site, and may continue to leach to groundwater. For all SC5 scenarios, deed restrictions and local ordinances would restrict activities at site that may increase metals leaching from soils
Protection of Environment	Ecological receptors would not be protected in long term as limited barriers to contaminated soils deteriorate. Contaminant uptake by biota would bioaccumulate in the ecological food chain. Groundwater quality would not be protected.	Biotic barrier in cover system would prevent potential exposure of ecological receptors to contaminants. Would be effective in long term if cap is maintained. Groundwater quality would be protected in the long term.	Excavation, treatment, and off-site disposal of contaminated soils would protect ecological receptors in the long term. Groundwater quality would be protected in the long term.	Same as Alternative SC3.	Chemical fixation and soil cover would protect ecological receptors in the long term. Groundwater quality would be protected in the long term.
CRITERION: COMPLIANCE WITH ARARs					
Chemical-Specific ARARs	Would not comply with state groundwater quality standards.	Would comply with state groundwater quality standards in the long term.	Same as Alternative SC2.	Same as Alternative SC2.	Same as Alternative SC2.

TABLE 8 continued...

Location-Specific ARARs	There are no location-specific ARARs associated with Alternative SC1.	Wetlands would be destroyed under SC2 but would be restored through off-site wetlands mitigation action. Flood storage capacity would be maintained.	Wetlands would be destroyed during remediation, but would be restored. Wetland and floodplain functional values would be restored.	Same as Alternative SC3.	Same as Alternative SC3, but wetlands would be restored through offsite wetlands mitigation action. Flood storage capacity would be maintained.
Action-Specific ARARs	Alternative SC1 would not comply with RCRA surface impoundment closure or RCRA post-closure long-term monitoring requirements. SC1 would not comply with the state closure requirements.	Alternative SC2 would comply with RCRA surface impoundment closure requirements, but would require waiver for bottom liner. Would comply with RCRA post closure monitoring requirements. Would comply with state AGQS (in long term), hazardous waste, and air pollution requirements.	SC3 would comply with RCRA closure requirements.	SC4 same as Alt. SC3.	SC5 same as Alt. SC3.
CRITERION: LONG-TERM EFFECTIVENESS AND PERMANENCE					
Magnitude of Residual Risk	No risk reduction anticipated, threats to human health (through groundwater) and ecological receptors remain. An estimated 41,000 CY of contaminated soils remain unmitigated on site.	If cover system is maintained, contaminant leaching into groundwater would be minimized. Ecological receptors protected since wastes consolidated under cap with biotic barrier. An estimated 41,000 CY of contaminated soils and 6300 CY solidified soils would remain on site.	Contaminant leaching and biota exposure reduced in the long-term. SC3 would be permanent. No soils in excess of PRG remain on site. Clean closure achieved.	Same as Alternative SC3.	Same as Alternative SC3.
Adequacy and Reliability of Controls	No new controls implemented. Existing site features provided very limited protection and would probably diminish in the long term.	Cover system would be reliable for minimizing contaminant leaching and potential biota exposures in the long term, if properly maintained and deed restrictions and ordinances are implemented and enforced to prevent damage to the cap. No difficulties anticipated for O&M of the cap. Cap components can be replaced if required.	Reliability of solidification for metals is high and would likely be permanent. Off-site disposal in solid waste landfill and TSDF would likely be permanent. No long-term management required for treated soils. Long-term groundwater monitoring required to assess metals leaching. Disposal of some soils with cyanide may be reactivity issue, but may be addressed through treatment at TSDF.	Reliability of off-site treatment and disposal is high and would likely be permanent. Same as Alternative SC3. Same as Alternative SC3.	Reliability of chemical fixation for metals is high and would likely be permanent. No long-term management required for treated soils. Long-term groundwater monitoring required to assess metals leaching. Disposal of some soils with cyanide may be reactivity issue, but may be readily addressed through additional treatment at Site.

TABLE 8 continued...

Need for 5-Year Review	Since wastes remain in place, 5-year reviews are required to assess contaminant status and changes of site conditions.	Same as Alternative SC1, since wastes remain in place, 5-year reviews are required.	5-year reviews not required since site would undergo clean closure.	Same as Alt. SC3, since clean closure.	5-year review needed since treated soils with high metals content backfilled in lagoons.
CRITERION: REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT					
Treatment Process Used	None.	None.	Solidification for metal contaminated soils. If reactive cyanide is present, which is unlikely, then treatment through oxidation or chlorination would be used for fraction of soils with cyanide.	Probably solidification for metal- contaminated soils at off-site TSDF. If reactive cyanide is present, which is unlikely, then treatment through oxidation or chlorination would be used for fraction of soils with cyanide.	Chemical fixation would be used to treat metals-contaminated soils. If reactive cyanide is present, which is unlikely, then treatment through oxidation or chlorination would be used for fraction of soils with cyanide.
Amount Destroyed or Treated	None.	None.	41,000 CY of metal contaminated soils would be treated.	Same as Alternative SC3, but soils would be treated at TSD facility off site.	Same as Alternative SC3, through on-site chemical fixation.
Reduction of Toxicity, Mobility, or Volume	None.	None.	Mobility of metal contaminants would be reduced through solidification in a soil-cement matrix, but soil volume increase expected through treatment.	Mobility of metal contaminants would be reduced, if solidified in a soil-cement matrix at TSDF. Soil volume increase expected as the result of treatment.	Mobility of metal contaminants would be reduced through fixation into more stable mineral form, no net volume increase expected through treatment, reduction of toxicity (bioavailability) is unknown.
Irreversible Treatment	Not applicable.	Not applicable.	Solidification of soils may not be totally irreversible; some leaching may occur if conditions change that weaken or degrade soil-cement matrix.	Solidification of soils at TSDF may not be totally irreversible; some leaching may occur if conditions change that weaken or degrade soil-cement matrix.	Chemical fixation is irreversible, since more stable (lower energy state) crystalline matrix is formed.
Type and Quantity of Residuals Remaining After Treatment	Not applicable.	Not applicable.	No contaminated soils in excess of PRG left on site after remedial action.	SC4: Same as SC3.	SC5: No contaminated soils in excess of PRGleft untreated on site.
Statutory Preference for Treatment	Would not satisfy preference.	Would not satisfy preference.	SC3 would satisfy statutory preference.	SC4 would likely satisfy statutory preference, since soils probably would be treated at TSDF.	SC5 would satisfy statutory preference.
CRITERION: SHORT-TERM EFFECTIVENESS					

TABLE 8 continued...

Community Protection	No risk to community anticipated.	Greater risk than SC1 to community anticipated because of vehicular traffic and construction activities. Engineering controls would be used during monolith demolition, excavation, grading, and capping to control fugitive dusts.	Greater risk than SC2 to community anticipated because of additional on-site treatment activities. Engineering controls would be used during monolith demolition, excavation, and grading, to control fugitive dusts.	Comparable to SC3. While less activity on site, but large quantity of contaminated soils, considered hazardous, would be transported on public roads over long distances. Engineering controls would be used during monolith demolition, excavation, grading, and capping to control fugitive dusts.	Risk comparable to or less than SC2. Less vehicular traffic, and comparable material handling and construction activities anticipated. Engineering controls would be used during monolith demolition, treatment, excavation, grading, and soil capping to control fugitive dusts and VOCs (if any).
Worker Protection	No risk to workers anticipated, if proper PPE used during long-term monitoring.	Proper PPE would be required during SC2 implementation and long-term monitoring. No significant risk to workers anticipated.	Same as SC2.	Same as SC2.	Same as SC2.
Environmental Impacts	No adverse impacts to wetlands anticipated.	Wetlands would be damaged during remedial action. Off-site mitigation action anticipated. Flood storage capacity would be restored.	Wetlands would be damaged during remedial action, but would be restored on site. Flood storage capacity would be increased.	Same as Alternative SC3.	Same as Alternative SC2. Flood storage capacity would not be impaired.
Time Until Remedial Action Objectives Achieved	Not applicable.	RAOs achieved in ~24-30 months, depending on weather conditions.	Weather a factor in remediation completion. Human health RAO and protection of environment RAO achieved in ~29-35 months.	Weather a factor in remediation completion. Human health RAO and protection of environment RAO achieved in ~29-35 months.	Weather a factor in remediation completion. Human health RAO and protection of environment RAO achieved in ~23 to 29 months.
CRITERION: IMPLEMENTABILITY					
Ability to Construct and Operate	SC1 readily implemented since there would be no remediation or response actions.	No difficulties anticipated for monolith demolition, consolidation, grading, and capping are readily implementable. Deed restrictions may be difficult to implement.	Same as SC2 (except capping), and would also involve handling and on-site treatment of large contaminated soil volume. While not as common as capping, solidification is a well demonstrated technique.	Same as SC2 (except capping), and would also involve handling and transport of large contaminated soil volume.	Same as SC2 (except capping), would also involve handling and on-site treatment of large contaminated soil volume. May require large area for temporary storage of treated materials. While not as common as solidification (SC3), chemical fixation has been demonstrated to be effective at full scale.
Ease of Doing More Action if Needed	If additional actions are required after 5-year review, they can be readily implemented.	Additional remedial actions are not anticipated. If additional actions are warranted, the cap system may be opened to access contaminated soils within.	Additional remedial actions are possible in lagoons, but would require removal of soil cover. Additional actions in NHPC Ops Area probably not possible, if lot is developed.	Same as SC3.	Additional remedial actions are possible but would need to remove soil cover and treated materials first.
Ability to Monitor Effectiveness	Long-term groundwater monitoring would be able to assess changes in contaminated soil status, site conditions, and groundwater migration.	Monitoring would provide assessment of contaminant status and magnitude of leaching to groundwater.	Same as SC2.	Same as SC2.	Same as SC2.
Ability to Obtain Approvals and	Coordination for 5-year reviews may be required and would be	Same as SC1.	Same as SC1.	Same as SC1.	Same as SC1.

TABLE 8 continued...

Availability of TSD Services and Capacities	No TSD services or capacities required, this criterion is not applicable.	No TSD services or capacities required.	TSD facilities are available off site to receive and dispose of the treated (and some untreated) soils. Capacity is available.	TSD facilities are available off site to receive, treat, and dispose of the untreated soils. Capacity is available.	TSD facilities are available off site to receive and dispose of difficult to treat soils. Capacity is available.
Availability of Equipment, Specialists, and Materials	Personnel available for implementation of long-term monitoring and 5-year reviews.	Ample availability of companies, personnel, and equipment for cap construction and maintenance. Same as Alternative SC2 for long-term monitoring and 5-year reviews.	Companies would be available to perform monolith demolition, off-site disposal, and long-term monitoring. On-site solidification treatment capability available. Wetlands restoration capability available. Expect adequate availability of experienced companies. Qualified personnel would be available for 5-year reviews.	Same as SC3, except for need for solidification services.	Same as SC3, except for treatment capability: chemical fixation firms, are available, but are fewer than firms that perform solidification.
Availability of Technology	Only typical groundwater sampling equipment and laboratories that perform analyses would be required for long-term monitoring.	Common construction techniques, equipment, and personnel required for cap placement and maintenance. Long-term monitoring would use typical sampling equipment and laboratories. A number of firms available perform work.	Common construction techniques and equipment required for excavation and wetlands restoration. Long-term monitoring would use typical sampling equipment and laboratories. Specialized firms with skilled personnel required for on-site solidification.	Same as Alternative SC3, except on-site solidification capability not required. Off-site treatment facilities are available.	Same as Alternative SC3. However, specialized firms with skilled personnel required for in place or ex-situ chemical fixation.
CRITERION: COST					
Capital Cost	$0	SC2: $3,528,100 Off-site Wetlands: $1,687,600	SC3: $14,393,000 Wetlands Mitig.: $859,200	SC4: $36,215,600 Wetlands Mitig.: $859,200	SC5: $5,755,600 Off-site Wetlands: $1,687,600
First Year Annual O&M Cost	$53,500 (1)	SC2 remediation: $244,950 (2) Wetlands Mitig.: $ 47,800 (3)	SC3: $0 Wetlands Mitig.: $ 47,800 (3)	SC4: $0 Wetlands Mitig.: $ 47,800 (3)	SC5: $214,950 (5) Wetlands Mitig.: $ 47,800 (3)
Present Worth Cost	$714,100	SC2 remediation: $5,331,600 Off-site Wetlands: $1,936,200	SC3: $22,585,200 Wetlands Mitig.: $1,107,800	SC4: $36,215,600 Wetlands Mitig.: $1,107,800	SC5: $7,197,800 Off-site Wetlands: $1,936,200

Notes:

(1) Add $23,000 every 5 years for reviews.
(2) Annual Costs: $244,950 (year 1); $132,900 (years 2-30); and add $23,000 every 5 years for reviews.
(3) Annual Costs: $47,800 (year 1); $132,880 (year 2); $38,350 (years 3-5)
(4) Annual Costs: $214,950 (year 1); $102,900 (years 2-30); and add $23,000 every 5 years for reviews.
(5) Annual costs: $214,950 (year 1); $103,900 (years 2-30); and add $23,000 every 5 years for reviews.

All present worth costs are estimated using a 7% discount rate.
Shaded area refers to selected alternative.

TABLE 9
COMPARATIVE ANALYSIS OF MANAGEMENT OF MIGRATION ALTERNATIVES
NEW HAMPSHIRE PLATING COMPANY SITE

ALTERNATIVES	ALTERNATIVE GW1: NO ACTION	ALTERNATIVE GW2: LIMITED ACTION	ALTERNATIVE GW3: GROUNDWATER EXTRACTION, TREATMENT, AND DISPOSAL
CRITERION: OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT			
Protection of Human Health Prevent exposure to contaminated groundwater	No reduction in risk is anticipated. Risks of 10^{-3} to 10^{-2} would remain. Groundwater in excess of MCLs and AGQS.	Risk reduction for human health is anticipated in the long term. Once source control is implemented, natural attenuation and degradation would reduce groundwater contaminant concentrations to MCL or AGQC in between 26 to 58 years. For remaining groundwater plume, some risk reduction is anticipated through deed restrictions or ordinance. However, if groundwater is used before groundwater quality is improved, same risks as Alternative GW1 would result.	Risk reduction anticipated in long term. Contaminants leaching into groundwater would be captured by extraction system. For portion of contaminant plume located east of the extraction system, some risk reduction is anticipated through deed restrictions or ordinance. However, if groundwater is used before groundwater quality is improved, same risks as Alternative GW1 would result.
Minimize contaminant migration to the Merrimack River	Would not be protective. VOCs and metal contaminants would continue to migrate downgradient and discharge to river indefinitely.	Once source areas are addressed, the plume discharging VOCs and metals to the river would diminish to MCLs and AGQS in about 26 (VOCs) to 58 (metals) years.	Would prevent continued migration of contaminated groundwater originating at site from discharging to River. However, portion of plume downgradient of extraction system would continue to discharge to the river until it is diminished.

TABLE 9
COMPARATIVE ANALYSIS OF MANAGEMENT OF MIGRATION ALTERNATIVES
NEW HAMPSHIRE PLATING COMPANY SITE

ALTERNATIVES	ALTERNATIVE GW1: NO ACTION	ALTERNATIVE GW2: LIMITED ACTION	ALTERNATIVE GW3: GROUNDWATER EXTRACTION, TREATMENT, AND DISPOSAL
CRITERION: COMPLIANCE WITH ARARs			
Chemical-specific ARARs	Would not comply with State ARARs governing groundwater quality.	Would comply with State groundwater quality criteria, GMZ establishment, and long-term monitoring.	Would comply with State groundwater quality criteria, GMZ establishment, and long-term monitoring.
Location-specific ARARs	Not applicable.	Not applicable.	The treatment facility would be constructed within the 100-year floodplain. All practicable measures would be taken to minimize impacts to the floodplain, and to mitigate loss of flood storage capacity. GW3 would comply with these ARARs.
Action-specific ARARs	Not applicable.	Would comply with State groundwater quality criteria, GMZ establishment, and long-term monitoring.	Would comply with NPDES and NH surface water discharge requirements. Would comply with air emissions requirements. Would attain RCRA requirements for handling hazardous materials.
Other Criteria and Guidance	Not applicable.	Not applicable.	Would be consistent with EPA air stripper emissions guidance.

TABLE 9
COMPARATIVE ANALYSIS OF MANAGEMENT OF MIGRATION ALTERNATIVES
NEW HAMPSHIRE PLATING COMPANY SITE

ALTERNATIVES	ALTERNATIVE GW1: NO ACTION	ALTERNATIVE GW2: LIMITED ACTION	ALTERNATIVE GW3: GROUNDWATER EXTRACTION, TREATMENT, AND DISPOSAL
CRITERION: LONG-TERM EFFECTIVENESS AND PERMANENCE			
Magnitude of Residual Risk	Carcinogenic risks of 10^{-3} to 10^{-2} would remain, if contaminated groundwater were to be used for drinking. No risk reduction for human health in long term, and continued discharge of contaminants to the river. Estimated 17,418,600 CF of contaminated overburden groundwater between site and the river.	In short term, risks are comparable to GW1. But once contaminant levels diminish through source controls, risks would be reduced to acceptable levels in the long term. Same as GW1 for estimated quantity of contaminated groundwater.	Risks comparable to GW2. Once contaminant concentrations in portion of plume east of extraction wells diminish, risks would be reduced to acceptable levels. Same as GW1 for estimated quantity of contaminated groundwater.
Adequacy and Reliability of Controls	No new controls implemented.	No response controls used to limit migration. Administrative controls, deed restrictions and ordinances (if implemented and enforced) would provide some protection from potential exposures.	Hydraulic containment and treatment are reliable and would minimize or prevent contaminant migration from the source areas. Reliability of systems is high if adequate O & M performed. Long-term groundwater monitoring would assess extraction system effectiveness. Pre-design investigations required to optimize systems design and operation.
Need for 5-Year Review	Since groundwater contaminants remain in place, 5-year reviews are required to assess contaminant status.	Since groundwater contaminants remain until diminished to acceptable levels through attenuation, 5-year reviews are required to assess contaminant status.	Since groundwater contaminants remain until diminished to acceptable levels through attenuation, 5-year reviews are required to assess contaminant status.

TABLE 9
COMPARATIVE ANALYSIS OF MANAGEMENT OF MIGRATION ALTERNATIVES
NEW HAMPSHIRE PLATING COMPANY SITE

ALTERNATIVES	ALTERNATIVE GW1: NO ACTION	ALTERNATIVE GW2: LIMITED ACTION	ALTERNATIVE GW3: GROUNDWATER EXTRACTION, TREATMENT, AND DISPOSAL
CRITERION: REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT			
Treatment Process Used	None.	None.	Metals removal by precipitation and physical treatment, would likely be permanent. VOCs removal by air stripping and activated carbon adsorption, and disposed
Amount Destroyed or Treated	None.	None.	Estimated 788,400,000 gallons of contaminated groundwater from overburden would be treated over 30-year period.
Reduction of Toxicity, Mobility, or Volume	None.	None.	Would remove VOCs and metals from overburden aquifer.
Irreversible Treatment	Not applicable.	Not applicable.	Metals removal is probably permanent, with offsite disposal. VOCs removal by air stripping and activated carbon is irreversible.
Type and Quantity of Residuals Remaining After Treatment	Not applicable.	Not applicable.	Estimated 62,400 gallons per year metal sludge. Estimated 13 TPY spent carbon.
Statutory Preference for Treatment	Does not satisfy preference.	Does not satisfy preference.	Would satisfy statutory preference.

TABLE 9
COMPARATIVE ANALYSIS OF MANAGEMENT OF MIGRATION ALTERNATIVES
NEW HAMPSHIRE PLATING COMPANY SITE

ALTERNATIVES	ALTERNATIVE GW1: NO ACTION	ALTERNATIVE GW2: LIMITED ACTION	ALTERNATIVE GW3: GROUNDWATER EXTRACTION, TREATMENT, AND DISPOSAL
CRITERION: SHORT-TERM EFFECTIVENESS			
Community Protection	No risk to community anticipated.	No risk to community anticipated.	No significant risk to community anticipated. Engineering controls would be used during extraction wells installation and treatment facility construction and operation. Offgas released would be minimized or prevented through automatic shutoffs and controls.
Worker Protection	Proper PPE required during implementation and monitoring. No risk to workers anticipated.	Proper PPE required during implementation and monitoring. No risk to workers anticipated.	Proper PPE required during construction and operations, and for long-term monitoring. No risk to workers anticipated.
Environmental Impacts	No adverse impact to the environment anticipated.	Same as GW1.	Adverse impacts are not anticipated. Effect of groundwater extraction to be assessed during pre-design investigation.
Time Until Remedial Action Objectives Achieved	Estimated to be in excess of 700 years.	With a source control action (no further leaching) implemented, estimated 26 (TCE) to 58 (Cd) years for current groundwater plume to diminish to acceptable levels.	With extraction wells in place, estimated 40 - 112 years needed for current groundwater plume contamination to diminish to acceptable levels.

TABLE 9
COMPARATIVE ANALYSIS OF MANAGEMENT OF MIGRATION ALTERNATIVES
NEW HAMPSHIRE PLATING COMPANY SITE

ALTERNATIVES	ALTERNATIVE GW1: NO ACTION	ALTERNATIVE GW2: LIMITED ACTION	ALTERNATIVE GW3: GROUNDWATER EXTRACTION, TREATMENT, AND DISPOSAL
CRITERION: IMPLEMENTABILITY			
Ability to Construct and Operate	No construction or operation required.	No construction or operation required, only establishment of GMZ and deed restrictions and ordinances will be needed.	Extraction wells installation and operation, and construction and operation of treatment facility are all implementable. Deed restrictions may be difficult.
Ease of Doing More Action if Needed	Additional actions can be readily implemented if required after 5-year review.	Additional actions can be easily implemented if required after 5-year review.	Additional actions can be implemented if required after periodic reviews.
Ability to Monitor Effectiveness	Long-term monitoring would provide assessment of groundwater contaminant status and migration.	Long-term monitoring of groundwater could be used to assess changes in contaminant leaching or migration status.	Groundwater monitoring would be used to assess extraction and treatment systems effectiveness, and contaminant status.
Ability to Obtain Approvals and Coordinate with Other Agencies	Coordination for 5-year reviews may be required and would be implementable.	Coordination for 5-year reviews may be required and would be implementable.	Coordination for periodic reviews may be required and would be implementable.
Availability of TSD Services and Capacities	No TSD services or capacities required.	No TSD services or capacities required.	Capacity required for recycling or disposal VOCs and regeneration of spent carbon. Municipal and sludge disposal landfills required for metal treatment sludges.
Availability of Equipment, Specialists, and Materials	Personnel are available for implementation of long-term monitoring and 5-year reviews.	Same as GW1.	Companies are available to perform all construction, operation, maintenance, and monitoring. Personnel are available for periodic reviews.
Availability of Technology	Only typical groundwater sampling equipment and analytical laboratories are required for long-term monitoring.	Only typical groundwater sampling equipment and analytical laboratories are required for long-term monitoring.	All treatment technologies are well demonstrated. Treatability testing required for optimizing process steps.

TABLE 9
COMPARATIVE ANALYSIS OF MANAGEMENT OF MIGRATION ALTERNATIVES
NEW HAMPSHIRE PLATING COMPANY SITE

ALTERNATIVES	ALTERNATIVE GW1: NO ACTION	ALTERNATIVE GW2: LIMITED ACTION	ALTERNATIVE GW3: GROUNDWATER EXTRACTION, TREATMENT, AND DISPOSAL
CRITERION: COST			
Capital Cost	$0	$20,000	$3,078,000
First Year Annual O&M Cost	$56,550 (1)	$56,500	$206,800 (1)
Present Worth Cost	$751,400	$771,400	$5,644,200

Note: (1) Add $23,000 every five years for reviews.
All present worth costs are estimated using a 7 percent discount rate.

TABLE 10

SOIL CLEANUP LEVELS
NEW HAMPSHIRE PLATING COMPANY SITE, MERRIMACK, NH
units: (mg/kg)

Contaminant of Concern	Protection of Groundwater [edge of waste unit] (1)				
	NHPC Bldg.	Lagoon 1 & S. Wetland	Lagoon 2	Lagoons 3 & 4	N. Wetland
Arsenic	84.2	148	196	115	121
Beryllium	–	–	–	–	–
Cadmium	***3.3***	***6.42***	***2.55***	***2.42***	***1.78***
Chromium	212000	114000	141000	145000	102000
Cyanide (2)	26000	26000	26000	26000	26000
Lead	50.5	96.4	53.8	43.2	35.9
Manganese	61.7	118	66.9	54.2	44.1
Nickel	262	510	177	181	126

Contaminant of Concern	Human Health (3)		Environmental Receptors			Background (4)	CRDL (5)	Detected Site Concentration		
	Indust.	Resid.	Shrew	Robin	Heron			Average	Maximum	Frequency
Arsenic	5.4	0.9	–	–	–	6.3	2	5.3	11.5	80/81
Beryllium	2.2	1.3	–	–	–	0.96	1	0.71	1.4	81/81
Cadmium	140	108	***5.6***	12.4	14.5	BD	1	162.4	1277	413/772
Chromium	–	–	–	–	–	16.2+	2	119.6	403	110/402
Cyanide	–	–	–	–	–	BD		41.73	509	46/74
Lead	–	–	–	–	–	BD	0.6	84.3	3742	95/403
Manganese	–	–	–	–	–	215.0	3	128	309	69/81
Nickel	–	–	–	–	–	10.0	8	50.8	214	90/402

NOTES:

(1) Soil concentration estimated by groundwater modeling, if leached, would result in MCL or health-based limit in groundwater at each source area's eastern edge.

(2) CN soil concentration estimated based on soil-water partitioning, only. Attentuation and transport not taken into consideration.

(3) Included for comparison purposes.

(4) Inorganics concentrations identified in background surficial soil location BKG-C6.

(5) EPA Contract Required Detection Limit (metals).

BOLD Italics font indicates final remediation goals which are based on Cadmium.

* Pure Product: pure contaminant at source will not produce a contaminant conc. exceeding exposure criteria at the exposure point.

\+ Background and CRDL concentrations for total chromium

– Not a COC, PRG not developed for this contaminant.

NA Not analyzed

BD Below analytical method detection limit (ICP Metals Analysis)

[C:\ARCS1\NHPC\TABLES\SOILPRG1.WK3] 20 MAR 96

TABLE 11

INTERIM GROUNDWATER CLEANUP LEVELS
NEW HAMPSHIRE PLATING COMPANY SITE, MERRIMACK, NH
units: (ug/L)

Contaminant of Concern	Human Health Risk		ARARs		Background Conc. (1)	CRDL/ CRQL (2)
	Carcinogen (1.0E-06)	Toxicant (HI=1.0)	Federal MCL	State AGQS		
Arsenic	0.05	11	***50***	50	5.0	10
Cadmium	NA	18	***5***	5	ND	5
Chromium	NA	37,000	***100***	100	ND	10
Cyanide	NA	730	***200***	200	ND	10
Lead	NA	NA	***15****	15	ND	3
Manganese	NA	***180***	--	--	51.0	15
Nickel	NA	730	***100***	100	21.0	40
1,1,1-Trichloroethane	NA	2,800	***200***	200	--	1
1,1-Dichloroethene	0.07	330	***7***	7	--	1
1,2-Dichloroethene	NA	330	***70/100+***	70/100+	--	1
1,2-Dichloroethane	0.20	28	***5***	5	--	1
Chloroform	0.28	370	***100***		--	1
Trichloroethene	2.50	220	***5***	5	--	1
Tetrachloroethene	1.40	370	***5***	5	--	1
Vinyl Chloride	0.03	NA	***2***	2	--	2

NOTES:
(1) Inorganics concentrations identified in background shallow groundwater sample location MW-210S
(2) EPA Contract Required Detection Limit (inorganics)/Quantitation Limit (organics)
Federal MCL: Safe Drinking Water Act Maximum Contaminant Level for drinking water
State AGQS: New Hampshire Ambient Groundwater Quality Standards
NA Not Applicable or Not Analyzed (in background column)
ND Not Detected
– No PRG developed for this contaminant and PRG type
* Action Level
\+ Cis-DCE=70/ Trans-DCE=100
Final cleanup levels are in BOLD italics font

TABLE 12A
CHEMICAL-SPECIFIC ARARs AND TBCs for SOURCE CONTROL ALTERNATIVE (SC5)
CHEMICAL FIXATION, ON-SITE BACKFILLING, and OFF-SITE WETLANDS RESTORATION
NEW HAMPSHIRE PLATING COMPANY SITE

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTIONS TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Requirements	SDWA-Maximum Contaminant Levels (MCLs) (40 CFR 141.11-141.16)	Relevant and Appropriate	MCLs have been promulgated for a number of common organic and inorganic contaminants to regulate the concentration of contaminants in public drinking water supply systems. MCLs may be relevant and appropriate for NHPC groundwater because the aquifer beneath the site is a potential drinking water supply.	MCLs were used in determining clean-up levels for the aquifer. MCLs were also used to derive potential soil cleanup levels (PRGs). Under this alternative, all soils exceeding PRG would be addressed, therby complying with this ARAR.
State Regulatory Requirements	New Hampshire Groundwater Protection Rules (Env-Ws, 410.03, 410.04 and 410.05)	Applicable	These regulations establish state ambient groundwater quality standards. 410.03 requires that all groundwater of the state shall be suitable for drinking, shall not contain regulated contaminants in excess of the 410.05 requirements, and shall not result in discharges to surface water in excess of surface water quality standards. The 410.03 regulations are derived from MCLs and health-based limits to protect quality of ambient groundwater. Exemptions from groundwater quality criteria (410.04) include areas designated as GMZs.	NH ambient groundwater quality standards (AGQSs) were used along with Federal MCLs to derive potential soil cleanup levels (PRGs). Where the state AGQSs are more stringent than Federal MCLs and non-zero MCLGs, the state standards were used. SC5: would attain this ARAR because all soils exceeding PRG would be addressed and because leachate from the remaining soils would not exeed AGQSs.

TABLE 12A
CHEMICAL-SPECIFIC ARARs AND TBCs for SOURCE CONTROL ALTERNATIVE (SC5)
CHEMICAL FIXATION, ON-SITE BACKFILLING, and OFF-SITE WETLANDS RESTORATION
NEW HAMPSHIRE PLATING COMPANY SITE

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTIONS TO BE TAKEN TO ATTAIN REQUIREMENT
State Regulatory Requirements (Cont'd)	New Hampshire Surface Water Quality Standards (Env-Ws 430-437)	Relevant and Appropriate	This regulation establishes water quality criteria for toxic substances and establishes rules for determining acceptable point- and non point-source discharges to the state's surface waters.	SC5 would comply with this ARAR by treating soils so that the contaminants remaining in the soils, when leached by precipitation into the underlying groundwater, and with migration and discharge to the Merrimack River, would not exceed MCLs at the edge of the River.
	New Hampshire Primary Drinking Water Criteria (Env-Ws 316, 317 & 319)	Relevant and Appropriate	New Hampshire MCLs and MCLGs establish contaminant levels that are allowable in public water supplies, and can be used as cleanup standards for aquifers that are potential drinking water sources. The regulations are generally equivalent to SDWA MCLs.	New Hampshire MCLs, non-zero MCLGs and SMCLs were used in determining acceptable clean-up levels where they are more stringent than federal MCLs and non-zero MCLGs. SC5 would attain this ARAR because all soils exceeding PRG would be addressed.
Criteria Advisories and Guidance	EPA Risk Reference Doses (RfDs)	To Be Considered	RfDs are dose levels developed by EPA for use in estimating the non-carcinogenic risk resulting from exposure to toxic substances.	RfDs were used to assess health risks due to exposure to non-carcinogenic contaminants present at the site and to develop of acceptable soil PRG concentrations. Consistent with this TBC, all soils exceeding PRG would be addressed.
Criteria Advisories and Guidance (Cont'd)	EPA Human Health Assessment Cancer Slope Factors (CSFs)	To be Considered	CSFs are developed by EPA for health effects assessments or evaluation by the Human Health Assessment Group. These values present the most up-to-date cancer risk potency information and are used to compute the individual incremental cancer risk resulting from exposure to carcinogens.	CSFs were used to compute the individual cancer risk resulting from exposure to contaminants and in the development of acceptable contaminant levels. SC5 would be consistent this TBC.
	EPA Health Advisories, Human Health Risk Assessment Guidance and Ecological Risk Assessment Guidance	To be Considered	These advisories and guidance documents provide guidance for developing health risk information and environmental assessment at Superfund sites.	These advisories and guidance documents were used in assessing health risks and in considering environmental effects from contaminants present at the site. SC5 would be consistent with these TBCs.

TABLE 12A
CHEMICAL-SPECIFIC ARARs AND TBCs for SOURCE CONTROL ALTERNATIVE (SC5)
CHEMICAL FIXATION, ON-SITE BACKFILLING, and OFF-SITE WETLANDS RESTORATION
NEW HAMPSHIRE PLATING COMPANY SITE

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTIONS TO BE TAKEN TO ATTAIN REQUIREMENT
	EPA Final Groundwater Use and Value Determination Guidance	To Be Considered	This regional guidance establishes an approach allowing states to play a pivotal role in determining the relative "use" and "value" of site ground water resources. The determination of the aquifer as a "high", "medium", or "low" use aquifer impacts the appropriateness of restoration time periods and the extent of restoration of the contaminated ground water plume as called for in the remedial alternatives.	The site's groundwater aquifer was determined to be of "medium to high" use and value. SC5 will be implemented to provide for the most rapid restoration possible.
	NH DES Contaminated Sites Risk Characterization and Management Policy	To be considered	This policy identifies a tiered risk-based approach to characterizing risk and the process used to manage exposures to contaminants remaining at the site.	Actions implemented under SC5 would conform to this policy's requirements to manage exposures.

TABLE 12B
LOCATION-SPECIFIC ARARs AND TBCs for SOURCE CONTROL ALTERNATIVE (SC5)
CHEMICAL FIXATION, ON-SITE BACKFILLING, and OFF-SITE WETLANDS RESTORATION
NEW HAMPSHIRE PLATING COMPANY SITE

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTIONS TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Requirements	Protection of Wetlands (Executive Order 11990), 40 CFR 6.302(a) and 40 CFR 6, App. A (Policy on Implementing E.O. 11990)	Applicable	Federal agencies are required to avoid undertaking or providing assistance for new construction located in wetlands unless there is no practicable alternative and the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use.	Under SC5, soil treatment and excavation would result in the unavoidable destruction of the existing wetland system. Off-site compensatory wetlands mitigation would beperformed, which would comply with this ARAR.
	Floodplain Management (Executive Order 11988, 40 CFR 6.302(b) and 40 CFR 6, App. A (Policy on Implementing E.O. 11988)	Applicable	Federal agencies are required to avoid impacts associated with the occupancy and modification of a floodplain and avoid support of floodplain development wherever there is a practicable alternative.	The flood storage capacity within the 100-year floodplain would not be diminished once remediation is completed. SC5 would comply with this ARAR.
	RCRA Floodplain Restrictions for Solid Waste Disposal Facilities and Practices (40 CFR 257.3-1)	Relevant and Appropriate	Solid waste practices must not restrict the flow of a 100-year flood, reduce the temporary water storage capacity of the floodplain, or result in washout of solid waste, so as to pose a hazard to human life, wildlife, or land or water resources.	Treated materials that constitute solid waste would be backfilled on site within the 100-year floodplain. The treated materials would be covered with a soil cover to prevent erosion and washout. No loss of flood storage capacity, is anticipated. SC5 would comply with this ARAR.

TABLE 12B
LOCATION-SPECIFIC ARARs AND TBCs for SOURCE CONTROL ALTERNATIVE (SC5)
CHEMICAL FIXATION, ON-SITE BACKFILLING, and OFF-SITE WETLANDS RESTORATION
NEW HAMPSHIRE PLATING COMPANY SITE

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTIONS TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Requirements (Cont'd)	CWA - Dredge and Fill Regulations (40 CFR 230; 33 CFR 320-330)	Applicable	These regulations of which 40 CFR 230 are also known as the CWA Section 404(b)(i) Guidelines, outline requirements for the discharge of dredged or fill materials into surface water, including wetlands. Under these requirements, no activity that impacts a wetland shall be permitted if a practicable alternative which would have less adverse impact exists.	SC5 involves the excavation and treatment of contaminated soils in the former lagoon, wetland and building areas. SC5 would comply with this ARAR since there is no practicable alternative that would have less adverse impacts to the wetlands and the anticipated wetlands loss would be mitigated through an offsite action.
	Endangered Species Act (16 USC 1531 et seq.; 40 CFR 6.302(h))	Applicable	This statute requires that Federal agencies avoid activities which jeopardize threatened or endangered species or adversely modify habitats essential to their survival. Mitigation measures should be considered if a listed species or habitat may be jeopardized.	During the RI, the effects on endangered and threatened species were considered and the U.S. Fish and Wildlife Service was consulted. No endangedred or threatened species were identified on site, but their presence has been noted in the area.
	Fish and Wildlife Coordination Act (16 U.S.C. 661)	Applicable	This regulation requires that any Federal agency that proposes to modify a body of water must take action to prevent, mitigate or compensate for project-related losses of fish and wildlife resources.	During the identification, screening, and evaluation of alternatives, the effects on fish and wildlife resources were evaluated. If an alternative modifies the wetlands on site, EPA will ensure that losses to these resources will be prevented, mitigated or compensated and that the U.S. Fish and Wildlife Service will be consulted. SC5 would comply with this ARAR.

TABLE 12B
LOCATION-SPECIFIC ARARs AND TBCs for SOURCE CONTROL ALTERNATIVE (SC5)
CHEMICAL FIXATION, ON-SITE BACKFILLING, and OFF-SITE WETLANDS RESTORATION
NEW HAMPSHIRE PLATING COMPANY SITE

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTIONS TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Requirements (Cont'd)	An Act Relating to the Preservation of Historical and Archeological Data (16 USC 469a-1)	Applicable, if encountered	This statute requires that, whenever any Federal agency finds or is made aware that its activity in connection with any construction project or federally licensed project, activity or program may cause irreparable loss or destruction of significant scientific, prehistorical, historical, or archeological data, such agency shall undertake the recovery, protection and preservation of such data or notify the Secretary of Interior. The undertaking could include a preliminary survey (or other investigation as needed) and analysis and publication of the reports resulting from such investigation.	If significant scientific, prehistorical, historical, or archeological data are encountered during soil excavation, steps will be implemented to recover, protect and preserve such data. SC5 would comply with this ARAR.
	Archeological Resources Protection Act (16 USC 470aa-mm, 36 CFR 296, 32 CFR 229, 43 CFR7, and 18 CFR 1312)	Relevant and Appropriate, if encountered	This regulation develops procedures for the protection of archeological resources.	If archeological resources are encountered during soil excavation, they must be reviewed by Federal and State archaeologists. This requirement is applicable to any excavation onsite. SC5 would comply.
State Regulatory Requirements	Rules Relative to Prevention of Pollution from Dredging, Filling, Mining, Transporting, and Construction (Env-Ws 415)	Applicable	These rules establish criteria for the protection of surface water quality resulting from activities which significantly alter the terrain or occurs in or on the border of surface water.	Under SC5, the site terrain would be modified during excavation. However, SC5 would comply with this ARAR by regrading and vegetating the created storm water retention basins to prevent erosion or washout.

TABLE 12B
LOCATION-SPECIFIC ARARs AND TBCs for SOURCE CONTROL ALTERNATIVE (SC5)
CHEMICAL FIXATION, ON-SITE BACKFILLING, and OFF-SITE WETLANDS RESTORATION
NEW HAMPSHIRE PLATING COMPANY SITE

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTIONS TO BE TAKEN TO ATTAIN REQUIREMENT
State Regulatory Requirements (Cont'd)	New Hampshire Criteria and Conditions for Fill and Dredge in Wetlands (Env-Wt 300)	Applicable	These regulations provide requirements for the dredge and/or fill of wetlands and establish criteria for protection of fish, wildlife, commerce, and public recreation. Under this requirement, no activity that impacts a wetland shall be permitted if a practicable alternative exists that would have less adverse impact on the areas and environments.	Under SC5, the site terrain would be modified during excavation. SC5 would comply with this ARAR since compensatory wetlands would be established offsite.
	New Hampshire Siting Regulations for Hazardous Waste Facilities (Env-Wm 353.09 and 353.10)	Applicable	These rules impose restrictions on where hazardous waste facilities can be located, specifically locations near geologic fault areas or near floodplains.	The treated soils would no longer be hazardous by characteristic. SC5 would comply with this ARAR.
Criteria, Advisories, Guidance	U.S. EPA Memorandum, "Policy on Floodplains and Wetland Assessments for CERCLA Actions" (Aug. 6, 1985)	To Be Considered	This guidance discusses situations that require preparation of a floodplains or wetlands assessment, and the factors which should be considered in preparing an assessment, for response actions undertaken pursuant to section 104 or 106 of CERCLA.	SC5 would be consistent with this TBC because no practicable alternative outside the wetlands or floodplain exist.
	Memorandum of Agreement (MOA) between EPA and the U.S. Department of the Army	To Be Considered	This notice provides clarification and general guidance regarding the level of mitigation necessary to demonstrate compliance with the Clean Water Act section 404(b)(1) Guidelines.	SC5 would be consistent with this TBC because all practicable steps have been undertaken to first avoid and then minimize adverse impacts to the aquatic ecosystem.
	Guidance on Flexibility of the 404(b)(1) Guidelines	To Be Considered	This document provides guidance on the flexibility that the U.S. Army Corps of Engineers should be utilizing when making determinations of compliance with the Section 404(b)(1) Guidelines, and guidance on the use of mitigation banks as a means of providing compensatory mitigation for Corps regulatory decisions.	SC5 would be consistent with this TBC becasue an appropriate level of analysis has been provided supporting the conclusion that there is no practicable alternative to the treatment, excavation and filling in of the on-site wetlands.

TABLE 12C
ACTION-SPECIFIC ARARs AND TBCs for SOURCE CONTROL ALTERNATIVE (SC5)
CHEMICAL FIXATION, ON-SITE BACKFILLING, and OFF-SITE WETLANDS RESTORATION
NEW HAMPSHIRE PLATING COMPANY SITE

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTIONS TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Requirements	RCRA - General Facility Standards (40 CFR 264 Subpart B)	Applicable	These regulations outline requirements for general waste analysis, security, inspections, personnel training, and handling of ignitable, reactive or incompatible wastes for hazardous waste facilities.	SC5 would comply with this ARAR.
	RCRA - Preparedness and Prevention (40 CFR 264 Subpart C)	Applicable	The regulations in this subpart outline requirements for the safe design and operation of a facility, safety equipment, and communication systems for RCRA hazardous waste facilities.	SC5 would comply with this ARAR.
	RCRA - Groundwater Monitoring (40 CFR 264 Subpart F)	Applicable	Details requirements for groundwater monitoring and responding to releases from Solid Waste Management Units.	SC5 would comply since long-term and post-closure groundwater monitoring would be implemented.
	Requirements for Hazardous Waste Tank Systems (40 CFR 264 Subpart J)	Applicable, if ex-situ treatment is required	These regulations specify the design, installation, operation, monitoring, inspection, contingency plan, and closure requirements for the storage or treatment of hazardous waste using a tank system.	If ex-situ chemical fixation is required, then SC5's use of tank systems would comply with this ARAR.
	RCRA - Surface Impoundments (40 CFR 264 Subpart K)	Applicable	Details the design, construction, operation, monitoring, inspection, and contingency plans for a RCRA surface impoundment. Also provides three closure options for CERCLA sites: clean closure, containment closure, and alternate closure.	SC5 would comply since all lagoon contents considered "hazardous" would be treated and closure and post-closure plans will be prepared to comply with these requirements in case not all contaminated soils can be practically excavated and treated.

TABLE 12C
ACTION-SPECIFIC ARARs AND TBCs for SOURCE CONTROL ALTERNATIVE (SC5)
CHEMICAL FIXATION, ON-SITE BACKFILLING, and OFF-SITE WETLANDS RESTORATION
NEW HAMPSHIRE PLATING COMPANY SITE

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTIONS TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Requirements (Cont'd)	Requirements for Hazardous Waste Piles (40 CFR 264 Subpart L)	Applicable	These regulations identify design, operating, monitoring, closure, and post-closure requirements for the storage or treatment of RCRA hazardous waste in piles. If the hazardous waste is accumulated on-site for 90 days or less, these regulations reference 40 CFR 262.34, 264.1, and 265 Subpart W, which allows for the use of drip pads.	SC5's use of the "pugmill area" for stockpile and staging will comply with these requirements.
	RCRA - Land Treatment (40 CFR 264 Subpart M)	Relevant and Appropriate	These regulations detail the requirements for conducting land treatment of RCRA hazardous waste.	SC5's in-place chemical fixation process would be conducted in compliance with this requirement.
State Regulatory Requirements	New Hampshire Abandonment of Well Rules (Env-We 604)	Applicable	These requirements regulate well closure.	The abandonment of existing monitoring wells would comply with this ARAR. SC5 would comply.
	New Hampshire General Design Requirements (Env-Wm 702.09)	Applicable	All hazardous waste treatment and transfer facilities are to meet specified design requirements.	SC5 on-site treatment systems would be designed to meet these requirements.
	New Hampshire Environmental and Health Requirements (Env-Wm 702.08)	Applicable	These rules require the operator of a hazardous waste facility to meet environmental standards for surface water, groundwater, and air.	SC5 would be conducted to comply with these requirements.
	New Hampshire Monitoring of Hazardous Waste Treatment Facilities (Env-Wm 702.10-702.13)	Applicable	The regulations specify requirements for installation and operation of one or more of the following monitoring systems: • Groundwater monitoring network • Air emission monitoring network	SC5 would comply since groundwater and air emission monitoring consistent with this regulation would implemented during the remedial action.

TABLE 12C
ACTION-SPECIFIC ARARs AND TBCs for SOURCE CONTROL ALTERNATIVE (SC5)
CHEMICAL FIXATION, ON-SITE BACKFILLING, and OFF-SITE WETLANDS RESTORATION
NEW HAMPSHIRE PLATING COMPANY SITE

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTIONS TO BE TAKEN TO ATTAIN REQUIREMENT
State Regulatory Requirements (Cont'd)	New Hampshire General Operation Requirements (Env-Wm 708)	Applicable	These rules establish requirements for hazardous waste facility operation.	SC5 would comply with this ARAR.
	New Hampshire Groundwater Protection Rules, Groundwater Management Zone (Env-Ws 410.26)	Applicable	These regulations specify the requirement of a GMZ at sites with contaminated groundwater that exceeds the AGQSs.	A GMZ will be established for the delineated contaminant plume. Institutional controls such as deed restrictions will be imposed to prevent the use of groundwater within the GMZ as a potable water supply. SC5 would comply with this ARAR.
	NH Groundwater Protection Rules, Water Quality Sampling, Analysis, and Reporting; Groundwater Monitoring Wells (Env-Ws 410.30 and 410.31)	Applicable	These rules establish the requirements for sampling and monitoring groundwater, and specify monitoring well design and installation.	Under SC5, groundwater would be sampled and monitored in accordance with these requirements to assess groundwater quality downgradient of the source areas.
	New Hampshire Toxic Air Pollutants (Env-A 1302)	Applicable	These rules establish Ambient Air Limits (AALs) and air quality impact analyses to protect the public from concentrations of pollutants in ambient air that may cause adverse health effects. If AALs are not met, then corrective action, which may include Best Available Control Technology or Reasonably Available Control Technology, shall be implemented to meet the AALs.	SC5 remedial actions would be implemented to prevent air emissions in excess of the pertinent AALs.
	New Hampshire Testing and Monitoring Procedures (Env-A 805)	Applicable	These regulations identify requirements for air emission testing for stationary sources which are subject to opacity and/or emission limits.	During on-site remedial action, air emissions would be monitored and tested to ensure that these sources do not exceed pertinent standards.

TABLE 12C
ACTION-SPECIFIC ARARs AND TBCs for SOURCE CONTROL ALTERNATIVE (SC5)
CHEMICAL FIXATION, ON-SITE BACKFILLING, and OFF-SITE WETLANDS RESTORATION
NEW HAMPSHIRE PLATING COMPANY SITE

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTIONS TO BE TAKEN TO ATTAIN REQUIREMENT
State Regulatory Requirements (Cont'd)	New Hampshire Fugitive Dust Control (Env-A 1002)	Applicable	These regulations require precautions to prevent, abate, and control fugitive dust during specified activities, including excavation, construction, and bulk hauling.	Fugitive dust emissions would be controlled during remedial activities. SC5 would comply with this ARAR.
	New Hampshire Emergency Procedures (Env-A 505.02 and 506.02)	Applicable	The regulations impose obligations on sources of air pollution in emergency situations.	During remedial actions, SC5 would comply in the event of "warning" and/or "emergency" status.

TABLE 13A
CHEMICAL-SPECIFIC ARARs AND TBCs for MANAGEMENT OF MIGRATION ALTERNATIVE (GW2)
NATURAL ATTENUATION WITH INSTITUTIONAL CONTROLS AND MONITORING
NEW HAMPSHIRE PLATING COMPANY SITE

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTIONS TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Requirements	SDWA-Maximum Contaminant Levels (MCLs) (40 CFR 141.11-141.16)	Relevant and Appropriate	MCLs have been promulgated for a number of common organic and inorganic contaminants to regulate their concentrations in public drinking water supply systems. MCLs are relevant and appropriate for NHPC groundwater because the aquifer beneath the site is a potential drinking water supply.	MCLs were used in determining potential action levels for the aquifer. GW2 would comply with this ARAR by establishing a GMZ, implementing a source control action, using deed restrictions to prohibit use of contaminated groundwater for drinking and allowing attenuation of the contaminant plume to occur over time.
State Regulatory Requirements	New Hampshire Groundwater Protection Rules (Env-Ws, 410.03, 410.04 and 410.05)	Applicable	These regulations establish state ambient groundwater quality standards (AGQSs). 410.03 requires that all groundwater of the state shall be suitable for drinking, shall not contain regulated contaminants in excess of the 410.05 requirements, and shall result in discharges to surface water in excess of surface water quality standards. The 410.03 regulations are derived from MCLs and health-based limits to protect quality of ambient groundwater. Exemptions from groundwater quality criteria (410.04) include areas designated as GMZs.	NH AGQSs were used along with Federal MCLs in determining clean-up levels for the aquifer. Where the state AGQSs are more stringent than Federal MCLs and non-zero MCLGs, the state standards were used. GW2 would comply with this ARAR by establishing a GMZ, implementing a source control action, using deed restrictions to prohibit use of contaminated groundwater for drinking and allowing attenuation of the contaminant plume to occur over time.

TABLE 13A
CHEMICAL-SPECIFIC ARARs AND TBCs for MANAGEMENT OF MIGRATION ALTERNATIVE (GW2)
NATURAL ATTENUATION WITH INSTITUTIONAL CONTROLS AND MONITORING
NEW HAMPSHIRE PLATING COMPANY SITE

State Regulatory Requirements (Continued)	New Hampshire Surface Water Quality Standards (Env-Ws 430-437)	Relevant and Appropriate	This regulation establishes water quality criteria for toxic substances and establishes rules for determining acceptable point- and non-point-source discharges to the state's surface waters.	Because contaminated groundwater originating from the site is currently discharging to the Merrimack River, these regulations were considered in determining the level of groundwater treatment necessary at the site. Because under GW2 a source control action will be implemented to prevent further degradation of groundwater quality, this ARAR will be met over time as the attenuation of the contaminant plume occurs.
AUTHORITY	**REQUIREMENT**	**STATUS**	**REQUIREMENT SYNOPSIS**	**ACTIONS TO BE TAKEN TO ATTAIN REQUIREMENT**
State Regulatory Requirements (Continued)	New Hampshire Primary Drinking Water Criteria (Env-Ws 316, 317 & 319)	Relevant and Appropriate	New Hampshire MCLs and MCLGs establish contaminant levels that are allowable in public water supplies, and can be used as action levels or clean up standards for aquifers that are potential drinking water sources. The regulations are generally equivalent to SDWA MCLs.	New Hampshire MCLs, non-zero MCLGs and SMCLs were used to determine acceptable cleanup levels where they are more stringent than federal MCLs and non-zero MCLGs. GW2 would comply with this ARAR by implementing a source control action to prevent further degradation of groundwater quality, and using deed restrictions to prohibit use of contaminated groundwater for drinking and allowing attenuation of the contaminated plume to occur over time.
Criteria Advisories and Guidance	EPA Risk Reference Doses (RfDs)	To Be Considered	RfDs are dose levels developed by EPA for use in estimating the non-carcinogenic risk resulting from exposure to toxic substances.	RfDs were used to assess health risks due to exposure to non-carcinogenic chemicals in groundwater, and to develop of acceptable groundwater PRG concentrations. GW2 would be consistent with this TBC since remedial actions would be implemented to prevent ingestion and mitigate contaminant migration and the PRG concentration levels will be met over time as the attenuation of the contaminant plume occurs.

TABLE 13A
CHEMICAL-SPECIFIC ARARs AND TBCs for MANAGEMENT OF MIGRATION ALTERNATIVE (GW2)
NATURAL ATTENUATION WITH INSTITUTIONAL CONTROLS AND MONITORING
NEW HAMPSHIRE PLATING COMPANY SITE

Criteria Advisories and Guidance (Continued)	EPA Human Health Assessment Cancer Slope Factors (CSFs)	To Be Considered	CSFs are developed by EPA for health effects assessment or evaluation by the Human Health Assessment Group. These values present the most up-to-date cancer risk potency information and are used to compute the individual incremental cancer risk resulting from exposure to carcinogens.	CSFs were used to compute the individual cancer risk resulting from exposure to chemicals and in developing acceptable contaminant levels. GW2 would be consistent with this TBC since remedial actions would be implemented to prevent ingestion and mitigate contaminant migration and since the PRG concentration levels will be met over time as the attenuation of the contaminant plume occurs.
AUTHORITY	**REQUIREMENT**	**STATUS**	**REQUIREMENT SYNOPSIS**	**ACTIONS TO BE TAKEN TO ATTAIN REQUIRED**
Criteria Advisories and Guidance (Continued)	EPA Health Advisories, Human Health Risk Assessment Guidance and Ecological Risk Assessment Guidance	To Be Considered	These advisories and guidance documents provide guidance for developing health risk information and environmental assessment at Superfund sites.	These advisories and guidance documents were used in assessing health risks and in considering environmental effects from contaminants present at the site. GW2 would be consistent with this TBC.
	EPA Final Groundwater Use and Value Determination Guidance	To Be Considered	Provides a rating system for the State to establish restoration goals for a groundwater aquifer based on its vulnerability, use, and value.	This guidance was considered in conjunction with the Federal SDWA and New Hampshire Groundwater Protection Rules in order to determine groundwater cleanup levels. The aquifer was classified as medium to high value. GW2 is consistent with this TBC.

TABLE 13B
ACTION-SPECIFIC ARARs AND TBCs for MANAGEMENT OF MIGRATION ALTERNATIVE (GW2)
NATURAL ATTENUATION WITH INSTITUTIONAL CONTROLS AND MONITORING
NEW HAMPSHIRE PLATING COMPANY SITE

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTIONS TO BE TAKEN TO ATTAIN REQUIREMENT
State Regulatory Requirements	New Hampshire Groundwater Protection Rules, Groundwater Management Zone (Env-Ws 410.26)	Applicable	These regulations specify the requirements of a GMZ at sites with contaminated groundwater that exceeds the AGQS.	GW2 would comply with this ARAR. A GMZ will be established for the delineated contaminant plumes. Deed restrictions and local ordinances would be used to prevent the use of groundwater within the GMZ for drinking.
	New Hampshire Groundwater Protection Rules, Water Quality Sampling, Analysis, and Reporting; Groundwater Monitoring Wells (Env-Ws 410.30 and 410. 31)	Applicable	These rules establish the requirements for sampling and monitoring groundwater, and specify monitoring well design and installation.	GW2 would comply since groundwater would be sampled and monitored in accordance with these requirements to ensure that groundwater quality outside the GMZ is not degraded.

APPENDIX A
DES Letter of Concurrence

State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES
6 Hazen Drive, P.O. Box 95, Concord, NH 03302-0095
(603) 271-2900 FAX (603) 271-2456

Ken Smith

September 28, 1998

Patricia L. Meaney, Director
Office of Site Remediation and Restoration
US EPA - Region 1
John F. Kennedy Federal Building (HBO)
1 Congress Street
Boston, MA 02203-2211

SUBJECT: MERRIMACK - New Hampshire Plating Superfund Site, Record of Decision Declaration of Concurrence

Dear Ms. Meaney:

The New Hampshire Department of Environmental Services (Department) has reviewed and concurs with the "Record of Decision" (ROD) for the New Hampshire Plating (NHP) Superfund Site in Merrimack, New Hampshire. The ROD addresses the remedial actions necessary to address potential threats to human health, welfare and the environment at NHP which resulted from releases of hazardous substances and documents the remedial actions to protect human health and the environment.

EPA prepared the NHP ROD in accordance with the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). The Department has participated in the oversight of EPA's Remedial Investigation, Risk Assessment and Feasibility Study. The Department has also reviewed the various alternatives and has indicated its support for the selected remedy.

The selected source control remedy (SC-5) includes in-situ treatment of metal-contaminated soils by chemical fixation and removal, testing and on-site placement of solidified material presently contained in a temporary storage cell. The management of migration remedy (GW-2) consists of establishing a Groundwater Management Zone (GMZ), under WS 410.26, performing long-term monitoring of groundwater quality, and allowing the natural attenuation of metals and volatile organic compounds (VOCs) to reduce these constituents to the State's Ambient Groundwater Quality Standards (AGQS) over time. If a municipal well is installed in a mutually agreeable area outside the GMZ and is later found to be impacted by on-site contamination, EPA and the Department will evaluate options to isolate the plume from the well.

As a demonstrated state-of-the-art chemical process, chemical fixation can treat soils containing leachable heavy metals by using in-situ or ex-situ processing equipment. In the Department's review of available literature, no heavy metal bearing wastes have been found to be resistant to the chemical fixation process. The intent of the source control remedy is to initially perform a treatability scale viability demonstration and then use the resultant data of the study to engineer and implement to a full scale project application.

Natural attenuation has been determined by EPA's consultant, using modeling results developed during the RI, to be equal or superior to an active pump and treat system because, with source controls measures implemented at the site, there is little difference in the predicted time required to attain AGQS. In fact, for some pumping scenarios, the impact was negative due to aquifer characteristics and the proximity of the Merrimack River. Because the groundwater extraction system would remove approximately 30 to 50 gallons per minute from the aquifer system, there would be less groundwater available to flush out the remaining downgradient portion of the aquifer. Hence, a longer remediation time frame would be required. The management of migration remedy as discussed in the text of the NHP ROD is consistent with the State's "Draft Guidelines for Selection of Natural Attenuation for Groundwater Restoration under Env-Ws 410" in that it meets the guidance for implementation of natural attenuation at contaminated sites and for monitoring of the natural attenuation process.

Following the procedures outlined in EPA's guidance entitled, Ground Water Use and Value Determination Guidance, Final Draft, dated April 3, 1996, the Department determined that the groundwater in the vicinity of the NHP site is medium to high value. This determination is consistent with the Merrimack Village District's (MVD) long-term strategy to reevaluate the use of the groundwater in the area as an alternative to meet future drinking water supply demands. The NHP site is in a high transmissive aquifer that has potential for high yielding wells. Current indications are that the Town of Merrimack will need additional drinking water supply sources, which may include the use of the "Horseshoe Pond aquifer," within the next decade. The MVD and the Department realize that the quality of the groundwater in this area has been temporarily impaired by NHP and other industrial activities in the areas which continue to have significant commercial/industrial activity. Consequently the Department believes that any future development of drinking water supply wells in this area will require careful aquifer management and will have to comply with the State's wellhead protection requirements under Env-Ws 378.

As part of the remedy, EPA and the Department have worked jointly to secure wetland areas to compensate for the loss of wetland at the NHP site. On March 23, 1998, the State purchased an ecologically rare and significant wetland in the adjacent Town of Litchfield known as Grassy Pond. The Department, under an agreement with the EPA, will be reimbursed 90% of its costs once the ROD is complete. In addition to Grassy Pond, a second wetland acquisition will occur in the Town of Merrimack. Negotiations for the so-called Naticook Road wetland in Merrimack, will begin after the ROD is complete. If negations fail, EPA and the Department will help with the Town to identify an alternative wetland of equal ecological and monetary value.

The selected remedy will include a provision to construct and sample monitoring wells on the Litchfield side of the Merrimack River to determine if contaminated groundwater has migrated under and across the river. EPA and the Department will evaluate existing hydrogeologic information from the Town of Litchfield to help understand groundwater flow and evaluate existing potential receptors as possible sampling locations. Installation of well couplets will be installed in the shallow and deep overburden and will be used to determine if NHP-related contamination extends beyond the Merrimack River.

The Department reviewed all information in the NHP Administrative Record, evaluated the cumulative risks associated with current and future potential exposures to the contaminants whose presence is associated with a CERCLA release and determined the actions set forth in the NHP ROD are consistent with State applicable or relevant and appropriate requirements. Acting as agent for the State of New Hampshire, the Department concurs with the remedial decision selected under CERCLA for NHP.

In striving to achieve the maximum benefit with limited public (and private) resources, the Department continues to seek reasonable and practical solutions to the often costly and complex environmental challenges associated with contaminated site cleanups. Through the partnership and dedication exhibited by all parties, the rapid implementation of the actions necessary to protect human health and the environment will serve to expedite the achievement of our mutual environmental goals and facilitate efforts to restore the local economy in order to protect the welfare of those in communities surrounding the NHP site. As always, the Department stands ready to provide the guidance and assistance EPA may require in order to take the actions necessary to protect human health and the environment in a complete and cost-effective manner.

Sincerely,

Philip J. O' Brien, Ph.D.
Director
Waste Management Division

A:\MEANEY.LET
cc: Dana Bisbee, Esq., Assistant Commissioner, NHDES
Carl W. Baxter, P.E., Administrator, Hazardous Waste Remediation Bureau, WMD
Richard H. Pease, P.E., Hazardous Waste Remediation Bureau, WMD
Michael Walls, Esq., NH Department of Justice
Richard Boynton, EPA - New England
Jim Dilorenzo, EPA- New England

APPENDIX B
Responsiveness Summary

RESPONSIVENESS SUMMARY

FEASIBILITY STUDY

NEW HAMPSHIRE PLATING COMPANY SUPERFUND SITE
MERRIMACK, NEW HAMPSHIRE
CERCLIS ID NO. NHD001091453

Tetra Tech NUS, Inc.

EPA Contract No. 68-W6-0045
EPA Work Assignment No. 018-RIFS-01G1
TtNUS Project No. N7691

SEPTEMBER 1998

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ATTACHMENTS

PREFACE

The U. S. Environmental Protection Agency (EPA) held a 30-day public comment period, from January 16, 1998 through February 14, 1998, to provide an opportunity for interested parties to comment on EPA's preferred alternative to address soil and groundwater contamination at the New Hampshire Plating Company (NHPC) Superfund Site in Merrimack, New Hampshire. The preferred alternative was selected after EPA developed a feasibility study that scrutinized various options for addressing soil and groundwater contamination resulting from past waste disposal practices at the site. EPA identified its preliminary recommendation of a preferred alternative in a proposed plan, issued in January 1998, at the start of the NHPC public comment period. On the evening of January 15, 1998, EPA conducted a public meeting to discuss the feasibility study and the preferred alternative. On January 28, 1998, EPA held a formal public hearing at which two commenters spoke. Six comments were received during the public comment period; one commenter responded at the public hearing and in writing three times.

The purpose of this responsiveness summary is to document EPA responses to the comments and questions raised during the public comment period. EPA considered all of the comments summarized in this document before selecting the cleanup plan to address soil and groundwater contamination at the site.

The responsiveness summary is divided into the following sections:

Section I. Overview. This section discusses the site history, outlines the objectives of the feasibility study, identifies the alternatives evaluated in the feasibility study, and identifies and summarizes general reaction to EPA's preferred alternative.

Section II. Background on Community Involvement and Concerns. This section contains a summary of the history of community interest and concerns regarding the NHPC site.

Section III. Comments Received During the Public Comment Period and EPA's Response to those Comments. Each written and oral comment from the public and interested parties on the feasibility study and proposed plan are repeated and responded to directly.

ATTACHMENT A - This attachment provides a list of the community relations activities that EPA has conducted for the NHPC site.

ATTACHMENT B - This attachment is the transcript of the January 28, 1998, public hearing held in Merrimack, New Hampshire.

ATTACHMENT C - This attachment includes the complete text of comments received during the public comment period.

I. OVERVIEW

The NHPC Superfund Site is located on Wright Avenue in Merrimack, New Hampshire, a community midway between Nashua and Manchester. The NHPC site is a 13.1 acre lot where NHPC provided electroplating services to local industries from 1962 to 1985. Plating process wastes, including metals and organic solvents, were disposed by discharging to unlined trenches in the building's concrete floor, which directed wastes through a discharge pipe to four lagoons in a wetland behind the building.

In the early 1980s, the New Hampshire Department of Environmental Services (NHDES) and EPA began attempts to regulate NHPC's hazardous waste disposal activities under the Resource Conservation and Recovery Act (RCRA). The state issued a Notice of Violation and Order of Abatement in which New Hampshire Plating was required to treat its wastes prior to discharge into the lagoons. NHPC ceased operations in 1985 because it was unable to meet the financial assurance provisions of RCRA and to continue to pursue the field investigation necessary to determine the nature and extent of the contamination it caused. In 1987, a contractor for the state stabilized the plating waste in the lagoon system with lime and a sodium hypochlorite solution; removed debris, drums, and plating tank liquids; and conducted a limited decontamination of the NHPC building. An EPA emergency removal action, conducted from 1989 to 1991, confirmed that a number of volatile organic compounds (VOCs) including trichloroethylene (TCE) and 1,1,1-trichloroethane (1,1,1-TCA); metals such as arsenic, cadmium, chromium, lead, zinc; and cyanide were present in the lagoon system. Since these contaminants were detected in monitoring wells on and around the site, in July 1991, EPA proposed to add the site to its National Priorities List (NPL), making it eligible for funds for long-term cleanup. Final NPL listing occurred in October 1992. Soon thereafter, EPA initiated a remedial investigation/feasibility study (RI/FS) for the site.

During the RI, initial data indicated that a portion of the contaminated groundwater beneath the site might be flowing south toward and possibly underneath Horseshoe Pond. Later investigations determined that groundwater was migrating off site and discharging to the Merrimack River. The dilapidated NHPC building and the contaminated underlying soils resulting from the use of unlined trenches for waste disposal were deemed potential continuing sources of contamination to soil and groundwater. As a result, EPA prepared an Engineering Evaluation/Cost Analysis (EE/CA) to support selection of a short-term action, referred to as a Non-Time-Critical Removal Action (NTCRA). NTCRAs allow EPA to spotlight and address portions of Superfund sites that lend themselves to rapid short-term cleanup approaches. The goal of the NTCRA was to reduce those sources of contamination, thereby limiting contaminant migration into underlying soil and groundwater, while the RI studies necessary for long-term cleanup continued.

In 1993, EPA signed an action memorandum selecting the NTCRA components. They included decontaminating, dismantling, and disposing the NHPC building and contents; sampling and potentially removing an underground storage tank; disposing off site contaminated soil beneath the former building; and placing a temporary cover over the former building location. These activities were completed in 1994.

In 1996, EPA issued the site-wide RI report; the FS was released in January 1998. A proposed plan, outlining the findings of the RI and the FS, and detailing EPA's preferred alternative, was sent to the site mailing list. The proposed plan, and notices in the local

newspapers (Nashua Telegraph, Union Leader, Village Crier, and Bedford-Merrimack Bulletin), announced the January 15 public meeting, the January 28 public hearing, and the comment period, extending from January 16 through February 14.

A. Preferred Alternative

EPA identified cleanup objectives that would address site risks. The objectives included:

- minimizing metals leaching from soil into groundwater; metal contamination rendered groundwater unsafe for human consumption
- preventing ingestion of groundwater that exceeds levels set to protect human health
- minimizing off-site migration of contaminated groundwater and protecting the Merrimack River
- preventing contact between burrowing animals and contaminated soil

EPA identified response actions that might be taken to satisfy these objectives that included: no action, which serves as a comparative baseline; limited action, which restricts access and monitors the site; contain contamination (leave it where it is and cover it); move the contamination off site; and treat it on site.

Based on these general response actions, EPA evaluated five soil alternatives in the FS:

1 No action
2 Consolidate contaminated soils, cap them, implement institutional controls
3 Excavate contaminated soils, solidify them, dispose them off site, restore wetlands
4 Excavate contaminated soils, dispose them off site, restore wetlands
5 Chemically treat contaminated soils in place, construct an off-site wetland

and three groundwater alternatives:

1 No action

2 Establish a Groundwater Management Zone, monitor natural attenuation, and implement deed restrictions

3 Prevent off-site migration (contain) of contaminated groundwater, treat and discharge it, establish a Groundwater Management Zone and implement deed restrictions

After reviewing the FS alternatives against the nine cleanup criteria cited in the regulations, the proposed plan identified EPA's preferred alternative, which is Alternative 5 for soil and Alternative 2 for groundwater.

The preferred soil alternative included:

- treating metals-contaminated soil with a binding agent to significantly reduce leaching (fixation)
- redepositing the treated soil on site in two lagoons
- demolishing the temporary storage unit and using its material as additional backfill
- constructing or preserving an off-site wetland

The preferred groundwater alternative included:

- implementing a Groundwater Management Zone to monitor the progress of natural attenuation and restrict groundwater use
- conducting long-term monitoring of surface and groundwater

When combined, Alternatives 5 and 2 will meet all of EPA's objectives for this action. Implementation of Soil Alternative 5 will prevent the continuing migration of contaminants to groundwater by binding contaminants to the soil. Once the contaminated soil has been addressed, the level of contamination in groundwater will naturally attenuate and will achieve the state's groundwater quality standards in the future.

B. General Reaction to the Preferred Alternative

Except for one commenter who expressed concern about possible short-term health effects on nearby residents during excavation activities, little comment was expressed on the preferred soil cleanup alternative. Of the comments received either in writing or at the public hearing, concerns revolved around whether the preferred alternative for groundwater (limited action) took into consideration the town's need for additional potable water supplies. Other concerns addressed the location of the off-site wetland mitigation area selected to be protected or constructed to replace wetland functions lost as a result of the soil cleanup strategy, and whether contaminated groundwater was migrating beneath the Merrimack River to the Town of Litchfield.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

The level of community concern about the site was highest in the early 1990s at the end of EPA's emergency removal action, when town officials learned that waste would remain stored on site indefinitely. Concerns expressed by people interviewed in the spring of 1993 for the Community Relations Plan included the credibility of the federal bureaucracy, safety and public health issues (including the NHPC building itself), future uses for the NHPC site, contamination from other sites, and water supply quality.

Implementing the NTCRA addressed the first two of these concerns: by decontaminating, dismantling, and disposing the NHPC building off-site, the public's concern about its safety

and public health implications was reduced. EPA demonstrated that when a threat was defined, quick action was taken to protect the community. EPA anticipates that implementation of the proposed plan will respond to the three of four remaining concerns. Although the EPA is working with them, the NHDES has taken the lead on studying contamination that may be coming from other nearby properties.

Attachment A lists community relations activities conducted at the NHPC site.

III. COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA'S RESPONSE TO THOSE COMMENTS

Two people testified at the public hearing: one offered general support for the proposed plan; the second argued that the groundwater component of the proposed plan was technically unsound and compromised the town's future drinking water supply source. A copy of the hearing transcript is attached as Attachment B. Eight written comments were received, one of which was also read into the hearing record. Attachment C summarizes the written public comments. Appendix D contains the complete text of written comments submitted during the public comment period.

Comment 1: Soil Alternative 5, the preferred alternative, would result in airborne contamination during excavation that could impact the health of people living nearby. The commenter prefers Soil Alternative 4, featuring off-site disposal and wetlands restoration.

Response: Soil excavation is necessary under both Soil Alternatives 4 and 5 so that remediation can be completed. In Soil Alternative 4, excavation would be required to move the contaminated soil into temporary stockpiles and then loaded into dump trucks for shipping to an off-site location. Soil Alternative 5 features first treating the soil with a binding agent, then excavating it in successive "lifts" until subsurface soil is reached that meets acceptable limits. The treated soil would be placed in Lagoons 1 and 2, covered, and vegetated. Table 3 of the proposed plan indicates that both alternatives are equally protective, however, Alternative 4 (off-site disposal) is four times more expensive than Alternative 5. Measures would be taken under either alternative to minimize dust generation and potential impacts to nearby residences.

The column entitled "The Nine Criteria for Choosing a Cleanup" on page 7 of the proposed plan explains the criteria EPA uses to assess alternatives. Number 5, Short-term effectiveness, addresses whether the cleanup could cause short-term hazards to workers, residents, or the environment. Section 4 of the FS addresses these issues for both alternatives by stating that, "During monolith [temporary storage unit] demolition, excavation, truck loading, backfilling and grading, risks posed by fugitive dusts to off-site workers [and residents] would be minimized by appropriate engineering control measures (dust suppressants, water sprays)." And "While engineering controls can be implemented during excavation, grading, and loading to minimize impacts of fugitive air emissions, some releases may occur. Air monitoring would be performed during remediation to assess the need to provide engineering controls or to stop excavation activities."

Finally, toward the end of the design phase, EPA will hold a public meeting to explain the details of the remediation, including the steps planned to ensure that there are no unacceptable levels of fugitive emissions.

Comment 2: I support the current proposal. I "urge a solution that can bring the site back to viable use as expeditiously as possible."

Response: EPA appreciates the Community Development Director's support of the Proposed Plan. By remediating on-site soils and removing the Temporary Storage Unit, a large portion of the site will be available for commercial or industrial use. The entire front parcel, which housed the former plating building, will be available for unrestricted commercial or industrial use. Approximately 3 to 4 acres of the rear parcel that will receive the treated soil will be suitable for non-intrusive uses such as a parking lot or recreational field. The rest of the parcel will remain as wetlands. The entire site lies within a 100-year floodplain.

It is EPA's intention to perform the soil clean up as quickly as possible. However, as a federal fund lead, EPA needs to compete with other clean up projects across the nation. It has been EPA's experience that some projects have required as long as three years to secure funding. In the interim, necessary pre-design and design work will be performed that will require about a year to complete.

Comment 3: Groundwater Alternative 3, Treat Contaminants On Site, would enable the Horseshoe Pond aquifer to be retained for use as a source of potable water by the year 2008. The preferred alternative, Groundwater Alternative 2, Limited Action, would not retain the aquifer's high value.

Response: Groundwater Alternative 2, Limited Action (long-term monitoring and institutional controls) was formulated as a passive groundwater remedial approach that will be implemented only in conjunction with active soil remediation. Once the source of groundwater contamination (the metals-laden soil and sediments on the NHPC property) is addressed (treated, removed, covered, etc.), there will no longer be any future migration of metals into the underlying groundwater. With this aggressive source reduction approach, the contaminated groundwater will gradually be flushed from the aquifer until levels are reduced to below the New Hampshire Ambient Groundwater Quality Criteria.

Groundwater Alternative 3, Groundwater Collection, Treatment, and Discharge, will also, in time, restore groundwater quality for the portion of the aquifer underlying the NHPC site and extending eastward to the Merrimack River. Groundwater Alternative 3 was formulated as an active groundwater extraction and treatment option whether or not any soils (source) remediation occurred. The purpose of Groundwater Alternative 3 is to prevent contaminated groundwater from migrating from the NHPC site. This means, even if the soils were never cleaned up, contaminated groundwater would not migrate off site and cause further degradation of groundwater east of the site. Using a series of interceptor wells, Groundwater Alternative 3 would capture groundwater migrating from the site. In time, groundwater quality for the portion of the

aquifer extending from the site to the Merrimack River would be naturally restored.

Groundwater Alternatives 2 and 3 of the FS were developed based on the following considerations:

1) there are no current residential or public wells in the site's vicinity.

2) the current land use is commercial/industrial, and it is expected that the future land use will remain the same.

3) restrictions (WS 410) will be enacted to prevent the use of underlying groundwater as a potable supply.

4) NHDES' groundwater use and value determination.

5) EPA and NHDES' desire to develop a cost-effective remedial approach consistent with the aquifer use and value.

The Merrimack Village District (MVD) expressed concern regarding the length of time needed under Groundwater Alternatives 2 and 3 to restore groundwater quality in the site's vicinity. The extended restoration duration would preclude siting a public supply well near Horseshoe Pond, which is located near the site. Based on a meeting between EPA, the NHDES, and the MVD on February 13, 1998, the MVD requested that EPA prepare a more aggressive groundwater alternative that would result in a shorter remediation time frame than offered by either Groundwater Alternatives 2 or 3. The MVD stated that information developed by their consultant (Emery and Garrett) indicated that the area underlying the "Horseshoe Pond aquifer" could yield sufficient quantities of water for future use.

EPA appreciates the need to identify and protect future potential drinking water supplies in the Town of Merrimack and the MVD's desire to use this highly productive aquifer. However, EPA and NHDES questioned whether it was realistic to install a public water supply well in a commercial/industrial area.

To address the MVD's concern, EPA performed the following activities:

- Reviewed the Groundwater Exploration Program Phase I Report (prepared by Emery and Garrett Groundwater, Inc. for the MVD) and the state's well siting criteria to determine if a supply well placement in the Horseshoe Pond vicinity is practicable

- Identified the closest viable location to situate a hypothetical municipal supply well in the vicinity of the NHPC Site and within the "Horseshoe Pond aquifer" by reviewing land use zoning, groundwater contamination sources, and the state's well siting regulations,

- Evaluated whether a hypothetical well could yield a desired 300 to 400 gallons per minute rate by assessing the MVD consultant's report and United States Geological Survey geologic and groundwater data,

- Evaluated whether pumping this hypothetical supply well could potentially induce contaminated groundwater to flow from the NHPC site plume to the well.

A detailed evaluation of the viability of siting a municipal supply well was prepared and forwarded to the MVD (letter report of May 28, 1998 prepared by Brown & Root Environmental, Inc. on behalf of EPA). Based on the assessment of current and future land use, state well siting regulations, and the hydrogeology of the area of interest, EPA concluded the following:

- It would be highly infeasible to site a hypothetical municipal supply well in the NHPC site's immediate vicinity that would have an adequate wellhead protection area and a required protective radius of at least 400 feet. There are five known hazardous waste sites with groundwater concerns surrounding the NHPC site. In addition, land use in the NHPC vicinity is either commercial or industrial, and siting a water supply well in this area would be infeasible because of inadequate wellhead protection.

- A parcel of undeveloped land situated to the southeast of Horseshoe Pond was identified as a viable municipal water supply well siting location because it is adequately distant from identified potential contaminant sources, but within the desirable "Horseshoe Pond Aquifer".

- Sustained pumping rates of between 125 to 250 gpm are likely for a hypothetical municipal well situated in the undeveloped parcel located southeast of Horseshoe Pond (higher yields may be possible).

- Pumping the hypothetical supply well would not likely draw contaminated groundwater from the NHPC vicinity to the supply well because of the limited influence over a long distance. Horseshoe Pond would recharge the supply well under sustained pumping conditions.

Based on the above assessments, more aggressive remediation of the groundwater plume at the NHPC site would not allow for a successful siting of a high yield water supply well in the site's immediate vicinity because of the need to meet state well siting requirements, its proximity to four known hazardous waste sites, and its proximity to commercially and industrially zoned lands and properties. Therefore, consideration of a more aggressive active groundwater remediation system to address the NHPC groundwater plume will not be pursued further.

Comment 4: The commenter raises several points:

a) The model used indicates that limited action (Groundwater Alternative 2) would attain cleanup goals faster than the active remediation (Groundwater Alternative 3). The model must not be representative of real conditions.

b) Describe how modeling was conducted, and present a discussion of why more realistic cleanup alternatives were not evaluated or presented.

c) Describe how EPA's proposed cleanup plan will affect the MVD's future use for a well in the Horseshoe Pond area, because the MVD is concerned about obtaining "new source approval" status.

Response: EPA's response parallels the comments characterizations.

a) A groundwater fate and transport model was used during the FS Report development to estimate the approximate number of years needed to restore groundwater quality to acceptable levels, which are the state's Ambient Groundwater Quality Criteria. The details, assumptions, input values, and printouts of numerous iterations are presented in the FS Report. As indicated in the previous response, the groundwater alternatives were based on current and projected future aquifer use considerations. The focus of the modeling was to assess the effect of performing different degrees of contaminated soil remediation, thereby improving and protecting groundwater quality in the long term through a more passive approach.

Groundwater Alternative 2 assumed that a level of source control, meaning active remediation of the soil, would be enacted, thereby eliminating further contaminant migration into groundwater. Aquifer contaminants, meaning contaminants in the groundwater and those adsorbed to saturated soil particles, would gradually be flushed out by precipitation infiltration and by groundwater entering the affected portion of the aquifer. Based on the most aggressive remediation of soils possible, the model estimates that up to 54 years may be required before contaminant levels diminish to the Ambient Groundwater Quality Standards throughout the plume.

Based on the considerations discussed in the response to Comment 3, Groundwater Alternative 3 was developed to prevent contaminant migration off site from the NHPC property regardless of whether the source control cleanup was implemented. Only one line of interceptor wells was considered because of the proximity of the site to the Merrimack River. At the time the FS Report was being prepared (prior to the public comment period), there had been no indication from either town officials or the state that groundwater in the site's vicinity would be considered for future drinking water, considering the nearby industrial land use, the number of active industrial and commercial facilities, and the proximity of the railroad tracks and sewer lines. In this particular scenario, one line of interceptor wells would be effective in capturing contaminated groundwater occurring at the NHPC site. The groundwater that had already left the site would continue on its path to the Merrimack River. Because the groundwater extraction system would remove approximately 30 to 50 gallons per minute from the aquifer system, there would be less

groundwater available to flush out the remaining downgradient portion of the aquifer. Hence, a longer remediation time frame would be required.

Information used in the model was developed during the RI, or was supplemented by data from various literature and journal sources. The same input parameters were applied for each model run for each groundwater alternative including: size and concentration of contaminant plume, thickness of the aquifer, hydraulic gradient, porosity, precipitation and infiltration, contaminant retardation rates, and contaminant partitioning coefficients, etc. The differences in modeling for each alternative related to how the groundwater was being removed from the aquifer: under natural flow conditions, or under artificial conditions by pumping.

b) During the development of Groundwater Alternative 3, active groundwater extraction and treatment and several variations were considered. An evaluation considered recharging extracted and treated groundwater into the NHPC site to aid in flushing the contaminants from the aquifer. Appendix D of the FS Report presents a hydrogeologic evaluation of recharging (injecting) the treated groundwater on site.

Groundwater would be extracted from the shallow overburden aquifer and from the deep overburden aquifer; these two aquifers appear to be separated by a semi-confining unit. Discharging treated water into the shallow overburden would be difficult because of its limited thickness and low hydraulic conductivity, meaning the shallow overburden aquifer would not be able to accept the estimated 30 to 50 gallons per minute of water that would need to be reinjected. Injecting treated water into the deep overburden was more plausible because it is a more hydraulically conductive unit. Mounding of groundwater would occur, which could benefit flushing, but could foster contaminant migration in other directions (toward Horseshoe Pond) if not captured by the extraction well. Excess groundwater could also be injected into the bedrock aquifer; however, because of the uncertainties and the nature of fractured bedrock, the injected water could "short circuit" and discharge to the overburden aquifer, causing complications in the extraction system or causing contaminants to migrate in an undesired manner. Because of the unknowns, potential for fostering contaminant migration through reinjection, the inability of the shallow overburden to accept treated groundwater, and the considerations cited previously, and lack of any groundwater users in the vicinity of the site, an active aquifer flushing alternative was not pursued.

Because of the MVD's concern regarding the extended remediation time frame under Groundwater Alternatives 2 and 3, EPA and MVD did discuss the possible development of a more aggressive active aquifer flushing alternative, if information was developed that indicated that situating a municipal supply well in the NHPC site's vicinity was viable. However, following the completion of the well siting and hydrogeologic evaluation (see Response to Comment 3), it was determined that developing another groundwater remediation option was unnecessary.

EPA has expended considerable effort to assess whether a municipal supply

well could be situated in the vicinity of the NHPC site vicinity. As presented in the response to Comment 3, EPA's well siting and hydrogeologic evaluations concluded that the proximity to several industrial facilities (which are known or potential groundwater contamination sources), to the sewer line that runs parallel to the Boston and Maine railroad right of way, and proximity to Daniel Webster Highway commercial facilities (gas stations, automobile painting establishments, dry cleaners, etc.) would preclude establishing a public supply well near the NHPC site. However, EPA did identify a parcel of undeveloped land that is in the area of the "Horseshoe Pond aquifer" that could potentially be developed as a well field. Any alternative, whether passive or active, will require that a WS 410 GMZ be established until ambient groundwater quality standards are attained. No well can be installed within a GMZ during the remediation time frame. However, this undeveloped parcel falls outside the GMZ and could be more fully evaluated and potentially developed to meet the MVD's needs in a much shorter time frame.

Comment 5: One commenter opposes selection of a wetland mitigation area not within the Town of Merrimack.

Response: As explained in a letter from EPA Region 1 to the Nature Conservancy on March 4, 1998, EPA intends to purchase two wetland areas to compensate for the unavoidable loss of wetlands on the New Hampshire Plating Site. EPA has been pursuing a unique and threatened wetland located in the Town of Litchfield (Grassy Pond) as adequate mitigation. On March 23, 1998, EPA and the NHDES purchased Grassy Pond to stop imminent development. However, EPA realizes that the benefit to the Merrimack community from the preservation of Grassy Pond is not adequate because the property is located on the opposite side of the Merrimack River. EPA therefore intends to purchase an unnamed wetland in the Town of Merrimack to: (1) address the Conservation Commission's desire to compensate for the loss of on-site wetlands within the town; (2) ensure adequate mitigation for wetlands loss through the joint preservation efforts; and (3) ensure well-head protection for town wells. If the purchase of this property is not viable, i.e. the owner will not sell, EPA will work with the Conservation Commission to determine other suitable compensation.

Comment 6: Two commenters (the Merrimack Conservation Commission and the Merrimack Village District Wellhead Protection Committee) support selection of land denoted in town tax maps as Lot 3B-260 (the White Pine Swamp Area) as the wetland mitigation area discussed in the proposed plan. The Conservation Commission notes that this land "is within the wellhead protection area of Merrimack Village District Wells No. 1, 2, and 3."

Response: EPA intends to purchase the unnamed wetland in the Town of Merrimack. Lot 260 of Tax Map 3B is among the properties being considered. EPA has began the process of securing this property, in cooperation with the Nature Conservancy, by hiring an independent certified appraiser and performing a use and value wetland delineation.

Comment 7: One commenter requests that the selected remedy include a provision to construct and sample monitoring wells on the Litchfield side of the Merrimack River to determine if contaminated groundwater has migrated "deeper into the

water table and potentially move(d) under and across..." the river. The commenter requests that sampling results be sent to the Litchfield Board of Health and the Conservation Commission. The commenter encloses a copy of the town tax maps with names and addresses of property owners.

Response: During the RI, wells were not installed on the Litchfield side of the river because: (1) contamination is confined primarily to the shallow overburden aquifer on the Merrimack side of the river and it is likely that the contaminants are discharging to the Merrimack River and (2) groundwater flow on the Litchfield side is likely to be toward the river. However, to address the Town's concern, EPA will perform the following activities: (1) evaluate any existing hydrogeologic information from the Town of Litchfield to help understand groundwater flow (2) evaluate existing potential receptors, i.e. well users, as possible sampling locations and (3) determine the best location and number of wells that should be installed as permanent long-term monitoring points. EPA may need assistance from the town to obtain access to potential well locations through use of public land or rights of way. EPA will request the town designate an official representative, i.e. health officer, to coordinate well installations and submit future data.

Comment 8: One commenter requests that EPA conduct a public hearing on this issue for the information and education of the residents of Litchfield.

Response: As stated above, EPA believes that the Litchfield aquifer is not affected by the NH Plating plume. Hopefully, this finding will be confirmed through the initial and long-term periodic monitoring of existing and/or newly installed wells in Litchfield. EPA believes that this issue does not warrant a public hearing that may have the unintended result of worrying area residents without basis. Instead, EPA: (1) addressed the Litchfield selectmen in a public forum (2) will contact area property owners for permission to access existing and/or install wells for sampling and (3) will hold a public hearing later if sampling results indicate a potential problem exists.

Several comments were offered after the close of the public hearing.

Comment: What is the executive order referenced at the public meeting?

Response: President Clinton has ordered that sites that can complete all cleanup levels stipulated in their RODs by the end of the year 2000 should receive priority for funding.

Comment: Does the approximately $10 million estimated cost of the proposed plan include funds spent to date on the site?

Response: No. It does not include the money spent conducting the two removal actions in 1989 and 1994 and the RI/FS. The total past costs for the site are approximately $7 million.

Comment: Who owns the site?

Response: The former plating company owners still hold the titles. EPA holds a lien on them and back taxes are due the town. EPA will not take the properties but the town could take the land without incurring liability.

Comment: If the town took the land, could the area behind the former building be used as a recreation area?

Response: Yes. A portion of the lagoon system will receive the treated soil so the area would be flattened out. Uses such as a parking lot, a playing field, or any other use that does not include excavation should be acceptable. Excluding areas that will continue to be wetlands, approximately 3 to 4 acres could be available for such uses.

Comment: Does the proposed plan include any land use restriction on abutting properties?

Response: The only restriction would be that wells in the Groundwater Management Zone could not be used for potable purposes.

Comment: Is EPA working with the NHDES to monitor abutting properties?

Response: Yes. NHDES is the lead; EPA is working with the state.

ATTACHMENT A

COMMUNITY RELATIONS ACTIVITIES CONDUCTED AT THE NHPC SUPERFUND SITE IN MERRIMACK, NEW HAMPSHIRE

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COMMUNITY RELATIONS ACTIVITIES CONDUCTED AT THE NHPC SUPERFUND SITE IN MERRIMACK, NEW HAMPSHIRE

Community relations activities conducted at the NHPC Site include:

- EPA conducted local interviews to assist in developing a Community Relations Plan (April/May 1993).

- EPA issued the NHPC Community Relations Plan (July 1993).

- EPA published notices in early November 1993 in the Nashua Telegraph, Union Leader, Village Crier, and Bedford-Merrimack Bulletin announcing the establishment of the Administrative Record for the NTCRA and the date of the public meeting and public hearing to discuss the NTCRA preferred alternative and solicit public comment on the preferred alternative.

- EPA released a fact sheet, dated November 1993, discussing the EE/CA and its preferred alternative for the NTCRA.

- EPA conducted a public meeting to discuss the preferred alternative and a public hearing to solicit public comment on the preferred alternative. Both activities were held on November 15, 1993. Twenty-six people signed the sign-in sheet; eight people testified during the public hearing. A copy of the hearing transcript is included in the Administrative Record at the Information Repositories at the Merrimack Public Library and at the EPA Records Center.

- EPA conducted a public comment period from November 3 through December 2, 1993. Two people submitted written comments.

- EPA issued a press release on February 24, 1994, announcing it would remove the NHPC building the following summer.

- EPA issued a press release on November 3, 1994, announcing the initiation of the removal action on the NHPC building.

- EPA published notices in January 1998, in the Nashua Telegraph, Union Leader, Village Crier, and Broadcaster announcing the establishment of the Administrative Record for the RI/FS, and the dates of the public meeting, the public hearing, and public comment period.

- In early January 1998, EPA issued a proposed plan, which described the results of the RI and FS, and identified EPA's preferred cleanup alternative. The proposed plan was sent to the NHPC site mailing list.

- EPA conducted a public meeting on January 15, 1998, to discuss the Preferred Alternative. Eleven people signed the sign-in sheet.

- EPA conducted a public hearing on January 28, 1998, to solicit public comment on the Preferred Alternative. Twelve people signed the sign-in sheet; two people testified during the hearing.

- EPA conducted a public comment period from January 16, 1998 through February 14, 1998. Eight written comments were submitted.

- EPA and NHDES met with the Merrimack Village District on February 13, 1998.

- EPA and NHDES met with the Litchfield selectmen on April 13, 1998.

ATTACHMENT B

TRANSCRIPT OF THE JANUARY 28, 1998 PUBLIC HEARING

EPA REGION 1, NEW ENGLAND

NEW HAMPSHIRE PLATING COMPANY
SUPERFUND SITE

Public Hearing in Merrimack, New Hampshire

January 28, 1998

This hearing held at the Courtroom at Merrimack Town Hall, 6 Baboosic Lake Road, Merrimack, New Hampshire 03054

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CARL BAXTER, N.H. DES Chief
TAL HUBBARD, N.H. DES State Project Manager

MR. BOYNTON: Good evening. My name is Richard Boynton. I'm the supervisor in EPA's Superfund Program out of the Boston office. I have the responsibility for implementing response actions at the National Priorities List sites in New Hampshire. I think we have 18. I'll be the Hearing Officer for tonight's hearing on the New Hampshire Plating Superfund Site. Also present with me tonight are James DiLorenzo, who is U.S. EPA's project manager for the site; Angela Bonarrigo in the front row, who is our community relations specialist; Betsy Horne of Brown and Root Environmental at the table near the door and to my left is Carl Baxter, who is New Hampshire DES chief for the Bureau of Waste Management and Tal Hubbard of the New Hampshire DES. He's the project manager for the state. The purpose for this hearing is to accept oral comments on the New Hampshire Plating Feasibility Study and on EPA's proposed plan for addressing the contamination at the site. This is a formal hearing and we will not be responding to the comments tonight but will respond to them in writing after the closure of the comment period in a document called a Responsiveness Summary.

EPA conducted a public information meeting on the Feasibility Study Proposed Plan on January 15th at this

location. At that meeting we presented information concerning the proposed plan and responded to questions about the site. The public comment period began on January 16th, 1998 and will end on February 14th, 1998.

Now, let me describe the format of the hearing. First Jim DiLorenzo will give a brief overview of the proposed plan to clean up the site. Following Jim's presentation we will accept oral comments for the record. If you wish to make a comment please fill out an index card, available from Betsy in the rear of the room and also we have extra copies of the proposed plan available if you don't have one. I'll call on those wishing to make comments in the order in which I receive the cards. When I call on you I would ask you to stand and come forward, we have a microphone, and state your name and address and affiliation. The reason for this is we're recording these proceedings verbatim and we'll need this information for the record. If you have comments that may take longer than say, 15 minutes, please summarize your main points and provide us with a copy of the full text which I'll enter into the record in its entirety. Following your comments anybody at the table, Jim, I or the State, may ask you a question regarding your statement for clarification. After all the comments have been heard I will close the formal

hearing and at that point we can take questions that will be off the record. If you wish to submit written comments you can give those to us tonight or you can mail them to our Boston office and the address is in the proposed plan. If you have any questions about how to submit comments you can talk to Angela or anyone of us. As I mentioned earlier, we will have a Responsiveness Summary that will become part of the administrative record for the site and it will be included with our record of decision that we prepare at the end of the comment period.

Are there any questions about the format for the hearing? (No response from the audience). Before I ask Jim to talk about the site I just wanted to mention that we have received a comment from the Merrimack Village District dated January 12th, 1997. I want to correct that for the record and that date should be 1998. This comment in general talks about the Horseshoe Pond aquifer which may be needed by the year 2008. This letter, signed by Mr. Moreau, the chairman, will be entered into the record in its entirety as part of the comments.

We also received some comments from some local residents who were concerned about the implementation of the actual work at the site and what kind of risks that might cause them as local people living near the site.

With that, Jim why don't you begin.

MR. DiLORENZO: What I'm going to do is provide a very brief overview of what's already in the proposed plan just to try to clarify the main points of what is contained in that document. I'm sure many of you have come here with questions and we want to get right to those statements and questions.

So with that in mind, the proposed plan puts forth EPA's remedy for the New Hampshire Plating Superfund Site, which is located off of Wright Ave. and is delineated here on this map and the proposed plan. It includes treatment of soil and groundwater, active treatment of soil, passive treatment of groundwater. What that means is that the soil, which contains primarily cadmium but also many other plating metals, will be treated on site. The contaminated soil currently exists in the former lagoon locations where they were discharged from the plating facility and underneath the former plating building itself. So this area here and throughout this area here. Together that represents about 40,000 yards of contaminated soil. The soil will be treated down to the groundwater table on-site through a process called chemical fixation. The purpose of which is to eliminate the leach-ability of the metals through treatment of the metals itself. It chemically

binds the metals to the soil rendering them unleachable. That process would be performed on-site in one-foot lifts. The process involves spraying the soil with this reagent which reacts with the soil in a 24 hour time frame and renders the soil unleachable. It is excavated in one-foot lifts, temporarily stockpiled. Once all the soil has been treated it will be redeposited back in roughly this area of the site and revegetated, the top of it will be revegetated.

Once that is done, that will remove the ongoing source of contamination to the groundwater. The groundwater right now is contaminated with the same metals, primarily Cadmium and also some solvents, primarily Trichloroethene. The solvents were not found in the soils on-site, we tested for them but they are in the groundwater. I want to note too that the groundwater contamination is limited to the shallow aquifer. We did sample the shallow, which is basically the water table aquifer. And then there's also a deeper aquifer which was sampled. That had some traces of the metals but no contamination that exceeds ambient groundwater quality standards. That's also true of the bedrock. So the contamination is limited to the shallow aquifer.

What we're proposing to do with groundwater is once

the source of contamination is removed and treated we feel that over a period of time, 26 to 54 years, that groundwater will attenuate. And we would propose establishing a groundwater management zone around basically this area here, something of that fashion. What that groundwater management zone does is establishes a monitoring program and establishes restrictions on groundwater use in that area. Currently the only groundwater user is the Jones Chemical Corporation who has a production well. What we would be looking to restrict is water used for potable uses. So that would act to protect the public in terms of not allowing them to drink the water and establish a monitoring program to ensure that the levels do begin to decrease once the source control is complete. We would expect to see a decrease begin within five years after the start of the remedy. If not, then we would re-evaluate the approach at that time.

Included in the monitoring program, we will continue to sample surface water on Horseshoe Pond and the Merrimack River. Past sampling has indicated no impact to those surface water bodies and we would expect that trend to continue. With that done that would open for re-use this front parcel as industrial/commercial redevelopment in the future. This back parcel would have some use in the

nonwetland areas. These former lagoons were a wetland and are required under the Clean Water Act and the Federal Executive Order to be either restored or compensated.

As I said earlier, we need to excavate material from this area no matter which remedial approach we take. Therefore, impact to the wetlands is unavoidable, in fact it's already been impacted by the former plating operation. So what we're proposing to do is leave the treated material on-site which is going to require us to compensate for the approximately three acre wetland. For compensatory measures we are working with the Merrimack Conservation Commission and others to find suitable off-site locations, either inside the town or outside the town. The preference is to find something in the same watershed area and in near proximity to the site if possible.

With that said, the plan schedule is to have a Responsiveness Summary following the close of the public comment period on February 14. Thirty to 60 days we will have a record of decision out with our final determination. Any issues that are raised will be responded to in writing and we could also discuss them in an informal fashion directly if you would like during that time period. Once those issues are addressed we would anticipate having a record of decision in 30 to 60 days, sometime hopefully by

the end of March, and then we would have to compete for federal funds to perform the work. Right now I don't have a firm estimate of how long that may take. It's a federally funded project and it could take several months or even longer to obtain the funding. So that is hard to predict. But once we have the record of decision finalized it will be put forth to a national review panel who looks at this remedial action and all the other remedial actions that EPA is putting forth across the country and they basically rank them and determine who gets funding for what. The entire cost of this proposed remedy is just shy of ten million dollars including the soil treatment, the monitoring program and any incidental costs with the institutional controls, the groundwater management zone.

So with that said, once the soil treatment starts we estimate it would take two years to complete. I think that covers everything in a nutshell. Like Richard said, we'll open it up to formal comments now and then afterwards, once we close the hearing, if you want to come up and ask specific questions we'll hang around as long as it takes to try to answer them. Thank you.

MR. BOYNTON: The first person to make a comment is Mr. Jay Minkarah, Town of Merrimack Community Development Director.

MR. MINKARAH: I'll keep my comments brief and I have to apologize because I don't really have a strong understanding of the technical aspects of the cleanup. Overall, as I understand it the current proposal is most likely the proposal that would most swiftly return the property to an economically viable use, which from the prospective of the Community Development Department is our greatest interest. From that perspective I think at this point I am at least supportive of the current proposal. We certainly do have concerns that the cleanup be done in a manner that protects the interests of the existing viable uses in the area. We do have active industrial sites and we certainly have a concern that there not be an adverse impact to those.

We do have a concern for the quality of the groundwater and the speed in which it will be restored to an acceptable level. However, from my limited understanding it appears that the alternative that is currently proposed, basically the attenuation, is probably as effective as any more aggressive approach. Perhaps I'm wrong in understanding that but that seems to be -- that is at least my understanding. Otherwise I would just urge a solution that can bring this site back to viable use as expeditiously as possible. Thank you.

MR. BOYNTON: The next comment is from Mr. Brian J. Wilson, Merrimack Village District.

MR. WILSON: Good evening. I have a letter dated today. It's directed at Mr. Jim DiLorenzo and I need to read it into the record

MR. BOYNTON: If you'd like to and then if you could just hand it to us, if it's not 25 pages long.

MR. WILSON: No, actually it's only two and I think I can go through it pretty good. This is in comment after the fact that we came to the informational meeting, we asked some questions, we heard some answers and we sat down and thought about how we felt about the whole project itself.

The Merrimack Village District Wellhead Protection Committee has reviewed the proposed plan for the New Hampshire Plating Superfund Site. While we agree with the soil cleanup portion of the plan we are extremely concerned about the groundwater cleanup proposal. We understand that this portion of the project consists of Alternative 2: Limited Action. The limited action would indeed be limited, providing only natural attenuation of groundwater pollution. This is virtually the same as the No Action alternative with the minor exception that a groundwater

management zone be established and there would be long term monitoring of the groundwater.

We are also concerned with evaluation that was done for the project. Your table 4 of the proposed plan dated January 19, 1998 shows Alternative 2 with a shorter cleanup time for groundwater than Alternative 3, an active cleanup. We suspect the modeling that this is based on is not representative of real conditions since it suggests that your pump and treat system be less effective than no system at all. What are the assumptions used in the model? We do not believe that the model or the evaluation represents what would really happen if a competent groundwater cleanup scenario were used. We do not agree that the only groundwater cleanup option available would make the situation worse instead of better. Perhaps the model's assumption should be re-examined or the cleanup scenario should be modified so that it represents a more realistic situation.

The town of Merrimack's water situation is such that we cannot afford to write off major sources of water. The Horseshoe Pond aquifer is such a source. We have not tested the area because of the presence of this superfund site, however our hydrogeologic evaluation of the town identified it as one of the highest, if not the highest,

groups in Merrimack. The same hydrogeologic study also revealed to us that are no other sites left in Merrimack. Our two most recent well sites are located just over the town line in Hollis because of the fact that there were no other sites left in Merrimack.

The town is also working with DES to get Merrimack industrial metal sites cleaned up as soon as possible so that we may restore well 6 to good production capability. Once well 6 has been restored our next most cost effective alternative is to purchase water from one of our neighbors. Somewhat less cost effective is an intake and treatment plant on the Merrimack River. Currently not a very practical alternative because of the expense, difficulty of operation and low water levels during our maximum daily demand. As a result of these factors this Horseshoe Pond aquifer is of critical importance to the town of Merrimack and the Merrimack Village District.

As a result of these concerns we request that the EPA provide us with the following information: a written description of how the modeling of the groundwater cleanup alternative was conducted and a discussion of why more realistic cleanup alternatives were not evaluated or presented. Please also tell us how the model's assumptions could be modified to show a more realistic situation or

alternatively discuss why other alternatives were not presented or their benefits not estimated if the hydrogeologic situation is too complex to model. Please describe how EPA's proposed cleanup will effect Merrimack Village District's future use of the Horseshoe Pond area for a production well. We are most concerned about how we would be able to obtain new source approval for a well in the Horseshoe Pond area if the site has not been cleaned up adequately.

Based on the current proposal and our concerns as described above we do not support the cleanup as proposed. Should you have any questions there's phone numbers of where we can be reached and it's signed by Eilene Pannetier, Wellhead Chairman.

MR. BOYNTON: Thank you Mr. Wilson. Does anyone else wish to make a comment at this time?

(No response from the audience)

MR. BOYNTON: If there are no further comments for the record I am going to close the hearing and then we can take general questions after that. So with that, I thank you all for coming and I want to thank you for your comments. This hearing is closed.

OFF THE RECORD (7:35 p.m.)

STATE OF NEW HAMPSHIRE

MERRIMACK, SS.

I, Cori Crumb, a Notary Public in the State of New Hampshire, do hereby certify that I transcribed from a tape recording the foregoing **thirteen (13)** pages and that the same is a true, full and correct transcript of all of the testimony, to the best of my knowledge and belief.

I further certify that I am neither attorney nor counsel for, nor related to, or employed by any of the parties to this action, and further that I am not a relative or employee of any attorney or counsel employed in this case, nor am I financially interested in this action.

IN WITNESS WHEREOF, I hereunto set my hand this 5th day of February 1998.

Cori Crumb

Cori Crumb, Audio Transcriber

My Commission Expires July 31, 2001

ATTACHMENT C

COMPLETE TEXT OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD

Merrimack Village District • Box 1949 • Merrimack, N.H. 03054

January 12, 1997

Mr. Jim DiLorenzo
Remedial Project Manager
USEPA (HBO)
JFK Federal Building
Boston, MA 02203

Dear Mr. DiLorenzo:

A study performed by the Merrimack Village District's hydrogeologists in 1994-1995 showed that the Horseshoe Pond area near New Hampshire Plating may be one of the only significant aquifers remaining in Merrimack.

We have recently added a well online in the adjacent town of Hollis and we have an additional tap site, also in Hollis. These are small yield wells and we will need more wells in the future. After expected restoration of a well in South Merrimack that had been contaminated by Merrimack Industrial Metals and the added Hollis well, by the year 2004 we will be facing a critical need for other sources.

Your proposal to clean up the New Hampshire Plating site is of vital interest to us as we plan for the future. Your groundwater clean up alternatives found listed on page 9 of your plan we received this date caused us to focus on "Alternative 3" - Treat Contaminants on Site. We feel that this procedure would enable the Horseshoe Pond aquifer to be retained in our planning for use by the year 2008 and that the high value that this aquifer represents would be retained.

We need to take what steps possible to avoid having Horseshoe Pond abandoned as a potential source of water. If we can be of further assistance, please do not hesitate to call.

Sincerely,

Bruce Moreau, Chairman

Lon Woods, Commissioner

Eileen Pannetier, Vice-Chairman

Dan Bittel, Commissioner

Peter Karam, Commissioner

Field Office Tel. (603) 424-7171 • Business Office Tel. (603) 424-9241 • Fax (603) 424-0563

6666/60220

Use This Space to Write Your Comments
or to be added to the mailing list

EPA wants your written comments on the options under consideration for dealing with contamination at the New Hampshire Plating Superfund Site. You can use the form below to send written comments. If you have questions about how to comment, please call EPA Community Involvement Coordinator, Angela Bonarrigo at (617) 565-2501. Please mail or fax this form or additional sheets of written comments, postmarked no later than February 14, 1998 to:

Jim DiLorenzo
Remedial Project Manager
U.S. Environmental Protection Agency
Region I (HBO)
JFK Federal Building
Boston, MA 02203-0001

or E-mail your comments to dilorenzo.jim@epamail.epa.gov

Dear Ms. Bonarrigo:

I have received proposed plans regarding NH Plating Co. and wish to comment. Please note the location of my property in respects to the site.

I am in agreement with Alternative-2 but not in favor of Alternative-5. I would prefer alternative-4 involving in-situ treatment and wetlands restoration.

Our property borders closely to site and have no information as to how close contaminants actually are. During the excavation process, I am concerned for my family's health and

(Attach sheets as needed)

Comment Submitted by: Barbara Gate

15 Railroad Ave
Merrimack NH
03054

New Hampshire Plating Company Superfund Site
Public Comment Sheet (Continued)

am requesting any information on possible side effects of contact with contaminants that are airborne or become exposed during this process. Please call to exchange information. I may have or forward current findings if possible.

Thank you for your consideration and concern regarding the safety of my family.

Sincerely,

Gretchen Kale, Brent Harbeck + sons

---Fold, staple, stamp, and mail---

Gretchen Kale/Brent Harbeck
15 Railroad Ave
Merrimack NH 03054

MANCHESTER, NH 03

32 USA

Jim DiLorenzo
Remedial Project Manager
U.S. Environmental Protection Agency
Region I (HBO)
JFK Federal Building
Boston, MA 02203

Merrimack Village District • Box 1949 • Merrimack, N.H. 03054

January 28, 1998

Mr. Jim DiLorenzo
Remedial Project Manager
USEPA
JFK Federal Building
Boston, MA 02203

Dear Mr. DiLorenzo:

The Merrimack Village District Wellhead Protection Committee has reviewed the proposed plan for the New Hampshire Plating Superfund site. While we agree with the soil clean up portion of the plan, we are extremely concerned about the groundwater clean up proposal. We understand that this portion of the project consists of Alternative 2: limited action. The limited action would indeed be limited: providing only "natural attenuation" of groundwater pollution. This is virtually the same as "no action" alternative, with the minor exception that a groundwater management zone would be established, and there would be long-term monitoring of the groundwater.

We are also concerned with the evaluation that was done for the project. Your Table 4 of the proposed plan dated January 19, 1998 shows Alternative 2 with a shorter clean up time for groundwater than Alternative 3: an active clean up. We suspect that the modeling that this is based on is not representative of real conditions, since it suggests that your pump and treat system be less effective than no system at all. What are the assumptions used in the model? We do not believe that the model, or the evaluation, represents what would really happen if a competent groundwater clean up scenario were used. We do not agree that the only groundwater clean up option available would make the situation worse instead of better. Perhaps the model's assumption should be reexamined, or the clean up scenario should be modified so that it represents a more realistic situation.

The Town of Merrimack's water situation is such that we cannot afford to "write-off" major sources of water. The Horseshoe Pond aquifer is such a source. We have not tested the area because of the presence of this Superfund site, however, our hydrogeologic evaluation of the town identified it as one of the highest, if not the highest producing area in Merrimack.

Field Office Tel. (603) 424-7171 • Business Office Tel. (603) 424-9241 • Fax (603) 424-0563

Merrimack Village District • Box 1949 • Merrimack, N.H. 03054

January 28, 1998

Mr. Jim DiLorenzo

The same hydrogeologic study also revealed to us that there are no other sites left in Merrimack. Our two most recent well sites are located just over the town line in Hollis, because of the fact that there are no other sites left in Merrimack. The town is also working with DES to get the Merrimack Industrial Metals site cleaned up as soon as possible, so that we may restore well 6 to good production capability. Once well 6 has been restored, our next most cost-effective alternative is to purchase water from one of our neighbors. Somewhat less cost-effective is an intake and treatment plant on the Merrimack River, currently not a very practical alternative because of the expense, difficulty of operation, and low water levels during our maximum day demand. As a result of these factors, this Horseshoe Pond aquifer is of critical importance to the Town of Merrimack and the Merrimack Village District.

As a result of these concerns, we request that EPA provide us with the following information:

1) A written description of how the modeling of groundwater clean up alternatives was conducted and a discussion of why more realistic clean up alternatives were not evaluated or presented. Please also tell us how the model's assumptions could be modified to show a more realistic situation, or alternatively, discuss why other alternatives were not presented or their benefits not estimated if the hydrologic situation is just too complex to model.

2) Please describe how EPA's proposed clean up will affect Merrimack Village District's future use of the Horseshoe Pond area for a production well. We are most concerned about how we would be able to obtain "new source approval" for a well in the Horseshoe Pond area if the site has not been cleaned up adequately.

Based on the current proposal and our concerns described above, we do not support the clean up as proposed. Should you have questions regarding this matter, please do not hesitate to contact me at 424-8444 x301 or Brian Wilson, MVD Assistant Superintendent, at 424-7171. Thank you in advance to your response to these requests.

Sincerely,

Eileen Pannetier
Chairman
Wellhead Protection Committee

Field Office Tel. (603) 424-7171 • Business Office Tel. (603) 424-9241 • Fax (603) 424-0563

Two Liberty Way, Suite 1, Litchfield, NH 03052-2345
TELEPHONE: (603) 424-4046
FAX: (603) 424-3014

TOWN OF LITCHFIELD

12 February, 1998

Mr. Jim DiLorenzo
Remedial Project Manager
U.S. Environmental Protection Agency (HBO)
JFK Federal Building
Boston, MA
02203

Re: N.H. Plating Superfund Site - Official Comment

Dear Mr. DiLorenzo:

The Town of Litchfield, situated directly across the Merrimack River from the N.H. Plating Company Superfund site has reviewed the proposed plan for cleanup and wishes to make the following comments part of the official records.

The Town of Litchfield has reviewed the proposed cleanup documents presented at the Public Informational meetings held on January 15 & 28, 1998. In reviewing these documents and the comments made by EPA personnel at the meetings, the Town has a concern surrounding the contamination of the groundwater present at the site in Merrimack and its migration towards the Merrimack River. As stated by EPA, the contamination of the groundwater on the Merrimack side currently resides in the upper strata of the water table and there has been to date no detection of the contamination in the River water, its sediments or fauna. The Town of Litchfield is concerned that the contamination of the N.H. Plating Company site may migrate deeper into the water table and potentially move under and across the Merrimack River thus presenting a hazard to residents of Litchfield.

The Town of Litchfield bordering the Merrimack is composed mostly of agricultural and residential property. Residents of the Town currently utilized the water from our aquifer for both drinking as well as agricultural purposes. The utilization of water contaminated by heavy metals and organic compounds as described in Table 2 (Groundwater Standards and Average Concentrations Detected) in your informational bulletin presented at the Public Meetings we believe to be inappropriate and warrants monitoring by EPA and the Town of Litchfield.

The Town of Litchfield is requesting that as part of the cleanup of the N.H. Plating Company Superfund Site that monitoring wells sampled at an appropriate frequency be established on the Litchfield side of the Merrimack River. The purpose of the monitoring wells would be to detect as early as possible any migration of groundwater contaminants and thus provided some assurance of protection to Litchfield residents. Furthermore, the Town of Litchfield requests that any results of groundwater monitoring performed on either the Merrimack or Litchfield side of the river be provided to the Litchfield Board of Selectmen and the Litchfield Conservation Commission. The Town of Litchfield also requests that the EPA conduct a Public hearing on this matter for the information and education of the town residents. It is anticipated that the establishment, monitoring and reporting of results for the monitoring wells would be performed at the expense of the EPA Superfund Program. We have enclosed in this letter a photocopy of the Town's tax maps with the names and addresses of property owners.

Should you have any questions on this matter, please do not hesitate to contact the Board of Selectmen or Conservation Commission.

Respectfully submitted,

John Pinciaro
Chairman
Board of Selectmen

John Devereaux
Selectman

Pat Jewett
Selectman

John Lazzaro
Selectman

Tom Levesque, Sr.
Selectman

Frank Byron
Chairman
Conservation Commission

Merrimack Village District • Box 1949 • Merrimack, N.H. 03054

February 13, 1998

Jim DiLorenzo
Environmental Protection Agency
HAND DELIVERED

Dear Mr. DiLorenzo:

The Merrimack Village District Wellhead Protection Committee supports the mitigation procedures set forth by the Merrimack Conservation Committee. This 50.337 acre plot (29.6 acres we believe to be wetlands) marked by Town of Merrimack tax maps as lot 3-B-260 has numerous benefits to the town. It is an environmentally sound decision, by the Conservation Committee, to protect this area from future development for several socio-economic reasons. This area is an excellent recharge source for an underlying aquifer system. Your cooperation in supporting the efforts of our Conservation Committee is appreciated.

Sincerely,

Brian J Wilson

Brian J. Wilson
Assistant Superintendent

Field Office Tel. (603) 424-7171 • Business Office Tel. (603) 424-9241 • Fax (603) 424-0563

Town of Merrimack, New Hampshire 03054

603/424-3531
Community Development Department. P.O. Box 940 603/424-3931
Town Hall. West Wing. 8 Baboosic Lake Road Fax 603/424-1408
Divisions: Code Enforcement & Building – Conservation – Health – Planning & Zoning

February 13, 1998

Mr. James M. DiLorenzo, Environmental Eng.
U.S. Environmental Protection Agency
Office of Site Remediation and Restoration
JFK Federal Building (HBO)
Boston, MA 02203-2211

RE: New Hampshire Plating
Wetland Mitigation Sites

Dear Mr. DiLorenzo:

This letter is submitted by the Merrimack Conservation Commission to urge the U.S. Environmental Protection Agency (EPA) to select a parcel of land within the Town of Merrimack to be used as a mitigation site for the wetlands which will be destroyed as a result of site redemption activities at the New Hampshire Plating Site on Wright Avenue in Merrimack, NH.

At the Conservation Commission's January 27, 1998 meeting which was attended by you and Mr. Tal Hubbard of the NHDES, three potential sites were suggested for mitigation: 1)the Skylar Property, Tax Map 3D-1/3, 2) an area in the White Pine Swamp area, Tax Map 3B/260, and 3) an area owned by the Manchester YMCA located adjacent to Horseshoe Pond, Tax Map 4D-4/43. On January 9, 1998 site inspections were made of the Skylar and White Pine Swamp properties. At our January 10, 1998 Conservation Commission meeting it was reported to us that of these two properties the White Pine Swamp lot looked more favorable. However, it was also reported that EPA may consider selecting properties outside of the Town of Merrimack as a mitigation site.

The Conservation Commission wishes to go on record as opposing EPA's selection of mitigation sites outside of the Town of Merrimack. We believe that it is inappropriate to spend Federal monies (tax payers dollars) on land acquisition outside of Merrimack when the loss of valuable wetland areas has occurred within the Town. Merrimack, as you may well know, relies on groundwater for nearly 100 percent of its potable drinking water supply. It is imperative that the Town protect its groundwater supply by practicing wise land management and controlling those activities in the vicinity

of our water supply wells and wellhead protection areas. One method of control is for the Town to acquire lands within and adjacent to wellhead protection areas. Accordingly, it would be very appropriate for the Town to acquire the 55+acre parcel of land in the White Pine Swamp area. As was pointed out in the Commission's January 27, 1998 meeting, this land is within the wellhead protection area of Merrimack Village District Wells No. 1, No. 2 and No. 3. Acquisition of the White Pine Swamp property provides the following benefits for the Town:

- Property is located in the headwaters of a stream which runs into Greenspond which is adjacent to MVD Well #3;
- The property itself is a source of recharge within the recharge area for MVD Well #3;
- It is a nursery and brooding area for waterfowl;
- It is a suitable habitat for mink, otters and beavers;
- It serves as a nesting area for songbirds and marsh dwellers;
- It is located in the same watershed as the NH Plating Site wetlands;
- Ensures protection of a large upland area around the wetlands by removing development options which are currently being considered; and finally
- Is within the Town where the remediation site is located.

The Merrimack Conservation Commission urges you and your staff to select the White Pine Swamp property (or other appropriate area within the Town) as the mitigation area for the wetlands which will be destroyed during the site remediation activities at the NH Plating remediation site. If you have any questions regarding this matter, please do not hesitate to call me at (603)595-4504.

Very truly yours,

Michael R. Burke

Michael R. Burke, Chairman
Merrimack Conservation Commission

Mrb/lbw

CC: Dean Shankle, Town Manager
Merrimack Board of Selectmen
Jay Minkarah, Community Development Director
Brian Wilson. Asst. Superintendent, MVD

D297ltr: NHPLTMIT

APPENDIX C
Administrative Record Index

New Hampshire Plating Company
NPL Site Remedial Administrative Record

Index

Compiled: January 9, 1998

Prepared for

Region I
Waste Management Division
U.S. Environmental Protection Agency

With Assistance from

TECHLAW, INC.
160 North Washington Street, Suite 400, Boston, MA 02114 (617) 720-0320

INTRODUCTION

This document is the Index to the Administrative Record File compiled for the New Hampshire Plating Superfund Site. The index cites site-specific documents. Site-specific documents in the Administrative Record File are in order by the Document No. included at the end of each citation.

The Administrative Record File is available for public review, by appointment, at the EPA Region I OSRR Records Center, 90 Canal Street, Boston, MA, (617-573-5729) and at the Merrimack Public Library, 470 Daniel Webster Highway, Merrimack, New Hampshire 03054.

Questions concerning this Administrative Record File should be addressed to the EPA Region I site manager.

An Administrative Record is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).

New Hampshire Plating Company
NPL Site Remedial Administrative Record

Table of Contents

Jberggre.idx	Title	Author	Date	Doc #
000001	Trip Report For The Initial Waste Management Division Visit to New Hampshire Plating Site.	RICHARD WILLEY	1992- 2-25	000001
000002	Transmittal of Initial Release Public Health Assessment.	LOUISE HOUSE	1992- 5-27	000002
000003	Transmittal of Site Photo Frame No. 7920 and Request for Additional Copies.	RUTH LEABMAN	1992- 5-29	000003
000004	Letter from Richard Goehlert, U.S. EPA RI, to C. Porfert, U.S. EPA RI. Review of Removal data to focus the Remedial Investigation.	RICHARD GOEHLERT	1992- 6- 2	000004
000005	Letter from Pheobe Call, Badger Engineers, to Richard Goehlert, U.S. EPA RI. Summary of July 22, 1992, Kickoff Meeting.	PHEOBE CALL	1992- 7-31	000005
000006	Letter from Pheobe Call, Badger Engineers, to Richard Goehlert, U.S. EPA RI. Addendum to July 22, 1992, Kickoff Meeting.	PHEOBE CALL	1992- 8- 6	000006
000007	Transmittal of Draft Work Plan and Draft Detailed Cost Estimate, New Hampshire Plating, Technical Assistance.	GEORGE GARDNER	1992- 8-14	000007
000008	Letter Requesting Technical Assistance in Characterizing Contaminated Solid Wastes.	RICHARD WILLEY	1992- 8-26	000008
000009	Transmittal of Community Relations Material, Technical Assistance, New Hampshire Plating Superfund Site.	ROBERT PALERMO	1992- 9-17	000009
000010	Transmittal of Draft Work Plan and Draft Detailed Cost Estimate, Remedial Investigation/Focus Feasibility Study, New Hampshire Plating Company Site.	GEORGE GARDNER	1992-10-20	000010
000011	Transmittal of Site Base Maps Pertaining to the Remedial Investigation.	RICHARD GOEHLERT	1992-11- 9	000011
000012	Transmittal of Draft Health and Safety Plan, New Hampshire Plating Company Site.	ROBERT PALERMO	1992-11-16	000012

Jberggre.idx	Title	Author	Date	Doc #
000013	Letter from Lucy Guzman, Halliburton NUS, to Richard Goehlert, U.S. EPA RI. Changes needed in NHDES Data Format to Facilitate CLP Comparisons.	LUCY GUZMAN	1992-12-15	000013
000014	Transmittal Letter for Groundwater Level Measurements adn Groundwater Sampling Information.	ROBERT PALERMO	1993- 2- 4	000014
000015	Transmittal of Draft Location and Elevation Survey Services Specifications, RI/FS, New Hampshire Plating Company Site.	GEORGE GARDNER	1993- 3- 1	000015
000016	Letter Concerning Sampling Locations and Water Level Evaluations.	RICHARD GOEHLERT	1993- 3- 5	000016
000017	Letter Concerning Remedial Investigation Activities List.	JIM DI LORENZO	1993- 3-11	000017
000018	Transmittal of the Agency For Toxic Substances and Disease Registry (ASTDR) Public Health Assessment - Public Comment Release.	MAX HOWIE	1993- 3-15	000018
000019	Letter Concerning the Use of Merrimack's Wastewater Treatment Facility.	RICHARD GOEHLERT	1993- 3-24	000019
000020	Transmittal of Wastewater Quality Regulations, Ground Water Protection Rules, Hazardous Waste Rules and Solid Waste Rules.	MICHAEL ROBINETTE	1993- 4- 9	000020
000021	Letter Concerning Soil Testing and Remedy Alternatives.	RICHARD GOEHLERT	1993- 8-11	000021
000022	Transmittal of Quality Assurance/Quality Control Documentation for VOC Samples Analyzed by NHDES.	MICHAEL ROBINETTE	1993-10-15	000022
000023	Transmittal of One Diskette Containing Water Quality Analysis Conducted by NHDES.	C. WAYNE IVES	1993-10-29	000023
000024	Letter Concerning the Location of Monitoring Wells on YMCA Property.	JIM DI LORENZO	1994- 9- 1	000024
000025	Transmittal of Requested Information, RI Field Program, New Hampshire Plating Company Site.	ROBERT PALERMO	1994- 3-22	000025
000026	Sampling and Analysis Data: Available for review at EPA Records Center.			000026

Jberggre.idx	Title	Author	Date	Doc #
000027	Sampling and Analysis Plan, Technical Assistance with Transmittal Letter (Draft).		1992- 8-	000027
000028	Sampling and Analysis Plan, Phase I Lagoon and Surficial Soil Sampling, RI/FS (Draft Final).		1993- 4-	000028
000029	Final Phase II Sampling and Analysis Plan, RI/FS, New Hampshire Plating Superfund Site.		1993-11-	000029
000030	Letter Concerning Soil Screening Treatability Results.	STEVEN SAFFERMAN	1993-11-23	000030
000031	Letter from Steven Safferman, U.S. EPA, to Richard Goehlert, U.S. EPA RI. Revised Memo - Soil Screening Treatability Results.	STEVEN SAFFERMAN	1993-12-13	000031
000032	Letter Concerning Groundwater Sampling Results.	RICHARD GOEHLERT	1994- 2- 3	000032
000033	Transmittal of Horseshoe Pond Inorganic Data Validation Packages for Surface Water and Sediments.	ROBERT PALERMO	1994- 5-13	000033
000034	Conceptual Wetland Mitigation Plan, RI/FS.		1994- 8-	000034
000035	Geophysical Investigations in the Vicinity of a Former Electroplating Facility in Merrimack, New Hampshire with Transmittal Letter.	THOMAS MACK	1994- 9-27	000035
000036	Ecological Characterization for New Hampshire Plating Site with Transmittal Letter.	GORDON BECKETT	1994- 9-29	000036
000037	Sampling and Analysis Plan for Soil Characterization, RI/FS, (Draft).		1994-12-	000037
000038	Summary of Phase I and Surficial Soil Sampling XRF Metals and CLP Cyanides Map.		1994-12-	000038
000039	Health and Safety Plan, Phase I Lagoon and Surficial Soil Sampling, RI/FS, (Draft).		1992-11-	000039
000040	Phase II Lagoon Sampling Remedial Investigation Report Map.		1996- 2-13	000040
000041	Remedial Investigation Report, Volume 1 - Text, RI/FS, with Transmittal Letter (Draft Final).		1996- 5-	000041
000042	Remedial Investigation Report, Volume 2 - Tables, RI/FS, (Draft Final).		1996- 5-	000042

All Documents

Jberggre.idx	Title	Author	Date	Doc #
000043	Remedial Investigation Report, Volume 3 - Figures, RI/FS, (Draft Final).		1996- 5-	000043
000044	Remedial Investigation Report, Volume 4 - Appendices, RI/FS, (Draft Final).		1996- 4-	000044
000046	Work Plan, Remedial Investigation/Focus Feasibility Study, with Transmittal Letter (Draft Final).		1993- 1-	000046
000047	Baseline Human Health Risk Assessment, Appendix E, RI/FS, (Draft Final).		1995-10-	000047
000048	Final Feasibility Study, New Hampshire Plating Company Site.		1997-12-	000048
000049	Letter from Michael Robinette, NHDES, to Charles Watson, Town of Merrimack. Questions regarding the remediation process.	MICHAEL ROBINETTE	1992- 7-22	000049
000050	Community Relations Plan, RI/FS, with Transmittal Letter.		1993- 7-	000050
000051	"EPA to Resume Cleanup at Waste Site in Merrimack."		1990- 5-15	000051
000052	"EPA Proposes 22 Site to Superfund List, Two in New England."		1991- 7-25	000052
000053	"Health Report Expected on New Hampshire Metals Site."		1993- 3-16	000053
000054	"Public Comment Sought on Merrimack Site."		1993- 3-31	000054
000055	"EPA Studying Merrimack Waste Site Contamination."		1993- 5-28	000055
000056	"Merrimack Residents Told Site is not a Health Threat."		1993- 6-10	000056
000057	"EPA to Monitor Merrimack Pollution Site."		1993-10-23	000057
000058	Letter Containing a Summary of Issues Raised at June 13, 1990, Public Meeting.	EBER CURRIER	1990- 6-27	000058
000059	New Hampshire Plating Superfund Site, Wednesday June 9, 1993, Meeting Agenda with Transmittal Letter.	ROBERT PALERMO	1993- 6- 9	000059
000060	"Remedial Activities Underway."		1993- 5-	000060
000061	Letter from Merrill Hohman, U.S. EPA Region I to Ken Finkelstein, National Oceanic and Atmospheric Administration with attached Trustee Notification	MERRILL HOHMAN	1993- 2-25	000061

Jberggre.idx	Title	Author	Date	Doc #
000062	Proposed Plan, New Hampshire Plating Company Superfund Site.		1998- 1-	000062

03.01 REMEDIAL INVESTIGATION - CORRESPONDENCE

Title:	Trip Report For The Initial Waste Management Division Visit to New Hampshire Plating Site.		
Addressee:	U.S. EPA REGION 1		
Authors:	RICHARD WILLEY - HYDROLOGIST		
Date:	February 25, 1992		
Format:	CORRESPONDENCE	No. Pgs:	5
AR No.	03.01.1	Document No.	000001

Title:	Transmittal of Initial Release Public Health Assessment.		
Addressee:	FRANK CIAVATTIERI - U.S. EPA REGION 1		
Authors:	LOUISE HOUSE - DEPT. OF HEALTH AND HUMAN SERVICES		
Date:	May 27, 1992		
Format:	CORRESPONDENCE	No. Pgs:	1
AR No.	03.01.2	Document No.	000002

Title:	Transmittal of Site Photo Frame No. 7920 and Request for Additional Copies.		
Addressee:	DENNIS MORGAN - U.S. EPA REGION 1		
Authors:	RUTH LEABMAN - U.S. EPA REGION 1		
Date:	May 29, 1992		
Format:	CORRESPONDENCE	No. Pgs:	1
AR No.	03.01.3	Document No.	000003

Title:	Letter from Richard Goehlert, U.S. EPA RI, to C. Porfert, U.S. EPA RI. Review of Removal data to focus the Remedial Investigation.		
Addressee:	C PORFERT - U.S. EPA REGION 1		
Authors:	RICHARD GOEHLERT - U.S. EPA REGION 1		
Date:	June 2, 1992		
Format:	CORRESPONDENCE	No. Pgs:	2
AR No.	03.01.4	Document No.	000004

Title:	Letter from Pheobe Call, Badger Engineers, to Richard Goehlert, U.S. EPA RI. Summary of July 22, 1992, Kickoff Meeting.		
Addressee:	RICHARD GOEHLERT - U.S. EPA REGION 1		
Authors:	PHEOBE CALL - BADGER ENGINEERS		
Date:	July 31, 1992		
Format:	CORRESPONDENCE	No. Pgs:	3
AR No.	03.01.5	Document No.	000005

Title:	Letter from Pheobe Call, Badger Engineers, to Richard Goehlert, U.S. EPA RI. Addendum to July 22, 1992, Kickoff Meeting.		
Addressee:	RICHARD GOEHLERT - U.S. EPA REGION 1		
Authors:	PHEOBE CALL - BADGER ENGINEERS		
Date:	August 6, 1992		
Format:	CORRESPONDENCE	No. Pgs:	2
AR No.	03.01.6	Document No.	000006

Title:	Transmittal of Draft Work Plan and Draft Detailed Cost Estimate, New Hampshire Plating, Technical Assistance.		
Addressee:	DIANE KELLEY - U.S. EPA REGION 1		
Authors:	GEORGE GARDNER - HALLIBURTON NUS		
Date:	August 14, 1992		
Format:	CORRESPONDENCE	No. Pgs:	1
AR No.	03.01.7	Document No.	000007

Title:	Letter Requesting Technical Assistance in Characterizing Contaminated Solid Wastes.		
Addressee:	JOAN COLSON - U.S. EPA OFFICE OF RESEARCH & DEVELOP.		
Authors:	RICHARD WILLEY - HYDROLOGIST		
Date:	August 26, 1992		
Format:	CORRESPONDENCE	No. Pgs:	2
AR No.	03.01.8	Document No.	000008

Title:	Transmittal of Community Relations Material, Technical Assistance, New Hampshire Plating Superfund Site.		
Addressee:	RICHARD GOEHLERT - U.S. EPA REGION 1		
Authors:	ROBERT PALERMO - BADGER ENGINEERS		
Date:	September 17, 1992		
Format:	CORRESPONDENCE	No. Pgs:	1
AR No.	03.01.9	Document No.	000009

Title:	Transmittal of Draft Work Plan and Draft Detailed Cost Estimate, Remedial Investigation/Focus Feasibility Study, New Hampshire Plating Company Site.		
Addressee:	DIANE KELLEY - U.S. EPA REGION 1		
Authors:	GEORGE GARDNER - HALLIBURTON NUS		
Date:	October 20, 1992		
Format:	CORRESPONDENCE	No. Pgs:	1
AR No.	03.01.10	Document No.	000010

Title:	Transmittal of Site Base Maps Pertaining to the Remedial Investigation.		
Addressee:	ROBERT PALERMO - BADGER ENGINEERS		
Authors:	RICHARD GOEHLERT - U.S. EPA REGION 1		
Date:	November 9, 1992		
Format:	CORRESPONDENCE	No. Pgs:	1
AR No.	03.01.11	Document No.	000011

Title:	Transmittal of Draft Health and Safety Plan, New Hampshire Plating Company Site.		
Addressee:	RICHARD GOEHLERT - U.S. EPA REGION 1		
Authors:	ROBERT PALERMO - BADGER ENGINEERS		
Date:	November 16, 1992		
Format:	CORRESPONDENCE	No. Pgs:	1
AR No.	03.01.12	Document No.	000012

Title:	Letter from Lucy Guzman, Halliburton NUS, to Richard Goehlert, U.S. EPA RI. Changes needed in NHDES Data Format to Facilitate CLP Comparisons.		
Addressee:	RICHARD GOEHLERT - U.S. EPA REGION 1		
Authors:	LUCY GUZMAN - HALLIBURTON NUS		
Date:	December 15, 1992		
Format:	CORRESPONDENCE	No. Pgs:	2
AR No.	03.01.13	Document No.	000013

Title:	Transmittal Letter for Groundwater Level Measurements adn Groundwater Sampling Information.		
Addressee:	RICHARD WILLEY - U.S. EPA REGION 1		
Authors:	ROBERT PALERMO - BADGER ENGINEERS		
Date:	February 4, 1993		
Format:	CORRESPONDENCE	No. Pgs:	2
AR No.	03.01.14	Document No.	000014

Title:	Transmittal of Draft Location and Elevation Survey Services Specifications, RI/FS, New Hampshire Plating Company Site.		
Addressee:	DIANE KELLEY - U.S. EPA REGION 1		
Authors:	GEORGE GARDNER - HALLIBURTON NUS		
Date:	March 1, 1993		
Format:	CORRESPONDENCE	No. Pgs:	1
AR No.	03.01.15	Document No.	000015

Title:	Letter Concerning Sampling Locations and Water Level Evaluations.		
Addressee:	ROBERT PALERMO - BADGER ENGINEERS		
Authors:	RICHARD GOEHLERT - U.S. EPA REGION 1		
Date:	March 5, 1993		
Format:	CORRESPONDENCE	No. Pgs:	1
AR No.	03.01.16	Document No.	000016

Title:	Letter Concerning Remedial Investigation Activities List.		
Addressee:	KATHY DONOVAN - BADGER ENGINEERS		
Authors:	JIM DI LORENZO - U.S. EPA REGION 1		
Date:	March 11, 1993		
Format:	CORRESPONDENCE	No. Pgs:	2
AR No.	03.01.17	Document No.	000017

Title:	Transmittal of the Agency For Toxic Substances and Disease Registry (ASTDR) Public Health Assessment - Public Comment Release.		
Addressee:	FRANK CIAVATTIERI - U.S. EPA REGION 1		
Authors:	MAX HOWIE - DEPT. OF HEALTH AND HUMAN SERVICES		
Date:	March 15, 1993		
Format:	CORRESPONDENCE	No. Pgs:	2
AR No.	03.01.18	Document No.	000018

Title:	Letter Concerning the Use of Merrimack's Wastewater Treatment Facility.		
Addressee:	ROBERT PALERMO - BADGER ENGINEERS		
Authors:	RICHARD GOEHLERT - U.S. EPA REGION 1		
Date:	March 24, 1993		
Format:	CORRESPONDENCE	No. Pgs:	1
AR No.	03.01.19	Document No.	000019

Title:	Transmittal of Wastewater Quality Regulations, Ground Water Protection Rules, Hazardous Waste Rules and Solid Waste Rules.		
Addressee:	KATHY DONOVAN - BADGER ENGINEERS		
Authors:	MICHAEL ROBINETTE - N.H. DEPT. OF ENVIRONMENTAL SERVICES		
Date:	April 9, 1993		
Format:	CORRESPONDENCE	No. Pgs:	1
AR No.	03.01.20	Document No.	000020

Title:	Letter Concerning Soil Testing and Remedy Alternatives.		
Addressee:	WILLIAM SLACK - UNIVERSITY OF CINCINNATI		
Authors:	RICHARD GOEHLERT - U.S. EPA REGION 1		
Date:	August 11, 1993		
Format:	CORRESPONDENCE	No. Pgs:	1
AR No.	03.01.21	Document No.	000021

Title:	Transmittal of Quality Assurance/Quality Control Documentation for VOC Samples Analyzed by NHDES.		
Addressee:	LUCY GUZMAN - HALLIBURTON NUS		
Authors:	MICHAEL ROBINETTE - N.H. DEPT. OF ENVIRONMENTAL SERVICES		
Date:	October 15, 1993		
Format:	CORRESPONDENCE	No. Pgs:	1
AR No.	03.01.22	Document No.	000022

Title:	Transmittal of One Diskette Containing Water Quality Analysis Conducted by NHDES.		
Addressee:	AMY HOYT - U.S. EPA REGION 1		
Authors:	C. WAYNE IVES - N.H. DEPT. OF ENVIRONMENTAL SERVICES		
Date:	October 29, 1993		
Format:	CORRESPONDENCE	No. Pgs:	1
AR No.	03.01.23	Document No.	000023

Title:	Transmittal of Requested Information, RI Field Program, New Hampshire Plating Company Site.		
Addressee:	RICHARD GOEHLERT - U.S. EPA REGION 1		
Authors:	ROBERT PALERMO - BADGER ENGINEERS		
Date:	March 22, 1994		
Format:	CORRESPONDENCE	No. Pgs:	2
AR No.	03.01.24	Document No.	000025

Title:	Letter Concerning the Location of Monitoring Wells on YMCA Property.		
Addressee:	TERRY BENHARDT - MERRIMACK YOUTH ASSOCIATION		
Authors:	JIM DI LORENZO - U.S. EPA REGION 1		
Date:	September 1, 1994		
Format:	CORRESPONDENCE	No. Pgs:	1
AR No.	03.01.25	Document No.	000024

03.02 REMEDIAL INVESTIGATION - SAMPLING & ANALYSIS DATA

Title:	Sampling and Analysis Data: Available for review at EPA Records Center.	
Format:		No. Pgs: 1
AR No.	03.02.1	Document No. 000026

Title:	Sampling and Analysis Plan, Technical Assistance with Transmittal Letter (Draft).	
Authors:	HALLIBURTON NUS	
Date:	August 1992	
Format:	REPORT, STUDY	No. Pgs: 109
AR No.	03.02.2	Document No. 000027

Title:	Sampling and Analysis Plan, Phase I Lagoon and Surficial Soil Sampling, RI/FS (Draft Final).	
Authors:	HALLIBURTON NUS	
Date:	April 1993	
Format:		No. Pgs: 80
AR No.	03.02.3	Document No. 000028

Title:	Final Phase II Sampling and Analysis Plan, RI/FS, New Hampshire Plating Superfund Site.	
Addressee:	U.S. EPA	
Authors:	HALLIBURTON NUS	
Date:	November 1993	
Format:	REPORT, STUDY	No. Pgs: 145
AR No.	03.02.4	Document No. 000029

Title:	Letter Concerning Soil Screening Treatability Results.	
Addressee:	RICHARD GOEHLERT - U.S. EPA REGION 1	
Authors:	STEVEN SAFFERMAN - U.S. EPA OFFICE OF RESEARCH & DEVELOP.	
Date:	November 23, 1993	
Format:	CORRESPONDENCE	No. Pgs: 2
AR No.	03.02.5	Document No. 000030

Title:	Letter from Steven Safferman, U.S. EPA, to Richard Goehlert, U.S. EPA RI. Revised Memo - Soil Screening Treatability Results.		
Addressee:	RICHARD GOEHLERT - U.S. EPA REGION 1		
Authors:	STEVEN SAFFERMAN - U.S. EPA OFFICE OF RESEARCH & DEVELOP.		
Date:	December 13, 1993		
Format:	CORRESPONDENCE	No. Pgs:	10
AR No.	03.02.6	Document No.	000031

Title:	Letter Concerning Groundwater Sampling Results.		
Addressee:	ROBERT PALERMO - BADGER ENGINEERS		
Authors:	RICHARD GOEHLERT - U.S. EPA REGION 1		
Date:	February 3, 1994		
Format:	CORRESPONDENCE	No. Pgs:	1
AR No.	03.02.7	Document No.	000032

Title:	Transmittal of Horseshoe Pond Inorganic Data Validation Packages for Surface Water and Sediments.		
Addressee:	RICHARD GOEHLERT - U.S. EPA REGION 1		
Authors:	ROBERT PALERMO - BADGER ENGINEERS		
Date:	May 13, 1994		
Format:	CORRESPONDENCE	No. Pgs:	2
AR No.	03.02.8	Document No.	000033

Title:	Conceptual Wetland Mitigation Plan, RI/FS.		
Addressee:	U.S. EPA		
Authors:	HALLIBURTON NUS		
Date:	August 1994		
Format:	REPORT, STUDY	No. Pgs:	44
AR No.	03.02.9	Document No.	000034

Title:	Geophysical Investigations in the Vicinity of a Former Electroplating Facility in Merrimack, New Hampshire with Transmittal Letter.		
Addressee:	RICHARD WILLEY - U.S. EPA REGION 1		
Authors:	THOMAS MACK - UNIVERSITY OF CINCINNATI		
Date:	September 27, 1994		
Format:	REPORT, STUDY	No. Pgs:	47
AR No.	03.02.10	Document No.	000035

Title: Sampling and Analysis Plan for Soil Characterization, RI/FS, (Draft).
Addressee: U.S. EPA
Authors: HALLIBURTON NUS
Date: December 1994
Format: REPORT, STUDY No. Pgs: 75
AR No. 03.02.11 Document No. 000037

Title: Summary of Phase I and Surficial Soil Sampling XRF Metals and CLP Cyanides Map.
Addressee: U.S. EPA
Authors: HALLIBURTON NUS
Date: December 1994
Format: MAP No. Pgs: 1
AR No. 03.02.12 Document No. 000038

03.04 REMEDIAL INVESTIGATION - INTERIM DELIVERABLES

Title: Health and Safety Plan, Phase I Lagoon and Surficial Soil Sampling, RI/FS, (Draft).
Addressee: U.S. EPA
Authors: HALLIBURTON NUS
Date: November 1992
Format: WORK PLAN No. Pgs: 131
AR No. 03.04.1 Document No. 000039

Title: Ecological Characterization for New Hampshire Plating Site with Transmittal Letter.
Addressee: CARL DELOI - U.S. EPA REGION 1
Authors: GORDON BECKETT - U.S. DEPT. OF INTERIOR
Date: September 29, 1994
Format: REPORT, STUDY No. Pgs: 36
AR No. 03.04.2 Document No. 000036

03.06 REMEDIAL INVESTIGATION - REMEDIAL INVESTIGATION REPORTS

Title:	Phase II Lagoon Sampling Remedial Investigation Report Map.		
Authors:	HALLIBURTON NUS		
Date:	February 13, 1996		
Format:	MAP	No. Pgs:	14
AR No.	03.06.1	Document No.	000040

Title:	Remedial Investigation Report, Volume 4 - Appendices, RI/FS, (Draft Final).		
Addressee:	U.S. EPA		
Authors:	HALLIBURTON NUS		
Date:	April 1996		
Format:	REPORT, STUDY	No. Pgs:	488
AR No.	03.06.2	Document No.	000044

Title:	Remedial Investigation Report, Volume 1 - Text, RI/FS, with Transmittal Letter (Draft Final).		
Addressee:	U.S. EPA		
Authors:	HALLIBURTON NUS		
Date:	May 1996		
Format:	REPORT, STUDY	No. Pgs:	423
AR No.	03.06.3	Document No.	000041

Title:	Remedial Investigation Report, Volume 2 - Tables, RI/FS, (Draft Final).		
Addressee:	U.S. EPA		
Authors:	HALLIBURTON NUS		
Date:	May 1996		
Format:	REPORT, STUDY	No. Pgs:	171
AR No.	03.06.4	Document No.	000042

Title:	Remedial Investigation Report, Volume 3 - Figures, RI/FS, (Draft Final).		
Addressee:	U.S. EPA		
Authors:	HALLIBURTON NUS		
Date:	May 1996		
Format:	REPORT, STUDY	No. Pgs:	53
AR No.	03.06.5	Document No.	000043

03.07 REMEDIAL INVESTIGATION - WORK PLANS AND PROGRESS REPORTS

Title:	Work Plan, Remedial Investigation/Focus Feasibility Study, with Transmittal Letter (Draft Final).		
Addressee:	U.S. EPA		
Authors:	HALLIBURTON NUS		
Date:	January 1993		
Format:	WORK PLAN	No. Pgs:	144
AR No.	03.07.1	Document No.	000046

03.10 REMEDIAL INVESTIGATION - ENDANGERMENT/BASELINE RISK ASSESSMENTS

Title:	Baseline Human Health Risk Assessment, Appendix E, RI/FS, (Draft Final).		
Addressee:	U.S. EPA		
Authors:	HALLIBURTON NUS		
Date:	October 1995		
Format:	REPORT, STUDY	No. Pgs:	256
AR No.	03.10.1	Document No.	000047

04.06 FEASIBILITY STUDY - FEASIBILITY STUDY REPORTS

Title:	Final Feasibility Study, New Hampshire Plating Company Site.		
Addressee:	U.S. EPA		
Authors:	BROWN & ROOT		
Date:	December 1997		
Format:	REPORT, STUDY	No. Pgs:	698
AR No.	04.06.1	Document No.	000048

04.09 FEASIBILITY STUDY - PROPOSED PLANS FOR SELECTED REMEDIAL ACTION

Title:	Proposed Plan, New Hampshire Plating Company Superfund Site.		
Authors:	U.S. EPA		
Date:	January 1998		
Format:	REPORT, STUDY	No. Pgs:	16
AR No.	04.09.1	Document No.	000062

13.01 COMMUNITY RELATIONS - CORRESPONDENCE

Title:	Letter from Michael Robinette, NHDES, to Charles Watson, Town of Merrimack. Questions regarding the remediation process.		
Addressee:	CHARLES WATSON - TOWN OF MERRIMACK		
Authors:	MICHAEL ROBINETTE - N.H. DEPT. OF ENVIRONMENTAL SERVICES		
Date:	July 22, 1992		
Format:	CORRESPONDENCE	No. Pgs:	2
AR No.	13.01.1	Document No.	000049

13.02 COMMUNITY RELATIONS - COMMUNITY RELATIONS PLANS

Title:	Community Relations Plan, RI/FS, with Transmittal Letter.		
Addressee:	U.S. EPA REGION 1		
Authors:	HALLIBURTON NUS		
Date:	July 1993		
Format:	REPORT, STUDY	No. Pgs:	23
AR No.	13.02.1	Document No.	000050

13.03 COMMUNITY RELATIONS - NEWS CLIPPINGS/PRESS RELEASES

Title:	"EPA to Resume Cleanup at Waste Site in Merrimack."		
Authors:	U.S. EPA REGION 1		
Date:	May 15, 1990		
Format:	FACT SHEET, PRESS RELEASE	No. Pgs:	2
AR No.	13.03.1	Document No.	000051

Title:	"EPA Proposes 22 Site to Superfund List, Two in New England."		
Authors:	U.S. EPA REGION 1		
Date:	July 25, 1991		
Format:	FACT SHEET, PRESS RELEASE	No. Pgs:	2
AR No.	13.03.2	Document No.	000052

Title: "Health Report Expected on New Hampshire Metals Site."
Authors: TELEGRAPH NEWS
Date: March 16, 1993
Format: NEWS CLIPPING No. Pgs: 1
AR No. 13.03.3 Document No. 000053

Title: "Public Comment Sought on Merrimack Site."
Authors: ROCKINGHAM COUNTY NEWS
Date: March 31, 1993
Format: NEWS CLIPPING No. Pgs: 1
AR No. 13.03.4 Document No. 000054

Title: "EPA Studying Merrimack Waste Site Contamination."
Authors: UNION LEADER NEWSPAPER
Date: May 28, 1993
Format: NEWS CLIPPING No. Pgs: 1
AR No. 13.03.5 Document No. 000055

Title: "Merrimack Residents Told Site is not a Health Threat."
Authors: UNION LEADER NEWSPAPER
Date: June 10, 1993
Format: NEWS CLIPPING No. Pgs: 1
AR No. 13.03.6 Document No. 000056

Title: "EPA to Monitor Merrimack Pollution Site."
Authors: UNION LEADER NEWSPAPER
Date: October 23, 1993
Format: NEWS CLIPPING No. Pgs: 1
AR No. 13.03.7 Document No. 000057

13.04 COMMUNITY RELATIONS - PUBLIC MEETINGS/HEARINGS

Title: Letter Containing a Summary of Issues Raised at June 13, 1990, Public Meeting.
Addressee: PAUL GROULX - U.S. EPA REGION 1
Authors: EBER CURRIER - TOWN OF MERRIMACK
Date: June 27, 1990
Format: CORRESPONDENCE No. Pgs: 1
AR No. 13.04.1 Document No. 000058

Title:	New Hampshire Plating Superfund Site, Wednesday June 9, 1993, Meeting Agenda with Transmittal Letter.		
Addressee:	RICHARD GOEHLERT - U.S. EPA REGION 1		
Authors:	ROBERT PALERMO - BADGER ENGINEERS		
Date:	June 9, 1993		
Format:	PUBLIC MEETING RECORDS	No. Pgs:	4
AR No.	13.04.2	Document No.	000059

13.05 COMMUNITY RELATIONS - FACT SHEETS/INFORMATION UPDATES

Title:	"Remedial Activities Underway."		
Authors:	U.S. EPA REGION 1		
Date:	May 1993		
Format:	FACT SHEET, PRESS RELEASE	No. Pgs:	8
AR No.	13.05.1	Document No.	000060

6.04 NATURAL RESOURCE TRUSTEE - TRUSTEE NOTIFICATION FORM AND SELECTION GU

Title:	Letter from Merrill Hohman, U.S. EPA Region I to Ken Finkelstein, National Oceanic and Atmospheric Administration with attached Trustee Notification		
Addressee:	KENNETH FINKELSTEIN - NATL. OCEANIC AND ATMOSPHERIC ADMIN.		
Authors:	MERRILL HOHMAN - U.S. EPA REGION 1		
Date:	February 25, 1993		
Format:	CORRESPONDENCE	No. Pgs:	4
AR No.	16.04.1	Document No.	000061

APPENDIX D
Groundwater Use and Value Determination

State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES
NHDES
6 Hazen Drive, P.O. Box 95, Concord, NH 03302-0095
(603) 271-2900 FAX (603) 271-2456

January 12, 1998

Mr. Harley Laing
U.S. Environmental Protection Agency
John F. Kennedy Federal Building
1 Congress Street
Boston, MA 02203-2211

SUBJECT: Merrimack, New Hampshire Plating Site, Groundwater Use and Value Determination (DES #840630)

Dear Mr. Laing:

The New Hampshire Department of Environmental Services (Department) has completed the groundwater use and value determination for the New Hampshire Plating Superfund Site (Site) located in Merrimack, New Hampshire. The Department made the determination at the request of the U.S. Environmental Protection Agency (EPA) using EPA's guidance document entitled, Ground Water Use and Value Determination Guidance, Final Draft, dated April 3, 1996.

Following the procedures outlined in the guidance document, the Department has determined that the groundwater in the vicinity of the Site is **Medium to High Value**. Attached is a worksheet (Appendix A) summarizing the site-specific use and value considerations and a list of the sources of information used for the determination.

EPA and the Department recognize this determination should not be used mechanically to direct a particular remedial outcome, but instead should be used as a management tool for remedial action development and selection. The Department believes that the use and value determination provides the foundation for selecting a remedy that is resource-based and incorporates several of the features of EPA's guidance document in that it: 1) recognizes an increased state role for Superfund decision-making in accordance with the principles of the Comprehensive State Groundwater Protection Program (CSGWPP), 2) creates the framework for a cost-effective and practical decision relative to groundwater, 3) reflects the Town of Merrimack's intentions with respect to their long term plans for use of the groundwater in the vicinity of the Site (Appendix B), and 4) facilitates making a decision that is consistent with the state and federal corrective action programs. The Department has an increased role because EPA-New England endorsed New Hampshire's CSGWPP program in 1994.

The use and value determination is consistent with past discussions between the agencies in which the Department has emphasized the selection of remedies that: (1) achieve treatment, removal or containment of the source of groundwater contamination and (2) restore groundwater quality to Ambient Groundwater Quality Standards (AGQS), i.e., drinking water standards. The proposed remedy for the Site includes capping the existing lagoon area to contain the contamination source, the off-site replacement of wetlands damaged by Site waste disposal practices, and natural attenuation of groundwater contamination. In this case, it is expected that groundwater contamination levels will diminish with time after the source has been controlled by capping. Natural attenuation was determined by EPA's consultants to be equal or superior to an active pump and treat system because, with a cap in-place, there is little or no difference in the predicted time required to attain AGQS at the site. In fact, for some pumping scenarios, the impact was negative due to aquifer characteristics and the proximity of the Merrimack River. As at other sites in New Hampshire, the groundwater contamination plume will be managed through a Groundwater Management Zone which is likely to diminish in size over time as the contamination source is contained and groundwater is remediated.

This determination is also consistent with the Town of Merrimack's long term strategy to reevaluate the use of the groundwater in the area as an alternative to meet future water supply demands. The Site is on an aquifer area that has the potential for high yielding wells. Current indications are that the Town will need additional water supply sources, which may include the use of the Horseshoe Pond aquifer, in just over 10 years. The Department concurs with the Town that the Horseshoe Pond aquifer should not be abandoned. However, both the Town and Department also realize that the quality of the groundwater in this area has been temporarily impaired by the Site and other industrial activities in the area. It will take time to remediate the groundwater in this area. The area also continues to have significant commercial/industrial activity. Consequently, any future development of water supply wells in this area will require careful aquifer management, the need for which may diminish with time somewhat as water quality improves, and an aggressive wellhead protection program.

If you have any questions on this declaration, please contact Carl Baxter at (603)271-2909.

Sincerely,

Robert W. Varney
Commissioner

CWB/pjw/h:\share\superfun\carl\plating.ltr
Attachment
cc: Philip J. O'Brien, Ph.D., Director, WMD
Harry Stewart, P.E., Chief Engineer, WMD
Carl Baxter, P.E., WMD
Tal Hubbard, P.E., WMD
Larry Brill, EPA-New England
Richard Boynton, EPA-New England
James DiLorenzo, EPA-New England
Bruce W. Moreau, Chairman, Merrimack Village District
Dean Shankle, Jr., Town Manager, Town of Merrimack

APPENDIX A
NEW HAMPSHIRE PLATING SITE, MERRIMACK
SUMMARY OF GROUNDWATER SITE-SPECIFIC USE AND VALUE CONSIDERATIONS

FACTORS	HIGH	MEDIUM	LOW	COMMENTS
1. QUANTITY	X			U.S.G.S. Water Resources Investigation report 86-4358 states that permeable, coarse-grained deposits capable of yielding large quantities of water to wells are located along the Merrimack River from 1 mile south of the Thortons Ferry toll gate of the F.E. Everett Turnpike northward to the Bedford town line (includes study area). However, these discontinuous aquifers are surrounded by finer, grained materials. The transmissivity varies from less than 2,000 ft^2/d to more than 8000 ft^2/d. Saturated thickness ranges from about 20 to 100 ft, the greatest saturated thickness is between Horseshoe Pond and the Souhegan River (includes study area). This aquifer has potential for additional high-yield wells, especially north of the Souhegan river (north of the study area) because of the large area and saturated thickness of the aquifer and its potential for induced recharge.
2. QUALITY		X		Area is commercial/industrial with some residential with other actual and potential future contamination sources. The proximity of the aquifer to the Merrimack River (induced recharge) may subject it to recent treatment requirements (Safe Drinking Water Act) for some potential well sites in the area.
3. CURRENT PUBLIC WATER SUPPLY SYSTEMS (PWSS)			X	The Merrimack Village Water District (MVWD) provides drinking water to the study area. The MVWD operates four municipal wells that draw groundwater from the overburden. Two of the production wells are located one mile north of the site, and the other two production wells are located approximately two miles southwest of the site.
4. CURRENT PRIVATE DRINKING WATER SUPPLY WELLS			X	The nearest residential well is located 3500 feet to the west and upgradient of the site. A private well located along the western bank of Horseshoe Pond was originally used as an irrigation well for watering lawns. Due to low yields, the well is no longer in use. Jones Chemical, Inc., (within study area) has a bedrock water supply well that is used for non-contact cooling water in its manufacturing process. The process water is discharged directly to the Merrimack River. A Groundwater Management Zone (GMZ) will be established to control future use of groundwater.

APPENDIX A
NEW HAMPSHIRE PLATING SITE, MERRIMACK
SUMMARY OF GROUNDWATER SITE-SPECIFIC USE AND VALUE CONSIDERATIONS

FACTORS	HIGH	MEDIUM	LOW	COMMENTS
5. LIKELIHOOD AND IDENTIFICATION OF FUTURE DRINKING WATER USE		X		U.S.G.S. Water Resources Investigation report 86-4358 states that permeable, coarse-grained deposits capable of yielding large quantities of water to wells are located along the Merrimack River from 1 mile south of the Thortons Ferry toll gate of the F.E. Everett Turnpike northward to the Bedford town line (includes study area). However, these discontinuous aquifers are surrounded by finer, grained materials. The transmissivity varies from less than 2,000 ft^2/d to more than 8000 ft^2/d. Saturated thickness ranges from about 20 to 100 ft; the greatest saturated thickness is between Horseshoe Pond and the Souhegan River (includes study area). This aquifer has potential for additional high-yield wells, especially north of the Souhegan river (north of the study area) because of the large area and saturated thickness of the aquifer and its potential for induced recharge. Current indications are that the Town may need the aquifer in the study area or other water sources in a little over 10 years. Nevertheless all parties realize that the quality of the groundwater has been stressed because of several industries in the area and the area contains significant industrial/commercial development. It will take time to remediate the groundwater and institute a well head protection area for the aquifer.
6. OTHER CURRENT OR REASONABLE EXPECTED GROUNDWATER USE(S) IN REVIEW AREA		X		Municipal water available to site area. A Groundwater Management Zone (GMZ) will control future use of groundwater. However, area groundwater is currently used as process water for one industry.
7. ECOLOGICAL VALUE		X		Groundwater discharges to Merrimack River and Horseshoe Pond, both Class B surface waters (swimmable, fishable and with treatment can be used as a drinking water source). Both surface waters are used for recreational purposes.
8. PUBLIC OPINION	X			Town may need to use the aquifer in the study area in a little over 10 years. The area has potential for high yield wells.

APPENDIX B
CORRESPONDENCE FROM THE TOWN OF MERRIMACK

Merrimack Village District • Box 1949 • Merrimack, N.H. 03054

June 3, 1997

Mr. Carl Baxter
6 Hazen Drive
Concord, NH 03301

Dear Mr. Baxter:

A study performed by MVD's hydrogeologists in 1994-1995 showed that the Horseshoe Pond area near New Hampshire Plating may be one of the only significant aquifers left in Merrimack.

As you know, Merrimack recently put a well on line in the Town of Hollis, and we have one additional well site yet to tap, also in Hollis. However, these are small wells and Merrimack is still growing. We expect to have that last source of water on line by the year 2004, after restoring a well contaminated by Merrimack Industrial Metals in South Merrimack.

Depending on Merrimack's growth rate and the amount of water we're able to pump from well 6, we will need additional water sources as early as 2008, about 10-11 years from now. Therefore, it is critical that the Horseshoe Pond aquifer not be abandoned or downgraded from the high value aquifer it represents.

If we can be of further assistance, please do not hesitate to call.

Sincerely,

Bruce W. Moreau
Chairman, Board of Commissioners
Merrimack Village District

Field Office Tel. (603) 424-7171 • Business Office Tel. (603) 424-9241 • Fax (603) 424-0563

Emery & Garrett Groundwater, Inc.
56 Main Street • P.O. Box 1578
Meredith, New Hampshire 03253
(603) 279-4425 *Fax (603) 279-8717*

June 26, 1997

Mr. Carl Baxter
Administrator
New Hampshire Department of Environmental Services
Waste Management Division
Hazardous Waste Remediation Bureau
6 Hazen Drive
P.O. Box 95
Concord, NH 03301

JUN 30

Dear Mr. Baxter,

The Merrimack Village District (MVD) Board of Commissioners has requested that I write you this brief letter regarding the potential to protect/remediate groundwater resources proximal to the Horseshoe Pond region in Merrimack, New Hampshire. As I understand it, you are considering which aquifers in the State will receive priority for future protection/cleanup. Groundwater resources in Merrimack, for the most part, have been developed to nearly their fullest extent. Merrimack currently uses seven sand and gravel wells spread throughout the district to meet their daily and peak water supply demands. According to the Water Supply Master Plan, the MVD will need to secure additional groundwater resources in the future.

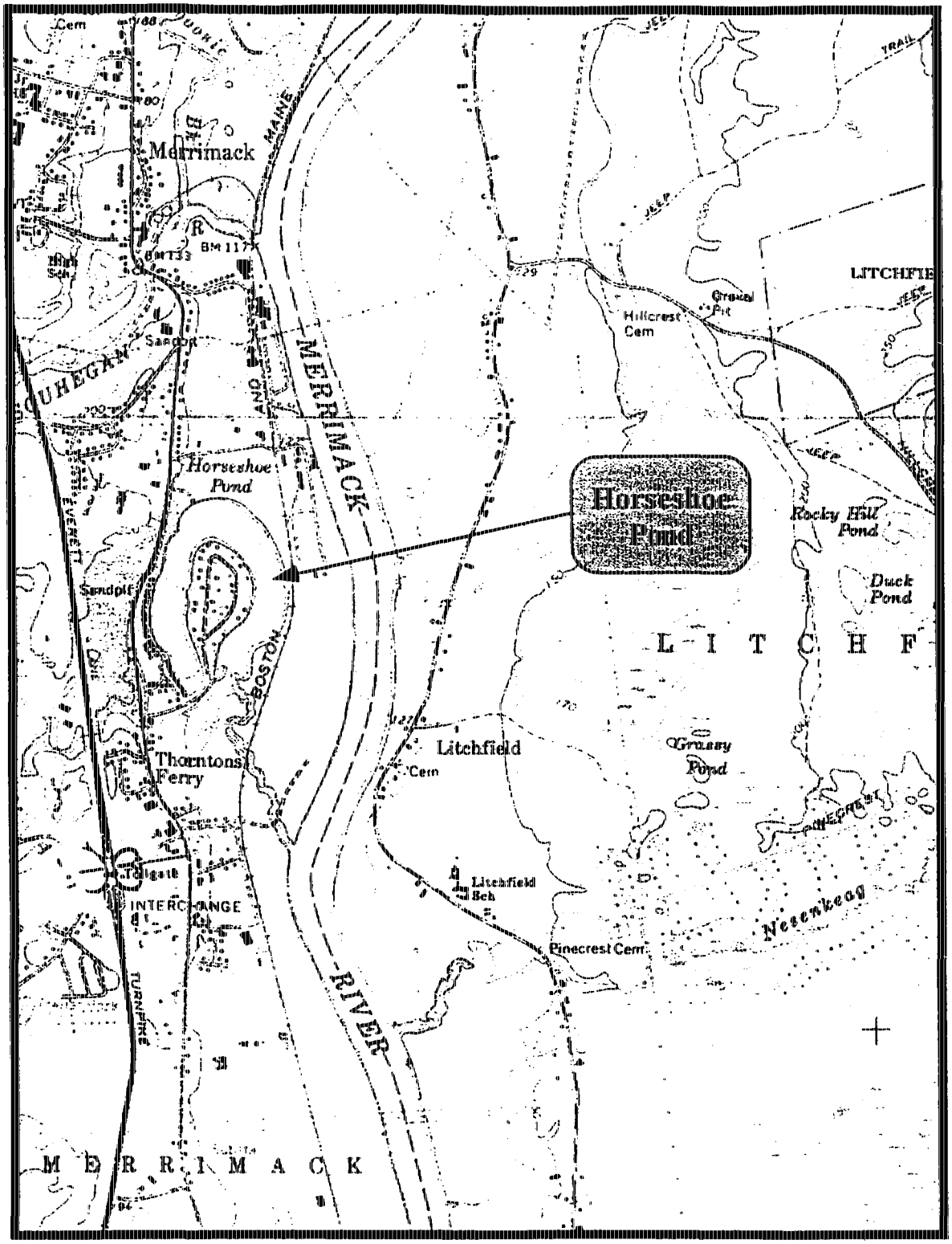
Emery & Garrett Groundwater, Inc. (EGGI) conducted a groundwater investigation in 1994 for the entire Merrimack Village District with the objective of assessing potential groundwater resources that could be developed to meet future water supply needs of the MVD. Based on our investigation, we believe that the geological environment proximal to the Horseshoe Pond (Figure 1) is favorable for the development of groundwater resources from unconsolidated sand and gravel materials. Unfortunately, we were not able to recommend that this aquifer be pursued for development in its present state due to existing contaminant threats to groundwater quality. On behalf of the MVD, we ask that this aquifer surrounding the Horseshoe Pond area be given a high priority for remediation and protection efforts so that it could potentially be used in future years.

Best regards,

James M. Emery
President

cc: Eileen Pannetier – MVD Commissioner

LOCATION MAP FOR HORSESHOE POND AREA
MERRIMACK, NEW HAMPSHIRE



Base map information from
7.5' Nashua North, NH, USGS quadrangle.

Scale is 1:24000 1"=2000'

APPENDIX E
Letter/Report to Merrimack Village District

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
JOHN F. KENNEDY FEDERAL BUILDING
BOSTON, MASSACHUSETTS 02203-0001

June 6, 1998

Brian J. Wilson
Assistant Superintendent
Merrimack Village District
2 Greens Pond Road
P.O. Box 1949
Merrimack, NH 03054

Subject: Additional Hydrogeologic Evaluation from February 13, 1998 Meeting
Response to Merrimack Village District's Concerns
New Hampshire Plating Superfund Site

Dear Mr. Wilson:

During EPA's public comment period on the Proposed Cleanup Plan for the New Hampshire Plating Superfund Site (NHP Site), the MVD expressed concerns with the passive natural attenuation approach to groundwater remediation which was presented as EPA's preferred alternative. In a meeting between the MVD, EPA and NHDES on February 13, 1998, EPA agreed to perform the following activities:

1. review State and local well siting criteria to determine the feasibility of installing a hypothetical municipal supply well in the vicinity of the NHP Site and preferably within the highly productive "Horseshoe Pond Aquifer";

2. evaluate existing hydrogeolic information to determine the anticipated radius of influence of a hypothetical supply well and determine the need to isolate the NHP Site contaminant plume; and

3. present and evaluate a more aggressive groundwater remediation alternative which incorporates active flushing to accelerate aquifer restoration.

EPA's consultant, Brown and Root Environmental (BRE), has completed an extensive evaluation of the State's well siting criteria and Emery & Garrett's (EG) town-wide resources study. BRE has concluded that it may be possible to install a municipal well in an area just south of Horseshoe Pond. Based on existing information, it appears a well in this area would be on the fringe of the highly productive "Horseshoe Pond Aquifer", would support a sustainable yield of approximately 250 gpm and would not communicate with the NHP Site contaminant plume. The MVD would need to collect actual field data to determine accurate well yields. The property is currently zoned as industrial but is undeveloped.

Based on BRE's report (enclosed), established well siting criteria prohibit installation of a municipal well in the immediate vicinity of the NHP Site. Therefore, EPA has determined that completion of a more aggressive groundwater remediation alternative is not necessary. The current passive approach, as presented in EPA's Proposed Plan, will be protective of public health and the environment. EPA is planning to include a contingency in the pending Record of Decision (ROD) which would allow for the installation of physical barriers or other appropriate methods to contain and isolate the plume from a "newly installed MVD supply well" in the unlikely event that site-related contaminant infiltration becomes a problem.

EPA has prepared formal written responses to your comments submitted during the public comment period which will be distributed with the release of the pending ROD. Please review the attached report and call me at (617) 223-5510 if you have any questions or would like to schedule a subsequent meeting.

Sincerely,

James M. DiLorenzo
Remedial Project Manager
Office of Site Remediation and Restoration

cc: Tom Andrews, DES
Liyang Chu, BRE (w/o enclosure)
Dick Boynton, EPA(w/o enclosure)
Sean Goodwin, Town (w/o enclosure)

Brown & Root Services

55 Jonspin Road / Wilmington, MA 01887-1020 / 978-658-7899 / Fax: 978-658-7870

RAC I-EPA-0659W

Contract No. 68-W6-0045

May 28, 1998

Mr. Jim DiLorenzo (HBO)
U.S. Environmental Protection Agency
J.F. Kennedy Federal Building
Boston, Massachusetts 02203-2211

Subject: Evaluation of Potential Supply Well Siting Locations
New Hampshire Plating Company Site
Feasibility Study
RAC I W.A. No. 018-RIFS-01G1

Dear Mr. DiLorenzo:

As requested, enclosed is the evaluation of potential locations in the vicinity of the New Hampshire Plating Company (NHPC) Site located in Merrimack, New Hampshire, that may be suitable for siting a hypothetical municipal supply well. This evaluation was prepared to address concerns raised by Merrimack Village District after the EPA presented its preferred groundwater remediation option for the NHPC Site. A hydrogeologic evaluation was also prepared that assessed the pumping of a hypothetical well and its potential influence of the NHPC groundwater plume.

Should you have any questions or comments on this transmittal, please call me at (978) 658-7899.

Very truly yours,

Liyang Chu
Project Manager

PMO - (c

LC:pmp

Enclosures

c: H. Horahan (EPA) w/o enc.
A. Ostrofsky (B&RE) w/text & tables only.
L. Terzis/M. Healey (B&RE) w/enc.
File 7691-1.0 w/o enc.; File 7691-3.4 w/enc.

ATTACHMENT
EVALUATION OF POTENTIAL SUPPLY WELL SITING LOCATIONS
NEW HAMPSHIRE PLATING COMPANY SITE, MERRIMACK, NEW HAMPSHIRE
W.A. NO. 018-RIFS-01G1
May 28, 1998

INTRODUCTION

A meeting was held on February 13, 1998 between the U.S. Environmental Protection Agency (EPA), the Merrimack Village District (MVD), the New Hampshire Department of Environmental Services (NHDES), and Brown & Root Environmental (B&RE) to discuss the EPA's preferred alternative to addressing groundwater contamination associated with the New Hampshire Plating Company (NHPC) Superfund Site, which is situated along Wright Avenue near the Horseshoe Pond area, in Merrimack, New Hampshire.

EPA had previously presented Alternative GW2 of the Feasibility Study during the January 1998 public hearing as its preferred remediation approach. GW2 consists of establishing a Groundwater Management Zone (GMZ), performing long-term monitoring of groundwater quality, and allowing the natural attenuation of metals and volatile organic compounds (VOCs) to reduce these constituents to the state's Ambient Groundwater Quality Standards over time. EPA and B&RE explained that GW2 was developed, in part, based on the current and anticipated future commercial/industrial land use of the NHPC property and adjacent properties, and the premise that groundwater in this area is not, and would not be used as a potable water supply because of the industrial activities in the vicinity of NHPC. The entire area is served by the MVD's distribution system.

During EPA's public comment period, the MVD expressed concerns and dissatisfaction with this approach because it would not allow groundwater quality to be restored to drinking water standards within a time frame that would permit the use of the aquifer as a potable water supply. The MVD projects the town will need additional supply wells within eight years. The MVD wanted EPA to consider an active groundwater remediation approach that would meet this desired time frame.

During the February 13th meeting, the MVD informed EPA and the NHDES that information developed in a town-wide study completed by its consultant, Emery & Garrett Groundwater, Inc. (EGGI), indicated that the area in the vicinity of the NHPC Site, referred to as the "Horseshoe Pond aquifer", was one of the last viable locations in the town suitable for siting a municipal water supply well. EPA inquired where the MVD was considering siting this well, and whether it was practical to install a municipal supply well in the vicinity of several industrial facilities that have associated groundwater issues (which are being addressed or evaluated separately by the NHDES). The MVD indicated that EGGI had determined that the area underlying the "Horseshoe Pond aquifer" could yield sufficient quantities of water for use, but an actual location had not yet been identified because of NHPC's Superfund status and the presumption that EPA would be conducting an active groundwater remediation. EPA felt that it was unreasonable to

consider and implement a costly active aquifer remediation in an industrial area where siting a municipal supply well would be unlikely. The NHDES indicated that there are state siting regulations for large overburden and bedrock community wells that would prohibit siting a well near potential contaminant sources.

To resolve this issue, EPA offered, and MVD agreed, that it was necessary to:

- identify the closest viable location to situate a hypothetical municipal supply well in the vicinity of the NHPC Site and within the "Horseshoe Pond aquifer",
- evaluate whether this hypothetical well could yield a desired 300 to 400 gallons per minute rate,
- evaluate whether pumping this hypothetical supply well could potentially induce contaminated groundwater to flow from the NHPC Site to the well, and
- prepare a new groundwater remediation alternative (with modeling and estimated construction and operations costs) that employs active aquifer flushing to accelerate restoration of groundwater quality at the NHPC Site.

1.0 Identification of Closest Viable Well Siting Location

To identify the closest viable location to site a hypothetical municipal supply well, B&RE evaluated several information sources and compiled the findings into several figures enclosed with this evaluation. By graphically depicting the areas where siting a well is unsuitable because of known or potential contamination sources, or existing land use, these areas may be eliminated from further consideration and areas that are viable for installing a supply well can then be identified.

The following documents or information sources were consulted to determine where well siting could be restricted or prohibited:

- A Guide for New Large Overburden Wells, prepared by the NHDES that explains and defines the State of New Hampshire regulation Env-Ws 378, Site Selection of Wells for Community Water Systems, August 1993.

- Phase I Groundwater Exploration Report, prepared by Emery & Garrett Groundwater, Inc. (EGGI) for the Merrimack Village District, August 8, 1994.

- Town of Merrimack, Community Development Group, re: land use designations for various lots.

- Town of Merrimack property maps, Sheet Nos. 3D1, 3D2, 4D, 4D-1, 4D-2, 4D-3, 4D-4, 5D-1, and 5D-2. Prepared by James W. Sewall Company, dated April 1, 1979. Revisions: various dates.

Figure 1 depicts the locus map that encompasses the NHPC Site, the Horseshoe Pond area, the Daniel Webster Highway area, the F. E. Everett Highway area, property boundaries for various lots adjacent to the Site, the currently delineated groundwater plume associated with the NHPC Site, and identification of selected industrial facilities.

Figure 2 depicts the areas that are excluded from consideration as viable well siting locations based on: presence of potential and known sources of groundwater contamination, other New Hampshire well siting regulation requirements, and current land use. B&RE graphically depicted potential contaminant sources and the necessary protective radii from these potential threats to groundwater quality in Figure 2 to eliminate from consideration areas in the vicinity of the NHPC Site that would be unsuitable for siting a potable water supply well. Details on the development of Figure 2 are provided in Section 1.1.

Figure 3 depicts the extent of the 100-year floodplain and the 500-year floodplain, which indicate areas where if a well is sited, would need to be protected from the effects of the 100-year flood.

Based on the information presented in Figure 2, there appears to be an area situated southeast of Horseshoe Pond, within the desired "Horseshoe Pond Aquifer", that could be used to site a municipal supply well because it is currently undeveloped and is sufficiently far from any potential contamination sources to satisfy the state's siting regulations. However, this area is situated within the 100-year floodplain, which will require that additional measures be taken to ensure that operating a well and a pump house, if constructed in this area, would not be affected by the effects of a 100-year flood.

1.1 Identification of Potential Contaminant Sources

Two documents were used to develop the protective buffer zones, meaning areas where siting a municipal supply well is undesirable or unlikely.

a. The NHDES document A Guide for New Large Overburden Wells, which summarizes the state regulation Env-Ws 378 Site Selection of Wells for Community Water Systems, was used to preliminarily identify areas that would not be suitable for siting a municipal supply well. ENV-Ws 378 identifies the wellhead protection requirements to protect the groundwater supply from known or potential contaminant sources and incorporates these into the community water systems well siting requirements.

The review and approval process for the siting of a new large overburden well by the NHDES' Water Supply Engineering Bureau requires that the applicant, a water supplier, follow the Env-Ws 378 requirements including:

- establishing a wellhead protection area (WHPA), the area under which groundwater will flow toward a pumping well, using a default of a 4000-feet radius for the supply well (or determined using area-specific hydrogeologic characteristics
- preparing an inventory of existing and potential contamination sources
- establishing a protective radius area around a proposed supply well location so that the groundwater supply may be protected from the effects of known or potential contaminant sources. The protective radius area is defined "as an area that must be kept in a natural state and that is owned or otherwise controlled by the water supplier".
- having a well set back at least 50 feet from perennial water bodies

Following Env-Ws 378 requirements for a proposed production volume of greater than 144,000 gallons per day (or 100 gpm), a minimum protective radius of 400 feet is required. No underground utilities or structures may be installed within the protective radius area except for potable water and electrical or communication conduits. Appendix II of A Guide for New Large Overburden Wells identifies a number of potential contaminant sources including (but not limited to):

- transportation corridors including, but not limited to highways and railroads

- hazardous waste facilities (as regulated under the Resource Conservation and Recovery Act)
- manufacturing facilities (including electronics and chemical manufacturing, wood processing)
- vehicle service and repair shops
- general service and repair shops

To eliminate areas to be considered for siting a well, 400-foot buffer zones were depicted around identified potential contaminant sources. Because transportation corridors are considered potential contamination sources and may not be located in the wellhead protection area, a 400-foot buffer zone was depicted in Figure 2 to the east and west of the Boston & Maine railroad right of way, which traverses the area in a north-south direction just west of the Merrimack River. A sewer line is also located within the railroad right of way. 400-foot buffer zones were also established around two transportation corridors: the Daniel Webster Highway and the F. E. Everett Highway.

Hazardous waste facilities were identified and graphically depicted in Figure 2 of this memorandum, and are based in part on information listed in Appendix E of the EGGI Phase I report (see discussion in following paragraph); buffer zones of 1500 feet were depicted around these properties based on EGGI's approach. To identify land uses that may pose potential contaminant threats, Figure 9 of EGGI's report was consulted in addition to obtaining information from the Town of Merrimack's Community Development group.

b. As part of the Phase I Groundwater Exploration Report preparation, EGGI identified areas within Merrimack that would be incompatible with developing groundwater resources for potable water supplies. Using the NHDES files, EGGI identified known potential contaminant sources, including five hazardous waste sites from the NHDES' Federally Registered Sites List, with groundwater concerns, in a grouping in the vicinity of the New Hampshire Plating Company Site. EGGI also identified a number of other potential sources of groundwater contamination throughout the area including gas stations and existing industrial, commercial, and high density residential land uses. For the Phase 1 Report (Figures 8, 9, and 11), EGGI graphically depicted buffer zones around each known hazardous waste site, and identified land use areas that pose potential contaminant threat to groundwater quality, which EGGI considered to be less favorable for groundwater

development. EGGI designated 1500 feet radii circles around each of the five listed on the NHDES Federally Registered Sites List in the report figures. Leaking underground storage tank sites and selected areas of known contamination were depicted with a 750 feet radius buffer.

B&RE incorporated the 1500 feet distance as a buffer zone surrounding the perimeter of each of the five Federally Registered Sites in Figure 2. Current commercial and industrial land use areas were also integrated into Figure 2. Because there are numerous commercial businesses and industrial facilities in this area of Merrimack, at least a 400 feet distance should be maintained between the properties of concern and the hypothetical well location. The area encompassed by buffer zones covers the entire area from mid-Horseshoe Pond northward to the Souhegan River, westward to the Daniel Webster Highway, and eastward to the Merrimack River. EGGI has also identified current industrial, commercial, and high density (development too dense to obtain the required 400-foot protective radius) land uses within those buffer zones.

1.2 Identification of Potential Well Siting Locations

To identify potential well siting locations, areas that are currently undeveloped, pursuant to the NHDES' Env-Ws 378 requirements, and are not located within the buffer zones were considered. The NHPC Site and adjacent areas are situated in an area EGGI considers geologically favorable for groundwater development. However, based on the well siting requirements of the Env-Ws 378 regulation and information presented in EGGI's Phase I report, B&RE concludes that the areas adjacent to the NHPC Site area would not be a successful candidate for groundwater development. According to the documents reviewed, existing or potential contamination threats to groundwater and current land use would preclude siting a municipal supply well in the immediate vicinity of the NHPC Site, and still maintain an effective protective radius.

One area considered consists of the undeveloped property situated within the "Horseshoe Pond Aquifer area" and in the vicinity of the NHPC Site is currently zoned for industrial land use, but is not actively used. Lot No. 92 of Sheet No. 4D-3, located directly across Wright Avenue from the NHPC Site, is currently owned by the YMCA. However, most of this property is within 400 feet of the Daniel Webster Highway and the B&M Railroad right of way, within 400 feet of commercial properties, and is within the 1500 feet buffer zones

for several of the NHDES' Federally Registered Sites. This property appears not to be suitable for siting a municipal supply well.

Another area, comprising several other undeveloped properties situated southeast of Horseshoe Pond area, was also identified as a possible field location. These properties consist of Lot No. 4 of Sheet No. D4-1 (owned by the New England Pole Co.) and Lot No. 3 of Sheet No. 3D-1. A small portion of triangularly shaped area, bounded approximately by the Merrimack River, a tributary of Horseshoe Pond, and by the southern property boundary of Lot No. 7 of Sheet 4D-2. While the area is currently zoned for industrial land use, it is currently unused and undeveloped. There are no abutting active residential, commercial, or industrial activities. This area is also outside of the 1500 feet buffer zone of any of the NHDES' Federally Registered Sites. This area appears to be a viable location for siting a hypothetical municipal well.

This evaluation of potentially suitable locations was prepared only to assess the viability of siting a hypothetical supply well in the vicinity of the NHPC. The evaluation did not research the ownership of the properties considered, whether the properties are for sale, or whether it is viable for the MVD to acquire and use the properties. The evaluation was completed to assess whether there are viable locations within the "Horseshoe Pond Aquifer" and to support the hydrogeologic evaluation presented in Section 2.0 of this memorandum.

2.0 Hydrogeologic Evaluation

The hydrogeologic evaluation considered two issues:

- whether a hypothetical well situated in the vicinity of the NHPC Site, in the "Horseshoe Pond Aquifer", could yield the desired 300 to 400 gallons per minute rate (as discussed with the MVD), and

- whether pumping this hypothetical supply well could potentially induce contaminated groundwater to flow from the NHPC Site and vicinity to the supply well.

B&RE reviewed information presented in EGGI's Phase I Groundwater Exploration Report and in the United States Geological Survey (USGS) report titled: Hydrogeology of

Stratified-Drift Aquifers and Water Quality in the Nashua Regional Planning Commission Area South-Central New Hampshire (Toppin, 1987).

The Phase I Report presents the results of a geologic and hydrogeologic literature search, which compiled information from reports prepared by other investigators during water supply investigations and installation of water supply wells. The Phase I Report also relies heavily on information and interpretations presented in the USGS report (cited above). The Phase I report presents the sand and gravel deposits field mapping results, which supplement the USGS surficial geology maps. Bedrock outcrops were also mapped.

2.1 Well Yield Evaluation

The Phase I Report was reviewed to determine whether the geologic and hydrogeologic conditions presented in the report are reasonable, and to evaluate viability of siting a municipal water supply in the vicinity of the Horseshoe Pond area that would yield a sufficient quantity of water.

Review of the data presented in the USGS report indicates that a bedrock trough is present in the vicinity of the NHPC Site, as depicted in the various Figures of the Phase I Report. This bedrock trough is filled with glacially derived material that have a high transmissivity, as evidenced by the well yields. The evidence for the trough is corroborated through information provided by water supply wells and exploration wells that were advanced to refusal. In these reports, refusal is interpreted to be the top of bedrock. In addition, there are some wells advanced into bedrock within the trough and south of Horseshoe Pond. These well data, along with field mapping of the till and bedrock outcrops, support the interpretation of a bedrock trough.

The potential yield of a municipal supply well situated to the southeast of the Horseshoe Pond area was evaluated using the data presented in the USGS report. Estimation of the well yield used an approach similar to the one employed by the USGS, which used the Theis equation to predict the drawdown caused by pumping a water supply well. The input values used in the Theis equation are:

- Transmissivity - 2,000 and 4,000 feet squared per day (ft^2/day) (from the USGS report)
- Storativity - 15 percent (assumed, typical of sand and gravel)

- Elapsed time - 180 days (consistent with regulatory requirements, assuming no recharge)
- Saturated thickness - approximately 60 feet (based on USGS report)
- Pumping rate - rate that would result in a drawdown that does not exceed 30 percent of the saturated thickness of the aquifer (approx. 18 feet)
- Image well methods - used to evaluate the impact of the Merrimack River

The first set of estimates assumed that no greater than 30 percent drawdown in the saturated thickness would be induced by the hypothetical pumping well to minimize exposure of the well screen to prevent carbon dioxide-carbonate fouling [Driscoll, 1986]. By limiting the drawdown, the cost for pumping water out of the well can also be minimized. Assuming that the hypothetical pumping well has a screen length of 20 feet and 18 feet of drawdown, there would be 22 feet of saturated aquifer available for drawdown. It is estimated that pumping rates of 125 and 250 gallons per minute (gpm) could be sustained by the hypothetical pumping well based on the USGS' estimated transmissivity values (2,000 and 4,000 ft^2/day, respectively). While these estimated rates (see Tables 1 and 2) are lower than the 300 to 400 gpm desired by the MVD, they do represent the potential sustainable yields.

A second set of estimates were prepared to evaluate the effect of pumping the hypothetical well at higher sustained rates where drawdown would be approximately 66 percent of the saturated thickness (or 40 feet). Under these conditions, more of the well screen could be exposed during pumping and result in fouling. A greater unsaturated thickness would also result in higher pumping costs because more energy would be required to lift water to the ground surface. Using the estimated transmittivity values of 2,000 and 4,000 ft^2/day, sustained pumping rates of 325 and 600 gpm, respectively, could be attained (as presented in Tables 3 and 4).

These estimates indicate that sustainable yield between 125 to 250 gpm are viable, under conservative conditions that are protective of the well and having adequate saturated thickness for dry periods. Higher yields are possible, but there would much greater potential for fouling the well screen and for having inadequate reserve saturated aquifer thickness to draw from.

2.2 Estimated Pumping Well Influence

To address whether a hypothetical pumping well in the vicinity of the Horseshoe Pond area could draw contaminants from the plume in the NHPC Site's vicinity, the drawdown induced by pumping at various rates and at various distances from the pumping well were estimated and are presented in Tables 1 through 4.

A review of the Table 2 (250 gpm rate) indicates that a well pumping, at a sustainable yield, in the vicinity of Horseshoe Pond would not create a significant predicted drawdown (0.17 feet) at a distance of approximately 1,800 feet from the pumping well. The predicted drawdowns represent maximum values because, at this distance from the pumping well, the cone of depression induced by the pumping well would intersect Horseshoe Pond. Surface water from the pond would be drawn into the cone of depression, which would then stop increasing in size. Therefore, this analysis indicates that it is highly unlikely that contaminants from the NHPC site would be drawn into a water supply well pumping at between 125 to 250 gpm in the vicinity of the Horseshoe Pond area.

3.0 New Groundwater Remediation Alternative

A new groundwater remediation alternative to include active flushing of the portion of the aquifer underlying the Site was not developed. As described in Section 1.0 above, installation of a hypothetical municipal well in the immediate vicinity of the NHPC area is not viable. This determination is based on required well siting criteria and is not influenced by the existing groundwater contaminant plume emanating from the NHPC site. Since installation of a hypothetical well in the immediate vicinity of the NHPC site is not be possible, even after the contaminant plume is fully remediated, a more active groundwater remediation alternative would not facilitate the MVD's need to access the aquifer beneath the site.

Additionally, the hydrogeologic evaluation determined that it is unlikely a hypothetical well in this area would communicate with the NHPC plume. Therefore, a physical barrier or other form of plume containment does not appear to be necessary at this time.

4.0 Summary

Based on the review of available information, B&RE concluded that it would be highly infeasible to site a hypothetical municipal supply well in the NHPC Site's immediate vicinity, and have an adequate wellhead protection area, and a protective radius of at least 400 feet. There are five know hazardous waste sites with groundwater concerns surrounding the NHPC Site. In addition, land use in the NHPC vicinity is either commercial or industrial, and siting a water supply well in this area would be infeasible because of inadequate wellhead protection.

However, there is a parcel ~~piece~~ of undeveloped land situated to the southeast of Horseshoe Pond that could be a viable water supply well siting location, which is adequately far from identified potential contaminant sources, but within the desirable "Horseshoe Pond Aquifer".

B&RE's hydrogeologic evaluation concluded that sustained pumping rates of between 125 to 250 gpm are likely. While higher pumping rates are possible, they will increase the likelihood of fouling the well screen because of excessive drawdown and exposure of the well screen to ambient air, have much less saturated aquifer thickness, and would result in higher operational costs . The hydrogeologic evaluation also determined that pumping of the hypothetical supply well would not likely draw contaminated groundwater from the NHPC vicinity to the supply well because of the limited influence over a long distance and that Horseshoe Pond would recharge the supply well under sustained pumping conditions.

Therefore, based on the above assessments, remediating the groundwater plume at the NHPC Site would not allow for a successful siting of a high yield water supply well in the Site's immediate vicinity because of the need to meet Env-Ws 378 siting requirements, proximity to four NHDES Federally Registered Sites, and proximity to commercially and industrially zoned lands and properties.

TABLE 1
ESTIMATED DISTANCE/DRAWDOWN CALCULATIONS AT 125 GPM
PUMPING AND IMAGE WELL SUPERPOSITION
NEW HAMPSHIRE PLATING CO. SITE, MERRIMACK, NH

Monitoring Point Distance from well	Pumping/ Image Wells	Transmissivity (T)	Storativity (S)	Radial Distance (r)	Time Since Pumping Started (t)	Flow (Q)	Flow (Q)	u	W(u)	Drawdown (s)
		ft^2/day		feet	days	GPM	ft^3/day			feet
r = 0.5 ft	PW-1	2.00E+03	1.50E-01	0.5	180	125	2.41E+04	2.60E-08	16.89	16.17
r = 400 ft	PW-1	2.00E+03	1.50E-01	400	180	125	2.41E+04	1.67E-02	3.51	3.36
r = 600 ft	IW-1	2.00E+03	1.50E-01	600	180	-125	-2.41E+04	3.75E-02	2.73	-2.61
							Predicted Drawdown			0.75
r = 400 ft	PW-1	2.00E+03	1.50E-01	400	180	125	2.41E+04	1.67E-02	3.51	3.36
r = 800 ft	IW-1	2.00E+03	1.50E-01	800	180	-125	-2.41E+04	6.67E-02	2.19	-2.10
							Predicted Drawdown			1.26
r = 800 ft	PW-1	2.00E+03	1.50E-01	800	180	125	2.41E+04	6.67E-02	2.19	2.10
r = 1000 ft	IW-1	2.00E+03	1.50E-01	1000	180	-125	-2.41E+04	1.04E-01	1.82	-1.74
							Predicted Drawdown			0.35
r = 800 ft	PW-1	2.00E+03	1.50E-01	800	180	125	2.41E+04	6.67E-02	2.19	2.10
r = 1200 ft	IW-1	2.00E+03	1.50E-01	1200	180	-125	-2.41E+04	1.50E-01	1.46	-1.40
							Predicted Drawdown			0.70
r = 1200 ft	PW-1	2.00E+03	1.50E-01	1200	180	125	2.41E+04	1.50E-01	1.46	1.40
r = 1400 ft	IW-1	2.00E+03	1.50E-01	1400	180	-125	-2.41E+04	2.04E-01	1.22	-1.17
							Predicted Drawdown			0.23
r = 1200 ft	PW-1	2.00E+03	1.50E-01	1200	180	125	2.41E+04	1.50E-01	1.46	1.40
r = 1600 ft	IW-1	2.00E+03	1.50E-01	1600	180	-125	-2.41E+04	2.67E-01	0.98	-0.94
							Predicted Drawdown			0.46
r = 1800 ft	PW-1	2.00E+03	1.50E-01	1800	180	125	2.41E+04	3.38E-01	0.81	0.78
r = 2000 ft	IW-1	2.00E+03	1.50E-01	2000	180	-125	-2.41E+04	4.17E-01	0.67	-0.64
							Predicted Drawdown			0.13
r = 1800 ft	PW-1	2.00E+03	1.50E-01	1800	180	125	2.41E+04	3.38E-01	0.81	0.78
r = 2200 ft	IW-1	2.00E+03	1.50E-01	2200	180	-125	-2.41E+04	5.04E-01	0.56	-0.54
							Predicted Drawdown			0.24

Equations Used:

1) $u = r^2S/4Tt$

2) $s = (Q/4\pi T)W(u)$

PW = Pumping Well

IW = Image Well

TABLE 2
ESTIMATED DISTANCE/DRAWDOWN CALCULATIONS AT 250 GPM
PUMPING AND IMAGE WELL SUPERPOSITION
NEW HAMPSHIRE PLATING CO. SITE, MERRIMACK, NH

Monitoring Point Distance from well	Pumping/ Image Wells	Transmissivity (T)	Storativity (S)	Radial Distance (r)	Time Since Pumping Started (t)	Flow (Q)	Flow (Q)	u	W(u)	Drawdown (s)
		ft^2/day		feet	days	GPM	ft^3/day			feet
r = 0.5 ft	PW-1	4.00E+03	1.50E-01	0.5	180	250	4.81E+04	1.30E-08	17.58	16.83
r = 400 ft	PW-1	4.00E+03	1.50E-01	400	180	250	4.81E+04	8.33E-03	4.22	4.04
r = 600 ft	IW-1	4.00E+03	1.50E-01	600	180	-250	-4.81E+04	1.88E-02	3.40	-3.26
							Predicted Drawdown			0.79
r = 400 ft	PW-1	4.00E+03	1.50E-01	400	180	250	4.81E+04	8.33E-03	4.22	4.04
r = 800 ft	IW-1	4.00E+03	1.50E-01	800	180	-250	-4.81E+04	3.33E-02	2.87	-2.75
							Predicted Drawdown			1.29
r = 800 ft	PW-1	4.00E+03	1.50E-01	800	180	250	4.81E+04	3.33E-02	2.87	2.75
r = 1000 ft	IW-1	4.00E+03	1.50E-01	1000	180	-250	-4.81E+04	5.21E-02	2.43	-2.33
							Predicted Drawdown			0.42
r = 800 ft	PW-1	4.00E+03	1.50E-01	800	180	250	4.81E+04	3.33E-02	2.87	2.75
r = 1200 ft	IW-1	4.00E+03	1.50E-01	1200	180	-250	-4.81E+04	7.50E-02	2.09	-2.00
							Predicted Drawdown			0.75
r = 1200 ft	PW-1	4.00E+03	1.50E-01	1200	180	250	4.81E+04	7.50E-02	2.09	2.00
r = 1400 ft	IW-1	4.00E+03	1.50E-01	1400	180	-250	-4.81E+04	1.02E-01	1.82	-1.74
							Predicted Drawdown			0.26
r = 1200 ft	PW-1	4.00E+03	1.50E-01	1200	180	250	4.81E+04	7.50E-02	2.09	2.00
r = 1600 ft	IW-1	4.00E+03	1.50E-01	1600	180	-250	-4.81E+04	1.33E-01	1.59	-1.52
							Predicted Drawdown			0.48
r = 1800 ft	PW-1	4.00E+03	1.50E-01	1800	180	250	4.81E+04	1.69E-01	1.36	1.30
r = 2000 ft	IW-1	4.00E+03	1.50E-01	2000	180	-250	-4.81E+04	2.08E-01	1.18	-1.13
							Predicted Drawdown			0.17
r = 1800 ft	PW-1	4.00E+03	1.50E-01	1800	180	250	4.81E+04	1.69E-01	1.36	1.30
r = 2200 ft	IW-1	4.00E+03	1.50E-01	2200	180	-250	-4.81E+04	2.52E-01	1.04	-1.00
							Predicted Drawdown			0.31

Equations Used

1) $u = r^2S/4Tt$ 2) $s = (Q/4\pi T)W(u)$

PW = Pumping Well

IW = Image Well

TABLE 3
ESTIMATED DISTANCE/DRAWDOWN CALCULATIONS AT 300 GPM
PUMPING AND IMAGE WELL SUPERPOSITION
NEW HAMPSHIRE PLATING CO. SITE, MERRIMACK, NH

Monitoring Point Distance from well	Pumping/ Image Wells	Transmissivity (T)	Storativity (S)	Radial Distance (r)	Time Since Pumping Started (t)	Flow (Q)	Flow (Q)	u	W(u)	Drawdown (s)
		ft^2/day		feet	days	GPM	ft^3/day			feet
r = 0.5 ft	PW-1	2.00E+03	1.50E-01	0.5	180	325	6.26E+04	2.60E-08	16.89	42.04
r = 400 ft	PW-1	2.00E+03	1.50E-01	400	180	325	6.26E+04	1.67E-02	3.51	8.74
r = 600 ft	IW-1	2.00E+03	1.50E-01	600	180	-325	-6.26E+04	3.75E-02	2.73	-6.80
							Predicted Drawdown			1.94
r = 400 ft	PW-1	2.00E+03	1.50E-01	400	180	325	6.26E+04	1.67E-02	3.51	8.74
r = 800 ft	IW-1	2.00E+03	1.50E-01	800	180	-325	-6.26E+04	6.67E-02	2.19	-5.45
							Predicted Drawdown			3.29
r = 800 ft	PW-1	2.00E+03	1.50E-01	800	180	325	6.26E+04	6.67E-02	2.19	5.45
r = 1000 ft	IW-1	2.00E+03	1.50E-01	1000	180	-325	-6.26E+04	1.04E-01	1.82	-4.53
							Predicted Drawdown			0.92
r = 800 ft	PW-1	2.00E+03	1.50E-01	800	180	325	6.26E+04	6.67E-02	2.19	5.45
r = 1200 ft	PW-1	2.00E+03	1.50E-01	1200	180	-325	-6.26E+04	1.50E-01	1.46	-3.63
							Predicted Drawdown			1.82
r = 1200 ft	PW-1	2.00E+03	1.50E-01	1200	180	325	6.26E+04	1.50E-01	1.46	3.63
r = 1400 ft	IW-1	2.00E+03	1.50E-01	1400	180	-325	-6.26E+04	2.04E-01	1.22	-3.04
							Predicted Drawdown			0.60
r = 1200 ft	PW-1	2.00E+03	1.50E-01	1200	180	325	6.26E+04	1.50E-01	1.46	3.63
r = 1600 ft	IW-1	2.00E+03	1.50E-01	1600	180	-325	-6.26E+04	2.67E-01	0.98	-2.44
							Predicted Drawdown			1.19
r = 1800 ft	PW-1	2.00E+03	1.50E-01	1800	180	325	6.26E+04	3.38E-01	0.81	2.02
r = 2000 ft	IW-1	2.00E+03	1.50E-01	2000	180	-325	-6.26E+04	4.17E-01	0.67	-1.67
							Predicted Drawdown			0.35
r = 1800 ft	PW-1	2.00E+03	1.50E-01	1800	180	325	6.26E+04	3.38E-01	0.81	2.02
r = 2200 ft	IW-1	2.00E+03	1.50E-01	2200	180	-325	-6.26E+04	5.04E-01	0.56	-1.39
							Predicted Drawdown			0.62

Equations Used

1) $u = r^2S/4Tt$ 2) $s = (Q/4\pi T)W(u)$

PW = Pumping Well

IW = Image Well

TABLE 4
ESTIMATED DISTANCE/DRAWDOWN CALCULATIONS AT 600 GPM
PUMPING AND IMAGE WELL SUPERPOSITION
NEW HAMPSHIRE PLATING CO. SITE, MERRIMACK, NH

Monitoring Point Distance from well	Pumping/ Image Wells	Transmissivity (T)	Storativity (S)	Radial Distance (r)	Time Since Pumping Started (t)	Flow (Q)	Flow (Q)	u	W(u)	Drawdown (s)
		ft²/day		feet	days	GPM	ft³/day			feet
r = 0.5 ft	PW-1	4.00E+03	1.50E-01	0.5	180	600	1.16E+05	1.30E-08	17.58	40.40
r = 400 ft	PW-1	4.00E+03	1.50E-01	400	180	600	1.16E+05	8.33E-03	4.22	9.70
r = 600 ft	IW-1	4.00E+03	1.50E-01	600	180	-600	-1.16E+05	1.88E-02	3.40	-7.81
							Predicted Drawdown			1.88
r = 400 ft	PW-1	4.00E+03	1.50E-01	400	180	600	1.16E+05	8.33E-03	4.22	9.70
r = 800 ft	IW-1	4.00E+03	1.50E-01	800	180	-600	-1.16E+05	3.33E-02	2.87	-6.59
							Predicted Drawdown			3.10
r = 800 ft	PW-1	4.00E+03	1.50E-01	800	180	600	1.16E+05	3.33E-02	2.87	6.59
r = 1000 ft	IW-1	4.00E+03	1.50E-01	1000	180	-600	-1.16E+05	5.21E-02	2.43	-5.58
							Predicted Drawdown			1.01
r = 800 ft	PW-1	4.00E+03	1.50E-01	800	180	600	1.16E+05	3.33E-02	2.87	6.59
r = 1200 ft	PW-1	4.00E+03	1.50E-01	1200	180	-600	-1.16E+05	7.50E-02	2.09	-4.80
							Predicted Drawdown			1.79
r = 1200 ft	PW-1	4.00E+03	1.50E-01	1200	180	600	1.16E+05	7.50E-02	2.09	4.80
r = 1400 ft	IW-1	4.00E+03	1.50E-01	1400	180	-600	-1.16E+05	1.02E-01	1.82	-4.18
							Predicted Drawdown			0.62
r = 1200 ft	PW-1	4.00E+03	1.50E-01	1200	180	600	1.16E+05	7.50E-02	2.09	4.80
r = 1600 ft	IW-1	4.00E+03	1.50E-01	1600	180	-600	-1.16E+05	1.33E-01	1.59	-3.65
							Predicted Drawdown			1.15
r = 1800 ft	PW-1	4.00E+03	1.50E-01	1800	180	600	1.16E+05	1.69E-01	1.36	3.13
r = 2000 ft	IW-1	4.00E+03	1.50E-01	2000	180	-600	-1.16E+05	2.08E-01	1.18	-2.71
							Predicted Drawdown			0.41
r = 1800 ft	PW-1	4.00E+03	1.50E-01	1800	180	600	1.16E+05	1.69E-01	1.36	3.13
r = 2200 ft	IW-1	4.00E+03	1.50E-01	2200	180	-600	-1.16E+05	2.52E-01	1.04	-2.39
							Predicted Drawdown			0.74

Equations Used

1) $u = r^2S/4Tt$ 2) $s = (Q/4\pi T)W(u)$

PW = Pumping Well

IW = Image Well