Record of Decision

Garfield Groundwater Contamination Superfund Site

Operable Unit 1: Basements, Source Area, and Overburden Groundwater

City of Garfield
Bergen County, New Jersey

United States Environmental Protection Agency

Region 2

September 2016

DECLARATION STATEMENT
RECORD OF DECISION

SITE NAME AND LOCATION

Garfield Groundwater Superfund Site (NJN0000206317), City of Garfield, Bergen County, New Jersey. Operable Unit 1 – Basements, Source Area, and Overburden Groundwater.

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedy to address contaminated groundwater in the overburden aquifer at the Garfield Groundwater Contamination Superfund Site in the City of Garfield, Bergen County, New Jersey. The selected remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record established for this Site.

The State of New Jersey concurs with the selected remedy.

ASSESSMENT OF THE SITE

The remedy selected in the Record of Decision (ROD) is necessary to protect public health or the environment from actual or threatened releases of hazardous substances from the Site into the environment.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy described in this document represents the first of two planned remedial phases, or operable units, for the Garfield Groundwater Contamination Superfund Site.

The selected remedy for groundwater is comprised of *in situ* treatment using geochemical fixation; extraction, treatment, and reinjection of groundwater; and institutional controls.

The major components of the selected remedy include:

- Geochemical fixation through injection of a reducing agent to treat groundwater containing concentrations of total chromium greater than the New Jersey Groundwater Quality Standard of 70 parts per billion (ppb) throughout the Site;

- Extraction, treatment, and discharge of groundwater containing concentrations of total chromium greater than the New Jersey Groundwater Quality Standard of 70 ppb at the EC Electroplating property;

- Implementation of a long-term groundwater monitoring program to assess the effectiveness of the action over time;

- Institutional controls, such as designation of a Classification Exception Area, to restrict the installation of wells and the use of groundwater in areas of chromium contaminated groundwater; and

- Inspection and mitigation as necessary of residential and commercial basements in the areas impacted by contaminated groundwater.

DECLARATION OF STATUTORY DETERMINATIONS

Part 1: Statutory Requirements

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial actions, is cost effective, and utilizes permanent solutions and treatment technologies to the maximum extent practicable.

Part 2: Statutory Preference for Treatment

Geochemical fixation of the groundwater's chromium contamination satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment).

Part 3: Five-Year Review Requirements

Because the remedy will not result in hazardous substances, pollutants, or contaminants remaining above levels that allow for unlimited use and unrestricted exposure, a statutory five-year review will not be required. However, because it will take more than five years to attain remedial action objectives and cleanup goals, policy reviews are required. The first review will be conducted within five years of construction completion for the site to ensure that the remedy is, or will be, protective of human health and the environment.

ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the Administrative Record for the site.

- Chemicals of concern and their respective concentrations may be found in the "Site Characteristics" section.

- Baseline risk represented by the chemicals of concern may be found in the "Summary of Site Risks" section.

- A discussion of remediation goals may be found in the "Remedial Action Objectives" section.

- A discussion of source materials constituting principal threats may be found in the "Principal Threat Waste" section.

- Current and reasonably anticipated future land use assumptions are discussed in the "Current and Potential Future Site and Resource Uses" section.

- Estimated capital, annual operation and maintenance (O&M) and total present worth costs are discussed in the "Description of Alternatives" section.

- Key factors that led to selecting the remedy (i.e., how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) may be found in the "Comparative Analysis of Alternatives" and "Statutory Determinations" sections.

Walter E. Mugdan, Director
Emergency & Remedial Response Division
EPA – Region 2

September 20, 2016
Date

Decision Summary

Garfield Groundwater Contamination Superfund Site

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City of Garfield
Bergen County, New Jersey

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TABLE OF CONTENTS

PAGE

APPENDICES

SITE NAME, LOCATION, AND DESCRIPTION

The Garfield Groundwater Contamination Superfund Site (the Site) is located in a mixed commercial and residential neighborhood in the City of Garfield, Bergen County, New Jersey. The Site is defined by the location of chromium-contaminated groundwater at concentrations at or greater than the New Jersey Groundwater Quality Standard of 70 parts per billion (ppb). The source of groundwater contamination has been identified as the former EC Electroplating (ECE) facility at 125 Clark Street in Garfield that is located within the Site. The ECE property covers approximately 0.65 acres and is bounded by Clark Street to the north, Lincoln Place to the west, Sherman Place to the east, and residential properties to the south (Figure 1).

The U.S. Environmental Protection Agency (EPA) is the lead agency, and the New Jersey Department of Environmental Protection (NJDEP) is the support agency for this Site.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

EC Electroplating was founded in the late 1930s and operated until March 2009. The facility was used as a custom metal plating shop that electroplated chromium, copper, and nickel onto machined parts. One large cylindrical storage tank and three additional vertical tanks were used to store chromic acid plating solution. There were two documented spills at the facility that may have been sources of contamination. In December 1983, the large tank failed, releasing chromic acid directly to the shallow groundwater. One groundwater pumping well was installed to recover the spilled chromium, but was shut down after only 29% of the mass of chromic acid was recovered. In May 1996, a spill of process wastewater was mitigated by the Bergen County Hazardous Materials team. The results of EPA's groundwater investigation suggest that other spills or leaks of chromic acid may have occurred at the facility.

In October 2002, NJDEP requested EPA assistance to assess and mitigate chromium-contaminated groundwater infiltrating into basements of buildings in Garfield. From 2008 to 2015, EPA surveyed properties and sampled dust in the basements of residential and commercial properties. Properties where basement dust samples exceeded the Site-specific removal action level (RAL) for hexavalent chromium were decontaminated and the basements were sealed and/or had drainage systems installed to prevent groundwater infiltration.

EPA documented a need for removal action for the Site based on basement dust sampling results in the 2010 "E.C. Electroplating (Garfield Groundwater Contamination Site) - Determination of Significant Threat Memorandum." It was determined that exceedances of the RALs, as well as the potential for future contamination at levels exceeding these RALs, represented an unacceptable risk to individuals who may be exposed to hexavalent chromium dust on basement surfaces. Potentially contaminated surfaces in the basements were sampled by wiping a 10 centimeter x 10 centimeter area and analyzing the hexavalent chromium mass on the wipe. For basements used as a living space ("high use"), EPA developed a RAL of 1.1 micrograms of hexavalent chromium per wipe. For basements used for laundry and storage ("low use"), a RAL of 8.7 microgram per wipe of hexavalent chromium was developed. As of 2015, more than 500 properties were inspected and 14 of the properties required removal actions to address chromium-contaminated dust in the basements.

In April 2010, the New Jersey Department of Health and the US Agency for Toxic Substances and Disease Registry (ATSDR) issued a health consultation which assessed the potential chromium exposures to area residents based on previous sampling investigations conducted by EPA in residential and commercial properties. Both agencies concluded that there is evidence of a complete exposure pathway regarding ingestion of and dermal contact with surface dust containing chromium. Both agencies also concluded that past, present, and future exposures represented a public health hazard via the ingestion of chromium dust in some basements. In September 2010, ATSDR issued a Public Health Advisory for the Site, recommending that EPA take immediate measures to dissociate residents and others from the basement area of the properties showing the highest chromium levels in surface dust.

In June 2011, EPA conducted a site assessment of the abandoned ECE facility. EPA's assessment identified hazardous materials within vats, tanks and drums at the facility that presented an immediate threat to the surrounding community, and further identified the facility as the source of chromium contamination in groundwater. EPA removed all hazardous materials from the facility and disposed the materials at appropriate facilities. In 2012, all buildings and above-ground structures at the ECE facility were demolished by EPA.

Following the removal of the buildings, EPA conducted a comprehensive soil investigation on the ECE property to determine the extent of chromium contamination in the soils and substructures of the former facility. In October 2013, EPA mobilized at the ECE property to excavate soils and concrete contaminated with levels of hexavalent chromium above 20 parts per million (ppm), the NJDEP residential soil cleanup criteria. A total of 1,180 tons of concrete were removed from the property, including 897 tons that were disposed of as hazardous waste. A total of 5,686 tons of soil were removed from the property, including 2,701 tons that required disposal as hazardous waste. Only soil above the water table was addressed in this action. Post-excavation samples were collected and all excavated areas were backfilled and compacted with certified clean fill. The surface of the property was then covered with clean backfill and capped with asphalt in May 2014.

EPA initiated a shallow groundwater study in 2010 and then expanded the investigation to overburden and bedrock groundwater, residential soils, surface water, and sediments. The groundwater investigation included installation of conventional and multiport wells, downhole geophysical profiling, packer testing, a matrix diffusion study, and a groundwater-surface water interaction study. There are currently 52 overburden and bedrock wells in EPA's monitoring network. The results of this investigation were used to complete the human health and ecological risk assessments. EPA also conducted additional studies on aquifer testing, *in situ* reduction of hexavalent chromium in groundwater, and an ecological risk assessment of sediments in the Passaic River.

The Site was placed on EPA's National Priorities List in September 2011. The listing was based upon the ATSDR Public Health Advisory that recommended dissociation of individuals from the release, EPA's determination that the release is a significant threat to public health and that EPA anticipates it will be more cost-effective to use its remedial authority rather than its removal authority to respond to the release.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

EPA has worked closely with local residents, public officials, and other interested members of the community since NJDEP requested assistance with the Site in the early 2000s. At the completion of the Remedial Investigation and Feasibility Study (RI/FS) for OU1, EPA prepared a Proposed Plan presenting remedial alternatives as well as EPA's preferred remedy for the source area, overburden groundwater, and basements. The Proposed Plan and supporting documentation for OU1 were released to the public for comment on May 9, 2016. The Proposed Plan and index for the Administrative Record were made available to the public online, and the Administrative Record files were made available at the EPA Administrative Record File Room, 290 Broadway, 18th Floor, New York, New York; and the Garfield Public Library, 500 Midland Avenue, Garfield, New Jersey.

On May 9, 2016, EPA published a Public Notice in the *Bergen Record* newspaper that provided information about the public comment period, the public meeting for the Proposed Plan, and the availability of the administrative record for the Site. EPA also published a press release on May 9, 2016, to announce the release of the Proposed Plan. The public comment period closed on June 8, 2016.

A public meeting was held on May 19, 2016, at the Garfield Senior Center, 480 Midland Avenue, Garfield, New Jersey. The purpose of this meeting was to inform residents, local officials, and interested members of the public about the Superfund process, present details about EPA's remedial plan, receive comments on the Proposed Plan, and respond to questions from area residents and other interested parties. Responses to the comments received at the public meeting, and in writing during the public comment period, are included in the Responsiveness Summary, attached as Appendix IV to this ROD.

SCOPE AND ROLE OF THIS OPERABLE UNIT

This action, referred to as OU1, will be one of two actions for the Site. OU1 addresses the basements and the chromium contaminated groundwater at the ECE property and in the overburden groundwater.

The overburden aquifer is a source of hexavalent chromium contamination to the deeper bedrock aquifer. Operable Unit 2 (OU2) will address chromium contaminated groundwater in the deep bedrock aquifer and will be the focus of a future ROD for this Site.

SITE CHARACTERISTICS

The former ECE property is located in the City of Garfield approximately 0.6 miles east of the Passaic River (Figure 1). The topography of the 0.65-acre ECE property is flat and the property is enclosed by an 8 feet high screened chain link fence. The neighborhood immediately surrounding the ECE property consists of a mixture of residential and commercial properties. The ECE property is currently zoned residential.

Groundwater occurs within two hydrogeologic systems in Garfield - the unconsolidated overburden materials and fractured sedimentary bedrock. The overburden material underlying the region consists of a thick layer of unconsolidated glacial sediments and fill material. Groundwater flow in the overburden materials is predominantly controlled by local topography. The depth to groundwater in Garfield is generally less than 20 feet below ground surface.

The bedrock at the Site consists of interbedded siltstones, mudstones, and fine- to coarse-grained sandstones. Groundwater flow in the bedrock aquifer is controlled by fractures and bedding planes. At the ECE property source area, there is limited groundwater flow upward from the bedrock aquifer into the overburden. Outside the source area, the overburden groundwater generally flows downward into the bedrock aquifer.

Groundwater from the overburden aquifer discharges to the Passaic River. The Passaic River on Garfield's western border is tidally influenced and its width is generally 200 to 300 feet, with an estimated depth of 5 to 10 feet in the center. The river sediments are principally composed of sand and have low levels of organic carbon.

Nature and Extent of Contamination

Source Area

The ECE property is considered the source area of the Site based on the known releases of chromic acid and the chromium impacts to soil and groundwater at the property (Figure 2). Although EPA removed contaminated soils above the water table, there is still a zone of high chromium concentrations immediately below the water table that is a source of groundwater contamination. During a 2014 sampling event, the maximum hexavalent chromium concentration detected in groundwater was 269,000 ppb at monitoring well EPA-32-OB, near the historical location of the chromic acid tanks at the former ECE facility. High levels of hexavalent chromium were also detected in the shallow bedrock aquifer beneath the ECE property at 1,370 ppb at EPA-13-BR. The dominant form of chromium in the groundwater across the Site is hexavalent chromium, but trivalent chromium is also present.

Groundwater Downgradient of Source Area

Outside the source area, the greatest concentration of hexavalent chromium detected in an overburden well was 14,900 ppb at well EPA-06-OB (Figure 3). The average concentration of hexavalent chromium in the overburden plume is estimated to be 3,420 ppb.

The hexavalent chromium groundwater plume extends north of the ECE property to Van Winkle Avenue and south to Commerce Street. In the area of the plume, shallow groundwater that infiltrates into basements can transfer hexavalent chromium to the floor or walls.

The overburden plume flows to the west and discharges to the Passaic River. Hexavalent chromium and total chromium in samples from the surface water of the Passaic River do not exceed the NJDEP Ecological Screening Criteria in the area of the plume. However, the Passaic River sediment samples from this area are elevated in hexavalent chromium and total chromium.

Basements

Groundwater containing hexavalent chromium has infiltrated some basements of residences located within the boundaries of the downgradient overburden plume. Visual inspections were conducted at 512 properties potentially impacted by contaminated groundwater. Based on the visual inspection, sampling was deemed necessary at 324 properties (Figure 4). Concentrations of hexavalent chromium presenting an unacceptable risk to occupants were detected in wipe samples collected from the basements of 14 residences infiltrated by contaminated groundwater. The highest concentration of hexavalent chromium detected was 15,600 µg/wipe, above the RAL of 8.7 µg/wipe. Air samples collected at 21 properties with measurable concentrations of hexavalent chromium dust measured in air were orders-of-magnitude below the screening level of 1.1E-05 $\mu g/m^3$.

CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Groundwater Uses: Groundwater underlying the Site is considered by New Jersey to be Class II-A, a source of potable water; however, no complete exposure pathways to chromium-contaminated groundwater are known. All residents in the area of the Site are currently using public supply water, which is treated to assure all drinking water standards are met for contaminants. If chromium contaminated groundwater is used as drinking water in the future, significant health risks would exist.

Basement Uses: The majority of structures in the area of chromium-contaminated groundwater have basements. Basements of commercial buildings are primarily used for storage. The use of basements of residential buildings varies from low use such as utility, storage, and laundry rooms to high use as living space. It is expected that the use of commercial and residential basements for storage, laundry, and living spaces will continue. Removal actions have mitigated or eliminated current complete exposure pathways to chromium-contaminated dust in basements. However, if an individual is exposed to future contamination on basement surfaces at levels exceeding the RALs, an unacceptable health risk would exist.

SUMMARY OF SITE RISKS

As part of the RI/FS, EPA conducted a baseline risk assessment to estimate the current and future effects of contaminants on human health and the environment. A baseline risk assessment is an analysis of the potential adverse human health and ecological effects of releases of hazardous substances from a site in the absence of any actions or controls to mitigate such releases, under current and future land uses. The baseline risk assessment includes a human health risk assessment (BHHRA) and an ecological risk assessment (BERA). It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the baseline risk assessment for the Site.

Human Health Risk Assessment

A four-step process is utilized for assessing site-related human health risks for a reasonable maximum exposure scenario:

- *Hazard Identification* – uses the analytical data collected to identify the contaminants of potential concern (COPC) at the site for each medium, with consideration of a number of factors explained below;
- *Exposure Assessment* - estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways by which humans are potentially exposed;
- *Toxicity Assessment* - determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response); and
- *Risk Characterization* - summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site-related risks. The risk characterization also identifies contamination with concentrations which exceed acceptable levels, defined by the National Oil and Hazardous Substances Contingency Plan (NCP) as an excess lifetime cancer risk greater than $1 \times 10^{-6} – 1 \times 10^{-4}$ or a Hazard Index greater than 1.0; contaminants at these concentrations are considered chemicals of concern (COCs) and are typically those that will require remediation at the site. Also included in this section is a discussion of the uncertainties associated with these risks.

<u>Hazard Identification</u>

In this step, COPCs in each medium were identified based on such factors as toxicity, frequency of occurrence, fate and transport of the contaminants in the environment, concentrations, mobility, persistence and bioaccumulation. The HHRA began with selecting COPCs in groundwater that could potentially cause adverse health effects in exposed populations. Although the groundwater is currently not used for drinking water purposes, the HHRA assumed groundwater could be used as a source of drinking water in the future. As listed in Table 1, the COC, the only contaminant requiring remediation at the Site, is hexavalent chromium. Several other contaminants, namely arsenic, trichloroethylene, dieldrin and cyanide were also associated with unacceptable risk and/or hazard. However, these contaminants are not considered Site-related based on their distribution and frequency within the hexavalent chromium groundwater plume.

<u>Exposure Assessment</u>

Consistent with Superfund policy and guidance, the BHHRA assumes no remediation or institutional controls to mitigate or remove hazardous substance releases. Cancer risks and noncancer hazard indices were calculated based on an estimate of the reasonable maximum exposure (RME) expected to occur under current and future conditions at the site. The RME is defined as the highest exposure that is reasonably expected to occur at a site.

The BHHRA evaluated potential risks to populations associated with both current and potential future land uses. Exposure pathways were identified for each potentially exposed population and each potential exposure scenario for groundwater. Based on the current zoning and anticipated future use, the risk assessment focused on residential exposure to groundwater (ingestion, dermal contact and inhalation), which would be considered to be protective of any other users of groundwater, such as workers at commercial facilities. Risks from exposure to chromium residue in basements is currently being addressed through ongoing removal actions, so this pathway was not considered further in the BHHRA.

Following the excavation of soil and concrete from the ECE property, EPA performed a risk assessment on the remaining soil that was separate from the BHHRA for groundwater. The risk assessment considered both residential and commercial exposure to hexavalent chromium (no other constituents exceeded screening levels) in the remaining soil. Because the cancer risks and noncancer hazards were well below EPA's target levels, the removal action of soil excavation is considered protective of human health for current and future commercial/industrial, as well as residential uses.

A summary of the exposure pathways included in the BHRRA can be found in Table 2. Typically, exposures are evaluated using a statistical estimate of the exposure point concentration, which is an upperbound estimate of the average concentration for each contaminant, but in some cases may be the maximum detected concentration. The exposure point concentration for hexavalent chromium can be found in Table 1. A comprehensive list of the exposure point concentrations for all COPCs can be found in the BHHRA.

Toxicity Assessment

In this step, the types of adverse health effects associated with contaminant exposures and the relationship between magnitude of exposure and severity of adverse health effects were determined. Potential health effects are contaminant-specific and may include the risk of developing cancer over a lifetime or other noncancer health effects, such as changes in the normal functions of organs within the body (*e.g.*, changes in the effectiveness of the immune system). Some contaminants are capable of causing both cancer and noncancer health effects.

Under current EPA guidelines, the likelihood of carcinogenic risks and noncarcinogenic hazards due to exposure to site chemicals are considered separately. Consistent with current EPA policy, it was assumed that the toxic effects of the site-related chemicals would be additive. Thus, cancer and noncancer risks associated with exposures to individual COPCs were summed to indicate the potential risks and hazards associated with mixtures of potential carcinogens and noncarcinogens, respectively.

Toxicity data for the human health risk assessment were provided by the Integrated Risk Information System (IRIS) database, the Provisional Peer Reviewed Toxicity Database (PPRTV), or another source that is identified as an appropriate reference for toxicity values consistent with EPA's directive on toxicity values. This information is presented in Table 3 (noncarcinogenic toxicity data summary) and Table 4 (cancer toxicity data summary). Additional toxicity information for all COPCs is presented in the BHHRA.

Risk Characterization

Noncarcinogenic risks were assessed using a hazard index (HI) approach, based on a comparison of expected contaminant intakes and benchmark comparison levels of intake (reference doses, reference concentrations). Reference doses (RfDs) and reference concentrations (RfCs) are estimates of daily exposure levels for humans (including sensitive individuals) which are thought to be safe over a lifetime of exposure. The estimated intake of chemicals identified in environmental media (*e.g.*, the amount of a chemical ingested from contaminated drinking water) is compared to the RfD or the RfC to derive the hazard quotient (HQ) for the contaminant in the particular medium. The HI is obtained by adding the HQs for all compounds within a particular medium that impacts a particular receptor population.

The HQ for oral and dermal exposures is calculated as below. The HQ for inhalation exposures is calculated using a similar model that incorporates the RfC, rather than the RfD.

$$HQ = Intake/RfD$$

Where: HQ = hazard quotient
Intake = estimated intake for a chemical (mg/kg-day)
RfD = reference dose (mg/kg-day)

The intake and the RfD will represent the same exposure period (i.e., chronic, subchronic, or acute).

As previously stated, the HI is calculated by summing the HQs for all chemicals for likely exposure scenarios for a specific population. An HI greater than 1.0 indicates that the potential exists for noncarcinogenic health effects to occur as a result of site-related exposures, with the potential for health effects increasing as the HI increases. When the HI calculated for all chemicals for a specific population exceeds 1.0, separate HI values are then calculated for those chemicals which are known to act on the same target organ. These discrete HI values are then compared to the acceptable limit of 1.0 to evaluate the potential for noncarcinogenic health effects on a specific target organ. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. A summary of the noncarcinogenic hazards associated with these chemicals for each exposure pathway is in Table 5.

As seen in Table 5, the potential for adverse, noncarcinogenic health effects from future use of groundwater was indicated for hexavalent chromium in groundwater. The HI for noncancer effects is 141 for the adult resident and 355 for the child resident.

For carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a carcinogen, using the cancer slope factor (SF) for oral and dermal exposures and the inhalation unit risk (IUR) for inhalation exposures. Excess lifetime cancer risk for oral and dermal exposures is calculated from the following equation, while the equation for inhalation exposures uses the IUR, rather than the SF:

$$Risk = LADD \times SF$$

Where: Risk = a unitless probability (1×10^{-6}) of an individual developing cancer
LADD = lifetime average daily dose averaged over 70 years (mg/kg-day)
SF = cancer slope factor, expressed as [1/(mg/kg-day)]

These risks are probabilities that are usually expressed in scientific notation (such as 1 x 10^{-4}). An excess lifetime cancer risk of 1 x 10^{-4} indicates that one additional incidence of cancer may occur in a population of 10,000 people who are exposed under the conditions identified in the assessment. Again, as stated in the National Contingency Plan, the acceptable risk range for site-related exposure is 1 x 10^{-6} to 1 x 10^{-4}.

As shown in Table 6, the total carcinogenic risk for a future resident exposed to hexavalent chromium in drinking water is 5 x 10^{-1}, which is greater than 1 x 10^{-4} threshold.

The results of the BHHRA indicate that there are significant carcinogenic risks and noncarcinogenic health hazards to potentially exposed future residential receptors from ingestion and dermal contact with hexavalent chromium.

As stated previously, risks from exposure to chromium residue in basements is currently being addressed through ongoing removal actions. EPA documented a determination of significant threat for the Site based on basement dust sampling results in the 2010 "E.C. Electroplating (Garfield Groundwater Contamination Site) – Determination of Significant Threat Memorandum." It was determined that exceedances of the RALs, as well as the potential for future contamination at levels exceeding these values represented an unacceptable risk to individuals who may be exposed to hexavalent chromium dust on basements surfaces. Dust on potentially contaminated surfaces in the basements was sampled by wiping an area (10 centimeter x 10 centimeter) and analyzing the hexavalent chromium mass on the wipe. For basements used as a living space (high use), EPA developed a RAL of 1.1 micrograms of hexavalent chromium per wipe. For basements used for laundry and storage (low use), a RAL of 8.7 micrograms of hexavalent chromium per wipe was developed. As of 2015, more than 500 properties were inspected and 14 of the properties required removal actions to address chromium-contaminated dust in the basements.

Ecological Risk Assessment

A SLERA and Step 3A BERA were conducted as part of the RI to evaluate the potential for risk to ecological receptors from contamination in the absence of any remedial action. Potential complete exposure pathways for ecological receptors included areas where groundwater discharges to the Passaic River. Potential ecological receptors using the Passaic River include benthic macroinvertebrates, water column-dwelling aquatic life, mammals, and fish-eating birds. The potential ecological risk to these receptors from exposure to surface water and sediment along the Passaic River was evaluated in the SLERA and Step 3A BERA. The following summarizes the findings and conclusions for each receptor group following completion of the Step 3A BERA:

The Step 3A BERA indicated a potential for adverse effects to benthic macroinvertebrates from the presence of chromium in surface sediment at the location of groundwater discharge. The later BERA conducted in 2014 demonstrated no significant ecological risk to the benthic invertebrate community.

Chromium concentrations in surface water do not represent a potential risk to aquatic life and this receptor/exposure pathway does not warrant further evaluation.

There is negligible potential for chromium in sediment and surface water to represent a risk to mammalian and avian wildlife.

The SLERA indicated a potential for adverse effects to wildlife from the ingestion of chromium in food items. Although appropriate for the SLERA evaluation, the highly conservative assumptions used in the SLERA (for example, 100 percent of food derived from the site, and 100 percent bioavailability of chromium for accumulation and uptake) will overestimate actual risk. The refined food web models used in the Step 3A BERA incorporate less conservative (but more realistic) assumptions and additional methods relative to those used in the SLERA. The Step 3A BERA indicated a negligible potential for chromium in sediment and surface water to represent a risk to mammalian and avian wildlife.

In 2014, in order to further define the potential risk to the community of benthic organisms in the Passaic River, a BERA was completed. The BERA evaluated the potential exposure and consequent risk of chromium contamination to the benthic organisms inhabiting the eastern side of the river bottom in the city of Garfield. Based on a 42-day Hyalella azteca survival, growth, and reproduction sediment toxicity test, chromium levels in sediments located along the eastern side of the Passaic River between Faber Place and Monroe Street pose no ecological significant risk to survival and reproduction in the benthic invertebrate community inhabiting the area (Avatar Environmental 2015). Based on the results of the BERA, groundwater impacted with hexavalent chromium from the ECE property discharging to the Passaic River poses no threat to the benthic community.

The response action selected in the Record of Decision is necessary to protect the public health or welfare of the environment from actual or threatened releases of contaminants into the environment.

Uncertainties

The procedures and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty include:

- environmental chemistry sampling and analysis
- environmental parameter measurement
- fate and transport modeling
- exposure parameter estimation
- toxicological data.

Uncertainty in environmental sampling arises in part from the potentially uneven distribution of chemicals in the media sampled. Consequently, there is significant uncertainty as to the actual levels present. Environmental chemistry-analysis error can stem from several sources including the errors inherent in the analytical methods and characteristics of the matrix being sampled.

Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with the chemicals of concern, the period of time over which such exposure would occur, and in the models used to estimate the concentrations of the chemicals of concern at the point of exposure.

Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the risk assessment provides upper-bound estimates of the risks to populations near the site, and is highly unlikely to underestimate actual risks related to the site.

More specific information concerning public health risks, including a quantitative evaluation of the degree of risk associated with various exposure pathways, is presented in the risk assessment report which is included in the Administrative Record for this Site.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are specific goals to protect human health and the environment. These objectives are based on available information and standards such as applicable or relevant and appropriate requirements (ARARs) and risk-based levels established in the risk assessment.

The following remedial action objectives address the human health risks posed by contaminated groundwater at the Site:

- Restore the chromium-contaminated groundwater to levels acceptable for future beneficial use as a drinking water resource.
- Prevent exposure to chromium concentrations in groundwater above acceptable levels.
- Minimize the potential for infiltration of contaminated groundwater into basements and transfer of hexavalent chromium onto basement surfaces.
- For basement surfaces contaminated by groundwater infiltration, prevent direct contact with and ingestion of hexavalent chromium concentrations above acceptable levels.

There are currently no complete exposure pathways to contaminated groundwater. However, significant health risks would exist if contaminated groundwater were to be used as a drinking water source in the future or if contaminated groundwater were used in industrial processes. Additionally, there is the potential for recontamination and new contamination of residential basements through continued infiltration of contaminated groundwater exacerbated by weather conditions. Remedial actions must minimize the potential for human exposure to contaminated groundwater.

The cleanup of this Site is based on remediating the chromium contaminated groundwater to the NJ Groundwater Quality Standard for total chromium, 70 ppb. This is more conservative than EPA's Maximum Contamination Level (MCL) for total chromium, 100 ppb. Cleanup is also based on RALs developed to determine whether basements have been remediated to levels that are within the acceptable risk range for exposure to hexavalent chromium. The RAL for basements used as a living space (high use) is 1.1 micrograms of hexavalent chromium per 10 cm x 10 cm wipe, and 8.7 micrograms of hexavalent chromium per wipe for basements used for laundry and storage (low use). The chromium cleanup goals were selected to both reduce the risk associated with exposure to this contaminant to an acceptable level and to ensure minimal migration of chromium.

DESCRIPTION OF REMEDIAL ALTERNATIVES

CERCLA requires that each remedial alternative be protective of human health and the environment, be cost-effective, comply with other statutory laws, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practical. In addition, CERCLA includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances.

Potential technologies applicable to groundwater remediation were identified and screened by effectiveness, implementability, and cost criteria, with emphasis on effectiveness. In addition, institutional controls (e.g., a deed notice, an easement or a covenant) to limit the use of portions of individual properties may be required. These use restrictions are discussed below in each alternative as appropriate. The type of restriction will need to be determined after completion of the remedial alternative selected in the ROD. Consistent with expectations set forth in the NCP, none of the remedies rely exclusively on institutional controls to achieve protectiveness.

The cost estimates of each alternative assume 30 years of implementing the remedy. However, the time required to achieve the RAO for restoration of groundwater would be greater than 30 years for all of the alternatives. Based on EPA's groundwater modeling, restoration of chromium-contaminated groundwater to levels acceptable for use as a drinking water source is expected to take at least 80 years. The time frames below for construction are estimated and do not include the time for designing a remedy or the time to procure necessary contracts. Because each of the action alternatives are expected to take longer than 5 years, a site review will be conducted every 5 years until remedial goals are achieved.

Alternative 1 - No Action

The NCP requires that a "No Action" alternative be evaluated to establish a baseline for comparison with other remedial alternatives. Under the no action alternative, no remedial actions would be taken to reduce the levels of contamination in the source area or downgradient plume. Additionally, this option does not include the continuation of any existing institutional controls, nor the implementation of any new institutional controls. Any improvement of groundwater quality would be through natural attenuation.

Total Capital Cost:	$0
Operation and Maintenance:	$0
Total Present Net Worth:	$0
Construction Timeframe:	0 years.

Alternative 2A – Source Area Soil Mixing, with Pump and Treat

Under Alternative 2A, the focus of the remedial action would be confined to the saturated soils, weathered bedrock material, overburden aquifer, and shallow bedrock aquifer within the confines of the ECE property. A backhoe or auger would be used to distribute a chemical reagent to the soil. The reagent would be a reducing amendment that converts hexavalent chromium to the less toxic and less mobile form of trivalent chromium. Source mixing can be completed within one year. The optimal mixing locations and reagent selection would be developed during the remedial design.

Below the zone of soil mixing, contaminated groundwater would be extracted from the shallow bedrock at the source area. Extraction wells would be installed along the west side of the ECE property to maximize capture of the highest hexavalent chromium concentrations. The extracted groundwater would be treated and reinjected through wells along the east side of the ECE property.

Additional monitoring wells would be installed to assess concentration trends, establishment of reducing conditions, and overall performance of the remedy within the boundary of the ECE property. Monitoring would be performed within the existing downgradient plume well network to evaluate the fate of the plume after the source has been treated and institutional controls would also be implemented to reduce the risk of ingesting contaminated groundwater. Additionally, basement investigations and remedial actions including decontamination, the application of sealants, and/or the installation of drainage trenches and sumps would be carried out in areas that continue to be impacted by elevated concentrations of hexavalent chromium in groundwater.

This alternative is expected to reach the New Jersey Ground Water Quality Standard at the source area, but it would not address downgradient groundwater contamination. EPA would review this action at least every five years until the RAOs are achieved.

Total Capital Cost:	$8,000,000
Operation and Maintenance:	$5,900,000
Total Present Net Worth:	$13,900,000
Construction Timeframe:	2 years

Alternative 2B – Source Area *In situ* Reduction and Pump and Treat

Under Alternative 2B, the focus of the remedial action would be confined to the saturated soils, weathered bedrock material, overburden aquifer, and shallow bedrock aquifer within the confines of the ECE property. *In situ* injections would be performed in the contaminated groundwater in the source area. A grid of injection wells would be installed and a reducing amendment would be periodically injected into the wells to convert hexavalent chromium to trivalent chromium.

Contaminated groundwater would be extracted from the shallow bedrock at the source area. Extraction wells would be installed along the west side of the ECE property to maximize capture of the highest hexavalent chromium concentrations. The extracted groundwater would be treated and then reinjected through wells along the east side of the ECE property. Additional monitoring wells would be installed to assess concentration trends and reducing conditions across the source area. The optimal injection locations and reagent selection would be developed during the remedial design phase.

Four new permanent monitoring wells would be installed to assess concentration trends, establishment of reducing conditions, and overall performance of the remedy within the boundary of the ECE property. Monitoring would be performed within the existing downgradient plume well network to evaluate the fate of the plume after the source has been treated and institutional controls would also be implemented to reduce the risk of ingesting contaminated groundwater. Additionally, basement investigations and remedial actions including decontamination, the application of sealants, and/or the installation of drainage trenches and sumps would be carried out in areas that continue to be impacted by elevated concentrations of hexavalent chromium in groundwater.

This alternative is expected to reach the New Jersey Ground Water Quality Standard at the source area, but it would not address downgradient groundwater contamination. EPA would review this action at least every five years until the RAOs are achieved.

Total Capital Cost:	$3,300,000
Operation and Maintenance:	$6,900,000
Total Present Net Worth:	$10,200,000
Construction Timeframe:	2 years

Alternative 3 – Source Area Treatment and *In situ* Reduction

Under this alternative, one of the two source treatment alternatives as described in Alternative 2A or 2B would be implemented.

Overburden plume treatment would be implemented downgradient of the EC Electroplating property with a series of *in situ* reduction barriers arranged perpendicular to the flow of the groundwater plume. The reduction barriers would be established by injecting a reducing agent into an array of permanent injection wells across the overburden plume every 3 years for the first 10 years, and then as needed to maintain reducing conditions. The wells would be installed in the most contaminated areas of the plume; primarily within the City of Garfield streets or right-of-ways. The optimal injection well layout and reagent selection would be developed during the remedial design phase. The timeframe for *in situ* barrier injections is assumed to be 30 years.

To provide monitoring within the overburden plume, additional overburden monitoring wells would be installed throughout the plume to monitor concentration trends, establishment of reducing conditions, and overall performance of the remedy. Monitoring would be used to manage the lower concentration fringes of the plume and institutional controls would be implemented to reduce the risk of ingesting contaminated groundwater.

This alternative also includes basement investigations and remedial actions including decontamination, the application of sealants, and/or the installation of drainage trenches and sumps would be carried out in areas that continue to be impacted by elevated concentrations of hexavalent chromium in groundwater.

EPA would review this action at least every five years until the RAOs are achieved.

Total Capital Cost:	$14,100,000
Operation and Maintenance:	$23,200,000
Total Present Net Worth:	$37,300,000
Construction Timeframe:	2 years

Alternative 4 – Source Area Treatment and Pump and Treat

Under this alternative, one of the two source treatment alternatives as described in Alternative 2A or 2B would be implemented.

A pump and treat system would be installed to extract and treat the highest concentrations of hexavalent chromium within the overburden plume downgradient of the EC Electroplating property. Groundwater extraction wells installed primarily within the City of Garfield streets and right-of-ways would be designed to maximize removal of the hexavalent chromium mass from the overburden groundwater. The extracted water would be conveyed to a treatment plant to be treated by ion exchange or chemical reduction and precipitation. Following treatment, extracted groundwater would be discharged into the sanitary sewer or into the Passaic River. The well field design and treatment process options would be developed during the remedial design phase.

To provide monitoring within the overburden plume, additional overburden monitoring wells would be installed throughout the plume to assess concentration trends and long-term fluctuations in the water table because of extraction and overall performance of the remedy. Monitoring would be used to manage the lower concentration fringes of the plume, and institutional controls would be implemented to reduce the risk of ingesting contaminated groundwater.

This alternative also includes basement investigations and remedial actions including decontamination, the application of sealants, and/or the installation of drainage trenches and sumps would be carried out in areas that continue to be impacted by elevated concentrations of hexavalent chromium in groundwater.

EPA would review this action at least every five years until the RAOs are achieved.

Total Capital Cost:	$5,200,000
Operation and Maintenance:	$16,900,000
Total Present Net Worth:	$22,100,000
Construction Timeframe:	2 years

Alternative 5 – Source Area Treatment and Combined Pump and Treat with *In situ* Reduction

Under this alternative, one of the two source treatment alternatives as described in Alternative 2A or 2B would be implemented.

The *in situ* reduction barriers described in Alternative 3 and the pump and treatment system in Alternative 4 would both be implemented to combine hexavalent chromium mass removal with *in situ* reduction. The combination of pumping and *in situ* treatment would maximize flow of hexavalent chromium through the *in situ* reduction barriers, and allow the pump and treatment system to be operated intermittently to optimize removal of hexavalent chromium. The well field design, treatment process options, and reagent selection would be developed during the remedial design phase.

As in Alternatives 3 and 4, additional overburden monitoring wells would be installed throughout the plume to monitor concentration trends, establishment of reducing conditions, and overall performance of the remedy. Monitoring would be used to manage the lower concentration fringes of the plume, and institutional controls would be implemented to reduce the risk of ingesting contaminated groundwater.

This alternative also includes basement investigations and remedial actions including decontamination, the application of sealants, and/or the installation of drainage trenches and sumps would be carried out in areas that continue to be impacted by elevated concentrations of hexavalent chromium in groundwater.

EPA would review this action at least every five years until the RAOs are achieved.

Total Capital Cost:	$15,900,000
Operation and Maintenance:	$33,200,000
Total Present Net Worth:	$49,100,000
Construction Timeframe:	2 years

COMPARATIVE ANALYSIS OF ALTERNATIVES

In selecting a remedy, EPA considered the factors set out in CERCLA §121, 42 U.S.C. §9621, by conducting a detailed analysis of the viable remedial response measures pursuant to the NCP, 40 CFR §300.430(e)(9) and OSWER Directive 9355.3-01. The detailed analysis consisted of an assessment of each of the individual response measures per remedy component against each of nine evaluation criteria and a comparative analysis focusing upon the relative performance of each response measure against the criteria.

***Threshold Criteria** – The first two criteria are known as "threshold criteria" because they are the minimum requirements that each response measure must meet in order to be eligible for selection as a remedy.*

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1. Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

Alternative 1, No Action, would not provide overall protection of human health and the environment. This alternative would not achieve the RAOs for the source area or overburden plume within a reasonable timeframe. The contaminated source area soils would remain within the ECE property boundaries, and groundwater monitoring would not be performed to track plume migration and growth. Potential exposure to groundwater through basement infiltration and future use of the aquifer would continue to pose human health risks.

Alternatives 2, 3, 4, and 5 are protective of human health and the environment. These alternatives would meet the RAOs by treating the source area and downgradient groundwater, and by implementing the basement remedies and institutional controls in the overburden plume. By implementing source zone treatment on the ECE property, each of the alternatives would target and treat the highest hexavalent chromium concentrations in the overburden and shallow bedrock groundwater. Additionally, by implementing the basement remedies, health risks associated with groundwater infiltration into basements would be mitigated. These alternatives all result in decreases in concentration within the plume, which also would reduce the risk associated with groundwater infiltration into basements. The use of institutional controls would mitigate potential risks from exposure to groundwater through pathway elimination.

2. Compliance with applicable or relevant and appropriate requirements (ARARs)

Section 121(d) of CERCLA and NCP §300.430(f) (ii) (B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA section 121(d)(4).

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those State standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. Only those State standards that are identified in a timely manner, and are more stringent than Federal requirements, may be relevant and appropriate.

Compliance with ARARs address whether a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes or provides a basis for invoking a waiver.

Under Alternative 1, No Action, no cleanup measures will be taken and ARARs will not be achieved in a reasonable timeframe. Alternatives 2, 3, 4, and 5, would comply with all applicable ARARs and achieve remedial goals in the long term.

A complete list of ARARs can be found in Table 7 in Appendix I.

Primary Balancing Criteria *– The next five criteria, criteria 3 through 7, are known as "primary balancing criteria." These criteria are factors by which tradeoffs between response measures are assessed so that the best options will be chosen, given site-specific data and conditions.*

3. Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met. This criterion includes the consideration of residual risk that will remain on-site following remediation and the adequacy and reliability of controls.

Alternative 1 would not be effective or permanent, since the contaminants would not be monitored and there would be no mechanism to prevent future exposure to contaminated groundwater. The proposed source zone treatment in Alternatives 2, 3, 4, and 5 would be effective, and permanently treats hexavalent chromium mass within the source area, the ECE property. Alternative 2 achieves the PRGs downgradient of the source area primarily by dilution and dispersion as the hexavalent chromium plume migrates downgradient. Under Alternatives 3 and 5, *in situ* reduction injections would achieve PRGs by permanently reducing hexavalent chromium to trivalent chromium in the overburden plume. Under Alternatives 4 and 5, the pump-and-treat system would achieve PRGs by extracting groundwater and providing treatment *ex situ*.

Alternative 3 requires injections of a reducing amendment once every three years for approximately 10 years to establish permanent reduction barriers to reduce hexavalent chromium mass in the source overburden and overburden plume. The long-term effectiveness of the pump-and-treat system under Alternatives 4 and 5 relies on routine repair and replacement of pumps and rehabilitation of wells to maintain removal of hexavalent chromium mass.

Alternatives 2, 3, 4, and 5 would all rely on long-term monitoring to evaluate the effectiveness of the implemented remedy. Basement monitoring would be implemented until RAOs are achieved, and institutional controls would be used to mitigate risks until long-term effectiveness is achieved.

4. Reduction of Toxicity, Mobility, or Volume through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

Alternative 1 would not reduce the toxicity, mobility, and volume (TMV) through treatment, as no active treatment of contaminated groundwater occurs. *In situ* reduction under Alternatives 2, 3, and 5 would result in a reduction in both the toxicity and mobility of hexavalent chromium by reducing hexavalent chromium to trivalent chromium, which should be permanent. Under Alternatives 2, 3, 4, and 5, toxicity and mobility reduction through *in situ* reduction is achieved through source treatment.

Alternative 2 does not reduce TMV in the overburden plume through active treatment; reduction in toxicity and volume of the plume is achieved primarily through dilution and dispersion as groundwater flows downgradient. Under Alternatives 3 and 5, reduction of toxicity and mobility is achieved in the overburden plume through *in situ* barrier treatment to convert hexavalent chromium to trivalent chromium. Overburden plume pump-and-treat under Alternatives 4 and 5 would result in a reduction in both the toxicity and volume by decreasing hexavalent chromium concentrations and by shrinking the overall size of the plume.

5. Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community and the environment during construction and operation of the remedy until cleanup levels are achieved.

For Alternative 1, protection of the community and workers during remedial activities would not be applicable as no remedial action is occurring. Air monitoring, engineering controls and appropriate worker personal protective equipment (PPE) would be used to protect the community and workers for Alternatives 2 through 4.

Soil mixing and *in situ* injections in the source overburden may result in exposure to harmful chemicals, based on the reducing agent chosen. Soil mixing could be implemented within one year and would begin providing source zone treatment within 1 year of installation. However, soil mixing activities would generate a higher degree of noise and dust impacting nearby residents, compared to *in situ* injections. *In situ* injections would remediate source area overburden, but will require multiple injections over approximately 6 years.

Alternative 2 would have the least impact on the community or risk to workers, since no active remediation would be implemented in the plume downgradient of the source area. During implementation, Alternative 2A would have a greater impact on the community than Alternative 2B due to the use of multiple pieces of equipment needed to implement soil mixing. Additionally, the implementation time needed to carry out soil mixing would result in an extended period of disruption to the community as opposed to the installation of wells for injections. The risk of exposure to workers is greater under Alternative 2A, based on the process involved with soil mixing in which contaminated soils are brought to the surface and handled. Under Alternative 2A more chemicals would need to be transported and stored onsite at one time; however, under Alternative 2B, chemicals would need to be transported multiple times over the course of 6 years.

Because well drilling is generally limited to the City of Garfield right-of-ways, traffic may be disrupted for a long period. Additionally, during injections, large quantities of substrate will have to be transported, stored, and handled onsite. Treatment of the overburden plume will not begin until injections are completed and reducing conditions are established within the aquifer.

Under Alternatives 2, 3, 4, and 5, the implementation of source zone treatment could be carried out rapidly and be effective in the short term. The source area property is readily accessible and located in a mixed use industrial and residential neighborhood. The overburden plume pump-and-treat system under Alternative 4 would take less time to implement, but would have a greater impact on the community during installation of pump-and-treat system piping and wells and construction of the treatment plant. The short term effectiveness of the pump-and-treat system under Alternative 5 would be restricted by the time needed to install the *in situ* barriers, and therefore, would have similar short-term effectiveness as Alternative 3. Once implemented, the pump-and-treat systems under Alternatives 4 and 5 would provide immediate removal of hexavalent chromium.

Treatment of the overburden plume through any of the active alternatives would not result in short-term reduction in plume size, and thus a reduction in the number of basements with potential exposure risk. A 90 percent reduction in overburden plume area is estimated to take 180, 111, 117, and 84 years, under Alternatives 2, 3, 4, and 5, respectively. The time to achieve RAOs 3 and 4 would be the same for Alternatives 2, 3, 4, or 5, since the RAOs would be largely met through the basement inspections and remediation.

6. Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

The source remediation component of all alternatives could readily be implemented using commonly available technologies and local contractors. Implementation of the source area remedy would generally be feasible because all aboveground structures have been removed; however, soil mixing may be constrained due to the limited space within the ECE property and site traffic control issues.

Alternative 2 would be easier to implement than Alternatives 3, 4, or 5, since it does not involve active remediation in the downgradient overburden plume. The presence of the overburden plume beneath the highly urbanized and densely populated city areas and the abundance of utilities in the streets pose severe constraints on performing groundwater remediation under Alternatives 3, 4, and 5.

Implementation of Alternative 4 would result in disturbance of the community over a large area because of the installation and maintenance of the pump-and-treat system piping and wells and construction of the treatment plant. Alternatives 3 and 5 would result in disturbance of the community during plume remedy implementation because of the large number of injections wells required. Additionally, large volumes of substrate to facilitate the injections would need to be transported and stored onsite for Alternatives 2, 3, and 5. Permit equivalents needed to carry out the plume injections under Alternatives 3 and 5 include an Underground Injection Control (UIC) for injections and a right-of-way permit equivalent during well installation and injections. Right-of-way permit equivalents would also be required under Alternatives 4 and 5 for installing extraction wells, as well as New Jersey Pollutant Discharge Elimination System, UIC, or Publicly Owned Treatment Works (POTW) permit equivalents for discharge of treated groundwater. Alternatives 4 and 5 would require continued operation and maintenance (O&M) of the pump-and-treat system over a long period. This may require operator attention at least weekly. Alternative 3 would only require attention every 3 years when substrate would be injected.

7. Cost

Includes estimated capital and O&M costs, and net present worth value of capital and O&M costs.

The cost of Alternative 1 is $0. This Alternative provides no protection of human health or the environment.

The estimated present worth cost of Alternative 2A is $13,937,000, which includes O&M costs over a 30-year period.

The estimated present worth cost of Alternative 2B is $10,197,000, which includes O&M costs over a 30-year period.

The estimated present worth cost of Alternative 3 is $37,334,000, which includes the cost of Alternative 2A and O&M costs over a 30-year period.

The estimated present worth cost of Alternative 4 is $22,088,000, which includes the cost of Alternative 2A and O&M costs over a 30-year period.

The estimated present worth cost of Alternative 5 is $49,112,000, which includes the cost of Alternative 2A and O&M costs over a 30-year period.

For the purposes of cost estimating, soil mixing was assumed as the overburden source treatment option for Alternatives 3, 4, and 5. The cost estimates for each alternative are order-of-magnitude estimates with an accuracy range of plus 50 to minus 30 percent. A detailed cost estimate for the selected remedy, Alternative 3, is provided in Table 8 of Appendix I. The final costs will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variables. The specific details of the selected remedial alternative and the corresponding cost estimate will be refined during the remedial design phase of the project.

***Modifying Criteria** – The final two evaluation criteria, criteria 8 and 9, are called "modifying criteria" because new information or comments from the state or the community on the Proposed Plan may modify the preferred response measure or cause another response measure to be considered.*

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8. State Acceptance

Indicates whether based on its review of the RI/FS reports and the Proposed Plan, the state supports, opposes, and/or has identified any reservations with the selected response measure.

The State of New Jersey concurs with all components of the selected remedy.

9. Community Acceptance

Summarizes the public's general response to the response measures described in the Proposed Plan and the RI/FS reports. This assessment includes determining which of the response measures the community supports, opposes, and/or has reservations about.

EPA solicited input from the community on the remedial response measures proposed for the site. Oral comments presented at the public meeting were recorded, and EPA received written comments during the public comment period. The Responsiveness Summary addresses all public comments received by EPA during the public comment period. Overall, the community members, elected officials, and stakeholders were in favor of EPA's recommended alternative.

PRINCIPAL THREAT WASTE

Principal threat wastes are considered source materials, *i.e.*, materials that include or contain hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or as a source for direct exposure. EPA's removal actions at the ECE property addressed hazardous materials, buildings, subsurface structures, and soils. These actions removed all of the "principal threat" wastes at the Site.

SELECTED REMEDY

Based upon consideration of the results of the Site investigations, the requirements of CERCLA, the detailed analysis of the response measures, and public comments, EPA has determined that Alternative 3, source area treatment and *in situ* reduction, is the appropriate remedy for the chromium contaminated groundwater at the Site. The remedy best satisfied the requirements of CERCLA Section 121 and the NCP's nine evaluation criteria for remedial alternatives, 40 CFR § 300.430(e)(9). The major components of the selected remedy include:

- Geochemical fixation through injection of a reducing agent to treat groundwater containing concentrations of total chromium greater than the New Jersey Groundwater Quality Standard of 70 parts per billion (ppb) throughout the Site;

- Extraction, treatment, and discharge of groundwater containing concentrations of total chromium greater than the New Jersey Groundwater Quality Standard of 70 ppb at the EC Electroplating property;

- Implementation of a long-term groundwater monitoring to assess the effectiveness of the action over time;

- Institutional controls, such as designation of a Classification Exception Area, to restrict the installation of wells and the use of groundwater in areas of chromium contaminated groundwater; and;

- Inspection and mitigation as necessary of residential and commercial basements in the areas impacted by contaminated groundwater.

The selected remedy alternative for the Garfield Site was selected over the other alternatives because it is expected to achieve substantial and long-term risk reduction through chemical conversion of hexavalent chromium to a less toxic form in the source overburden and downgradient overburden plume and removal of hexavalent chromium in the shallow bedrock beneath the source area. Though Alternatives 3 and 4 are similar in most respects, Alternative 3 was selected because it will effectively remove and reduce hexavalent chromium mass over the long term with less disruption of the community and in less time. In addition, Alternative 3 will reduce the mobility of the hexavalent chromium contamination and the risk of contamination of residential basements.

The selected remedy creates an *in situ* treatment zone using a geochemical fixation process that uses reducing agents within the chromium-contaminated plume area (Figures 5 and 6). The chemical reducing agent would reduce hexavalent chromium to trivalent chromium in the contaminated aquifer, allowing the chromium to precipitate out of solution. Geochemical fixation would be used to treat the entire area of groundwater that contains chromium above the cleanup goal of 70 ppb.

The remedy also includes a groundwater extraction and treatment system to reduce levels of hexavalent chromium at the ECE property (Figure 7). Once contaminated groundwater is extracted and treated through *ex situ* treatment, it would be discharged through injection wells installed to the base of the shallow bedrock. Injecting treated water into the zone of contaminated groundwater flushes the bedrock and helps expedite remediation of the plume.

To minimize infiltration of chromium contaminated groundwater into basements, and prevent exposure to hexavalent chromium transferred onto basement surfaces, the remedy will involve dewatering, cleaning, and waterproofing of basements. This approach will be implemented at the Site where needed.

The estimated cost of the selected remedy for OU1 is $37,334,000; a detailed cost estimate is provided in Table 8 in Appendix I. The cost estimates are based on the best available information regarding the anticipated scope of the overall remedy. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedy. These are order-of-magnitude engineering cost estimates that are expected to be within plus 50 to minus 30 percent of the actual project costs.

Based on the information available at this time, EPA and the State of New Jersey believe the selected remedy provides the best balance of trade-offs among the response measures with respect to the nine evaluation criteria. EPA believes that the selected remedy will be protective of human health and the environment, will comply with ARARs, will be cost effective, and will utilize permanent solutions and alternative treatment technologies to the maximum extent practicable.

Summary of the Rationale for the Selected Remedy

The selection of Alternative 3 is believed to provide the best balance of trade-offs among the alternatives with respect to the evaluation criteria. EPA and NJDEP concur that the selected alternative will be protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, is cost-effective, and will utilize permanent solutions and treatment technologies to the maximum extent practicable.

Green Remediation

Consistent with EPA Region 2's Clean and Green policy, EPA will evaluate the use of sustainable technologies and practices with respect to implementation of all components of the selected remedy.

STATUTORY DETERMINATIONS

As was previously noted, CERCLA §121(b)(1) mandates that remedial actions must be protective of human health and the environment, cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which employ treatment to permanently and significantly reduce the volume, toxicity or mobility of the hazardous substances, pollutants, or contaminants at a site. CERCLA §121(d) further specifies that a remedial action must attain a degree of cleanup that satisfies ARARs under federal and state laws, unless a waiver can be justified pursuant to §121(d)(4).

Protection of Human Health and the Environment

The selected remedy, Alternative 3, will be protective of human health and the environment through the treatment of chromium contaminated groundwater, inspection and mitigation of basements, and institutional controls. Groundwater monitoring and institutional controls will further ensure that chromium-contaminated groundwater will not impact human health and the environment.

The selected remedy will, over time, eliminate all significant risks to human health and the environment associated with the chromium contaminated groundwater. This action will result in the reduction of potential exposure levels to chromium contaminated groundwater to within EPA's generally acceptable risk for non-carcinogens. Implementation of the selected remedy will not pose unacceptable short-term risks or adverse cross-media impacts.

Compliance with ARARs

The selected remedy for chromium-contaminated groundwater will comply with ARARs.

The selected remedy for groundwater has been developed to meet Federal and State ARARs for drinking water. Pursuant to the New Jersey Ground Water Quality Standards, N.J.A.C. 7:9-6 et seq., the groundwater at the Site is classified as IIA, which means it is a current or potential source of drinking water. The more restrictive of Federal or New Jersey standards is being used as the cleanup level for chromium in groundwater. A comprehensive ARAR discussion is included in the final Feasibility Study and a complete listing of ARARs is included in Table 7.

Cost Effectiveness

EPA has determined that the selected remedy is cost-effective and represents a reasonable value. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." (NCP §300.430 (f) (1) (ii) (D)). EPA evaluated the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, or volume through treatment; and short-term effectiveness). Overall effectiveness was then compared to costs to determine cost-effectiveness. The relationship of the overall effectiveness of the selected remedy was determined to be proportional to costs and hence, this alternative represents a reasonable value for the money to be spent.

The selected remedy is cost effective as it has been determined to provide the greatest overall protectiveness for its present worth costs.

Utilization of Permanent Solutions and Alternative Treatment Technologies

EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the Site. Of those alternatives that are protective of human health and the environment and comply with ARARs to the extent practicable, EPA has determined that the selected remedy provides the best balance of trade-offs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element and State and community acceptance.

The selected remedy will provide adequate long-term control of risks to human health and the environment through treatment of the chromium-contaminated groundwater, inspection and mitigation of basements, and long-term monitoring and institutional controls. The selected remedy does not present short-term risks different from the other alternatives. The selected remedy employs innovative technologies that have proved successful at other sites having chromium contaminated groundwater.

Preference for Treatment as a Principal Element

EPA’s removal actions at the EC Electroplating property removed all of the principal threats at the Site. Treatment of chromium contaminated groundwater through geochemical fixation will reduce the toxicity, mobility, and volume of hexavalent chromium at the Site.

Five-Year Review Requirements

Because this remedy will not result in hazardous substances, pollutants, or contaminants remaining above levels that would allow for unlimited/unrestricted use, it will not be necessary to perform a statutory review within five years after initiation of the remedial actions to ensure that the remedies are, or will be, protective of human health and the environment. However, because it will take more than five years to attain remedial action objectives and cleanup goals, policy five-year reviews are required.

DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the Site was released for public comment on May 9, 2016. The comment period closed on June 8, 2016. The Proposed Plan identified Alternative 3 (source area treatment and *in situ* reduction) as the preferred alternative to address chromium groundwater contamination at the Site. Upon review of all comments submitted, EPA has determined that no significant changes to the preferred alternative, as it was presented in the Proposed Plan, are warranted.

APPENDIX I
Tables & Figures

Table 1
Summary of Chemicals of Concern and
Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Current/Future **Medium: Groundwater** **Exposure Medium: Groundwater**							
Chemical of Concern	**Concentration Detected**		**Concentration Units**	**Frequency of Detection**	**Exposure Point Concentration**	**Exposure Point Concentration Units**	**Statistical Measure**
	Min	**Max**					
Hexavalent chromium	0.015	87000	ug/L	140/146	10900	ug/L	97.5% Kaplan-Meier (Chebyshev) UCL

Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

This table presents the chemical of concern (COC) and exposure point concentration (EPC) for hexavalent chromium in groundwater (i.e., the concentration that will be used to estimate the exposure and risk from each COC in these media). The table includes the range of concentrations detected for hexavalent chromium, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the EPC and how it was derived.

TABLE 2
SELECTION OF EXPOSURE PATHWAYS

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion Of Exposure Pathway
Future	Groundwater	Groundwater	Tap Water from Overburden & Bedrock Groundwater	Residents	Adult/Child	Dermal, Ingestion	On-site	Quant	Residents may use groundwater as a future potable water source. Dermal exposures are assumed to occur from bathing/showering.
			Tap Water from Overburden & Bedrock Groundwater	Industrial Workers & Commercial Workers	Adult	Dermal, Ingestion	On-site	Qual	Industrial/commercial workers may use groundwater as a future potable water source. Dermal exposures are assumed to occur from hand and face washing. Adult resident risk estimates will be used as a conservative estimate of industrial/commercial worker risks.
			Pooled Groundwater in Excavation/Trench	Construction Workers	Adult	Dermal	On-site	None	Future construction workers may occasionally contact standing water within an excavation. However, because of the limited extent of exposed skin, exposure frequency, and exposure time, potential exposures will not be quantified.
Current/Future	Groundwater	Surface Water	Passaic River	Recreational User	Adult/Child	Dermal, Fish Ingestion	Off-site	None	Although the site conceptual model indicates that contaminated groundwater is discharging to the river, hexavalent chromium was not detected in surface water. Additionally, this metal is expected to be reduced to trivalent chromium in fish tissue that might be consumed. Therefore, this pathway was not evaluated further.
		Sediment	Passaic River	Recreational User	Adult/Child	Dermal	Off-site	None	Surface sediments that would be available for contact by a fisher or recreational user show limited hexavalent chromium contamination. Additionally, based on the information provided in the Data Quality Evaluation Report in Appendix E, hexavalent chromium is unstable in site sediment and the concentrations are expected to be variable in this medium. Because of the uncertainty associated with the hexavalent chromium concentrations and the limited contamination in sediment, potential exposures to hexavalent chromium in site sediment were not quantified in the risk assessment.
		Surface Dust	Basements in Garfield	Residents	Adult/Child	Dermal, Ingestion, Inhalation	On-site	None	USEPA removal action addressed the majority of known properties requiring remediation. However, some homes did not allow access, either for inspection of basements or remediation. These properties will continue to be addressed by USEPA on a case-by-case basis to the extent possible.

		Surface Soil	Garfield Properties	Residents	Adult/Child	Dermal, Ingestion, Inhalation	On-site	None	USEPA remedial action addressed all known properties where basement sumps discharged to surface soil. Sumps were re-routed to the sanitary sewer.

Notes:
Quant- Quantitative
Qual - Qualitative
USEPA = United States Environmental Protection Agency
HHRA = Human Health Risk Assessment.

Summary of Selection of Exposure Pathways

The table describes the exposure pathways associated with the media that were evaluated for the risk assessment, and the rationale for the inclusion of each pathway. Exposure media, exposure points, and characteristics of receptor populations are included.

Table 3
Non-Carcinogenic Toxicity Data Summary

Pathway: Ingestion/Dermal

Chemicals of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Absorp. Efficiency (Dermal)	Adjusted RfD (Dermal)	Adj. Dermal RfD Units	Primary Target Organ	Combined Uncertainty /Modifying Factors	Sources of RfD Target Organ	Dates of RfD
Hexavalent chromium	Chronic	3.00E-03	mg/kg-day	2.5	7.50E-05	mg/kg-day	No observed effects	300/3	IRIS	9/3/1998

Pathway: Inhalation

Chemicals of Concern	Chronic/ Subchronic	Inhalation RfC	Inhalation RfC Units	Inhalation RfD (If available)	Inhalation RfD Units (If available)	Primary Target Organ	Combined Uncertainty /Modifying Factors	Sources of RfD Target Organ	Dates of RfC
Hexavalent chromium	--	NA	--	NA	N/A	NA	NA	N/A	N/A

Summary of Toxicity Assessment

This table provides non-carcinogenic risk information which is relevant to the contaminant of concern. When available, the chronic toxicity data have been used to develop oral reference doses (RfDs) and inhalation reference concentrations (RfCs).

N/A: Not Applicable
NA: Not Available
IRIS: Integrated Risk Information System, U.S. EPA

Table 4
Cancer Toxicity Data Summary

Pathway: Ingestion/ Dermal

Chemical of Concern	Oral Cancer Slope Factor	Units	Adjusted Cancer Slope Factor (for Dermal)	Slope Factor Units	Weight of Evidence/ Cancer Guideline	Source	Date
Hexavalent chromium	5.00E-01	$(mg/kg\text{-}day)^{-1}$	2.00E+01	$(mg/kg\text{-}day)^{-1}$	D (1)	NJDEP	6/1/2009

Pathway: Inhalation

Chemical of Concern	Unit Risk	Units	Inhalation Cancer Slope Factor	Slope Factor Units	Weight of Evidence/ Cancer Guideline	Source	Date
Hexavalent chromium	N/A	$(mg/m^3)^{-1}$	--	--			

Key:

IRIS: Integrated Risk Information System. U.S. EPA

(1) In the absence of an oral slope factor for hexavalent chromium, the US EPA determined in 2009 that the oral slope factor developed by the New Jersey Department of Environmental Protection (NJDEP) fulfills the criteria for a Tier 3 toxicity value to be used in Superfund risk assessments.

Summary of Toxicity Assessment

This table provides carcinogenic risk information which is relevant to the contaminants of concern. Toxicity data are provided for both the oral and inhalation routes of exposure.

Table 5
Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical Of Concern	Primary target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Groundwater	Hexavalent chromium	No observed effect	99	N/A	42	141
-			Chemical Total			--		141
		Exposure Point Total						141
	Exposure Medium Total							141
Medium Total								141

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical Of Concern	Primary target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Groundwater	Hexavalent chromium	No observed effect	234	N/A	123	355
-			Chemical Total			--		355
		Exposure Point Total						355
	Exposure Medium Total							355
Medium Total								355

Summary of Risk Characterization - Non-Carcinogens

The table presents hazard quotients (HQs) for each route of exposure and the hazard index (sum of hazard quotients) for all routes of exposure. The Risk Assessment Guidance for Superfund states that, generally, a hazard index (HI) greater than 1 indicates the potential for adverse non-cancer effects.

Table 6
Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child

Medium	Exposure Medium	Exposure Point	Chemical Of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Groundwater	Hexavalent chromium	3E-01	N/A	1E-01	5E-01
-			Chemical Total		--		5E-01
		Exposure Point Total					5E-01
	Exposure Medium Total						5E-01
Medium Total							5E-01

Summary of Risk Characterization - Carcinogens

The table presents cancer risks for each route of exposure and for all routes of exposure combined. As stated in the National Contingency Plan, the acceptable risk range for site-related exposure is 1 x 10^{-6} (1 in 1 million) to 1x 10^{-4} (1 in 10,000).

Table 7. Applicable or Relevant and Appropriate Requirements
Garfield Groundwater Contamination Superfund Site
Record of Decision

Act/Authority	Criteria/Issues	Citation	Brief Description	Applicability	Action to Be Taken on Selected Remedy to Attain Requirement
Chemical-Specific					
Federal Safe Drinking Water Act	National Primary Drinking Water Standards - Maximum Contaminant Level Goals (MCLGs) and Maximum Contaminant Levels (MCLs)	40 CFR 141.62 and NJAC 7:10	Establishes health-based standards for public drinking water systems. Also establishes drinking water quality goals set at levels at which no adverse health effects are anticipated, with an adequate margin of safety. The NCP specifically states that MCLs will be used as ARARs for useable aquifers rather than the more stringent MCLGs.	Applicable to the selected remedy. New Jersey classifies all groundwater as Class IIA groundwater, considered suitable for drinking water, The MCLs were considered when selecting the Preliminary Remedial Goal (PRG) for Cr(VI). The Federal MCL for total chromium is 100 µg/L. New Jersey sets the State MCL for total chromium at the federal MCL.	The cleanup standard for Cr(VI) in groundwater has been established below the Federal and state MCL of 100 µg/L – see the NJAC 7:9C ARAR.
New Jersey Statutes and Rules	Groundwater Quality Standards	NJAC 7:9C	Defines groundwater classifications and establishes groundwater quality standards for various compounds. The site groundwater is classified as Class IIA suitable for drinking water.	The New Jersey Class IIA groundwater quality standards are applicable to the selected remedy. The PRG for Cr(VI) at the Garfield Superfund Site is set at the New Jersey Class IIA groundwater quality standard for total chromium of 70 µg/L.	The cleanup standard for Cr(VI) in groundwater has been established at the NJ Class IIA groundwater quality standard of 70 µg/L.
NJDEP Chromium Workgroup	Chromium and No Further Action in Soils	Chromium Moratorium Memorandum from Commissioner Jackson (NJDEP 2007b).	Describes conditions under which no further action letters can be issued when 20 mg/kg of chromium can remain in unsaturated soils.	To be considered	Chromium in unsaturated soils may remain after implementation of the remedy at concentration greater than 20 mg/kg, therefore the conditions in the NJDEP memorandum will be

Act/Authority	Criteria/Issues	Citation	Brief Description	Applicability	Action to Be Taken on Selected Remedy to Attain Requirement
					incorporated into the remedial and design and remedial action.
Action-Specific					
Treatment and Discharge of Groundwater					
New Jersey Pollutant Discharge Elimination System (NJPDES) Discharges to Surface Water and POTWs	Surface Water and Groundwater Discharge Criteria	NJAC 7:14A-6.5, 12.11(d), 13	Establishes discharge standards for discharges to Publicly Owned Treatment Works (POTWs) and surface water. The nearest surface water body is the Passaic River, which is classified as an FW2-NT/SE2 water. Discharges to surface water from contaminated groundwater cleanup substantive requirements of the Category BGR-NJ0155438 would apply.	The discharge to surface water or discharge to POTW regulations are applicable if these discharges are pursued.	The design will comply with applicable standards for discharge limits and substantive requirements such as monitoring requirements. The design also will require compliance with BGR substantive requirements for treated construction dewatering, generally short term in nature (less than 6 months in duration), which may relate to the basement remediation portion of the remedy.
New Jersey Pollutant Discharge Elimination System (NJPDES) Underground Injection	Class V Underground Injection	NJAC 7:14A-6.5, 7.5(b)3(vii), 7.8, 8.5, 8.5, 8.10(a), 8.12(a), 8.12(c), 8.12(d), 8.16(b)1, 8.16(c)1, 8.16(f)	Requirements for discharge to groundwater through underground injection wells.	The UIC regulations are applicable to the reinjection of water. Because this is a CERCLA site with USEPA lead and NJDEP review, it is considered that the permit-by-rule applicability criteria in 7.5(b)3(vii) are met through NJDEP review of this FS and future Remedial Action Work Plan.	The permit-by-rule applicability criteria in 7.5(b)3(vii) will be met through NJDEP review of the Remedial Action Work Plan. Substantive permit-by-rule requirements such as monitoring will be defined in the remedial design or the associated

Act/Authority	Criteria/Issues	Citation	Brief Description	Applicability	Action to Be Taken on Selected Remedy to Attain Requirement
				Substantive permit-by-rule requirements such as monitoring would be adhered to, as proposed in an EPA-approved and NJDEP-reviewed work plan or remedial design.	EPA-approved and NJDEP-reviewed Remedial Action Work Plan.
New Jersey Pollutant Discharge Elimination System (NJPDES) Treatment Works Approval and Licensed Operator	Groundwater Treatment Ex Situ	NJAC 7:14-22.4(b)5 and NJAC 7:l0A-l.lO(c)1.	Treatment works approval and licensed operator are not required for discharges authorized under NJAC 7:14-7.5, per NJAC 7:14A-22.4(b)5	Not applicable; not an ARAR	Not an ARAR.
Water Supply Management Act and Implementing Rules	Extraction or Diversion of Groundwater or Surface Water Exceeding 70 gpm (100,000 gpd)	NJSA 58:1A-1 and NJAC 7:19	Rules governing the establishment of privileges to divert water, and the management of water quantity and quality. Includes schedule and reporting procedures.	NJSA 58:1-1A is applicable only if extraction of groundwater may exceed a rate of 70 gpm; however, the implementing rule (NJAC 7:19) is to be considered, as it applies administrative mechanisms through which objectives of the Water Supply Management Act can be achieved. Substantive requirements include conducting hydrogeologic testing, maintaining the passing flow at or above the 7-day, 10-year flow established by the United States Geologic Survey, mitigating adverse impacts on groundwater or surface water or there users, and use of a totalizer	The NJDEP Bureau of Water Allocation (BWA) uses a CERCLA Permit-Equivalency application form for CERCLA site actions and does not typically require all substantive requirements in the rule. The appropriate substantive requirements from the rule will be determined by EPA and will be described in the design which will undergo NJDEP review.

Act/Authority	Criteria/Issues	Citation	Brief Description	Applicability	Action to Be Taken on Selected Remedy to Attain Requirement
				flowmeter. Refer to Discharge to Surface Water and Discharge to Groundwater above for construction-related dewatering of less than 70 gpm.	
Well Drillers and Pump Installers Act	Drilling Contractor Requirements	NJSA 58:4A-5 et seq. and NJAC 7:9D	Requirements for drilling and installing wells, licensing of well driller and pump installer, construction, and well casing specifications.	Applicable.	The remedial design will require compliance with these regulations for the installation of monitoring wells, extraction wells, or reinjection wells.
Preparation and Disposal of Waste					
New Jersey Solid and Hazardous Waste Regulations	Generation and Management of Solid and Hazardous Wastes	NJAC 7:26 Solid Waste and NJAC 7:26G Hazardous Waste	Establishes requirements for generators, transporters, and facilities that manage nonhazardous solid waste and hazardous waste	Applicable to solid and hazardous wastes generated during implementation of the remedial actions. Water treatment systems that are operated under NJDPES are exempt from RCRA waste regulations.	The design will require that solid waste be managed in accordance with substantive requirements of solid waste generator rules, and that waste which is tested and found to be characteristically hazardous will be managed in accordance with substantive requirements of hazardous waste generator rules.
New Jersey Transportation Regulations (related to handling)	Onsite Preparation for Offsite Transportation	NJAC 16:49-2.1(a)1, 2, 3, 5,6	Rules for labeling of hazardous materials, packaging, and loading unloading.	The waste preparation requirements are applicable to the onsite management of the waste in anticipation of shipping offsite.	The design will require compliance.

Table 7. Applicable or Relevant and Appropriate Requirements
Garfield Groundwater Contamination Superfund Site
Record of Decision

Act/Authority	Criteria/Issues	Citation	Brief Description	Applicability	Action to Be Taken on Selected Remedy to Attain Requirement
Remedial Action - General					
Noise Control Act	Restrictions of Noise	NJSA 13:1G-1 et seq. and NJAC 7:29-1	Prohibits and restricts noise that unnecessarily degrades the quality of life. Sets maximum limits of sound from any industrial, commercial, public service or community service facility.	Relevant and appropriate.	The final design will address compliance with this regulation to the extent practicable.
Soil Erosion and Sediment Control Act	Standards for Soil Erosion and Sediment Control	NJAC 2:90	The New Jersey Department of Agriculture, Bergen County Soil Conservation District governs all soil disturbances greater than 5,000 ft^2.	Applicable to alternatives that would disturb greater than 5,000 ft^2.	The design will require compliance with the Bergen County Soil Conservation District, which follows the Seventh Edition, NJ Standards for Soil Erosion and Sediment Control, January 2014. Typical measures for shallow soil excavations include installation of silt fences, hay bales, and protection of storm drains. Implementation will comply with substantive requirements.
NJDEP Bureau of Non-Point Source Control	Stormwater Management	NJAC 7:8	Establishes requirements for best management practices and stormwater protection. The general permit for construction (5G3) substantive	Applicable if greater than 1 acre is disturbed.	The acreage to be disturbed will be determined during the design. The design will require compliance if clearing, grading, and excavation (generally,

Table 7. Applicable or Relevant and Appropriate Requirements
Garfield Groundwater Contamination Superfund Site
Record of Decision

Act/Authority	Criteria/Issues	Citation	Brief Description	Applicability	Action to Be Taken on Selected Remedy to Attain Requirement
			requirements would likely apply.		construction activities) that disturb 1 acre or more of land.
Location-Specific					
National Historic Preservation Act	Protects historic places	16 USC 470 Section 106 et. seq.	Requires federal agencies to take into account the effect of any federally-assisted undertaking or licensing on any district, site, building, structure, or object that is included in or is eligible for inclusion in the National Register of Historic Places.	Applicable if the portions of the site to be disturbed by remediation include historic or cultural resources.	The injection well locations will be determined during the design. Any adverse effects on historic and cultural resources that may be present will be identified, evaluated, and addressed during the design. The design will require compliance and coordination once the injection well locations are known.

Table 7. Applicable or Relevant and Appropriate Requirements
Garfield Groundwater Contamination Superfund Site
Record of Decision

Act/Authority	Criteria/Issues	Citation	Brief Description	Applicability	Action to Be Taken on Selected Remedy to Attain Requirement
New Jersey Register of Historic Places Act	Protects historic places	NJSA 12:1B-15.128 et seq.	Official list of New Jersey's historic resources of local, state, and national interest. Closely modeled after the National Register program. Both Registers have the same criteria for eligibility, nomination forms, and review process. Intended to protect properties significant in architecture, history, archaeology, engineering and/or culture.	Applicable if the portions of the site to be disturbed by remediation include historic or cultural resources. A preliminary search indicates that the properties listed below are in Bergen County: Erie Railroad Right-of-Way westward from Hudson, Jersey City at Coles; Erie Railroad Main Line Historic District (ID#218); Remains of Zabriskie's dock (ID#513). Further evaluation is needed to determine if they are within the site boundaries.	The injection well locations will be determined during the design. Any adverse effects on historic and cultural resources that may be present will be identified, evaluated, and addressed during the design. The design will require compliance and coordination once the injection well locations are known.

Notes:

µg/L	=	microgram per liter
MCL	=	maximum contaminant level
ARARs	=	applicable or relevant and appropriate requirements
mg/kg	=	milligram per kilogram
BWA	=	Bureau of Water Allocation
NCP	=	National Oil and Hazardous Substance Pollution Contingency Plan
CERCLA	=	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
NJDEP	=	New Jersey Department of Environmental Protection
Cr(VI)	=	hexavalent chromium
NJPDES	=	New Jersey Pollutant Discharge Elimination System
EPA	=	US Environmental Protection Agency
POTW	=	Publicly Owned Treatment Works
ft^2	=	square feet
ppb	=	parts per billion
FS	=	feasibility study
PRG	=	preliminary remediation goal
gpd	=	gallons per day
RAO	=	remedial action objective
gpm	=	gallons per minute
UIC	=	underground injection control
MCLGs	=	maximum contaminant level goals

Table 8. Cost Estimate for Alternative 3: Source Treatment and In situ Reduction for Overburden

Garfield Groundwater Contamination Superfund Site

Record of Decision

– ***DESIGN***

Pump and Treat System			***Source In situ Injections***		
Plume			*Treatment zone*		
Extraction wells	0		Area	18,000	sf
Extraction well depth	50	ft	Depth	19	ft
Reinjection wells	0		Depth to water	12	ft
Reinjection well depth	50	ft	Injection Well Spacing	20	ft
Monitoring wells	6		Injection Wells	45	
Monitoring wells depth	50	ft			
Extraction piping	0	ft	*Reagents*		
Reinjection/discharge piping	0	ft	Cr6 mass	3,496	lbs
			Calcium polysulfide	67,227	lbs, 3.3x stoichiometric demand to reduce Cr(VI) to Cr(III), based on reaction:
Source			Calcium polysulfide (30 wt%)	224,090	lbs, $2CrO_4^{2-} + 3CaS_5 + 10H^+ \text{--->} 2Cr(OH)_3 + 15S + 3Ca^{2+} + 2H_2O$
Extraction wells	3				
Extraction well depth	45	ft	***In situ Reduction Barriers***		
Reinjection wells	6		*Wells*		
Reinjection well depth	45	ft	Injection wells	290	5,800 ft of boundary with 20-ft well spacing
Monitoring wells	4		Injection well depth	50	ft
Monitoring wells depth	45	ft			
Extraction piping	250	ft	*Injections*		
Reinjection piping	250	ft	EVO (60%) per well per event	5,656	lbs, based on EVO Design Tool for 100% oil (see Attachment D-1), divided by 0.6
P&T monitoring & reporting			*In situ reduction monitoring & reporting*		
Annual cost (estimated from current monitoring costs), includes monthly effluent discharge monitoring.	$165,000		Additional annual cost routine monitoring & reporting	$25,000	Engineer's estimate

Table 8. Cost Estimate for Alternative 3: Source Treatment and In situ Reduction for Overburden

Garfield Groundwater Contamination Superfund Site

Record of Decision

Item Description	Qty	Units	Unit Cost ($)	Total Cost ($)	NOTES
– ***CAPITAL COSTS***					–
Pump and Treat System					
Pre-Construction					
Subcontractor Submittals	1	LS	$87,500	$87,500	Engineer's estimate, see Table D6 of FS
Utility Clearance	5	day	$1,200	$6,000	Engineer's estimate
Surveying	5	day	$1,500	$7,500	Engineer's estimate
Well Installation					
Mobilization (HSA)	1	LS	$9,285	$9,285	Based on 2012 Garfield project rates escalated 3% per year, assumes 1 mobilization
Install Wells (HSA)	300	FT	$109	$32,700	Based on 2012 Garfield project rates escalated 3% per year, includes permitting and development, assumes 4" wells and flush-mounted monuments.
Mobilization (Rotary)	1	ea	$8,723	$8,723	Based on 2012 Garfield project rates escalated 3% per year, assumes 1 mobilization
Install Wells (Rotary)	585	FT	$315	$184,275	Based on 2012 Garfield project rates escalated 3% per year, includes permitting and development, assumes 4" wells and flush-mounted monuments
T&D Soil - Non-hazardous	27	TON	$225	$6,075	Based on 2012 Garfield project rates escalated 3% per year
IDW water - Non-hazardous	2,250	GAL	$0.68	$1,530	Based on 2012 Garfield project rates escalated 3% per year, assumes 50 gal per overburden well and 150 gal per bedrock well

Item Description	Qty	Units	Unit Cost ($)	Total Cost ($)	NOTES
Trenching, Piping, Pumps					
Trenching	83	CY	$50	$4,150	Engineer's estimate (labor, equip, and materials for 1.5-ft wide trench). Assumes saw-cutting and repairing asphalt, backfilling
Piping (+15% for fittings and risers)	575	FT	$12.49	$7,182	Cost for 2" Schedule 80 PVC from 2012 Cost Book, escalated 3% per year
Sand	44	TON	$31.56	$1,389	2015 quote from Braen Supply, escalated 3% per year: $22.27/ton + $92 delivery charge for each 16 tons. This is equal to $28.54/Ton
T&D Soil - Non-hazardous	70	TON	$225	$15,750	Based on 2012 Garfield project rates escalated 3% per year
Extraction pumps	3	ea	$2,500	$7,500	Grundfos Red-Flo4, internet pricing
Electrical Subcontractor					
Connect extraction well pumps, power to system building	1	LS	$50,000	$50,000	Engineer's estimate
System					
50 gpm treatment plant	1	LS	$872,511	$872,511	Based on vendor quote (Siemens 2010, see Table D11 of FS), escalated 3% per year
System Startup	1	LS	$25,000	$25,000	Engineer's estimate
Source In situ Injections					
Pre-Construction					
Subcontractor Submittals	1	LS	$83,500	$83,500	Engineer's estimate, see Table D6
Utility Clearance	1	day	$1,200	$1,200	Engineer's estimate
Surveying	1	day	$1,500	$1,500	Engineer's estimate

Table 8. Cost Estimate for Alternative 3: Source Treatment and In situ Reduction for Overburden

Garfield Groundwater Contamination Superfund Site

Record of Decision

Item Description	Qty	Units	Unit Cost ($)	Total Cost ($)	NOTES
Well Installation					
Mobilization (HSA)	1	LS	$9,285	$9,285	Based on 2012 Garfield project rates escalated 3% per year, assumes 1 mobilization
Install Wells (HSA)	855	FT	$109	$93,195	Based on 2012 Garfield project rates escalated 3% per year, includes permitting and development, assumes 4" wells and flush-mounted monuments
T&D Soil - Non-hazardous	21	TON	$225	$4,725	Based on 2012 Garfield project rates escalated 3% per year
IDW water - Non-hazardous	2,300	GAL	$0.68	$1,564	Based on 2012 Garfield project rates escalated 3% per year, assumes 50 gal per overburden well and 150 gal per bedrock well
In situ Reduction Barriers					
Pre-Construction					
Subcontractor Submittals	1	LS	$83,500	$83,500	Engineer's estimate, see Table D6
Utility Clearance	5	day	$1,200	$6,000	Engineer's estimate
Surveying	5	day	$1,500	$7,500	Engineer's estimate
Well Installation					
Mobilization (HSA)	0	ea	$9,285	$0	Included in P&T wells costs
Install Wells (HSA)	14,500	FT	$109	$1,580,500	Based on 2012 Garfield project rates escalated 3% per year, includes permitting and development, assumes 4" wells and flush-mounted monuments.
T&D Soil - Non-hazardous	435	TON	$225	$97,875	Based on 2012 Garfield project rates escalated 3% per year

Table 8. Cost Estimate for Alternative 3: Source Treatment and In situ Reduction for Overburden

Garfield Groundwater Contamination Superfund Site

Record of Decision

Item Description	Qty	Units	Unit Cost ($)	Total Cost ($)	NOTES
IDW water - Non-hazardous	87,000	GAL	$0.68	$59,160	Based on 2012 Garfield project rates escalated 3% per year, assumes 50 gal per overburden well and 150 gal per bedrock well
1st Injection event					
Purchase & deliver EVO	1,674,176	lb	$2.37	$3,967,797	2012 Cost Book, escalated 3% per year
Purchase & deliver Ca polysulfide	224,090	lb	$0.43	$96,359	Based on 2012 project pricing (FRx, WY ANG), escalated 3% per year
Injection subcontractor	1	LS	$445,578	$445,578	Based on vendor quote (Vironex 5/2/14, see Table D10), escalated 3% per year
Institutional Controls					
Initiate institutional controls	1	LS	$88,098	$88,098	RACER Version 11.2.16
Subcontractor Fee (G&A, OH, and Fee)	18%		$7,954,406	$1,431,793	Markup added to Total Capital Cost
Payment and Performance Bond	2%		$9,386,199	$187,724	P&P Bond on Subcontractor Total Price
Professional/Technical Services					
PM	5%		$9,573,923	$478,696	Based on USEPA Guidance Document 540-R-00-002
CM	6%		$9,573,923	$574,435	
Remedial Design	6%		$9,573,923	$574,435	Based on USEPA Guidance Document 540-R-00-002
Reporting	1	LS	$75,000	$75,000	Engineer's estimate
Contingency (15% scope + 10% bid)	25%		$11,276,490	$2,819,122	Based on USEPA Guidance Document 540-R-00-002
SUBTOTAL CAPITOL COST				**$14,096,000**	**(Rounded)**

Table 8. Cost Estimate for Alternative 3: Source Treatment and In situ Reduction for Overburden

Garfield Groundwater Contamination Superfund Site

Record of Decision

Item Description	Qty	Units	Unit Cost ($)	Total Cost ($)	NOTES
OPERATION AND MAINTENANCE					
In situ Injection YR 3 (includes source BR P&T, source OB, and plume OB)					
Purchase & deliver EVO	1,674,176	lb	$2.37	$3,967,797	2012 Cost Book, escalated 3% per year
Purchase & deliver Ca polysulfide	224,090	lb	$0.43	$96,359	Based on 2012 project pricing (FRx, WY ANG), escalated 3% per year
Injection Subcontractor	1	LS	$445,578	$445,578	Based on vendor quote (Vironex 5/2/14, see Table D10 of FS), escalated 3% per year
Subcontractor Fee (G&A, OH, and Fee)	18%		$4,509,734	$811,752	
Payment and Performance Bond	2%		$4,509,734	$90,195	
Professional/Technical Services					
PM	5%		$5,411,681	$270,584	
CM	6%		$5,411,681	$324,701	
Reporting	1	LS	$25,000	$25,000	Engineer's estimate
Contingency (15% scope + 10% bid)	25%		$6,031,965	$1,507,991	Based on USEPA Guidance Document 540-R-00-002
SUBTOTAL IN SITU INJECTION - YR 3				**$7,540,000**	**(Rounded)**

Table 8. Cost Estimate for Alternative 3: Source Treatment and In situ Reduction for Overburden
Garfield Groundwater Contamination Superfund Site
Record of Decision

Item Description	Qty	Units	Unit Cost ($)	Total Cost ($)	NOTES
In situ Injection YR 6 (includes source BR P&T, source OB, and plume OB)					
Purchase & deliver EVO	1,674,176	lb	$2.37	$3,967,797	2012 Cost Book, escalated 3% per year
Purchase & deliver Ca polysulfide	224,090	lb	$0.43	$96,359	Based on 2012 project pricing (FRx, WY ANG), escalated 3% per year
Injection Subcontractor	1	LS	$445,578	$445,578	Based on vendor quote (Vironex 5/2/14, see Table D10 of FS), escalated 3% per year
Subcontractor Fee (G&A, OH, and Fee)	18%		$4,509,734	$811,752	
Payment and Performance Bond	2%		$4,509,734	$90,195	
Professional/Technical Services					
PM	5%		$5,411,681	$270,584	Based on USEPA Guidance Document 540-R-00-002
CM	6%		$5,411,681	$324,701	
Reporting	1	LS	$25,000	$25,000	Engineer's estimate
Contingency (15% scope + 10% bid)	25%		$6,031,965	$1,507,991	Based on USEPA Guidance Document 540-R-00-002
SUBTOTAL IN SITU INJECTION - YR 6				**$7,540,000**	**(Rounded)**
In situ Reagent Injection YR 1, 2, 4, 5 (includes source OB)					
Purchase & deliver Ca polysulfide	224,090	lb	$0.43	$96,359	Based on 2012 project pricing (FRx, WY ANG), escalated 3% per year

Item Description	Qty	Units	Unit Cost ($)	Total Cost ($)	NOTES
Injection Subcontractor	1	LS	$19,096	$19,096	Based on vendor quote (Vironex 5/2/14, see Table D10 of FS), escalated 3% per year

Subcontractor Fee (G&A, OH, and Fee)	18%		$115,455	$20,782	
Payment and Performance Bond	2%		$115,455	$2,309	
Professional/Technical Services					
PM	8%		$138,546	$11,084	Based on USEPA Guidance Document 540-R-00-002
CM	10%		$138,546	$13,855	
Reporting	1	LS	$15,000	$15,000	Engineer's estimate
Contingency (15% scope + 10% bid)	25%		$178,484	$44,621	Based on USEPA Guidance Document 540-R-00-002
SUBTOTAL IN SITU INJECTION - YR 1, 2, 4 ,5				**$223,000**	**(Rounded)**
In situ Injection YR 10, 15, 20, 25 (includes plume OB)					
Year 10	75%	of barrier injection scope		$5,538,000	Engineer's estimate
Year 15	50%	of barrier injection scope		$3,692,000	Engineer's estimate
Year 20	50%	of barrier injection scope		$3,692,000	Engineer's estimate
Year 25	25%	of barrier injection scope		$1,846,000	Engineer's estimate

Item Description	Qty	Units	Unit Cost ($)	Total Cost ($)	NOTES
Pump and Treat System O&M					
Annual O&M Labor (50 gpm treatment plant)	1	LS	$328,074	$410,092	Based on vendor quote (Siemens 2010, see Table D11 of FS), escalated 3% per year, with 25% contingency
Injection Well Rehabilitation	1	LS	$17,000	$21,250	Engineer's estimate (annual rehabilitation, $2000 mobilization and $2500 per well, with 25% contingency)

Groundwater Monitoring					
Pump and Treat and In situ Monitoring	1	LS	$190,000	$237,500	Engineer's estimate, with 25% contingency
Long-Term Monitoring (YR 11+)	1	LS	$165,000	$206,250	Engineer's estimate, with 25% contingency
Residential Basement Inspection and Remediation					
Inspections (YR 1-20)	5	ea	$3,000	$18,750	Based on EPA estimate, with 25% contingency
Remediation (YR 1-20)	2	ea	$10,000	$25,000	Based on EPA estimate (removal of impacted sediments, decontamination and polymer sealing of floors, and walls, installation of french drain/sump system), with 25% contingency
Institutional Controls					
IC monitoring, enforcement, and biennial certification (every 2 yrs)	1	LS	$24,832	$31,040	RACER Version 11.2.16 , with 25% contingency

Item Description	Qty	Units	Unit Cost ($)	Total Cost ($)	NOTES
PERIODIC COSTS					
System Abandonment		371	WELLS		Assumes 327 overburden wells and 44 bedrock wells, including existing wells
Well Abandonment	371	ea	$5,300	$1,966,300	Estimate from RACER, escalated 3% per year
Pump and Treat System Abandonment	1	ea	$100,000	$100,000	Engineer's estimate
System piping	1	ea	$100,000	$100,000	Engineer's estimate
Professional/Technical Services					
PM	5%		$2,166,300	$108,315	Based on USEPA Guidance Document 540-R-00-002

CM	6%	$2,166,300	$129,978	Based on USEPA Guidance Document 540-R-00-002
Contingency (15% scope + 10% bid)	25%	$2,404,593	$601,148	Based on USEPA Guidance Document 540-R-00-002
SUBTOTAL SYSTEM ABANDONMENT			**$3,006,000**	

PRESENT VALUE ANALYSIS 7.0%

Year	Cost Type	Cost	Discount Rate	Present Value
0	Capital Cost	$14,096,000	1.00	$14,096,000
1	O&M, Monitoring/Reporting	$712,592	0.93	$665,974
1	In situ Injection	$223,000	0.93	$208,411
2	O&M, Monitoring/Reporting	$743,632	0.87	$649,517
2	In situ Injection	$223,000	0.87	$194,777
3	O&M, Monitoring/Reporting	$712,592	0.82	$581,688
3	In situ Injection	$7,540,000	0.82	$6,154,886
4	O&M, Monitoring/Reporting	$743,632	0.76	$567,314
4	In situ Injection	$223,000	0.76	$170,126
5	O&M, Monitoring/Reporting	$712,592	0.71	$508,069
5	In situ Injection	$223,000	0.71	$158,996
6	O&M, Monitoring/Reporting	$743,632	0.67	$495,514
6	In situ Injection	$7,540,000	0.67	$5,024,220
7	O&M, Monitoring/Reporting	$281,250	0.62	$175,148
8	O&M, Monitoring/Reporting	$312,290	0.58	$181,756

Table 8. Cost Estimate for Alternative 3: Source Treatment and In situ Reduction for Overburden

Garfield Groundwater Contamination Superfund Site

Record of Decision

Year	Cost Type	Cost	Discount Rate	Present Value
9	O&M, Monitoring/Reporting	$281,250	0.54	$152,981
10	O&M, Monitoring/Reporting	$312,290	0.51	$158,752
10	In situ Injection	$5,538,000	0.51	$2,815,238
11	O&M, Monitoring/Reporting	$250,000	0.48	$118,773
12	O&M, Monitoring/Reporting	$281,040	0.44	$124,785
13	O&M, Monitoring/Reporting	$250,000	0.41	$103,741
14	O&M, Monitoring/Reporting	$281,040	0.39	$108,992
15	O&M, Monitoring/Reporting	$250,000	0.36	$90,612
15	In situ Injection	$3,692,000	0.36	$1,338,151
16	O&M, Monitoring/Reporting	$281,040	0.34	$95,198
17	O&M, Monitoring/Reporting	$250,000	0.32	$79,144
18	O&M, Monitoring/Reporting	$281,040	0.30	$83,150
19	O&M, Monitoring/Reporting	$250,000	0.28	$69,127
20	O&M, Monitoring/Reporting	$281,040	0.26	$72,626
20	In situ Injection	$3,692,000	0.26	$954,083
21	O&M, Monitoring/Reporting	$206,250	0.24	$49,812
22	O&M, Monitoring/Reporting	$237,290	0.23	$53,559
23	O&M, Monitoring/Reporting	$206,250	0.21	$43,508

Year	Cost Type	Cost	Discount Rate	Present Value
24	O&M, Monitoring/Reporting	$237,290	0.20	$46,781
25	O&M, Monitoring/Reporting	$206,250	0.18	$38,001
25	In situ Injection	$1,846,000	0.18	$340,124
26	O&M, Monitoring/Reporting	$237,290	0.17	$40,860
27	O&M, Monitoring/Reporting	$206,250	0.16	$33,192
28	O&M, Monitoring/Reporting	$237,290	0.15	$35,689
29	O&M, Monitoring/Reporting	$206,250	0.14	$28,991
30	O&M, Monitoring/Reporting	$237,290	0.13	$31,172
30	System Abandonment	$3,006,000	0.13	$394,890
TOTAL PRESENT VALUE ANALYSIS				**$37,334,000**

CLASS 4 RANGE	
50%	**$56,001,000**
-30%	**$26,133,800**

This construction cost estimate is not an offer for construction and/or project execution. The construction cost estimate for this Design is an Association for the Advancement of Cost Engineering (AACE) Class 4 estimate and is assumed to represent the actual total installed cost. The estimate above is considered control-level cost estimating, suitable for use in project budgeting and planning. This estimate has been prepared with partial design and engineering calculations. The level of accuracy for the class of estimate defines the upper and lower ranges of the cost estimate. It is based upon the level of design detail and uncertainty associate with that level of detail. For a Class 4 estimate, the accuracy range is +50% to -30%. It would appear prudent that internal budget allowances account for the highest cost indicated by this range as well as other site specific allowances. The cost estimate has been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, competitive market conditions, implementation schedule, and other variable factors. As a result, the final project costs will vary from the estimates presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding.

Legend

- Conventional Monitoring Well
- Multiport FLUTe Well
- Basement Study Area and 2011 Groundwater Study Area
- Present Groundwater Study Area
- E.C. Electroplating Site (125 Clark St., Garfield, NJ)

0 560 1,120 Feet

Imagery Source: NJ Office of Information Technology (NJOIT), Office of Geographic Information Systems (OGIS), 2008

Figure 1

Site Plan
Record of Decision
Garfield Groundwater Contamination Superfund Site
Garfield, NJ 07026

ch2m

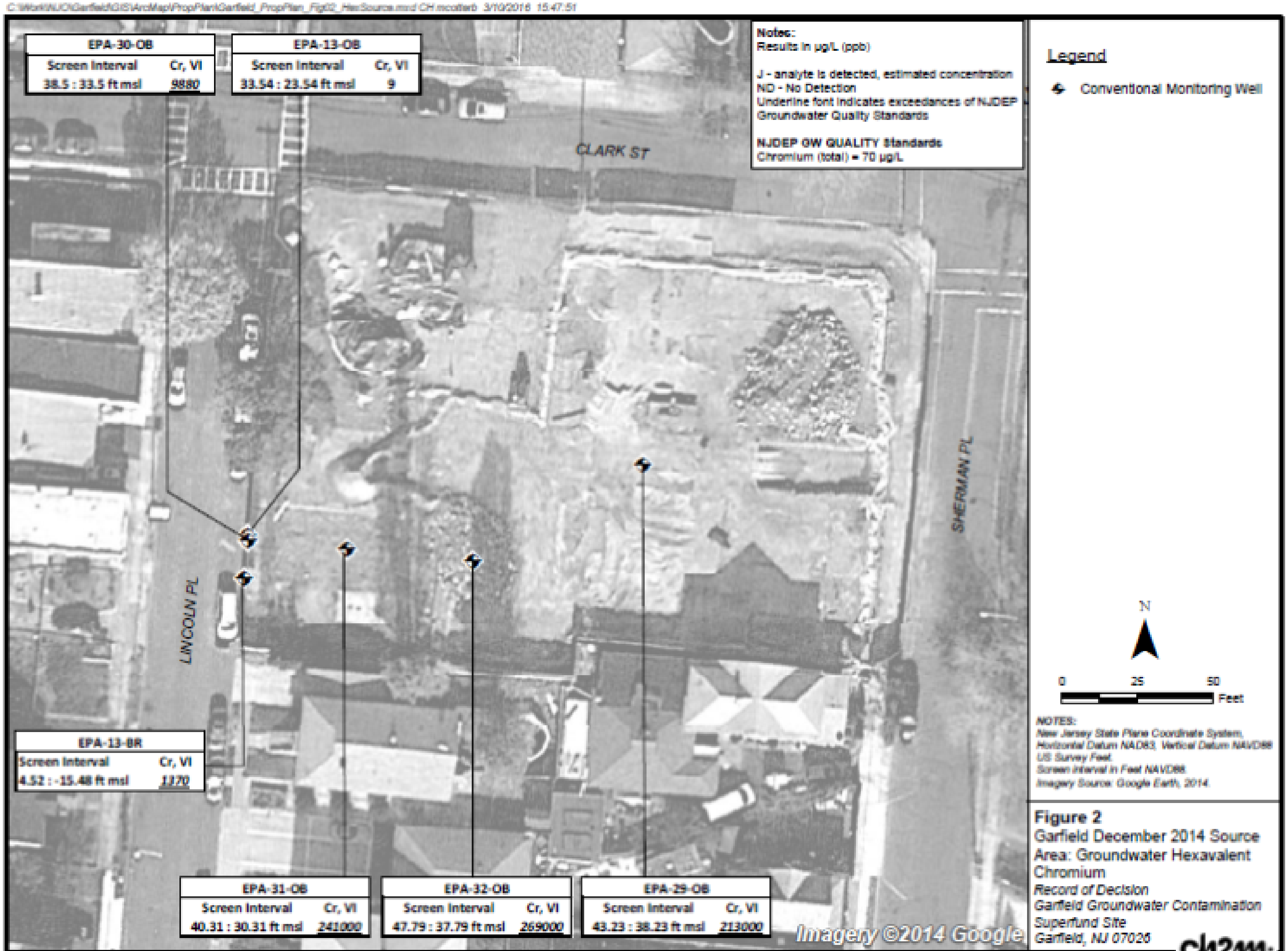
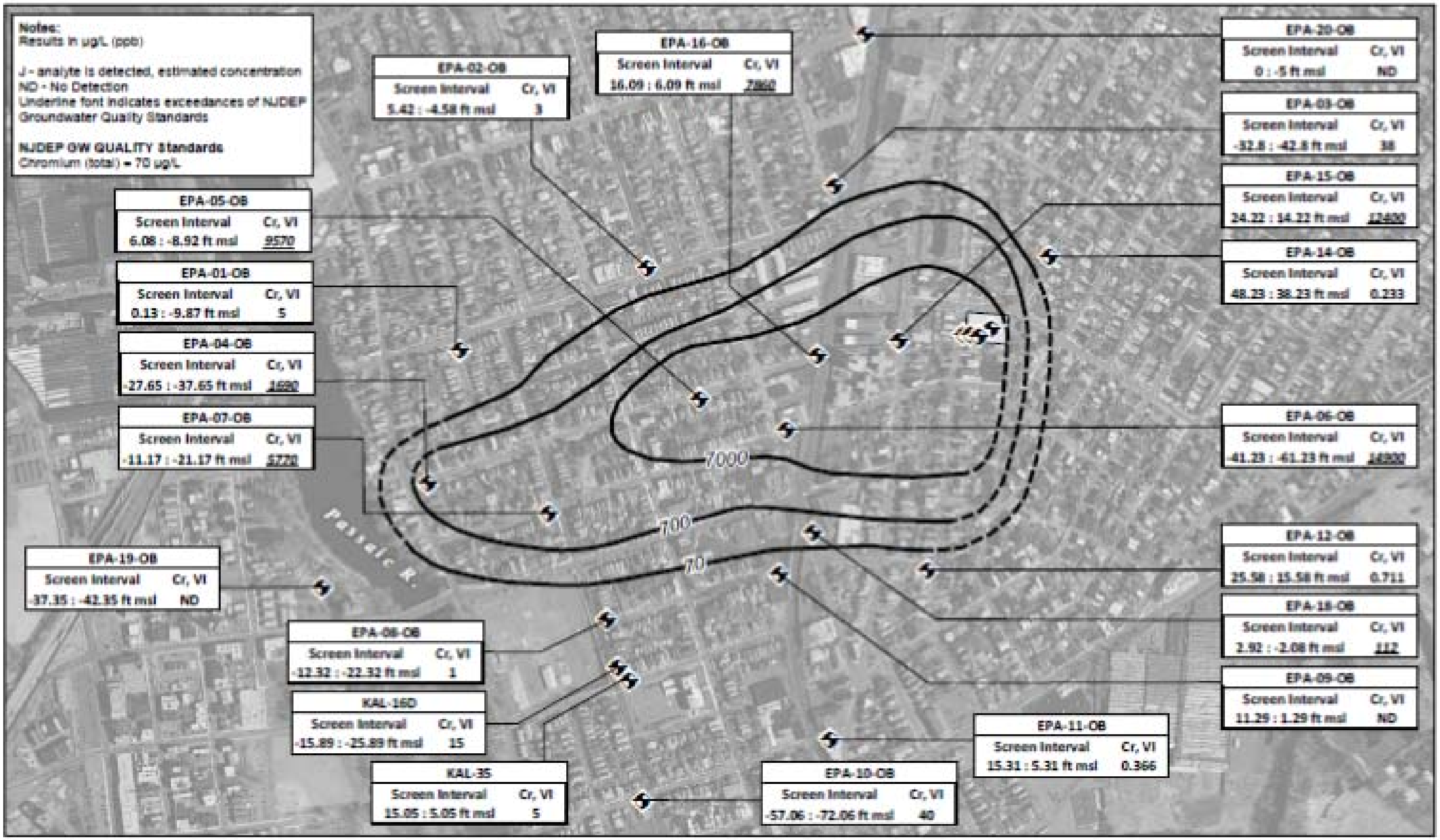


Figure 2
Garfield December 2014 Source Area: Groundwater Hexavalent Chromium
Record of Decision
Garfield Groundwater Contamination Superfund Site
Garfield, NJ 07026



Conventional Monitoring Well

70 Approximate Hexavalent Chromium Isoconcentration Contour (µg/L) (Dashed Where Inferred)

E.C. Electoplating Site (125 Clark St., Garfield, NJ)

0 250 500 750 1,000 Feet

N

NOTES:
New Jersey State Plane Coordinate System Horizontal Datum NAD83, Vertical Datum NAVD88 US Survey Feet.
MSL - Mean Sea Level
ND - Not Detected
Imagery Source: National Aerial Imagery Program, 2010
Screen Interval in Feet NAVD88
Overburden elevation ranges from 48.23 to -72.1 ft NAVD88

Figure 3
Garfield December 2014 Overburden Hexavalent Chromium
Record of Decision
Garfield Groundwater Contamination Superfund Site
Garfield, NJ 07026

ch2m

C:\WorkNJO\Garfield\GIS\ArcMap\PropPlan\Garfield_PropPlan_Fig03_HexChromeLTR.mxd

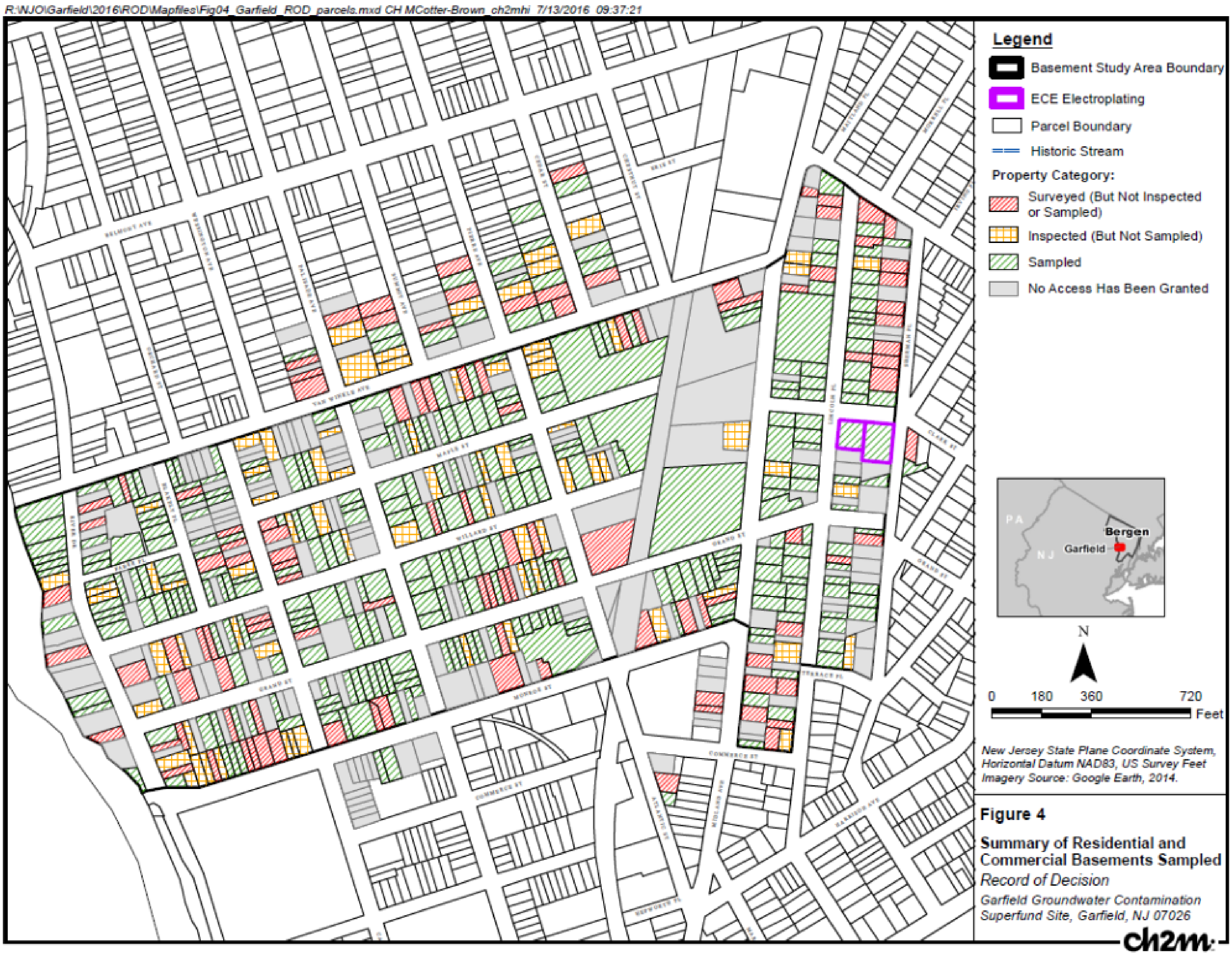


Figure 4

Summary of Residential and Commercial Basements Sampled

Record of Decision

Garfield Groundwater Contamination Superfund Site, Garfield, NJ 07026

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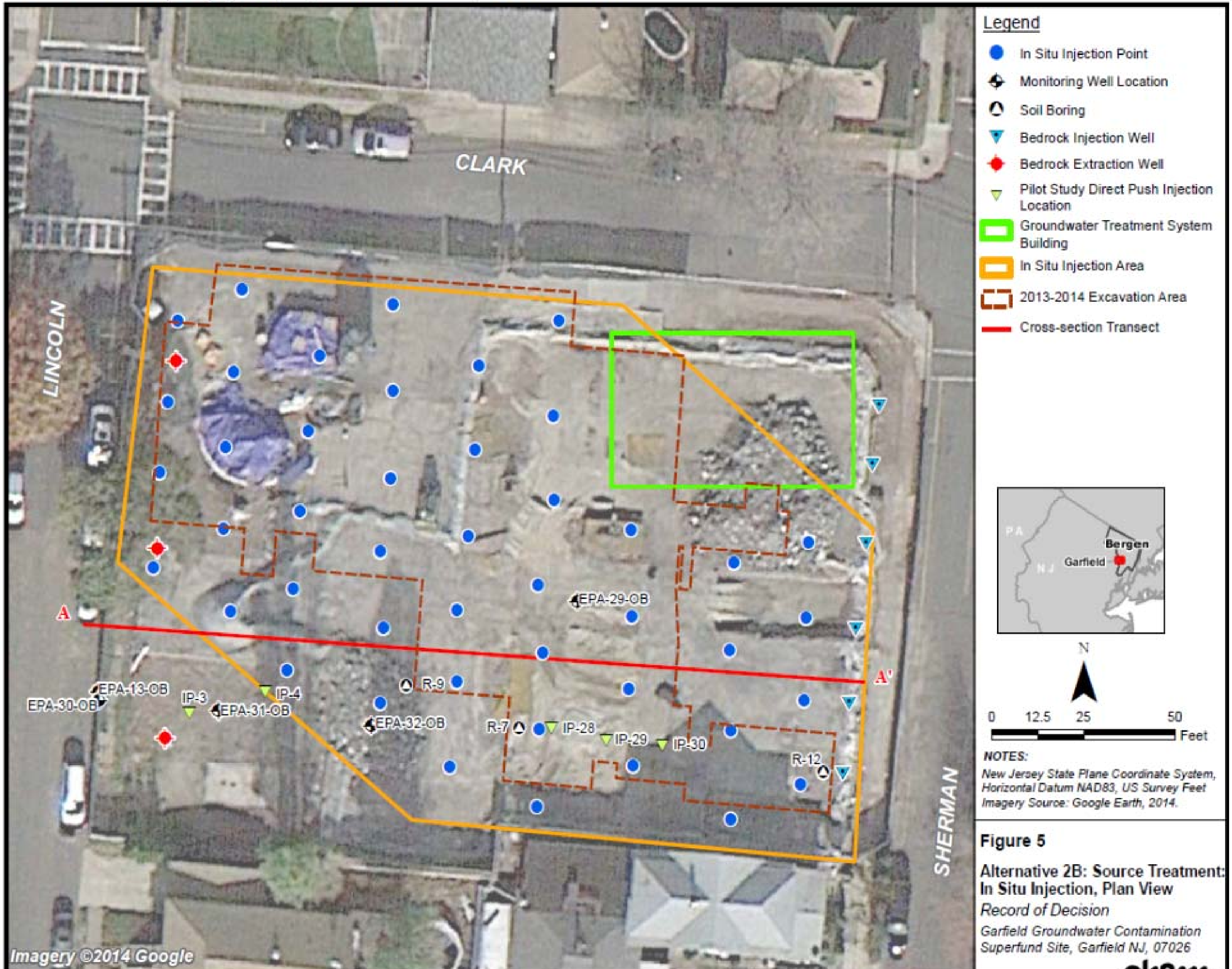

Figure 5

Alternative 2B: Source Treatment: In Situ Injection, Plan View

Record of Decision

Garfield Groundwater Contamination Superfund Site, Garfield NJ, 07026

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Legend

- Overburden Monitoring Well
- Former Garfield Municipal Well
- Grand Street Lot
- Kalama Chemical Site
- T.A. Farrell Site
- Source Treatment Area
- Alternative 3 In Situ Reduction Barrier

Approximate Hexavalent Chromium Isoconcentration Contour Lines (Dec 2014; Dashed Where Inferred)

- 70 µg/L
- 700 µg/L
- 7000 µg/L
- 70,000 µg/L

N

0 260 520 1,040 Feet

NOTES:

New Jersey State Plane Coordinate System, Horizontal Datum NAD83, US Survey Feet
MSL - Mean Sea Level
Screen Interval 1 (Feet Below Ground Surface)
Overburden elevation ranges from 0 to -72.1 ft NAVD88

Figure 6

Alternative 3: Source Treatment and In Situ Reduction Barriers for Overburden

Record of Decision

Garfield Groundwater Contamination Superfund Site, Garfield NJ, 07026

ch2m.

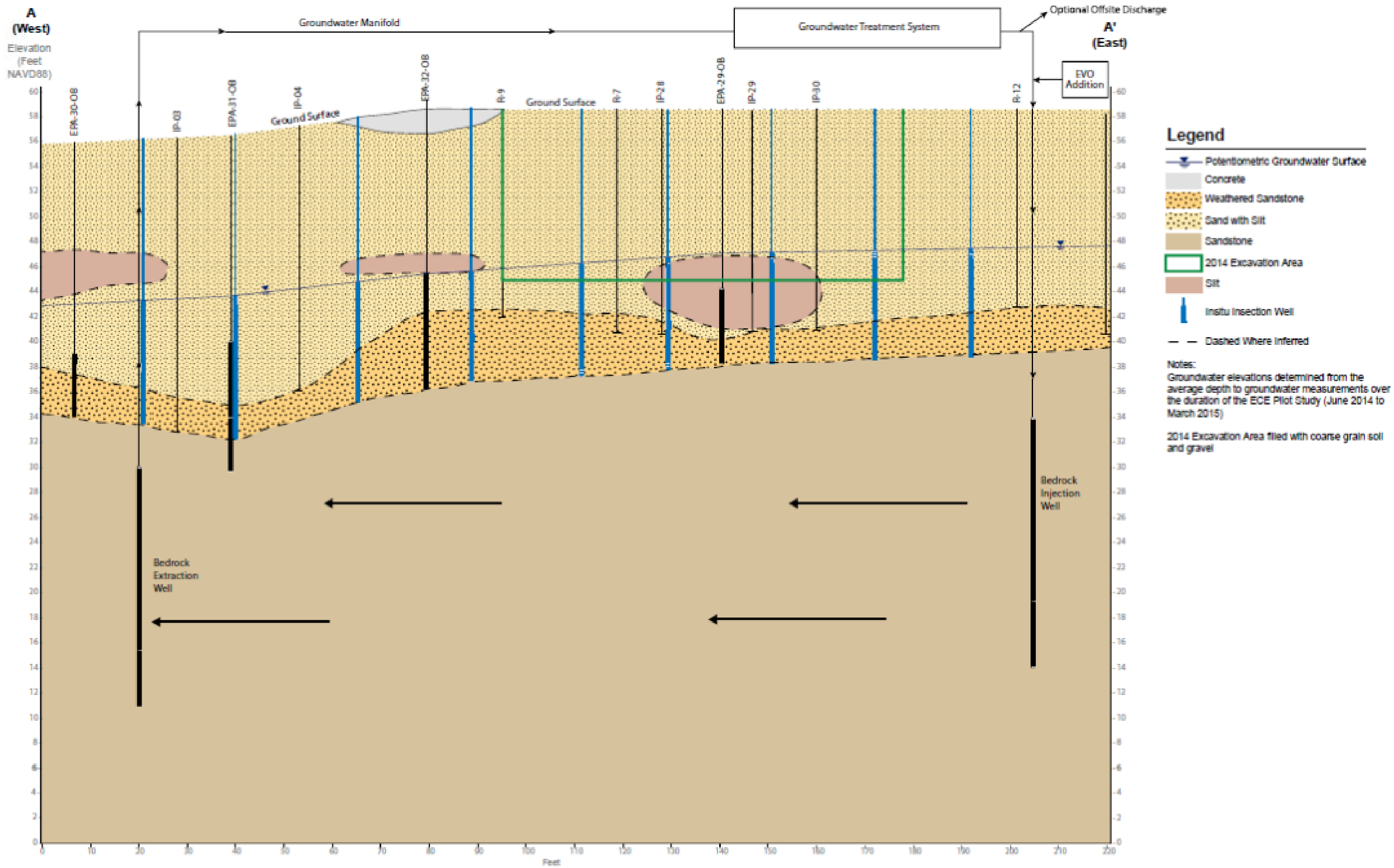

Figure 7
Alternative 2B: Source Treatment -
In situ Injection, Cross Section View
Record of Decision
Garfield Groundwater Contamination Superfund Site
Garfield, NJ 07026

ch2m:

APPENDIX II
Administrative Record Index

ADMINISTRATIVE RECORD INDEX OF DOCUMENTS

FINAL

05/02/2016 **REGION ID: 02**

Site Name: GARFIELD GROUND WATER CONTAMINATION
CERCLIS ID: NJN000206317
OUID: 01
SSID: A227
Action:

DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Addressee Name/Organization:	Author Name/Organization:
395804	5/2/2016	ADMINISTRATIVE RECORD INDEX FOR OU1 FOR THE GARFIELD GROUND WATER CONTAMINATION SITE	2	ARI / Administrative Record Index		R02: (US ENVIRONMENTAL PROTECTION AGENCY)
363134	9/29/2010	CDC CORRESPONDENCE REGARDING A PUBLIC HEALTH ADVISORY FOR HEXAVALENT CHROMIUM EXPOSURES ASSOCIATED WITH THE THE E.C. ELECTROPLATING SITE	1	LTR / Letter		
363161	11/9/2010	STATE NOMINATION FOR NATIONAL PRIORITIES LIST (NPL) FOR THE GARFIELD GROUND WATER CONTAMINATION SITE	2	PUB / Publication		
379178	4/1/2014	FINAL REMEDIAL INVESTIGATION REPORT APRIL 2014 VOLUME I: REPORT, TABLES, FIGURES AND APPENDIX A FOR THE GARFIELD GROUND WATER CONTAMINATION SITE	768	RPT / Report		
379179	4/1/2014	FINAL REMEDIAL INVESTIGATION REPORT APRIL 2014 VOLUME II: APPENDIX B-I FOR THE GARFIELD GROUND WATER CONTAMINATION SITE	4749	RPT / Report		
379177	4/1/2014	FINAL REMEDIAL INVESTIGATION REPORT APRIL 2014 VOLUME II: APPENDIX J FOR THE GARFIELD GROUND WATER CONTAMINATION SITE	30774	RPT / Report		
377055	3/30/2015	BENTHIC BASELINE ECOLOGICAL RISK ASSESSMENT FOR THE GARFIELD GROUND WATER CONTAMINATION SITE	90	RPT / Report	R02: (US ARMY CORPS OF ENGINEERS)	R02: (AVATAR ENVIRONMENTAL)
376326	8/25/2015	RESULTS OF THE IN SITU REDUCTION PILOT TEST FOR THE GARFIELD GROUND WATER CONTAMINATION SITE	158	MEMO / Memorandum	R02: (US ENVIRONMENTAL PROTECTION AGENCY), R02: (US ARMY CORPS OF ENGINEERS)	R02: (CH2M HILL)
376350	9/25/2015	2014 SITEWIDE GROUNDWATER SAMPLING TECHNICAL MEMORANDUM FOR THE GARFIELD GROUND WATER CONTAMINATION SITE	32	MEMO / Memorandum	R02: (US ENVIRONMENTAL PROTECTION AGENCY)	R02: (CH2M HILL)
396383	2/1/2016	FINAL FEASIBILITY STUDY REPORT OU1, PART 1 OF 2 FOR THE GARFIELD GROUND WATER CONTAMINATION SITE	132	RPT / Report	R02: (US ENVIRONMENTAL PROTECTION AGENCY), R02: (US ARMY CORPS OF ENGINEERS)	R02: (CH2M HILL)

ADMINISTRATIVE RECORD INDEX OF DOCUMENTS

FINAL

05/02/2016

REGION ID: 02

Site Name: GARFIELD GROUND WATER CONTAMINATION
CERCLIS ID: NJN000206317
OUID: 01
SSID: A227
Action:

DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Addressee Name/Organization:	Author Name/Organization:
396384	2/1/2016	FINAL FEASIBILITY STUDY REPORT OU1, PART 2 OF 2 APPENDICES FOR THE GARFIELD GROUND WATER CONTAMINATION SITE	1730	RPT / Report	R02: (US ENVIRONMENTAL PROTECTION AGENCY), R02: (US ARMY CORPS OF ENGINEERS)	R02: (CH2M HILL)
396443	3/1/2016	FINAL REMOVAL ACTION REPORT, REMOVAL ACTION 2 FOR THE E.C. ELECTROPLATING INCORPORATED SITE	1067	RPT / Report	R02: (US ENVIRONMENTAL PROTECTION AGENCY)	R02: (WESTON SOLUTIONS, INC.)
396421	4/5/2016	CORRESPONDENCE REGARDING RISK EVALUATION OF REMAINING SOILS AT THE FORMER E. C. ELECTROPLATING FACILITY, SOURCE OF CONATMINATION AT THE GARFIELD GROUND WATER CONTAMINATION SITE	25	LTR / Letter	R02: Flynn, Kathleen (NORTH MASSAPEQUA RESIDENT)	R02: Metz, Chloe (US ENVIRONMENTAL PROTECTION AGENCY), R02: Kiernan, Meghan (US ENVIRONMENTAL PROTECTION AGENCY)
396453	5/2/2016	PROPOSED PLAN FOR OU1 FOR THE GARFIELD GROUND WATER CONTAMINATION SITE	16	WP / Work Plan		R02: (US ENVIRONMENTAL PROTECTION AGENCY)

APPENDIX III
State Letter

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
SITE REMEDIATION PROGRAM
Mail Code 401-06
P. O. Box 420
Trenton, New Jersey 08625-0420
Tel. #: 609-292-1250
Fax. #: 609-777-1914

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

September 7, 2016

Mr. Walter Mugdan, Director
Emergency and Remedial Response Division
U.S. Environmental Protection Agency
Region II
290 Broadway
New York, NY 10007-1866

Re: Garfield Groundwater Contamination Superfund Site
Record of Decision Operable Unit 1
EPA ID# NJN0000206317
DEP PI# 004097

Dear Mr. Mugdan:

The New Jersey Department of Environmental Protection (DEP) completed its review of the "Record of Decision, Garfield Groundwater Contamination Superfund Site, Operable Unit 1: Basements, Source Area, and Overburden Groundwater, City of Garfield, Bergen County, New Jersey" prepared by the U.S. Environmental Protection Agency (EPA) Region II in August 2016 and concurs with the selected remedy to address contaminated groundwater in the overburden aquifer.

The selected remedy included in this Record of Decision covers the first of two planned remedial operable units for the Garfield Groundwater Contamination Superfund Site. DEP supports the selected remedies to address the source of chromium contamination affecting shallow groundwater and that has infiltrated into area basements. The primary remedial actions for contaminated groundwater are *in situ* treatment using geochemical fixation and, in addition, extraction, treatment, and reinjection of groundwater.

The components of the selected Operable Unit 1 remedy include:

- Geochemical fixation through injection of a reducing agent to treat groundwater containing concentrations of total chromium greater than the New Jersey Groundwater Remediation Standard of 70 parts per billion (ppb) throughout the Site;

- Extraction, treatment, and discharge of groundwater containing concentrations of total chromium greater than the New Jersey Groundwater Remediation Standard of 70 ppb at the EC Electroplating property;

- Implementation of a long-term groundwater monitoring program to assess the effectiveness of the action over time;

- Institutional controls, such as designation of a Classification Exception Area, to restrict the installation of wells and the use of groundwater in areas of chromium contaminated groundwater; and

- Inspection and mitigation as necessary of residential and commercial basements in the areas impacted by contaminated groundwater.

DEP appreciates the opportunity to participate in the decision making process to select an appropriate remedy for this site. Further, DEP is looking forward to future cooperation with EPA in remedial actions for Operable Unit 2 to ensure the deep groundwater also is protected at this site.

If you have any questions, please call me at 609-292-1250.

Sincerely,

Mark J. Pedersen
Assistant Commissioner
Site Remediation & Waste Management Program

C: Kenneth J. Kloo, Director, Division of Remediation Management, DEP
Edward Putnam, Assistant Director, Publicly Funded Response Element, DEP
Carole Petersen, Chief, New Jersey Remediation Branch, EPA Region II

APPENDIX IV
Responsiveness Summary

RESPONSIVENESS SUMMARY
Garfield Groundwater Contamination Superfund Site
Garfield, New Jersey

INTRODUCTION

This Responsiveness Summary provides a summary of the public's comments and concerns regarding the Proposed Plan for the Garfield Groundwater Contamination Superfund Site's (Site) Operable Unit 1 preferred remedy, and EPA's responses to those comments. All comments summarized in this document have been considered in EPA's final decision for the selection of remedial alternatives for the Site.

This Responsiveness Summary is divided into the following sections:

I. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS
This section provides the history of community involvement and interests regarding the Site.

II. COMPREHENSIVE SUMMARY OF MAJOR QUESTIONS, COMMENTS, CONCERNS AND RESPONSES
This section contains summaries of oral comments received by EPA at the public meeting, EPA's responses to these comments, as well as responses to written comments received during the public comment period.

The last section of this Responsiveness Summary includes attachments, which document public participation in the remedy selection process for this Site. These attachments are:

Attachment A contains the Proposed Plan that was distributed to the public for review and comment;

Attachment B contains the public notices that appeared in the Courier Post;

Attachment C contains the transcripts of the public meeting, and

Attachment D contains the written comments received by EPA during the public comment period.

I. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

EPA has worked closely with local residents, public officials, and other interested members of the community since NJDEP requested assistance with the Site in the early 2000s. On May 9, 2016, EPA released the Proposed Plan and supporting documentation for the groundwater remedy to the public. The Proposed Plan and index for the Administrative Record were made available to the public online, and the Administrative Record files were made available at the EPA Administrative Record File Room, 290 Broadway, 18th Floor, New York, New York; and the Garfield Public Library, 500 Midland Avenue, Garfield, New Jersey.

On May 9, 2016, EPA published a Public Notice in the *Bergen Record* newspaper that provided information about the public comment period, the public meeting for the Proposed Plan, and the availability of the administrative record for the Site. EPA also published a press release on May 9, 2016, to announce the release of the Proposed Plan. The public comment period closed on June 8, 2016.

A public meeting was held on May 19, 2016, at the Garfield Senior Center, 480 Midland Avenue, Garfield, New Jersey. The purpose of this meeting was to inform residents, local officials, and interested members of the public about the Superfund process, present details about EPA's remedial plan, receive comments on the Proposed Plan, and respond to questions from area residents and other interested parties.

II. COMPREHENSIVE SUMMARY OF MAJOR QUESTIONS, COMMENTS, CONCERNS, AND RESPONSES

Part 1: Verbal Comments

This section provides a summary of verbal comments received from the public during the public comment period and EPA's responses.

A. SUMMARY OF QUESTIONS AND EPA'S RESPONSES FROM THE PUBLIC MEETING CONCERNING THE GARFIELD GROUNDWATER CONTAMINATION SITE - May 19, 2016

A public meeting was held on May 19, 2016, at the Garfield Senior Center, 480 Midland Avenue, Garfield, New Jersey. In addition to a presentation of the investigation findings, EPA presented the Proposed Plan and preferred alternatives for the Site, received comments from meeting participants, and responded to questions regarding the remedial alternatives under consideration. A transcript of the public meeting is provided in Attachment C.

A summary of comments raised by the public following EPA's presentation are categorized by relevant topics and presented below:

Current Site Conditions

Comment 1: *A commenter asked for information on the depth of the contamination associated with the Garfield Site on the Passaic side (west) of the Passaic River.*

EPA response: Contamination associated with the Site was discovered 120 feet below ground surface.

Comment 2: *A commenter asked if additional contamination would be released into the groundwater now that the EC Electroplating buildings have been removed and the Site capped with asphalt.*

EPA response: EPA's excavation at the former EC Electroplating property removed the contaminated soil that was the source of the existing hexavalent chromium contamination in the overburden groundwater. The contamination in the groundwater beneath the EC Electroplating property is still mobile, and the movement is influenced by lateral groundwater flow and water entering the ground at the EC Electroplating property. EPA constructed an asphalt cap to prevent stormwater infiltration and impede the movement of the hexavalent chromium in the groundwater. Once implemented, EPA's selected remedy will reduce the toxicity and mobility of hexavalent chromium in the overburden groundwater.

Basements and Infiltration of Groundwater

Comment 3: *A commenter asked if weather events such as heavy rain would result in contaminated water infiltrating additional residential basements.*

EPA response: Heavy rain would temporarily raise the level of the water table, which increases the chances of water infiltrating basements that were not previously impacted. Heavy rain would not increase the amount of hexavalent chromium contamination in the groundwater.

Comment 4: *A commenter asked if the water pumped from basements is discharged to city sewers.*

EPA response: Yes. Water pumped from basements is discharged to the sanitary sewer and the Passaic Valley Sewage Commission treatment system.

Comment 5: *A commenter asked if homes with below-grade basements could be constructed on land within the boundaries of the area of the overburden groundwater plume.*

EPA response: Yes. The groundwater infiltration into basements is a function of two things: depth to the water table and how the basement is constructed. Shallow basements, higher quality construction, and newer basements have been found to better resist infiltration of water. As a best practice, basements in new construction should be sealed.

Comment 6: *A commenter asked about the likelihood of contamination from groundwater if the water table rises.*

EPA response: A higher water table increases the volume of water infiltrating basements. However, the amount of the hexavalent chromium contamination in the groundwater would not increase.

Comment 7: *A commenter asked if it is possible that a residence previously found not to be contaminated can become contaminated.*

EPA response: The potential for contamination of other properties is low. After extensive study of the approximately 40-year old contaminant plume, EPA has concluded that the extent of contamination is unlikely to change. In addition, excavation of contaminated soils at the EC Electroplating property has removed the source of the groundwater contamination. Once a source of contamination is removed, levels of contaminants tend to decrease, further reducing the potential for additional contamination.

Exposure to Contamination

Comment 8: *A commenter asked how the community could be exposed to the hexavalent chromium contamination.*

EPA Response: The risks of exposure are limited to dermal contact with and incidental ingestion of hexavalent chromium contamination in residential basements. Hexavalent chromium was deposited on basement surfaces as contaminated groundwater evaporated. Residents working in their basements could come into dermal contact with the hexavalent chromium and accidentally ingest it when touching their mouths. Results of air sampling in basements that were heavily contaminated indicate that the hexavalent chromium is not airborne, which eliminates inhalation as a pathway of exposure.

Comment 9: *A commenter asked if there is a risk of exposure to hexavalent chromium from eating vegetables grown in residential soils.*

EPA response: No. Plants do not have any specific mechanism for uptake of chromium, and any chromium that is taken up by plants accumulates mainly on roots and not in leaves or fruit. At the Garfield Site, groundwater contaminated with hexavalent chromium in exceedance of target levels is 14 feet below the ground surface, which is deeper than the reach of the roots of vegetable plants.

Comment 10: *A commenter asked if local road renovation would contaminate nearby homes with chromium.*

EPA response: No. The hexavalent chromium contamination is found only in groundwater at the Site, approximately 14 feet below ground surface.

Comment 11: *A commenter asked what the potential risks are to children who might be exposed to future chromium contamination.*

EPA response: The potential for exposure is extremely low. Hexavalent chromium contamination has not been found in drinking water in Garfield and no pathway exists for direct contact with contaminated overburden groundwater. EPA has removed the contaminated soil at the EC Electroplating property that was the source of the groundwater contamination and mitigated hexavalent chromium contamination in residential basements.

Superfund Process and Funding

Comment 12: *Several commenters asked if adequate funding was available to continue the inspections and mitigation of basements and remediate the Site.*

EPA response: CERCLA is an **"**enforcement first" program that enables EPA to pursue viable Potentially Responsible Parties (PRPs) to perform or pay for cleanup work. No viable PRPs have been identified for the Garfield Site. Funding for basement inspections and mitigation is EPA's priority. Additional funding is in place for the design of the remedy. As the remedy design process concludes, EPA Region 2 will request funding for the remedial action from EPA Headquarters. A priority panel will evaluate Region 2's request, along with requests for other Superfund sites across the U.S., and prioritize which sites receive the limited funding available for remedial actions.

Comment 13: *A commenter asked if the Superfund program is funded through the Right to Know Act.*

EPA response: No. Superfund is funded through the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), enacted by Congress in 1981. CERCLA put in place two mechanisms for ensuring the cleanup of sites contaminated with hazardous substances: broad liability provisions to require the "responsible parties" to pay for and implement cleanups themselves and a dedicated trust fund (or "Superfund") to provide funds for the government to clean up sites where those responsible did not have needed funds, had gone out of business, or were recalcitrant. The majority of the Superfund originally came from excise taxes on petroleum and chemical feedstocks and the corporate environmental income tax. Funding has been provided through general appropriations and settlements with PRPs since the authority for the Superfund taxes expired in 1995.

Comment 14: *A commenter asked if EPA would be transparent in its process to remediate the site and inform the City of Garfield of the progress of the project.*

EPA response: Yes. EPA will apprise the City Manager and community stakeholders of project milestones during meetings and via telephone, email, and community updates posted on the Garfield Site web page. EPA expects to continue to have meaningful public input throughout the implementation of the remedy.

Real Estate

Comment 15: *Several commenters asked if EPA provides assistance to residents attempting to sell properties.*

EPA response: Yes. EPA continues to inspect properties within the residential basement study area and sample for hexavalent chromium as necessary. EPA provides the results of inspections and sampling in letters to the owners of the properties. EPA has offered to participate in information sessions to educate realtors and other members of the community on the chromium contamination in Garfield.

Preferred Alternative

Comment 16: *A commenter asked if the emulsified vegetable oil is the material that reduces the hexavalent chromium to trivalent chromium.*

EPA response: Yes, indirectly. Emulsified Vegetable Oil, or EVO, is used to stimulate the growth of microbes in the groundwater. This microbial growth alters the chemistry of the groundwater and creates an environment where hexavalent chromium is converted to trivalent chromium. Other food-grade reagents as well as calcium polysulfide, ferrous sulfate, or sodium dithionite have been used successfully at other Sites, and will be evaluated during the remedial design phase for use in Garfield.

Comment 17: *A commenter asked if the 30- and 140-year time frames identified in the Proposed Plan and presentation refer to the time to complete construction or remediation.*

EPA response: The 30-year time frame is the standard used to estimate comparative costs for the remedial alternatives. Construction of the remedy will begin once the remedial design is complete, and is expected to last 2 years. All of the alternatives considered for the Site are expected to complete remediation in excess of 140 years. However, EPA will evaluate new and existing technologies that can improve or accelerate remediation of the groundwater at the Site.

Future Use of the Site

Comment 18: *A commenter asked if the EC Electroplating property would be available for municipal use in the future.*

EPA response: Yes. Source treatment at the EC Electroplating property requires installation of 45 wells through which reducing amendment will be injected over a period of approximately 6 years. The property will be available when the series of injections is complete and access to the wells is no longer needed.

Part 2: Written Comments

This section provides a summary of written comments received from the public during the public comment period and EPA's responses.

B. COMMENTS FROM THE NEW JERSEY SIERRA CLUB

<u>Comment 1</u>: *The New Jersey Sierra Club believes the U.S. Environmental Protection Agency plan to address groundwater contaminated with hexavalent chromium at the Garfield Groundwater Contamination Superfund site is not an appropriate response at the site. We believe it may not go far enough to remedy all of the toxic contamination because it is an experimental way of monitoring and selective site remediation.*

EPA Response: The remedy EPA has selected for the Garfield Site provides the best balance of trade-offs among the response measures with respect to the nine evaluation criteria. EPA believes that the selected remedy will be protective of human health and the environment, will comply with applicable and relevant and appropriate requirements, will be cost effective, and will utilize permanent solutions and alternative treatment technologies to reduce the toxicity and mobility of hexavalent chromium.

The technologies proposed in the remedy have been used successfully to remediate groundwater contamination at other Superfund sites. Pump and treat of contaminated groundwater is an industry standard. The EPA guidance document "In Situ Treatment of Soil and Groundwater Contaminated with Chromium. October 2000" (EPA/625, R-00/005) presents several examples of successful *in situ* treatment of chromium contaminated groundwater at sites in Indiana, California, and South Carolina.

Comment 2: *We need a real clean-up plan to adequately address the extent of this pollution, which includes removing all of the toxic contamination—not just monitoring and conducting selective remediation in some people's basements.*

EPA Response: EPA's proposed remedial action at the Garfield Site is a comprehensive approach to addressing the hexavalent chromium contamination in the source area, the EC Electroplating property; the overburden groundwater plume downgradient of the source area; and the residential basements. In the source area, the overburden groundwater will be treated with *in situ* injections and the shallow bedrock groundwater will be pumped to the surface, treated, and reinjected. The overburden plume outside of the source area will also be treated *in situ*, using injection barriers installed downgradient of the source area to the Passaic River. A reducing solution would be injected periodically into the wells to convert hexavalent chromium to trivalent chromium, which is the less toxic and less mobile form of chromium. The remedy includes long-term groundwater monitoring of the source area and downgradient overburden contaminant plume to evaluate the effectiveness of the remedy. EPA will continue to inspect, sample, and mitigate hexavalent chromium contamination in the basements of residential and commercial properties as necessary.

EPA expects the remedial action to meet the four Remedial Action Objectives (RAOs) for the Site identified in the Proposed Plan. These RAOs are to restore the chromium-contaminated groundwater to levels acceptable for future beneficial use as a drinking water resource; prevent exposure to chromium concentrations in groundwater above acceptable levels; minimize the potential for infiltration of contaminated groundwater into basements and transfer of hexavalent chromium onto basement surfaces; and, for basement surfaces contaminated by groundwater infiltration, prevent direct contact with and ingestion of hexavalent chromium concentrations above acceptable levels.

Comment 3: *Chromium is a toxic chemical that becomes more toxic when it mixes with drinking water. The chromium at this site is seeping into basements and drinking water wells.*

EPA Response: The comment that chromium at the site is seeping into drinking water wells is unsupported by the data gathered during the remedial investigation and sampling results of drinking water conducted by the City of Garfield. Hexavalent chromium has not been detected in the municipal water supply, but was discovered above acceptable levels in the basements of 14 residential properties in Garfield located above the groundwater contamination plume. From 2003 to 2015, EPA inspected or obtained information on over 500 residential and commercial properties in Garfield, and collected samples at over 300. Samples exceeded the Site-specific removal action level for hexavalent chromium in the basements of 14 properties. The basements were decontaminated and sealed and/or had drainage systems installed to prevent groundwater infiltration. EPA will continue to inspect, sample, and mitigate hexavalent chromium contamination in the basements of residential and commercial properties as necessary.

The commenter stated that chromium becomes more toxic when it mixes with drinking water. Chromium is a naturally occurring element found in rocks, animals, plants, and soil. Trivalent chromium occurs naturally in the environment. According to the Institute of Medicine of the National Research Council, trivalent chromium is an essential nutrient for normal energy metabolism. In contrast, the toxicity of hexavalent chromium is of much greater concern than trivalent chromium. Hexavalent chromium is rarely found in nature and is the contaminant of concern released from the EC Electroplating property. The objective of the remedial action is to restore the chromium-contaminated groundwater to levels acceptable for future beneficial use as a drinking water resource.

Comment 4: *The EPA must ensure adequate funding and an appropriate clean-up of the Garfield site to protect the human health of people who have been suffering for far too long.*

EPA Response: Funding is in place for remedial design and continuing basement inspections and mitigation. As the remedial design process concludes, EPA Region 2 will submit a request for funding for the remedial action at the Garfield Site to the Superfund National Risk-Based Priority Panel. Upon expiration of the Superfund taxing authority, EPA established the Priority Panel to evaluate the risk to human health and the environment at National Priorities List sites and establish funding priorities for all new cleanup construction projects in the Superfund program. The Priority Panel will evaluate Region 2's request, along with requests for other Superfund sites across the U.S., and prioritize which sites receive the limited funding available for remedial actions. The five criteria and associated weighting factors used to compare projects include risks to human population exposed, contaminant stability, contaminant characteristics, threat to a significant environment, and program management considerations.

Attachment A
Proposed Plan

Superfund Program
Proposed Plan

U.S. Environmental Protection Agency
Region 2

Garfield Groundwater Contamination Superfund Site
Garfield, New Jersey

May 2016

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan describes the remedial alternatives that the United States Environmental Protection Agency (EPA) considered to remediate contaminated groundwater at the Garfield Groundwater Contamination Superfund site (site) identifies EPA's preferred alternative along with the reasons for this preference.

The preferred alternative calls for in-situ treatment of the remaining chromium contamination at the original source, in-situ reduction of contamination in the overburden groundwater, and restrictions on groundwater use until the overburden groundwater is restored. The preferred alternative would also continue basement monitoring and mitigation until the overburden groundwater is restored, to prevent exposure to chromium that could enter basements with contaminated groundwater.

This document is issued by EPA, the lead agency for site activities, and the New Jersey Department of Environmental Protection (NJDEP), the support agency. EPA, in consultation with NJDEP, will select the final remedy for the site after reviewing and considering all information submitted during a 30-day public comment period. EPA, in consultation with NJDEP, may modify the preferred alternative or select another action presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all alternatives presented in this document.

EPA is issuing this Proposed Plan as part of its community relations program under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund). This Proposed Plan summarizes information that can be found in greater detail in the Remedial Investigation (RI) Report - Garfield Groundwater Contamination Superfund Site and the Garfield Groundwater Contamination Superfund Site Feasibility (FS) Study, as well as in other documents contained in the Administrative Record for this site.

MARK YOUR CALENDARS

Public Comment Period

May 9, 2016 to June 8, 2016

EPA will accept written comments on the Proposed Plan during the public comment period.

Public Meeting

May 19, 2016 at 7:00 P.M.

EPA will hold a public meeting to explain the Proposed Plan and all of the alternatives presented in the Feasibility Study. Oral and written comments will also be accepted at the meeting. The meeting will be held at the Garfield Senior Center, 480 Midland Ave., Garfield, NJ.

The Administrative Record files are available for public review at the following information repositories:

EPA Region 2 Records Center
290 Broadway, 18th Floor
New York, New York 10007-1866
(212) 637-4308
Hours: Monday-Friday – 9 A.M. to 5 P.M.

Garfield Public Library
500 Midland Ave., Garfield, NJ
(973) 478-3800

SITE DESCRIPTION

The site is located in a mixed commercial and residential neighborhood in the City of Garfield, Bergen County, New Jersey. The extent of the site is defined by the presence of chromium in the groundwater at concentrations at or greater than the New Jersey Groundwater Quality Standard of 70 micrograms per liter (µg/L). The source of groundwater contamination has been identified as the former EC Electroplating (ECE) facility at 125 Clark Street in Garfield. The ECE property covers approximately 0.65 acres. It is bounded by Clark Street to the north, Lincoln Place to the west, Sherman Place to the east, and residential properties to the south (Figure 1).

SITE HISTORY

EC Electroplating was founded in the late 1930s and operated until March 2009. The facility was used as a custom metal plating shop that electroplated chromium, copper, and nickel onto machined parts. One large cylindrical storage tank and three additional vertical tanks were used to store chromic acid plating solution. There were two documented spills at the site that may have been sources of contamination. In December 1983, the large tank failed, releasing chromic acid directly to the shallow groundwater. One groundwater pumping well was installed to recover the spilled chromium, but the complete mass was not recovered before the pumping shut down in 1985. In May 1996, a spill of process wastewater was mitigated by the Bergen County Hazardous Materials team. The results of EPA's groundwater investigation suggest that other spills or leaks of chromic acid may have occurred at the facility.

In October 2002, NJDEP requested EPA assistance to assess and mitigate chromium-contaminated groundwater infiltrating into basements of buildings in Garfield. From 2008 to 2015, EPA surveyed properties and sampled dust in the basements of residential and commercial properties. Properties where basement dust samples exceeded the site-specific removal action level (RAL) for hexavalent chromium were decontaminated and the basements were sealed and/or had drainage systems installed to prevent groundwater infiltration.

EPA documented a determination of significant threat for the site based on basement dust sampling results in the 2010 E.C. Electroplating (Garfield Groundwater Contamination Site) - Determination of Significant Threat Memorandum. It was determined that exceedances of the RALs, as well as the potential for future contamination at levels exceeding these values represented an unacceptable risk to individuals who may be exposed to hexavalent chromium dust on basements surfaces. Dust on potentially contaminated surfaces in the basements was sampled by wiping an area (10 centimeter x 10 centimeter) and analyzing the hexavalent chromium mass on the wipe. For basements used as a living space (high use), EPA developed a RAL of 1.1 micrograms of hexavalent chromium per wipe. For basements used for laundry and storage (low use), a RAL of 8.7 micrograms of hexavalent chromium per wipe was developed. As of 2015, more than 500 properties were inspected and 14 of the properties required removal actions to address chromium-contaminated dust in the basements.

In April 2010, the New Jersey Department of Health and the US Agency for Toxic Substances and Disease Registry issued a health consultation which assessed the potential chromium exposures to area residents based on previous sampling investigations conducted by EPA in residential and commercial properties. Both agencies concluded that there is evidence of a complete exposure pathway regarding ingestion of and dermal contact with surface dust containing chromium. Both agencies also concluded that past, present and future exposures represent a public health hazard via the ingestion of chromium dust in some basements. In September 2010, ATSDR issued a Public Health Advisory for the site, recommending that EPA take immediate measure to dissociate residents and others from the basement area of the properties showing the highest chromium levels in surface dust to prevent exposures from continuing.

In June 2011 EPA conducted a site assessment of the abandoned EC Electroplating facility. EPA's assessment identified hazardous materials within vats, tanks and drums at the facility which presented and immediate threat to the surrounding community, and further identified the facility as the source of chromium contamination in groundwater. EPA removed all hazardous materials from the facility and disposed the materials at appropriate facilities. In 2012 all buildings and above-ground structures on the ECE property were demolished by EPA.

Following the removal of the building and its contents, EPA conducted a comprehensive soil investigation on the ECE property to determine the extent of chromium contamination present in the soils and substructures of the former facility. EPA mobilized to the ECE property in October 2013 to excavate contaminated soils and concrete which exceeded 20 milligrams per kilogram (mg/kg) of hexavalent chromium (NJDEP soil cleanup criteria). A total of 1,180 tons of concrete was removed from the site, including 897 tons that was disposed of as hazardous waste. The total soil removed from the site was 5,686 tons. Of the soil removed, 2,701 tons required disposal as hazardous waste. Only soil above the water table was addressed in this action. Post-excavation samples were collected and all excavated areas were backfilled and compacted with certified clean fill. The surface of the site was then covered with clean backfill and capped with asphalt in May 2014.

The Garfield Groundwater Contamination Superfund Site was placed on EPA's National Priorities List in September 2011.

EPA initiated a shallow groundwater study in 2010 and then expanded the investigation to overburden and bedrock groundwater, residential soils, surface water, and sediments. The groundwater investigation included installation of conventional and multiport wells, downhole geophysical profiling, packer testing, a matrix diffusion study, and a groundwater-surface water interaction study. There are currently 52 overburden and bedrock wells in EPA's monitoring network. The results of this investigation were used to complete the human health and ecological risk assessments. EPA also conducted additional studies on aquifer testing, in-situ reduction of hexavalent chromium in groundwater, and an ecological risk assessment of sediments in the Passaic River. EPA continues to investigate and mitigate exposure to chromium caused by the intrusion of contaminated groundwater into the basements of buildings located in Garfield.

SITE CHARACTERISTICS

Physical Setting of the Site

The former ECE property is located in Garfield approximately 0.6 miles east of the Passaic River (Figure 1). The topography of the 0.65-acre ECE property is flat and the property is enclosed by an eight foot high screened chain link fence. The neighborhood immediately surrounding the ECE property consists of a mixture of residential and commercial properties. The ECE property is currently zoned residential.

Site Geology and Hydrogeology

Groundwater occurs within two hydrogeologic systems in Garfield — the unconsolidated overburden materials and fractured sedimentary bedrock. The overburden material underlying the region consists of a thick layer of unconsolidated glacial sediments and fill material. Groundwater flow in the overburden materials is predominantly controlled by local topography. The depth to groundwater in Garfield is generally less than 20 feet below ground surface.

The bedrock at the site consists of interbedded siltstones, mudstones, and fine- to coarse-grained sandstones. Groundwater flow in the bedrock aquifer is controlled by fractures and bedding planes. At the ECE property source area, there is limited groundwater flow upward from the bedrock aquifer into the overburden. Outside the source area, the overburden groundwater generally flows downward into the bedrock aquifer.

Groundwater from the overburden aquifer discharges to the Passaic River. The Passaic River on Garfield's western border is tidally influenced and its width is generally 200 to 300 feet, with an estimated depth of 5 to 10 feet in the center. The river sediments are principally composed of sand and have low levels of organic carbon.

Nature and Extent of Contamination

The ECE property is considered the source area of the site based on the known releases of chromic acid and the chromium impacts to soil and groundwater at the property (Figure 2). Although EPA removed contaminated soils above the water table, there is still a zone of very high chromium concentrations immediately below the water table that is a source of groundwater contamination. The maximum hexavalent chromium concentration found in groundwater in 2014 was 269,000 µg/L at monitoring well EPA-32-OB, near the historical location of the chromic acid tanks at the former ECE facility. The shallow bedrock aquifer beneath the ECE property also has high levels of hexavalent chromium, 1,370 µg/L at EPA-13-BR in 2014. The dominant form of chromium in the groundwater across the site is hexavalent chromium, but there is also trivalent chromium present.

Outside the source area, the greatest concentration of hexavalent chromium in an overburden well was 14,900 µg/L at well EPA-06-OB in 2014 (Figure 3). The average hexavalent chromium concentration in the overburden plume is estimated to be 3,420 µg/L.

The hexavalent chromium groundwater plume extends north of the ECE property to Van Winkle Avenue and south to Commerce Street. In the area of the plume, shallow groundwater that infiltrates into basements can transfer hexavalent chromium to the floor or walls.

The overburden plume flows to the west and discharges to the Passaic River. Hexavalent chromium and total chromium in samples from the surface water of the Passaic River do not exceed the NJDEP Ecological Screening Criteria in the area of the plume. However, the Passaic River sediment samples from this area are elevated in hexavalent chromium and total chromium.

SCOPE AND ROLE OF ACTION

The overall strategy for the Garfield Groundwater Contamination site is to remove principal threat waste, protect residents from exposure to hexavalent chromium contamination, and restore groundwater to levels acceptable for beneficial use. EPA is addressing the cleanup in two phases, called Operable Units. This Proposed Plan addresses Operable Unit 1 (OU1): the basements, ECE property source area, and overburden groundwater. The overburden aquifer is a source of hexavalent chromium contamination to the deeper bedrock aquifer. The groundwater in the bedrock aquifer will be addressed as Operable Unit 2.

PRINCIPAL THREAT WASTE

EPA's removal actions addressed hazardous materials, buildings, subsurface structures, and soils at the former ECE facility. These actions removed all of the "principal threat" wastes at the site (see inset box).

WHAT IS A "PRINCIPAL THREAT"?

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes an expectation that EPA will use treatment to address the principal threats posed by a Site wherever practicable (NCP Section 300.430(a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund Site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to ground water, surface water or air, or acts as a source for direct exposure. Contaminated ground water generally is not considered to be a source material; however, Non-Aqueous Phase Liquids (NAPLs) in ground water may be viewed as source material. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of the alternatives using the nine remedy selection criteria This analysis provides a basis for making a statutory finding that the remedy employs treatment as a principal element.

SUMMARY OF SITE RISKS

The purpose of the risk assessment is to identify potential cancer risks and noncancer health hazards at the site assuming that no further remedial action is taken. As part of the RI/FS, a baseline human health risk assessment (HHRA) was conducted to estimate the risks and hazards associated with the current and future effects of contaminants on human health and the environment (see adjoining box "What is Risk and How is it Calculated"). A screening-level ecological risk assessment (SLERA) and baseline ecological risk assessment (BERA) were also conducted to assess the risk posed to ecological receptors due to site-related contamination.

Human Health Risk Assessment

Groundwater

The HHRA began with selecting chemicals of potential concern (COPCs) in groundwater that could potentially cause adverse health effects in exposed populations. Although the groundwater is currently not used for drinking water purposes, the HHRA assumed groundwater could be used as a source of drinking water in the future.

In this assessment, exposure point concentrations were estimated using the 95% upper-confidence limit (UCL) of the average concentration of the contaminant. Chronic daily intakes were calculated based on the reasonable maximum exposure (RME), which is the highest exposure reasonably anticipated to occur at the site. The RME is intended to estimate a conservative exposure scenario that is still within the range of possible exposures.

Cancer risks and noncancer health hazards from exposure to contaminated groundwater were evaluated for adult and child residents. The excess lifetime cancer risk estimate is 5 x 10-1. The calculated hazard index (HI) is 141 for adult and 355 for the child. The contaminant associated with the elevated risk and hazard is hexavalent chromium. For these receptors, exposure to hexavalent chromium in groundwater results in an excess lifetime cancer risk that exceeds EPA's target risk range of 1 x 10-4 to 1 x 10-6 and an HI above the acceptable level of 1. Several other contaminants, namely arsenic, trichloroethylene, dieldrin and cyanide were also associated with unacceptable risk and/or hazard. However, these contaminants are not considered site-related based on their distribution and frequency within the hexavalent chromium groundwater plume.

Soil

None of the residential soil samples exceeded the 20 mg/kg hexavalent criteria. Following the excavation of soil and concrete from the ECE property, EPA performed a risk assessment on the remaining soil that was separate from the baseline HHRA for

WHAT IS RISK AND HOW IS IT CALCULATED?

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: In this step, the chemicals of potential concern (COPCs) at the site in various media (*i.e.*, soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil and ingestion of and dermal contact with contaminated groundwater. Factors relating to the exposure assessment include, but are not limited to, the concentrations in specific media that people might be exposed to and the frequency and duration of that exposure. Using these factors, a "reasonable maximum exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

Toxicity Assessment: In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure and severity of adverse effects are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other noncancer health hazards, such as changes in the normal functions of organs within the body (*e.g.*, changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and noncancer health hazards.

Risk Characterization: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks for all COPCs. Exposures are evaluated based on the potential risk of developing cancer and the potential for noncancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a "one in ten thousand excess cancer risk;" or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions identified in the Exposure Assessment. Current Superfund regulations for exposures identify the range for determining whether remedial action is necessary as an individual excess lifetime cancer risk of 10^{-4} to 10^{-6}, corresponding to a one in ten thousand to a one in a million excess cancer risk. For noncancer health effects, a "hazard index" (HI) is calculated. The key concept for a noncancer HI is that a "threshold" (measured as an HI of less than or equal to 1) exists below which noncancer health hazards are not expected to occur. The goal of protection is 10^{-6} for cancer risk and an HI of 1 for a noncancer health hazard. Chemicals that exceed a 10^{-4} cancer risk or an HI of 1 are typically those that will require remedial action at the site.

groundwater. The risk assessment considered both residential and commercial exposure to hexavalent chromium (no other constituents exceeded screening levels) in the remaining soil.

The HIs for the residential adult and the residential child from exposure to surface soil are 0.003 and 0.04, respectively, and the excess lifetime cancer risk is 3 x 10-5. For the worker, the HI from exposure to surface soil is 0.002 and the excess lifetime cancer risk is 1 x 10-6. For the excavation worker, assuming an exposure duration of 250 days, the HI is 0.4 and the cancer risk is 8 x 10-6. Because the cancer risks and noncancer hazards were well below EPA's target levels, the removal action of soil excavation is considered protective of human health for current and future commercial/industrial, as well as residential uses. Therefore, no further action for soils is necessary.

Ecological Risk Assessment

During the Remedial Investigation, a SLERA and a BERA were conducted to evaluate the potential for risk to ecological receptors from contamination. Potentially complete exposure pathways for ecological receptors included areas where groundwater discharges to the Passaic River. Ecological receptors evaluated included benthic organisms and water column-dwelling aquatic life within the Passaic River along with mammals and birds. The ecological risk assessments demonstrated that chromium concentrations in surface water do not represent a potential risk to aquatic life, and that there is negligible potential for chromium in sediment and surface water to represent a risk to mammalian and avian wildlife.

EPA completed an additional risk assessment in 2014 to further define the risk from chromium to benthic organisms inhabiting the eastern shoreline of the Passaic River. Based on a 42-day *Hyalella azteca* survival, growth, and reproduction toxicity test, chromium levels in sediments pose no ecological significant risk to survival and reproduction in the benthic invertebrate community and the effects on growth are expected to be minimal. Therefore, based on the results of this bioassay, ecological impacts are not expected in the benthic invertebrate community.

Risk Assessment Summary

It is EPA's judgement that the Preferred Alternative identified in this Proposed Plan is necessary to limit potential human health risks from actual or threatened releases of hazardous substances into the environment.

REMEDIAL ACTION OBJECTIVES

Before developing cleanup alternatives for a Superfund site, EPA establishes remedial action objectives (RAOs) to protect human health and the environment. The human health risk assessment showed that the site-related contaminants are total chromium and hexavalent chromium. Chromium may pose a risk to human health through groundwater ingestion, and hexavalent chromium may pose risks through groundwater use and contact with hexavalent chromium dust. The following RAOs address the human health risks posed by contaminated groundwater at the site:

RAO 1. Restore the chromium-contaminated groundwater to levels acceptable for future beneficial use as a drinking water resource.

RAO 2. Prevent exposure to chromium concentrations in groundwater above acceptable levels.

RAO 3. Minimize the potential for infiltration of contaminated groundwater into basements and transfer of hexavalent chromium onto basement surfaces.

RAO 4. For basement surfaces contaminated by groundwater infiltration, prevent direct contact with and ingestion of hexavalent chromium concentrations above acceptable levels.

For RAOs 1 and 2, the New Jersey Ground Water Quality Standards for Class II-A Ground Water apply. The RALs will be used to determine whether basements have been remediated to levels that are within the acceptable risk range for RAO 4.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA requires that each selected site remedy be protective of human health and the environment, be cost-effective, comply with other statutory laws, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances. Potentially applicable technologies were identified and screened with emphasis on the effectiveness of the remedial action. Those technologies that passed the initial screening were then assembled into five remedial alternatives. The timeframes below for construction do not include the time for designing the remedy or the time to procure necessary contracts. In addition they do not include timeframes to reach remediation goals. Because each of the action alternatives are expected to take longer than five years to achieve remediation goals, a site review will be conducted every five years (five-year reviews) until remediation goals are achieved.

Groundwater modeling performed during the RI/FS indicates that high chromium concentrations at the ECE property are a source to the overburden aquifer, and addressing the source area will accelerate restoration of the overburden aquifer can only be achieved by first addressing this source area. Alternatives 2A and 2B would be applied to the source area at the ECE property, including the contaminated groundwater in the overburden and shallow bedrock. Alternatives 3, 4, and 5 would include source treatment (either Alternative 2A or 2B) and address overburden groundwater contamination beyond the ECE property.

Common Elements for Alternatives 2A, 2B, 3, 4, and 5

To prevent exposure to hexavalent chromium in basements, inspections and mitigation actions will continue in the area impacted by contaminated groundwater. Actions including decontamination, the application of sealants, and/or the installation of drainage trenches and sumps would be executed as necessary.

The aquifer recovery timeframes for the remedial alternatives are long, on the order of decades. Until the remediation goals can be met, potential exposure to contaminated groundwater will be eliminated by the designation of an institutional control. The institutional control will be a New Jersey Ground Water Classification Exception Area that restricts the use of the contaminated aquifer. Groundwater monitoring would be performed in the source area and overburden plume to evaluate the hexavalent chromium concentrations and the effects of the remedy.

For the cost estimates of each alternative, EPA assumed 30 years of implementing the remedy. However, the time required to achieve groundwater restoration in RAO 1 would be greater than 30 years for all of the alternatives. Based on EPA's groundwater modeling, it is expected to take at least 80 years to restore the groundwater.

Alternative 1 - No Action

The No Action alternative was retained for comparison purposes as required by the NCP. Under this alternative, no action would be taken to remediate the contaminated groundwater at the site, and no institutional controls would be implemented.

Total Capital Cost: $0
Operation and Maintenance: $0
Total Present Net Worth: $0
Estimated Construction Timeframe: 0 years

Alternative 2A – Source Area Soil Mixing, with Pump and Treat

Soil mixing would be applied to the contaminated zone of soils in the source area on the ECE property. A backhoe or auger would be used to distribute a chemical reagent to the soil. The reagent would be a reducing amendment that converts hexavalent chromium to the less toxic and less mobile form of trivalent chromium. Source mixing can be completed within one year.

Below the zone of soil mixing, contaminated groundwater would be extracted from the shallow bedrock at the source area. Extraction wells would be installed along the west side of the ECE property to maximize capture of the highest hexavalent chromium concentrations. The extracted groundwater would be treated by ion exchange or chemical reduction and then reinjected or discharged to surface water. Additional monitoring wells would be installed to assess concentration trends and reducing conditions across the source area. The optimal mixing locations and reagent selection would be developed during the remedial design.

This alternative is expected to reach the New Jersey Ground Water Quality Standard at the source area, however it would not address downgradient groundwater contamination. EPA would review this action at least every five years until the RAOs are achieved.

Total Capital Cost: $8.0 million
Operation and Maintenance: $5.9 million
Total Present Net Worth: $13.9 million
Estimated Construction Timeframe: 2 years

Alternative 2B – Source Area In-Situ Reduction and Pump and Treat

In-situ injections would be performed in the contaminated groundwater in the source area. A grid of injection wells would be installed and a reducing amendment would be periodically injected into the wells to convert hexavalent chromium to trivalent chromium. In 2014, EPA carried out a pilot study using emulsified vegetable oil with magnesium sulfate injections in the source area groundwater. Hexavalent chromium concentrations significantly decreased in two monitoring wells. The results of this 2014 work would be applied to a design for this alternative.

Contaminated groundwater would be extracted from the shallow bedrock at the source area. Extraction wells would be installed along the west side of the ECE property to maximize capture of the highest hexavalent chromium concentrations. The extracted groundwater would be treated and then reinjected or discharged. New monitoring wells would be installed to assess concentration trends and reducing conditions across the source area. The optimal injection locations and reagent selection would be developed during the remedial design phase.

As in the case of Alternative 2A, this alternative is expected to reach cleanup levels within the source area beneath the ECE property; however, it would not address downgradient groundwater contamination. EPA would review this action at least every five years until the RAOs are achieved.

Total Capital Cost: $3.3 million
Operation and Maintenance: $6.9 million
Total Present Net Worth: $10.2 million
Estimated Construction Timeframe: 2 years

Alternative 3 – Source Treatment and In-Situ Reduction

Under this alternative, basement actions and source treatment as described in Alternative 2A or 2B would be implemented.

Overburden plume treatment would be implemented with a series of in-situ reduction barriers arranged perpendicular to the flow of the groundwater plume. The reduction barriers would be established by injecting a reducing agent into an array of permanent injection wells. The wells would be installed in the most contaminated areas of the plume; however the location of the barriers would be limited to the City of Garfield streets or right-of-ways. The optimal injection well layout and reagent selection would be developed during the remedial design phase. The timeframe for in-situ barrier injections is assumed to be 30 years. EPA would review this action at least every five years until the RAOs are achieved.

Total Capital Cost: $14.1 million
Operation and Maintenance: $23.2 million
Total Present Net Worth: $37.3 million
Estimated Construction Timeframe: 2 years

Alternative 4 – Source Treatment and Pump and Treat

Under this alternative, source treatment as described in Alternative 2A or 2B would be implemented.

A pump and treat system would be installed to extract and treat the highest concentrations of hexavalent chromium within the overburden plume. Groundwater extraction wells located within the City of Garfield streets and right-of-ways would be designed to maximize removal of the hexavalent chromium mass from the overburden groundwater. The extracted water would be conveyed to a treatment plant to be treated by ion exchange or chemical reduction and precipitation. Following treatment, extracted groundwater would be discharged into the sanitary sewer or into the Passaic River. The optimal well field design and treatment process options would be developed during the remedial design phase. EPA would review this action at least every five years until the RAOs are achieved.

Total Capital Cost: $5.2 million
Operation and Maintenance: $16.9 million
Total Present Net Worth: $22.1 million
Estimated Construction Timeframe: 2 years

Alternative 5 – Source Treatment and Combined Pump and Treat with In-Situ Reduction

Under this alternative, source treatment as described in Alternative 2A or 2B would be implemented.

The in-situ reduction barriers described in Alternative 3 and the pump and treatment system in Alternative 4 would both be implemented to combine hexavalent chromium mass removal with in-situ reduction. The combination of pumping and in-situ treatment would maximize flow of hexavalent chromium through the in-situ reduction barriers, and allow the pump and treatment system to be operated intermittently to optimize removal of hexavalent chromium. The well field design, treatment process options, and reagent selection would be developed during the remedial design phase. EPA would review this action at least every five years until the RAOs are achieved.

Total Capital Cost: $15.9 million
Operation and Maintenance: $33.2 million
Total Present Net Worth: $49.1 million
Estimated Construction Timeframe: 2 years

EVALUATION OF ALTERNATIVES

EPA uses nine criteria to assess remedial alternatives individually and compare them in order to select a remedy. The criteria are described in the box on the following page. This section of the Proposed Plan profiles the relative performance of each alternative against the nine criteria, noting how it compares to the other options under consideration. A detailed analysis of each of the alternatives is in the FS report. A summary of those analyses follows:

Overall Protection of Human Health and the Environment

Alternative 1 would not meet the RAOs and would not be protective of human health and the environment since no action would be taken. Contamination would remain for a long time into the future, while no mechanisms would be implemented to prevent exposure to contaminated groundwater. The toxicity, mobility, or volume (T/M/V) of contamination would not be reduced except through natural attenuation processes that would not be monitored.

Alternatives 2 through 5 would meet the RAOs 2, 3, and 4 for protection of human health through basement mitigation, monitoring, and institutional controls. A combination of Alternative 2A or 2B with Alternatives 3 through 5 would meet RAO 1 by achieving the remediation goal for the shallow aquifer.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Alternative 1 would not comply with the chemical-specific ARAR for groundwater, which is the New Jersey Ground Water Quality Standard of 70 µg/L chromium (Table 1). Location and action-specific ARARs do not apply for Alternative 1 since no remedial action would be conducted. A combination of a source area Alternative (2A or 2B) with an aquifer restoration alternative (Alternatives 3 through 5) would meet the groundwater standard. Alternatives 2 through 5 will also meet location and action-specific ARARs, such as New Jersey Pollution Discharge System/Discharge to Ground Water regulations for *in-situ* injections and discharge of treated groundwater.

Long-Term Effectiveness and Permanence

Alternative 1 would not be effective or permanent since there would be no measures to prevent exposure to contamination. Alternatives 2A, 2B, 3, 4, and 5 would provide adequate control of risk by implementing basement mitigation actions and institutional controls. The basement mitigation actions in the remaining alternatives would be effective in the long-term since exposure would be controlled, but these measures would not be permanent since there is the potential for recontamination until groundwater is restored. Institutional controls on groundwater use would also be effective until the RAOs are met.

EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES

Overall Protectiveness of Human Health and the Environment evaluates whether and how an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

Compliance with ARARs evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that are legally applicable, or relevant and appropriate to the site, or whether a waiver is justified.

Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.

Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, the community, and the environment during implementation.

Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

State/Support Agency Acceptance considers whether the State agrees with the EPA's analyses and recommendations, as described in the RI/FS and Proposed Plan.

Community Acceptance considers whether the local community agrees with EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

Long-Term Effectiveness and Permanence

Alternative 1 would not be effective or permanent since there would be no measures to prevent exposure to contamination. Alternatives 2A, 2B, 3, 4, and 5 would provide adequate control of risk by implementing basement mitigation actions and institutional controls. The basement mitigation actions in the remaining alternatives would be effective in the long-term since exposure would be controlled, but these measures would not be permanent since there is the potential for recontamination until groundwater is restored. Institutional controls on groundwater use would also be effective until the RAOs are met.

Alternatives 2A and 2B would be effective and permanently treat the highest concentrations of hexavalent chromium located in the source area in a relatively short period of time; however, they would not address the hexavalent chromium plume outside of the source area. Alternatives 3 and 5 would permanently reduce hexavalent chromium to trivalent chromium and so would be effective in the long-term. Alternatives 4 and 5 would achieve RAO 1 by extracting groundwater and permanently decreasing the mass of hexavalent chromium in groundwater.

Reduction in Toxicity, Mobility, or Volume (T/M/V) through Treatment

Alternative 1 would not reduce the contaminant T/M/V since no remedial action would be conducted. The total volume of contaminated groundwater might increase if the plume expands beyond its current area.

Alternatives 2A, 2B, 3, 4, and 5 would all be effective in reducing the toxicity and mobility of hexavalent chromium in the source area. Alternatives 3 and 5 would be the most effective in reducing the toxicity and mobility of hexavalent chromium. In-situ reduction of hexavalent chromium to trivalent chromium significantly decreases the toxicity and mobility of chromium. Alternatives 4 and 5 would be the most effective in reducing the volume of hexavalent chromium contamination because it would be extracted and removed from the overburden aquifer.

Short-Term Effectiveness

Short-term effectiveness includes an evaluation of the adverse effects a remedy may pose to the community, workers, and the environment during implementation. Alternative 1 would require no time to implement, and would cause no short-term impact to workers, the community or the environment. Continued infiltration into basements would cause potential hexavalent chromium exposures, and no active groundwater cleanup would reduce the groundwater plume mass. Alternatives 2A, 2B, 3, 4, and 5 could have short-term impacts to workers and the community during the remedial actions due to construction and maintenance operations. However, EPA would work with the community to reduce these impacts. Alternatives 2A and 2B would have fewer impacts on the community, because the actions would be contained in the former EC facility area. The excavation and stockpiling of soil and mechanical mixing of overburden soils below the water table in Alternative 2A would pose more short-term impacts to workers and the community than Alternative 2B which utilizes injections. Alternatives 3, 4, and 5 would have significant impacts on the Garfield community due to construction associated with the installation of injection or pumping wells and other infrastructure in the streets, especially considering Garfield's population density. A combination of Alternatives 2A and 5 would have the most short-term impacts on the community, whereas a combination of Alternative 2B and 4 would have the least.

Short-term effectiveness also considers the amount of time until the remedy effectively protects human health and the environment at the site. Alternatives 2A, 2B, 3, 4, and 5 would achieve RAOs 2, 3, and 4 quickly and therefore protect human health through the basement work and the institutional control.

The time to achieve RAO 1 is long for all of the active alternatives, with restoration times for the groundwater estimated in decades. Groundwater modeling was used to estimate the time needed to reach the remediation goal of 70 µg/L for chromium (the New Jersey Groundwater Quality Standard) throughout the entire overburden aquifer. For Alternative 1, groundwater modeling indicated that the remediation goal would achieved after 270 years. If either Alternative 2A or 2B alone were implemented, the groundwater model indicated that the restoration time would be 220 years. A combination of one of the source area alternatives (Alternative 2A or 2B) and Alternative 3 would achieve the RAO in 177 years, and the combination of a source area alternative with Alternative 4 would achieve the RAO in 174 years. Alternative 5 combined with a source area alternative would achieve the RAO in the least amount of time, estimated at 144 years.

Groundwater modeling has a limited capacity to accurately predict restoration timeframes at the RI/FS stage, and the timeframes discussed here and in the RI/FS Report are meant to evaluate the relative performance of the remedial alternatives. The timeframes of a source area alternative combined with Alternatives 3, 4 or 5 are similar whereas selection of a source area alternative alone would take substantially longer to achieve RAO 1.

Implementability

Alternative 1 would be the easiest technically and administratively to implement as no additional work would be performed at the site. Alternatives 2A, 2B, 3, 4, and 5 could all be implemented using locally available technologies and contractors.

Implementation of the source area alternatives would generally be feasible because all structures have been removed from the ECE property. However, the soil mixing component of Alternative 2A would require the removal of up to 14 feet of clean soil to access the contamination, which would make this alternative more difficult to implement compared to Alternative 2B, in-situ injection. In addition, the small size of the site would greatly inhibit the ability to mix the soil properly.

The setting of the site would be a challenge for implementing Alternatives 3, 4, and 5. The overburden plume is located in a densely populated area of Garfield, and there are extensive subsurface and above-ground utilities that may limit the location or number of potential injection or extraction wells. Alternatives 3 and 5 would require a greater number of wells than Alternative 4, but Alternatives 4 and 5 have greater implementability challenges due to the installation of piping needed to convey the extracted groundwater to a treatment system. The discharge of treated groundwater would require installation of additional subsurface piping which reduces implementability for Alternatives 4 and 5 compared to Alternative 3.

Costs

For the source area alternatives, Alternative 2A costs $13.9 million and Alternative 2B costs $10.2 million. The Alternative 2B cost is included in the cost estimates for Alternatives 3, 4, and 5. The cost of Alternative 3 is $37.3 million and the cost of Alternative 4 is $22.1 million. Alternative 5 has a total cost of $49.1 million.

State/Support Agency Acceptance

The State of New Jersey concurs with EPA's preferred alternative as presented in this Proposed Plan.

Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the Record of Decision, the document in which EPA formally selects the remedy for the site.

PREFERRED ALTERNATIVE

The preferred alternative for cleanup of OU1 groundwater at the site is Alternative 2B with Alternative 3, Source Treatment and In-Situ Reduction.

In the source area, the overburden groundwater would be treated with in-situ injections and the shallow bedrock groundwater will be pumped and treated. The overburden plume outside of the source area will also be treated in-situ, using injection barriers installed downgradient of the source area. A reducing solution would be injected periodically into the wells to convert hexavalent chromium to the less toxic and less mobile form trivalent chromium.

The preferred alternative was selected over the other alternatives because it will be effective in addressing the groundwater contamination and is the most implementable at the site.

EPA expects that the Preferred Alternative will satisfy the statutory requirements of CERCLA §121(b): 1) be protective of human health and the environment; 2) comply with ARARs; 3) be cost-effective; and 4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

Consistent with EPA Region 2's Clean and Green policy, EPA will evaluate the use of sustainable technologies and practices with respect to implementation of the selected remedy.

COMMUNITY PARTICIPATION

EPA and NJDEP provided information regarding the cleanup of the Garfield Groundwater Contamination Superfund Site to the public through meetings, the Administrative Record file for the Site, and announcements published in the local newspaper. EPA and NJDEP encourage the public to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted there.

The dates for the public comment period; the date, location, and time of the public meeting; and the locations of the Administrative Record files are provided on the front page of this Proposed Plan.

For additional information on EPA's Preferred Alternative for the Garfield Groundwater Superfund Site contact:

Shane Nelson
Remedial Project Manager
(212) 637-3130

Pat Seppi
Community Liaison
(212) 637-3679

U.S. EPA
290 Broadway, 19th Floor
New York, New York 10007-1866

On the Web at:
www.epa.gov/superfund/garfield-groundwater

Table 1. Preliminary Remediation Goals for Groundwater, Garfield Groundwater Contamination Superfund Site OU1, Garfield, New Jersey.

CAS Number	Chemical Name	Unit	NJ Groundwater Quality Standard Class IIA	EPA National Primary Drinking Water Standard	Preliminary Remediation Goal
7440-47-3	Chromium	µg/L	70	100	70

Table 2. Preliminary Remediation Goals for Basement Surfaces, Garfield Groundwater Contamination Superfund Site OU1, Garfield, New Jersey.

Basement Use	Removal Action Level, Hexavalent Chromium
High	110 µg/m^2 or 1.1 µg/wipe
Low	870 µg/m^2 or 8.7 µg/wipe

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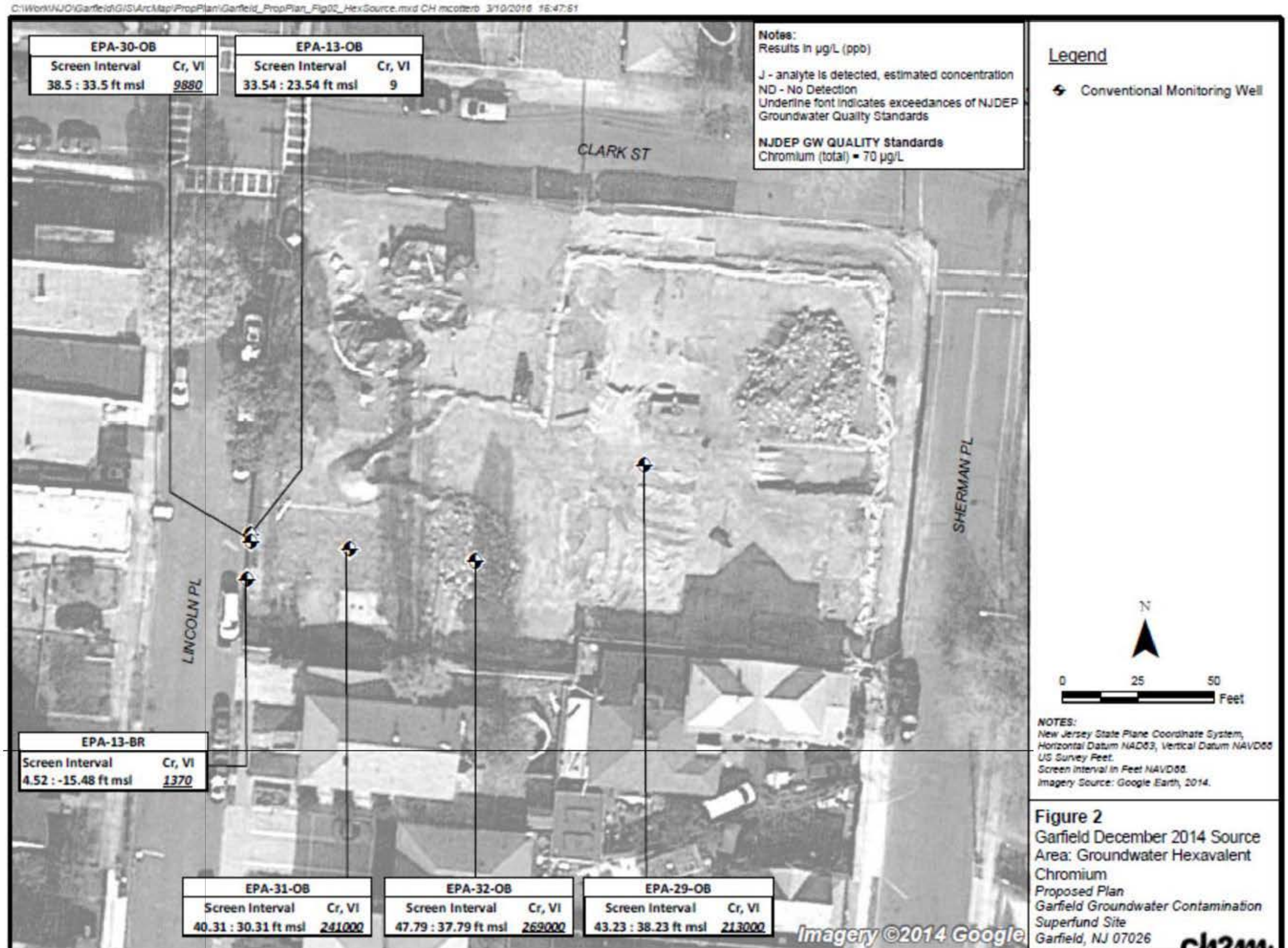
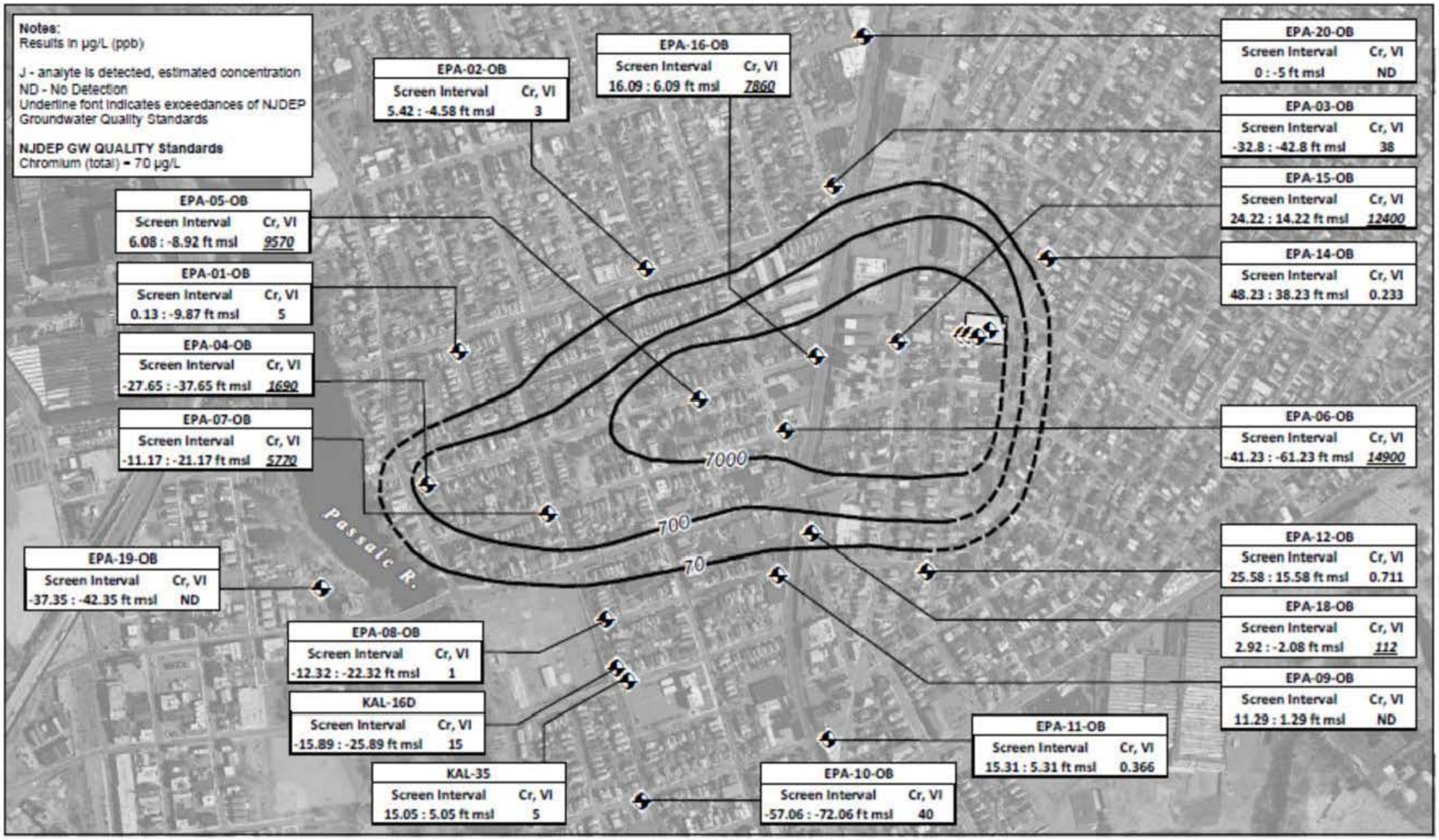
Figure 1

Site Plan
Proposed Plan
Garfield Groundwater Contamination Superfund Site
Garfield, NJ 07026

ch2m

C:\Work\NJO\Garfield\GIS\ArcMap\PropPlan\Garfield_PropPlan_Fig02_HexSource.mxd CH mcotterb 3/10/2016 16:47:51





Conventional Monitoring Well

70 Approximate Hexavalent Chromium Isoconcentration Contour (µg/L) (Dashed Where Inferred)

E.C. Electoplating Site (125 Clark St., Garfield, NJ)

0 250 500 750 1,000 Feet

N

NOTES:
New Jersey State Plane Coordinate System Horizontal Datum NAD83, Vertical Datum NAVD88 US Survey Feet.
MSL - Mean Sea Level
ND - Not Detected
Imagery Source: National Aerial Imagery Program, 2010
Screen Interval in Feet NAVD88
Overburden elevation ranges from 48.23 to -72.1 ft NAVD88

Figure 3
Garfield December 2014 Overburden Hexavalent Chromium
Proposed Plan
Garfield Groundwater Contamination Superfund Site
Garfield, NJ 07026

ch2m.

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Attachment B
Public Notice

Major sewer project just about complete

But Pequannock residents anxious about cost

By GENE MYERS
STAFF WRITER

PEQUANNOCK – Financial concerns have risen among township leaders and residents of the flood-prone village area, where a major sewer project is almost complete.

Although many residents and Township Council members see the ability to hook into the sewerage as a good thing, for some the mandate to hook up may present a financial hardship.

Once services become available, residents have three years to hook up at their expense. They cannot opt out, Township Manager David Hollberg said.

"I would expect that we will be ready to assess this project about a year from now, in the spring of 2017," said Hollberg.

Once everything is ready to go, according to past practice in the township, residents can finance the assessments over 10 years.

For some, that, combined with related hookup costs, presents a challenge. People have come to Councilwoman Cathy Winterfield saying as much.

"I have been approached by homeowners that need to connect because their septic are failing," she said. "But they don't have the means."

The council is looking into a hardship grant through Morris County's government, but Winterfield worries that it won't be sufficient.

"I think it's $35,000, or something like that. But maybe they need $40,000. They still don't have the money," she said of homeowners. "They were devastated twice, by Sandy and Irene. They rebuilt. Their septic is failing. They don't have the money. We have to do anything and everything to find grants."

Winterfield emphasized she's happy with the project "because this needed to be done." She just doesn't want people put into financial distress.

Councilman Richard Phelan questioned further: "Is there such a thing as a hardship case that the town has granted in the past?"

There was, Hollberg said.

"In extenuating circumstances, hardship allows relief in the requirement to connect. [But] for someone whose septic is failing, that's a different situation," said Hollberg, who added he would go back to the county for input.

Information is being sent to residents on a county program that provides funds to homeowners who meet need-based guidelines. Options available may include either a no-interest loan or a grace period of years, or both, before repayment is required.

But officials think it's best to avoid specifics until all options are weighed. And the program's income limits have Winterfield concerned that it won't be enough help, because the affected property owners have already incurred "immense" financial burdens in recovering from the major storms.

Once the township accepts the system as complete and it is tested, property owners will be notified that a three-year time frame has started, at the end of which they must be connected to the system, according to Hollberg.

After the council determines the tax levy based on the assessments, property owners will have up to 10 years to pay.

"Only the assessment can be paid over the 10 years," Hollberg said.

TELL THOSE DOGS TO KNOCK IT OFF!

AMY NEWMAN/STAFF PHOTOGRAPHER

Sebastian Tehozol trying to block out the barking as he and his mother, Rocio Garcia, waited Sunday to have their dog, Chiladrina, vaccinated at Paterson's Firehouse 1, which offered free pet rabies shots. Mom and son had come from a Mother's Day brunch.

Two held in Elmwood Park home invasion

A third man is sought after alleged robbery at gunpoint

By ANDREW WYRICH
STAFF WRITER

ELMWOOD PARK – Borough police arrested two men, and are searching for a third suspect, who allegedly forced their way into an apartment on Donor Avenue and threatened those inside on Sunday morning, authorities said.

A witness saw three men force their way into the apartment and order five women to the floor at gunpoint, Chief Michael Foligno said in a news release.

The suspects allegedly held the women at gunpoint for about 40 minutes while they "ransacked" the apartment, police said. No one was injured.

When officers arrived at the apartment, they spotted two of the suspects trying to flee the area in a vehicle and immediately placed them under arrest, Foligno said.

Police found several flat-screen televisions, iPads, iPhones, purses and handbags, Foligno said. On Sunday afternoon police discovered a 38-inch muzzle-style rifle in the bushes near a home on Boulevard between Godwin and Lincoln avenues.

Jamie Plaza, 32, and Jivon Gee, 20, both of Paterson, were arrested and charged with armed robbery, weapons offenses and conspiracy charges, police said.

Foligno said police were working to find a third suspect, who was described by police as a slim black male approximately 5 feet 6 inches to 5 feet 9 inches wearing all black clothing. Foligno said he should be considered armed and dangerous.

The Police Department is asking anyone with information to call 201-796-0700.

Email: wyrich@northjersey.com
Twitter: @AndrewWyrich

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY INVITES PUBLIC COMMENT ON THE PROPOSED PLAN FOR THE E.C. ELECTROPLATING (GARFIELD) SUPERFUND SITE GARFIELD, NEW JERSEY

The U.S. Environmental Protection Agency (EPA) announces the opening of a 30-day comment period on the preferred plan to address the groundwater contamination at the E.C. Electroplating Superfund site in Garfield, New Jersey. The preferred remedy and other alternatives are identified in the Proposed Plan.

The comment period begins on Monday, May 9, 2016 and ends on June 8, 2016. As part of its public comment period, EPA will hold a public meeting on May 19, 2016 at 7:00 at the Garfield Senior Center, 480 Midland Ave., Garfield NJ.

The Proposed Plan is available electronically at the following address:

[illegible]

Written comments on the Proposed Plan, postmarked no later than close of business June 8, 2016, may be emailed to [illegible] or mailed to [illegible], US EPA, 290 Broadway, 19th Floor, New York, NY 10007-1866.

The Administrative Record files are available for public review at the following information repositories:

Garfield Library, 500 Midland Ave., Garfield, NJ, (973) 478-3800 or at the USEPA – Region 2, Superfund Records Center, 290 Broadway, 18th Floor, New York, NY 10007-1866.

For more information, please contact Pat Seppi, EPA's Community Liaison, at 646.369.0068 or seppi.pat@epa.gov

3 youths accused in theft of car

Accident, chase result in capture

By LINDA MOSS
STAFF WRITER

PATERSON – Three youths who allegedly fled from police after carjacking a vehicle were apprehended and charged on Saturday night, Police Director Jerry Speziale said.

The three suspects, two juveniles and 18-year-old Lowen Henry, all of Paterson, allegedly carjacked a Toyota Avalon from a female Paterson resident at East Main Street and Haledon Avenue, Speziale said Sunday. The victim was forced from her vehicle at roughly 6 p.m. on Saturday, he said.

The Police Department provided a description of the stolen car during roll call for officers coming on duty, who were told to be on the lookout for it, Speziale said. Two rookie officers, Hector Mendez and Daniella Randino, were out on patrol when they spotted the stolen Avalon, he said.

They attempted to stop the car in the area of Goodwin and Graham avenues when the suspects sped off, Speziale said. The three then got into an accident, striking another vehicle in the area of Rosa Parks Boulevard and Governor Street.

The three suspects fled on foot from the car and a brief chase ensued before officers apprehended them at 8:22 p.m., Speziale said. By that time Lt. George Vazquez had called other police units to the scene, said Speziale, who credited the officers involved in the case with being alert.

All three youths were charged with carjacking, possession of stolen property and resisting arrest by flight, Speziale said.

Email: moss@northjersey.com

Attachment C
Public Meeting Transcripts

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2

- -x

GARFIELD GROUNDWATER CONTAMINATION

SUPERFUND SITE PUBLIC MEETING

- -x

Garfield Senior Center
480 Midland Avenue
Garfield, New Jersey

May 19, 2016
7:00 p.m.

P R E S E N T:

KATHRYN FLYNN,
EPA, Hydrogeologist

PAT SEPPI,
EPA Community Involvement Coordinator

CHLOE METZ,
EPA, Human Health Risk Assessor

SHANE NELSON,
EPA, Project Manager

RICHARD PUVOGEL,
EPA, Former Project Manager

ELIAS RODRIGUEZ,
EPA, Public Affairs

MR. DUCH: Good evening, ladies and gentlemen. Can everyone hear me?

My name is Tom Duch. I'm the city manager. I speak to you tonight on behalf of the mayor and council. Mayor Raymond will joint us during the evening.

I want to thank, first of all, publicly the United States EPA for being here this evening. I will tell you in the time that they have come here to work with us, they have been exceptional. Anything that we have asked for, anything that they have represented, anything that we have discussed, they really have come through.

By way of example, I had the opportunity to go to Washington and testify before a congressional committee. Shortly after that, we did receive funding which allowed the demolition of the EC Electroplating plant with all the appropriate environmental protections and controls.

After that, Mayor Delaney went and testified before a Senate committee. Shortly after that, 750 truckloads filled with drums of contaminated soil were removed from the old EC Electroplating site and replaced with clean soil.

The problem that still remains is that the chromium that wasn't recovered, the hexavalent chromium, remains in the ground and remains hazardous if it were to come in contact with people. The EPA will talk tonight a little about what the hazards might be and what the cleanup might be.

But to all of you who are present, I'd would say this, and I'd like to thank -- the representative of Congressman Pascrell's office is here -- I'd like to thank those representatives who have been to Garfield and who have taken an interest in this process. The late

Senator Lautenberg came to the site a number of times, Congressman Pascrell has been there many times, Senator Menendez has also been there many times, and now Senator Booker has joined us. And Senator Booker, in fact, made the arrangements for Mayor Delaney to testify before the Senate.

I'd also like to thank Judith Enck, who is the Regional Administrator of EPA. She has been exceptional in making sure that we in Garfield have a great team.

What's been nice about the team that's been assigned to us is that they have taken a real personal interest in us and in our people. It's not just a job. I feel very comfortable that they are -- they have a real feel for our community and they understand that we have some people that are scared and we have people that are looking for what can be done.

So, before I finish, I just want to make a couple of introductions. We have with us former mayor, Councilman Frank Calandriello. Thank you for being here.

(Applause)

MR. DUCH: We have at that same table Mr. Tom Barckett, president of our Board of Education.

(Applause)

MR. DUCH: Next to him is his wife, who is the Housing Authority Commissioner, Marie Barckett.

(Applause)

MR. DUCH: And next to her is Jack Mazzola, who is a recently re-elected school board member.

(Applause)

MR. DUCH: Thanks for being here.

What can we do?

The EPA can't really say this; I can say it the members of the governing body can say it. Tell your friends, tell your neighbors, tell anyone who is not here, tell anyone who has an interest, write to your congressman, write to our senators: The EPA needs the funding.

Congress, unfortunately, there are too many congressmen that are too interested in their own personal political careers. Congressman Pascrell happens to be an exception. He's a great representative, he's available whenever we call him. But it is really incumbent on us to lobby our legislators. Write to them.

The EPA needs the money. If they have the money -- you will find out later during this evening -- if they have the money, we can address the cleanup that needs to be done.

So, with that, I'd like to introduce Pat Seppi from the EPA.

(Applause)

MS. SEPPI: Thank you, Jim. We're not used to hearing so many nice things.

(Laughter)

MS. SEPPI: We certainly do appreciate that.

That goes both ways. The City of Garfield --

Richard, we're just getting started, so you didn't miss anything.

The City of Garfield has just been more than cooperative with us also.

MR. DUCH: I'm sorry, Pat, two more introductions.

MS. SEPPI: Okay.

MR. DUCH: Congressman Louis Aloia, also a former mayor.

(Applause)

MR. DUCH: And Darlene Reveille is our administrator over at our health department and our public health nurse.

MS. SEPPI: Again, thank you very much for the kind introductions. As I said, the City has been more than cooperative with us. It makes a big difference when we're trying to do the job that we need to do.

Thank you, everybody, for coming tonight. I want to have the people that are here from EPA introduce themselves and how they're related to the project.

So, Shane, do you want to start?

MR. NELSON: I'm Shane Nelson. I'm the new project manager for the Garfield site.

MS. SEPPI: Thank you.

Rich?

MR. PUVOGEL: I'm Rich Puvogel. I'm the previous project manager for the site.

MS. SEPPI: Kathryn?

MS. FLYNN: I'm Kathryn Flynn. I'm the hydrogeologist on the site.

MS. SEPPI: Chloe?

MS. METZ: I'm Chloe Metz. I'm the human health risk assessor for the site with EPA.

MS. SEPPI: And Elias?

MR. RODRIGUEZ: Elias Rodriguez, public affairs.

MS. SEPPI: Again, the reason we're here is to present to you our Proposed Plan to clean up contaminated groundwater at the site. We're kind of in the middle of a 30-day public comment period which will end on June 8.

Now, you'll notice this is a formal public meeting because this is the Proposed Plan public meeting. So, we have Linda Marino, a stenographer, here tonight, and she will be taking down all the questions, responses, all the information. And then we will finally have a transcript, which we will post on our web page, along with Shane's presentation from tonight. So, I can give everybody the information.

So, once the comment period is over, then Shane's job is to write our legally-binding document, which is called a Record of Decision. And he'll talk a little bit more about the time frame for that.

And, also, all the comments that are given tonight from the transcript will be included as a part of that

Record of Decision in what's called a Responsiveness Summary. So, you'll be able to look at that and go over any comments or questions that we receive tonight and find the answers there.

So, Shane does have a presentation. It's not very long. I love it because it has a lot of pictures and I think that makes things go a little bit faster. But I would ask one thing, and I know we hate to do this, but we would appreciate if you could hold your questions or comments until the end because what happens is once we get off track it's kind of hard to get back on.

But we'll certainly do our best to get through the presentation and then get to your questions, which is the most important part of this evening for us, your questions and concerns. We look at them and we value them.

So, you have until the 8th of June. Anybody who could not make the meeting tonight, they're certainly welcome to send written comments or e-mail comments to Shane. And his information will be up there on one of the slides, so you can get that information too.

And I think with that, I'm going to turn it over to Shane.

MR. NELSON: I just got my first pair of readers recently, so I'm still getting used to needing them.

(Laughter)

MR. NELSON: As Pat said, I'm Shane Nelson. I'm the project manager for the Garfield site.

EPA released the Proposed Plan for cleanup on May 9, and we're here tonight to share a little of that information with you.

I'm going to start the presentation with an overview of the Superfund process, go on to a little history of the Garfield site, EPA's activities at the site over the past how many years, discuss the alternatives and then the remedy EPA is proposing for the site, and then we'll finish up with questions.

The Superfund process begins with discovery of the site, somebody finds a site. Either the state or EPA steps in and does a site assessment or investigation of the site. From there, the site is placed on the National Priority List.

This is important because this is what releases the federal funding for us to actually investigate and study the site.

From there, we go to Remedial Investigation, which includes the human health and ecological risk assessment and also helps us determine what the site conditions are; what the contaminants are, how it's getting on the site, what the receptors are, things like that.

And from there, we go to the feasibility study where we evaluate the alternatives for cleaning up the site. These are the nine criteria, which I will share with you later in the presentation.

From there, we go to proposing a remedy. This is where we are now with the Garfield site. We release the Proposed Plan and we solicit comments from the community via a 30-day public comment period.

From there, like Pat said, we write the Record of Decision. This is important because this is what we use to request the funding to clean up the site. We have to have this in place.

From there, we go to remedy -- I'm sorry, Record of Decision will be finished before the end of September of this year for the Garfield site.

And then we do design of the remedy, which we think will take about a year and a half at the site.

And then we do action: Construction and operation of the remedy.

A little history of the Garfield

site.

In 1983, 1984, 3,600 gallons of chromium plating solution were released from a tank at the site.

A groundwater recovery well was installed in 1985. After a thousand gallons of chromic acid was removed, the well was turned off.

And this is actually a photograph of EC Electroplating in Garfield. This is the tank here we believe ruptured.

Given the amount of chromium we found in the groundwater here, we believe it was much more than just this tank that spilled. Probably with the operation of the facility, quite a bit was released.

1996, there was a spill of 250 gallons of processed wastewater at the site.

In 2000, chromium was discovered in the basements in Garfield.

In 2002, the NJ DEP asked for EPA to help evaluate and address the site.

And in 2011, EPA placed the Garfield site on the National Priority List.

MS. SEPPI: NJ DEP is New Jersey Department of Environmental Protection. They're our state partners.

MR. NELSON: What did EPA discover at the site?

We discovered hexavalent chromium in the soils at the EC Electroplating property. We discovered hexavalent chromium in the groundwater plume downgradient at the site. And we discovered hexavalent chromium in 14 basements in Garfield.

2010 to 2014, EPA conducted a removal action at the EC Electroplating property. This included removal of the waste, demolition of the buildings, removal of contaminated concrete slabs and basements, and excavation of the soil. We backfilled the site and we capped it in asphalt.

This is a photograph in 2011. This is EPA staff actually removing waste from the EC Electroplating buildings. EPA removed 233 drums of industrial waste and over 6,000 gallons of chromium-contaminated wastewater from the site.

In 2012, EPA demolished the buildings at the EC Electroplating property.

In 2013 and '14, EPA removed the contaminated basement slabs, basement material, and began excavating the soil at the site.

This is just a couple photographs that show you the excavation of the basement material and the start of the excavation.

This is an overview of the excavation plan for the site. Just to orient you, this is Lincoln Place, Clark is here, and Sherman is here.

We had a lot of data to work with at the site. The white boxes here are all data points where we did sampling, so we had a lot of guidance on where to dig and how deep to dig.

The colors here are just various concentrations of contaminants and levels we dug to. The purple is the deepest, down to the water table around 14 feet.

EPA removed 5,700 tons of contaminated soil from the site. Anything over 20 parts per million hexavalent chromium, which is a level that's protective of human health, were removed from the site.

This is another photograph to show you how deep we dug at the site. We dug pretty far.

And this is the site backfilled.

And this is the site with the asphalt cap. If you drive by, this is what you would see now behind the fence.

EPA also conducted removal action in 14 basements in Garfield. That work included installation of sump pumps to remove the water and then application of epoxy paint and sealant to keep water from coming in the basement.

Out of a study area of 17 homes, EPA inspected 400 homes and found contamination in 14 -- 500 homes out of a study area of 700 and found contamination in the 14.

We were reviewing a lot of numbers this afternoon in some of the reports.

2011 to 2014, we conducted a Remedial Investigation at the site. Through this, we identified the cleanup area as the basements, residential basements; the source area, which is the EC Electroplating property; and the overburden groundwater.

And in 2016, EPA completed a feasibility study of the site.

Through the Remedial Investigation process, we created this conceptual model of the plume in

Garfield. The red circle is the EC Electroplating property and the Monroe Street Bridge is here. The purple, green, and blue lines are the concentrations of the hexavalent chromium in the groundwater. The purple is the highest concentration. And the plume is pretty much bound by VanWinkle and Monroe Street.

This is the nine criteria for remedy evaluation I mentioned earlier.

The first two, the threshold criteria, every alternative we look at has to meet these two.

The next five are balancing criteria, what EPA uses to compare and evaluate the alternatives and select the remedy.

And then the last two, the modifying criteria, are what we use to tweak whatever remedy we selected.

The alternatives for the Garfield site. There are five of them; six if you Count 2A and B separately.

The first one, the no action alternative, is always included. It's what would happen at the site if EPA took no action, did no cleanup of the site.

2A and 2B address the contamination only at the EC Electroplating property.

And 3, 4, and 5 address the contamination at the EC Electroplating property as well as the downgradient plume that goes down towards the Passaic.

There are common elements of all the alternative. The first one is a New Jersey classification exception area, which restricts use of the groundwater at the site. You wouldn't be able to install a residential well.

The shallow bedrock groundwater treatment. The shallow bedrock at the EC Electroplating property, treatment of that.

And then all the basement inspections and treatment will continue as necessary.

What we're proposing as the remedy is Alternative 3, source treatment and in-situ reduction.

There are two parts to this: The first is the cleanup of the EC Electroplating property, the source of the contamination; and the second is the downgradient plume.

The cost of this alternative will be $37 million.

MR. MAZZOLA: That's what the EPA is suggesting, Remedy No. 3?

MR. NELSON: This is the one we're proposing. Out of the five/six, this is the one we're proposing. In a few slides, I'll get to why it was selected.

For the remedy of the source, this includes in-situ reduction barriers, pump and treat, source treatment. "In-situ" is that we're treating the groundwater at the site at the aquifer. So, it's treated at the site.

There will be injection wells to the base of the overburden, so through the soil to the top of the shallow bedrock.

Reducing amendment, possibly emulsified vegetable oil, will be injected every three years for ten years and after that as needed to maintain the condition.

And then there will be a pump-and-treat system installed at EC Electroplating to work sort of a flush at the shallow bedrock at the site.

This is an example of how the in-situ reduction barriers work. Material is injected here, it creates permeable barrier which the chromium-contaminated water will pass through, and it's converted to trivalent chromium, which is a much less toxic form of chromium.

This is an overview of the remedy at the EC Electroplating property. Again, you see here this is Lincoln, Clark, Sherman here.

The pump-and-treat system here in the yellow boxes, these will the injection wells, these are the extraction wells, and then wastewater treatment system would be installed here where the green box is.

There's also the in-situ injection points. There's 45 injection points here in the orange hexagon. This will be where the amendment would be injected to create the barriers there.

The two systems kind of work together. You're looking at an overview and it's sort of like all the maps are together, but the pump-and-treat system is actually at a lower level in the shallow bedrock and in-situ system is above it, kind of like a layer cake. They look like they're working together, but they're really in different layers, addressing contaminants at different layers.

The remedy for the plume is the in-situ reduction barriers, just like at EC Electroplating property. It includes reducing amendment injected every three years for ten years and then as needed to maintain the condition and monitoring the levels of chromium, hexavalent chromium.

And this is a conceptual model of what the installation of Alternative 3 would look like downgradient of the site. The red circle, the yellow, the EC Electroplating property, again here's Monroe, Monroe Street Bridge. The purple, green, and blue, again, are the concentrations of the contaminants down in the groundwater.

And the maroon lines here are actually the injection lines that we installed, the 290 injection points installed to check the material.

The benefits of the proposed remedy selected here: Overall protection of human health and environment is one of the first criteria, and in-situ reduction and pump-and-treat helps reduce the toxicity and mobility of the hexavalent chromium.

We will face some challenges in Garfield. The first one is the wells are installed in right-of-ways. So, that's a lot of utilities, trees, power lines. That limits where we can put the wells.

This is the drill rig they use to install the wells. And I took this the last time I was in Garfield; you see the power line, you see the trees. These are the difficulties we will have installing them in Garfield.

We also have another challenge. The groundwater treatment will take time. It does take time. We're using best available technology. We'll continue to explore new technologies that will help speed it up or make it better. Of the five alternatives, none of the five alternatives clean up the site in less than 140 years. So, it's a long-term project. We'll continue to improve it as time goes on.

Just to summarize the treatment: Use of reduction barriers; pump and treat; the injection wells in the plume to inject the material there; monitoring throughout the groundwater plume; basement inspections and mitigation will continue through any plan we do; and New Jersey classification exception area to control the use of the groundwater on the site. Again, that's restricting the installation of residential wells.

Questions?

MS. SEPPI: A couple of things. I think everybody probably knows, but I just want you to be sure that this does not effect their drinking water. And we say that over and over again, but a lot of people don't understand there's a difference between drinking water and groundwater. But we certainly say that here it has no effect on the drinking water whatsoever.

I guess we're still kind of amazed: We get calls every week from people who are within that study area, that original area of concern, who maybe after all this time they want to sell their house, they didn't have it sampled when we were doing it, and, so, we're still going out there.

We have Don Graham, our removal person, who will go out there and kind of do a visual first. And if he thinks there's a reason, then he will go ahead and sample. So, that's something still ongoing too, and I think that's very important for people to know that.

MR. NELSON: And if you find that your property has been sampled but you don't have the paperwork from that, please let us know, and we'll see what we have and get copies of the sampling letter back to you.

MS. SEPPI: We do have a database. It should have all the information in it as far as the sample results and any letters that have gone out to people. But you know, sometimes they get lost on the way too, so we're certainly always willing to look and see what we have and share that with you.

If somebody wants to sell their house, we can't give that letter that may have been sent to the homeowner to a prospective buyer. We would have to have the homeowner's permission to do that just to protect their privacy.

But we do that all the time too and that seems to work. We've dealt with a lot of realtors in Garfield who are interested in properties that they have up for sale and want more information. So, anybody out there, if they mention anything to you, just tell them to give us a call and we'll certainly do that.

Mayor, you've come in. We'll say hello.

MAYOR RAYMOND: I have a

question.

MR. DUCH: Introductions.

MAYOR RAYMOND: Oh, I'm Mayor Raymond; Deputy Mayor Glenn Mati; and of course everybody knows our City Manager, Tom Duch --

You introduced everybody. Okay.

I have a question that somebody just told me last night, that when this is pumped out of their basements, that it's being pumped into our sewers.

Is that correct?

MS. SEPPI: Rich, do you want to --

MR. PUVOGEL: Yes, that's correct.

MAYOR RAYMOND: So, wouldn't we be contaminating the river?

MR. PUVOGEL: No. It goes to the sewage treatment plant. The Passaic Valley Sewage Commission receives that. It goes to their treatment plant for treatment.

We've talked to them to have

this set up and this arrangement set up that we can discharge to their system.

MAYOR RAYMOND: Are we sure that it's coming out...

MR. PUVOGEL: Yes. We're discharging to the sanitary lines, not the storm lines. So, it goes to the Passaic Valley Sewage Commission.

MS. SEPPI: Good question.

Yes?

MR. MATI: I know we removed the building and we capped the ground there. My question is this: Will any more pollution go into the ground?

And the second part of the question is: Waiting for funding, will conditions from weather and things like that continue to move the contamination further down into other people's homes?

MS. SEPPI: Good questions.

Before we go any further, I would just ask for the purpose of our stenographer if you could just give your name. We want to make sure that your comments are responded to in the Responsiveness Summary.

MR. MATI: I'm Deputy Mayor Glenn Mati.

MS. SEPPI: Thank you.

Do you want to speak to that, Rich?

MR. PUVOGEL: After the EC Electroplating plant was dismantled and demolished and taken away, we dug down about 14 feet to the water table and removed the contaminated soil which was a source of groundwater contamination.

After that work, we placed a cap, asphalt cap, that was a fairly impermeable structure, on top to impede the movement of the groundwater or water infiltrating into the ground and moving it away.

The chromium in the groundwater beneath the EC Electroplating site is still mobile, so it still will move. But by removing the source, we took a big chunk or a big bite out of the source, but there's still source material in groundwater that we plan to address.

From our groundwater sampling -- we've done about three rounds of groundwater sampling site-wide, from the EC Electroplating site all the way down to the Passaic River and on the other side of the Passaic River, as a study of the whole plume as itself, and we don't believe that plume is very mobile.

It's too early to tell for sure. We only have three rounds of groundwater monitoring under our belts. Groundwater is a long-term thing. You want to study over a long period of time to really get a good picture.

So, I think we have two more rounds of samplings down the road at least through the whole network of monitoring wells we have out there before we can say for sure if it's staying. But taking out the source, that's a big start right there.

It's still mobile and that's why we want to address it within this type of remedy that we're proposing tonight.

MR. MATI: Thank you.

MS. SEPPI: Yes, sir.

MR. RIGOGLIOSO: Rich Rigoglioso.

You were saying the years, I heard the years. I read in the paper it takes about 30 years to clean up. Then you said 140.

Is it 30 to put the wells in and then 140 years to prevent everything or...

MR. NELSON: The wells are installed much faster than that.

MR. RIGOGLIOSO: Okay.

MR. NELSON: The estimates that we did for each alternative was done on that sort of 30-year time scale. There was a groundwater model that sort of showed that that's the correct way -- the groundwater model showed it's a longer time frame for cleanup of the site. So, the 30-year time frame is sort of pretty standard in remediation rhetoric.

In this particular case, we know based on the modeling that it will take longer than that.

MR. PUVOGEL: The 30-year time period is based on how -- that's we compare all remedies together. We use a 30-year period to cut the cost to make them all equal.

But as Shane said, the installing injection systems, it will take a few years to get that up and running. And the wells once they're installed will be permanent wells in the rights-of-way, and the thinking is we can go back an inject as we need to and establish -- try to establish barriers that are workable.

It will be some adjustment as we go, but time periods to clean up are over 30 years, well over 30 years.

It's well-embedded in the groundwater and the overburden of the groundwater, so we'll be tweaking as we go, trying new things, perhaps different amendments and see which ones work right.

Shane pointed out on the front end after we get our decision made to perform this work, we'll be doing design work. That will take a year and a half. And that design work will be looking at what type of injection wells to install, how big of an area they'll be able to inject to. So, we'll be studying those issues.

We'll also be studying different types of reactants that we'll be putting in the groundwater. Vegetable oil was used in the pilot study that we did earlier. It seemed to have very favorable results downgradient of the EC Electroplating property, so we're looking towards that and several other amendments that we can inject directly into the groundwater.

MAYOR RAYMOND: I have another question.

Is there going to be enough funding available to continue this program, this cleanup?

I mean, 30 years down the road, will Garfield be forgotten?

Is there a plan that goes into effect that has to be followed through?

What's the process?

MR. PUVOGEL: The process is once we get through remedial design or close to the finish of the remedial design, that's when we request the funding from Washington to apply to the remedial action, get the contractors out there.

So, when we apply for that, they look at our requests. And it goes through a priority panel, who looks at all the other sites across the country waiting for funding as well, and they prioritize which site gets the funding first.

And there's criteria used to make that grade: The types of contaminants, the threat to human health, the mobility I just talked about, the contamination, if it's still mobile. There are very high scores that this site would have, so I'm optimistic that it will score very highly.

MAYOR RAYMOND: There's really no guarantee.

MR. PUVOGEL: There are no guarantee.

MAYOR RAYMOND: Would it be helpful for us to contact our representatives that are in Washington?

Should we start on them now and just keep going?

MS. SEPPI: Well, you won't hear any answer about that from us, but Tom did say in the beginning in his introduction that that's something you that you all certainly have the opportunity to do if you chose to do that.

MR. PUVOGEL: We have funding that's ready to go to design, so that will keep us busy for the next year and a half as we run through design. After that, that's when we don't have money.

MS. GRINDROD: Jacky Grindrod, office of Congressman Bill Pascrell.

So, is that what it's called, a priority panel?

What department is it?

What's the name of the person who's in charge of deciding that right now?

MR. PUVOGEL: I don't know the particular name of the person who's in charge of that panel, but it's called EPA Priority Panel.

If you put that into internet, you'll find a website on it. It will describe the criteria of how sites are funded and what criteria are used to select sites for funding.

MS. SEPPI: The panel has people

all across different regions of EPA who get together. And they switch in and out too, so at different times it's different people.

MAYOR RAYMOND: Who appoints these people?

MS. SEPPI: I actually have no idea who appoints them.

MAYOR RAYMOND: How do they get there?

How did they get to be on that panel?

MR. PUVOGEL: The Priority Panel was established in 1995 to address just this issue. When the Superfund was running low on money, they established this panel. There's limited funding to go into remedial actions.

I don't know who is on it. I don't know if they're appointees. I couldn't answer that question.

MS. GRINDROD: That's EPA people though, they're not outsiders?

MR. PUVOGEL: Yes.

MS. SEPPI: One thing I wanted to mention, Rich, because you had a question to, why did we chose this remedy.

MR. RIGOGLIOSO: Yeah.

MS. SEPPI: The actual Proposed Plan goes into much, much more detail about each remedy as far as the costs, risks, and all that kind of information. So, if you're interested in looking at that, I would suggest you take a look at the Proposed Plan.

I don't know how many pages it is, Shane.

MR. NELSON: 17.

MS. SEPPI: So, it's not --

MR. NELSON: Not horrible. A good read.

MS. SEPPI: You might want to compare the remedy that we chose against other remedies that you find there just to see.

MR. RIGOGLIOSO: Well, remedy number one was the worst choice.

MS. SEPPI: Right.

MS. GRINDROD: I have one other question.

The emulsified vegetable oil, is that what breaks it down to the trivalent chromium?

MR. PUVOGEL: Indirectly. Emulsified vegetable oil, I look at it this way: It's basically a food for microbes that live underground.

MS. GRINDROD: Right.

But do they break it down to the trivalent?

MR. PUVOGEL: Yes, indirectly they do.

What happens to the microphones is they get fed by the emulsified vegetable oil and that population starts to grow. Life is good, they have plenty of food, so they have baby microbes, population explodes or grows very quickly. Microbes then get to a certain point where they consume all the oxygen in the groundwater, dissolved oxygen in groundwater. And there's a certain group of microbes that prefer low oxygen levels or anaerobic conditions in the groundwater, and those are the microbes we really like to grow there.

Once they start growing -- I won't get into the chemistry, but chrome six has six electrons on it and it wants to get reduced to chrome three. It's a fairly unstable compound. It doesn't want to be chrome six. As the microbes break down and ferment, hydrogen is released, and then you have -- the electrons want to get off of chrome six.

The conditions are just such that chrome six breaks down and forms chrome three. Chrome six is in the solution in the groundwater between the soil particles, and that breaks down to chrome three. Chrome three falls out of the groundwater. It's less toxic chromium.

And that's, in a sense, how it works, in a very general sense. We can get a lot more detailed in some of our plans you'll find on our internet site and in the Proposed Plan.

MS. GRINDROD: It will never get -- it will always be at least at that level of toxicity, the chrome three?

MR. PUVOGEL: Chrome three is very less toxic. I can't say -- nothing is nontoxic. It doesn't exit.

MR. NELSON: It contains some trace nutrients, like iodine, that your body needs little bit of. It's that less toxic that it's actually something your body actually needs a little of.

MR. PUVOGEL: You will find it in some vitamins.

MR. RIGOGLIOSO: The funding, I know it's a long process and it's complicated and takes years, but, you know, in the meantime our town, you know, that side of town is still a contaminated area over the years. You don't -- you'll get a different type of people moving into that area because you wouldn't move into contaminated, just like I wouldn't go move up to Ringwood where it's contaminated.

Will the funding always be in 30 years from now?

Because in 30 years, none of you are going to be there; hopefully, you'll still be alive, but --

(Laughter)

MR. RIGOGLIOSO: Knock on wood.

MR. PUVOGEL: It's our experience that once we initiate funding and the project is starting and operating, it's not turned off, is our usually experience.

MR. RIGOGLIOSO: So, the money will always be there, that $36 million.

MR. PUVOGEL: I can't say that in the next 30 years, but it's our experience on other sites we've cleaned up.

MR. CALANDRIELLO: Frank

Calandriello, Councilman, City of Garfield.

In my opinion, there's two different types of treatment: You're treating the source, and now we're treating the basements of the victims that have been contaminated.

The money that's available now for the basements, is there adequate funding to continue this process?

MR. PUVOGEL: Absolutely. That's the priority. That gets funding first. That's not going to go anywhere.

MR. CALANDRIELLO: Regardless of getting any major funding, that will continually -- you'll be there for the residents of this town whose basements have been contaminated?

MR. NELSON: Absolutely.

MS. SEPPI: Yes.

MR. PUVOGEL: Yes.

MR. CALANDRIELLO: That's on the short term. And that's on the people that have children and are worried about their basements. And, as you say, there's more that are being uncovered as far as the testing aspect because some people were never tested.

MS. SEPPI: And some people are renting and people are selling so, yes, there's always a pretty big turnover in that area.

MR. CALANDRIELLO: I just want to compliment, too, the EPA.

Obviously, years ago the State didn't handle this the proper way. And the City, going way back, thought they were handling it. It became our nightmare right around the year 2000 or in that neighborhood.

And I've got to say, right from back then to now, EPA, you have really done everything you said you were going to do.

I thank our legislators for trying to get the funding and I think I they're going to be successful, especially Mr. Pascrell. He's been really leading the charge.

This is a real disaster for the City. And what's even worse is that the perception that everybody has, it's really not the truth.

MS. SEPPI: That's right.

MR. CALANDRIELLO: And there are neighborhoods that have been devastated by value, there's neighborhoods that have been -- where their properties are perfectly clean. And I think that's the message that has to get out to the public because it's, you know, tragic.

And we also have our -- and I even ask Tom of the most of the time -- our Fire Company No. 3 that was contaminated, you know, we have a situation where that has to -- something has to be done over there. We're looking for the EPA to in some way, shape, or form help us, you know, because it's a building that is boarded up and it's in real dire straits and there's chromium contamination under the ground.

So, I think we could really use some help on that.

MS. SEPPI: I think we've been talking about that too.

MR. CALANDRIELLO: But the building has been there a number of years. It's a nuisance to the neighborhood. The police have to constantly watch it that children don't break in.

And if they do break in, are we negligent by not having that building razed or completely -- you know, the ground sealed?

And I'm asking if you could help us in some way get it done because it's really a hazard.

MS. SEPPI: Thank you, Frank.

Yes, Mayor?

MAYOR RAYMOND: Is there any help for the residents that are in that area that are having problems?

I know of one. She can't sell her house. Is there anything available to help these people?

Their property values went way down and now they're kind of stuck with this house, you know, that had a contaminated basement.

What do they do?

MS. SEPPI: One of the things we've been doing is trying to work with the realtors to educate them, give them a better understanding of what the situation is, because we just don't want them going and saying: I don't want to put this house on the market because it's contaminated.

That's absolutely not true, as Shane and Rich said. There are 14 homes that we've remediated, and that's doing I guess almost 500 samples.

MR. NELSON: 500 inspections, 14 were found to be...

MS. SEPPI: But anything monetary, all we can do it talk to a prospective buyer, which we do all the time, to a seller, and try to educate them as to what's going on and, hopefully, they can make an informed decision after that.

MR. PUVOGEL: We provide each property owner that we do the sampling or inspection, we provide them a letter from EPA that the property has been inspected. Either it's had a problem and has been addressed and cleaned up and will be monitored over the long term or the sampling showed that there is no problem and this is your documentation. So, that helps a lot of people.

And as Pat mentioned before, some people either lose letters or whatever. We're right there to help them out and talk to the realtors. That's how we can we can help.

MR. MATI: Can I ask something?

Do you guys have any idea how much of a fund there is in Washington for the whole country for the Superfund cleanups?

MR. PUVOGEL: Right now, the Superfund is fairly well depleted. I don't know the exact dollar amount. It gets recharged from settlements from polluters that we have.

The Superfund tax is no longer being collected. It's lapsed.

MR. NELSON: The settlements and general appropriations every year. Congress puts money in escrow.

MR. MATI: In Garfield, we're looking at right now $37 million. Just in New Jersey alone, as I read in the paper regularly, there's so many sites in New Jersey alone that are probably all competing for the same money then.

MS. SEPPI: Well, some of them are sites where we have responsible parties already who are responsible for paying for the cleanup. If it's a Fund-led site like this is, yes, those sites are kind of in a competition to get that money.

MR. PUVOGEL: One other thing is we don't stop looking for polluters through the life of the project.

We'll be looking at that again as we move through design and starting our remedial action we'll be looking at a responsible party search again. We don't stop that. Whenever that turns up --

MR. MATI: I'm just saying the $37 million is not something that's going to be easily obtained just for Garfield alone.

MR. PUVOGEL: Right.

MR. MATI: In the meantime, we just have to live with the way it is until we can come across some money.

Once they start pumping money into the City, it will continue, you're saying?

MR. PUVOGEL: Yes, in general, my experience has been that once funding starts for remedial action, you don't want to shut it off. It usually keeps going.

MS. SEPPI: And we do have money, as Rich said, for design, so we're okay for that.

MR. ALOIA: Louis Aloia. I have just one question with regard to the 14 homes.

They are sellable houses at this point?

Is that the point we're trying to convey to the public, that they've been remediated properly and addressed with whatever their circumstance may have been with regard to cracked basements or unfinished basements?

So, those homes are now sellable?

Full disclosure, of course, but, in your opinion, that's what we've accomplished with these 14 homes?

MR. PUVOGEL: What we've accomplished is we've cleaned them up. Whether they're sellable is a relevant thing to a prospective purchaser --

MR. ALOIA: Right.

The thing is you've made an unsafe circumstance now a safe, livable home.

MR. PUVOGEL: Correct.

MS. SEPPI: There's no environmental reason that these homes cannot be sold.

MR. ALOIA: That was the point that I was trying to clarify. So that's the 14.

With regard to the original site, will that ever be usable for a municipal purpose in the future?

Thirty years is a long time to be looking at the brown fence.

MR. PUVOGEL: For the EC Electroplating property itself with the injections that Shane has introduced here, the injection program there is estimated to take six years to reach cleanup goals on that property.

That's just a rough estimate, we have to see how this stuff works, but since we're attacking the source very aggressively, we just want to get that major bulk of contamination out as quickly as possible. We believe that the system that we've proposed here with the injection wells, the pumping system on one end, and the re-injection wells on the other side, that's roughly about six years.

MR. ALOIA: About six years out. Thank you.

MR. BARCKETT: Tom Barckett, President, Board of Education. I have two questions.

We're three houses away. I don't have any contamination in my basement. Thank God for that, but I still can't sell my house even if I wanted to. I don't want to leave Garfield. If I wanted to, I'd have a hard time because it's all around me.

We're having road renovation being done right now extensively.

Will that cause possibly a problem with houses that are not contaminated maybe getting contaminated.

MR. PUVOGEL: From road renovations? No.

MR. BARCKETT: They're digging

up the streets, putting in new lines.

MR. PUVOGEL: The water table is about down 12 feet.

MR. BARCKETT: So, the area that Councilman Aloia was talking, about five houses away from there is a school, School No. 7.

Can't this area be used for parking?

Because the parking in that area is horrendous. There's not enough parking for people that live here.

Can we ever use that?

MR. PUVOGEL: Eventually you will be able to use it, but for the short term, while these wells are in place, it would not be usable for parking.

Once we get done using the system and we can abandon the wells and seal them up and move on --

MR. BARCKETT: That's the six years you were talking about, possibly?

MS. SEPPI: Yes, ma'am.

MS. BOYER: Years ago, our neighbor was planting vegetables every year, about 75 feet, a good length. And over the years -- this was after the chromium spilled -- his teenage daughter died of leukemia and no one made any connection whatsoever.

But the thought comes to your mind, is that possible?

Because now there are immigrants coming in from Poland and on the same block, up the street, I saw them planting vegetables again. And I was wondering...

MS. METZ: Hexavalent chromium just because of what Rich talked about, it being so unstable, doesn't actually go into plants very well.

So, we've had that question over the years as we've worked in Garfield, and that's really not a concern. The groundwater is fairly deep. The plant roots wouldn't necessarily be getting down there. And on top of that, the hexa chrome is not really well taken up into the plants.

MR. PUVOGEL: Plus, we have done some soil sampling and it didn't show up in the soils, the surface soils, where people garden.

MS. SEPPI: Mayor?

MAYOR RAYMOND: How would a person become contaminated?

Is it airborne?

If it doesn't go into plants, it's not in the drinking water, how could our population be contaminated?

MS. METZ: It's really just the basements where we found it. The groundwater that has the contamination in it coming through the walls of the basement and depositing this hexavalent chromium on the walls. That's how people come in contact with it, when they go to their basement to clean or move things around --

MAYOR RAYMOND: You mean through skin?

MS. METZ: Through skin that is accidently -- you know, not washing your hands, getting it into your mouth, that kind of thing.

So, we did air testing in a lot of the basements that were heavily contaminated. We didn't find it airborne. And that makes sense because basements are kind of wet and, so, it's really not getting up into the air.

It's really mostly from the derma contact and getting that into your mouth. It's very is limited --

MAYOR RAYMOND: I have a question for our City health nurse.

Darlene, I'm happy to see you here.

Have we had any cancer clusters reported in that area?

MS. REVEILLE: Well, you know, New Jersey as a whole has a high incidence of cancer. But the cancer that's reported in Garfield is different types of cancer. None of it can be attributed to one specific carcinogen.

What we did with NYU when we did the toenail clippings study, the good news with that is -- we had over 50 people that volunteered to participate in the study. And of those sampled there were no samples that were elevated to a point that -- there were some very minor elevations, but not to the point where it caused any type of health concern or harm.

So, there was one sample that was taken, and you always have like -- it was an outlier. And that person actually worked in an industry that uses -- that is exposed to hexavalent chromium. It's a type of a metal plating company. So, he did have an elevated and still after further testing had no health pathology associated with it.

So, that was the good thing, that -- of all the people that came out of the toenail clipping study.

MR. RIGOGLIOSO: Is it safe to say that if you go and build a house in that area or knock a house down, it should be built on slab, no more underground basements?

MR. PUVOGEL: You can build a basement.

The groundwater infiltration into basements is a function of two things: The depth of the water table and, also, how the basement is constructed. Some basements are a little shallower than others, others are better built, and newer basements seem to be a bit tighter, so they seem to be better waterproof.

So, it's no problem with putting a basement in if you're doing new construction as long as you seal it.

MS. SEPPI: Sir, in the back.

MR. MAZZOLA: Jack Mazzola, 250 Midland Avenue.

You said that it's 12 feet groundwater on the site. That's what you said. Now, I have a wall by me that's about 10 feet and I have a basement which is about another

5 feet, and I don't have groundwater coming up.

So, how do you have it up there and it's not by me?

MR. PUVOGEL: The 12 feet depth of the groundwater, it varies where you are in the whole plume area.

MR. MAZZOLA: I'm about 150 feet away from the site.

So, if I'm 150 feet away and you're saying that it's 12 feet, the groundwater, that you already dug it up and seen it, how don't I have it?

And then I have another property across the street that goes down another 7 feet, so now we're talking 17 feet all together, and I have no water there.

How is that?

MR. PUVOGEL: A property across the street on Lincoln Place has a basement about 8 feet deep and they have groundwater infiltration in the basement. It's very variable where you are. We can't say 12 feet across the whole plume area. It's going to vary as you move down the hill towards the Passaic River. Groundwater just works that way.

It depends on how much fill has been placed on these properties before built. Some properties were filled more than others, some are lower to the water table than others. There's a lot of variability that comes with each property.

So, the 12 feet number I put out there is a general average number. It does not represent the entire site.

MR. MAZZOLA: How deep are the wells?

MR. PUVOGEL: The wells go down to over 400 feet.

MR. MAZZOLA: 400 feet?

MR. PUVOGEL: For our monitoring wells. The injections wells on the EC Electroplating property would be -- the ones in the shallow on the property would be about 20 feet deep to inject material.

MR. MAZZOLA: So, 20 feet is about -- so, all the basements, like, down Grand Street would be 7 feet below mine, so you're talking that it's 10, 17, like 24.

MR. PUVOGEL: You're talking 7 feet lower than yours in elevation as far as the ground slopes?

MR. MAZZOLA: We're talking about grounds. I know the height of grounds. I can tell you that.

MR. PUVOGEL: Okay.

MR. MAZZOLA: The grounds are definitely about 24 feet once they start changing.

We're talking about basement apartments that have basements 7 feet down on average.

MR. PUVOGEL: Right.

MR. MAZZOLA: So, you're going to have the wells 20 feet deep.

MR. PUVOGEL: Right.

MR. MAZZOLA: And we got 24 feet on this side.

MR. PUVOGEL: The well depth is

20 feet. That's the bottom of the well. The wells are screened, they're slotted, come up to a certain -- to the top of the water table.

So, when the injection goes in the well, it just doesn't come out to 20 feet deep, it comes out the length of that screen. Wherever we find the water table in that one position, we'll be drilling a well down, looking at the water table depth, and putting a screen or a slotted screen in the well, and constructing that well so the injectant goes through the entire length of that water column in the overburden before it hits bedrock.

That's going to vary where we are, like across the street and on the property EC Electroplating itself.

MR. MAZZOLA: Who determined the 20 feet?

MR. PUVOGEL: Design engineers.

And that's conceptual. It's going to be different wherever you are on the area that we inject. It's not a rock solid 20 feet across the whole plume area. It's going to have to vary just by design.

MR. MAZZOLA: The bottom line is it's on a hill, it's on an incline, and it's a 24-foot drop. That's the bottom line. So, if you've got a 20-foot well, I don't think it's going go to the 24. I could be wrong.

MS. FLYNN: I'm the hydrogeologist of the cite. I worked on the Remedial Investigation with our team, and that's where we wanted to studdie the groundwater throughout Garfield at every depth.

So, at the EC Electroplating site, the tanks were pretty shallow and the contamination there is the most shallow. And then as the groundwater flows very slowly away from the site, it descends the contamination, so we looked for it everywhere.

So, we have a very good idea from our 55 wells in Garfield of the depth of contamination and the concentration of chromium that we can find there. So, that's why when we go into design, we'll continue the process of adding on to that information, but we are confident that we can find the contamination and treat those areas aggressively to reduce the chromium concentrations.

I understand your concern because there is contamination at different depths throughout the site. But we have that very well characterized in our investigation. We have wells at 400 feet that aren't contaminated, we have wells at 20 feet that are contaminated, but we have the whole plume delineated very well.

MR. MAZZOLA: The tank that leaked was not an in-ground, first thing. It was aboveground.

MS. FLYNN: Right.

MR. MAZZOLA: That's the first thing. It was aboveground, that's the first thing.

MS. FLYNN: We took samples
below the property. We found very
high concentrations of chromium, so
that's what we need to go after.

MR. PUVOGEL: And that tank that
leaked was semi-aboveground and built
into the ground about seven feet deep.

MR. MAZZOLA: I know exactly the
thing. We seen it every day. As you
pass by, you see it.

MS. SEPPI: Not anymore. Now
it's just a paved parking lot since we
demolished it.

Do we have any more questions?

Good questions. And if
everybody would please sign in if you
haven't, I would appreciate it. We're
trying to get together a better
mailing list than we have already.

MR. RIGOGLIOSO: I have one more
question.

What Councilman Calandriello was
saying before, when you were talking
about the realtors and trying to
educate them about how safe the area

is, but the perception is it's still a contaminated area. And when you're a homebuyer or looking for a home, you know, as a realtor, that may be the last place you bring them unless there's where the money is.

And Councilman Calandriello said maybe the EPA could put out something saying that it's not contaminated -- well, you can't lie, but it's a safe area, it's a place that you could put a family out there, so maybe the home values do go up a little.

Because as far as everyone is concerned in the neighboring towns it's a contaminated area. And people are moving out, you're getting Section 8s there, the renters there, or whatever it is, but you're not getting homeowners there or they're letting the house go because they can't get their value.

So, is there some kind of bulletin you could put out there, something you put out in the paper?

You know, because that's all we hear, contamination, contamination, in a populated area.

MS. SEPPI: It's not just here. This is comment at all the sites we have. Once that stigma gets attached to them, it's really hard to change that.

We can talk and see what we can do. I don't know if one article in the newspaper would help. Maybe a fact sheet that we could put together.

Do you have a Board of Realtors here?

We've met with Passaic County Board of Realtors. You might have the same thing here. We can meet with them as a group to talk about this a little more and help educate them. Any suggestions you have, we're certainly willing to listen.

MR. CALANDRIELLO: Can I say one thing? I think Mr. Aloia kind of brought it out, I just want to say it again: The sites that you've treated are not hazardous to someone's health at this time.

MS. SEPPI: No.

MR. CALANDRIELLO: And I think that's something that needs to be highlighted because that alone helps the perception of what's really being done here. Really, the work that you do, you go in and you clean up the site, you wipe the walls, you seal the basements. I've seen the work and it's really good work and it makes something that maybe was hazardous into something that's now safe.

And that's why the continuation of the money to be there to maintain it, to change sump pumps when the pumps go, and if there's cracks that develop and water starts coming back, even if it probably will never, it's reassuring that EPA will be there, and that's important.

MAYOR RAYMOND: I have a question to follow up that one.

I know the EPA is part of the

federal budget. What happens if they decide to start cutting the federal budget and they cut your funds to where you can't really treat all these Superfund sites?

I mean, that's a concern. We don't have a guarantee that money is always going to be there.

MR. NELSON: I'm a big budget nerd. Our budgets have been cut over the years and I think EPA made a focus of making sure the money is there for Superfund sites even with budget cuts that have come through in the past ten or so years.

MS. SEPPI: And we've become even more aggressive in looking for responsible parties so they can help defray costs that would be our costs.

MAYOR RAYMOND: We know there's one homeowner on Monroe Street, she just abandoned her house. She didn't even try and sell it. It was like a hopeless situation.

So, I understand, Frank, what

you said, and it's been cleaned up and it's been remediated, but I don't know, I think I, myself, would be leary if I knew it was in the Superfund site.

You know, could it happen again? Could this water table come up again with this contaminant in it?

But there really are no guarantees. I think you should be complimented for the work you're doing. It seems to be -- it's thorough.

But is there a guarantee?

Is this really where you would want to buy a house?

I feel sorry for the homeowners in that areas because, one, I know one that's on the Garfield Police Department just sold his house down there, he took a big loss. But just to get out of the area, he sold the house. He had a buyer and he figured might as well grab it, better than nothing.

So, I'm concerned about those people, their property values, and what they're going to do.

MS. BISHOP: Maryann Bishop. I'm here for one reason: I have a 13 year old and a 17 year old.

Down the road, can they end up getting cancer?

MS. SEPPI: Do you live within the area that we're looking at?

MS. BISHOP: No.

MS. METZ: There'd really be no way for them to come in contact with this material.

It's in the groundwater and the only place where it's becoming available for exposure are in those basements that are getting wet. We've thoroughly surveyed the area, we've remediated the 14 that had problems and we're going to continue with that.

As conditions change, people should call us if their basement starts getting wet when it didn't before or if they were remediated and the system isn't working the way it's supposed to. We have our removal folks in place, so they can come out on very quick notice and make sure things are okay.

So, you know, we have a system in place to address those basement exposures, which is really where people would come in contact with the chromium. But if you're outside of the study area, there's no way --

MS. BISHOP: There's no way. I know. I call you guys all the time, I call you all the time, and I ask questions.

MS. METZ: It's okay.

MS. BISHOP: It isn't for me, it's for my two kids.

MS. METZ: It's scary, I totally understand.

But you're outside. You should feel comfortable that they're okay.

MS. SEPPI: That there's no exposure to the chromium. Who knows what else is out there that people are exposed to, but it's not the chromium for you.

MS. BISHOP: It's just in that area.

MS. METZ: Yes.

MR. MAZZOLA: Do you know the depth on the Passaic side of the water table or the spill or whatever had the chromium.

MS. FLYNN: We have wells installed in the City of Passaic --

MR. MAZZOLA: I know where it is.

MS. FLYNN: -- and there's no contamination in the very shallow groundwater there, it's in the deeper groundwater in Passaic. So, I can show you --

MR. MAZZOLA: How deep is it.

MS. FLYNN: -- that information.

I think it's greater than 80 feet --

MR. MAZZOLA: 80 feet.

MS. FLYNN: -- in the bedrock aquifer. So, we did investigate that area of the contaminated plume.

MR. MAZZOLA: What do you do with the banks?

I mean, the banks don't want to touch nobody's property. What is the deal with that?

Meaning that if you go for a loan, somebody sells a property, somebody has to buy it, they don't have the money, they have to go to the bank.

MR. PUVOGEL: We have been contacted by some banks that have questions about the situation in Garfield. We've provided them information about the status of the home that they're discussing and the area in general and what we have done out there.

That's what we can do. We can provide them with the information that they need to make decisions.

MR. MAZZOLA: Well, they look at a circle and they see how far you are and if it's contaminated and they don't give you a loan, how do you resolve that problem?

MR. PUVOGEL: Well, we can talk to the banks and educate them on the situation, that we're here, we're cleaning up the site, we're addressing the properties that are effected, they've been cleaned up, there are no exposure at present, and the bank can make their decision. I can't tell you what a bank's decision will be.

MR. MAZZOLA: Most of the time, they drop you. They don't want to be near it. The property cannot be sold afterwards. The banks don't want to be stuck with a million dollar property.

MR. PUVOGEL: And the bank becomes the owner, you mean?

MR. MAZZOLA: By default, the bank becomes the owner.

MR. RIGOGLIOSO: Is it possible that a house that's contaminated and then years down the line -- my house was never contaminated, five, six

years down the line --
MR. MATI: That's what I said.
MR. PUVOGEL: Okay.
That house becomes contaminated?
MR. RIGOGLIOSO: It's fairly -- it's possible but not likely.
MR. RIGOGLIOSO: Okay.
MR. PUVOGEL: This contaminant plume is a fairly old plume. It's been around for quite a while, 40 years.
MR. RIGOGLIOSO: So, it won't splinter off into other home areas.
MR. PUVOGEL: We don't think so --
MR. RIGOGLIOSO: Or the chance is unlikely.
MR. PUVOGEL: -- especially now that the source has been removed. We think we'll see things receding just from the source being removed itself. Once we start the system on the property, the problems start to go away; very slowly, but it's on the mend.

MS. SEPPI: Tom?

MR. DUCH: Yes, just one comment.

Over the last several years, I have received ten, twelve calls from people who were selling their homes and who were looking for an update from the EPA. I've referred them to the EPA, and those closings took place.

So, as long as they issue a letter -- no one has come back to me and said: Oh, I can't sell. Oh, I have a problem.

You know, I don't --

MR. MAZZOLA: For a home?

MR. DUCH: -- if everyone has reached out to me, but those who have, I referred them right over.

MR. MAZZOLA: Any commercial property --

MR. DUCH: Commercial, I have not received any calls, any commercial, none.

MR. MAZZOLA: You're going ing

to receive one now.

(Laughter)

MR. MATI: As a member of the city government, working with your agency and all, I think we can safely say that we have done everything we can now on this project, it all depends on the funds, correct?

I mean there's nothing else the city could have done, any more, with this pending the money, right?

MS. SEPPI: Absolutely. You've been more than cooperative, as I said before. And the money is an issue, it's a major issue.

And all we can do is get through the design, we have the money for that, and then, you know, go to our headquarters and bring it before the board, and, hopefully, we'll be able to get the money to do the work too.

MR. MATI: I just don't want the perception of the town to think that we're not doing what we can to fix the problem.

You know what I'm saying?

MS. SEPPI: You've been a pleasure.

MR. PUVOGEL: You've done a great deal. This is a town that's rolled out the red carpet for EPA to help us. With the well installations, Tom has been very accommodating in pulling the resources of the City together to help us out, from the traffic officers to the Department of Public Works. We've had just great cooperation.

And we look forward to that cooperation as we move forward with designing this placement of the wells and the City's input on certain positions, what works best for the remedy and the City. This is not over. This is just the beginning. We're looking forward to a working relationship with the City of Garfield and to continue a very good relationship.

MR. RIGOGLIOSO: Will everything

being transparent as you go along with the remediation, like let the council know what's going on, if you hit any snags, there's a delay, or is it going to be kept in-house?

MR. PUVOGEL: No, no, we'll be working with the council.

MR. NELSON: As much as we know, we'll let you know, whether it's a community bulletin or a phone call to Tom. Somebody is going to know.

MS. SEPPI: We've had lots of meetings with Tom and other members of the Council and City government and we'll continue to do that.

MR. PUVOGEL: If the council wants us to come to brief them from time to time, we're more than happy to do that.

MS. SEPPI: Another question?

MR. MAZZOLA: The funding that you get, is it from the Right to Know Act?

Isn't that the same?

MS. SEPPI: No.

MR. PUVOGEL: No. It's the general fund.

MR. NELSON: This is CERCLA, that's RCRA. Two different laws.

MR. MAZZOLA: A lot of companies pay a fund for EPA. Gas stations pay a fund and the Right to Know Act definitely pays -- there's money that you pay.

MR. NELSON: I don't think it's going into our Superfund, the Superfund for this cleanup.

MR. MAZZOLA: Well, does it go into Superfund or no?

MR. PUVOGEL: No. The tax has not been renewed for the Superfund --

MR. NELSON: 1995 was the last time --

MS. SEPPI: In 1995, that stopped.

MR. PUVOGEL: So, any money that we get to perform this remedy comes from general tax revenues.

The Superfund tax was a levy placed on petrochemical companies and chemical companies. That lapsed.

MR. MAZZOLA: Only the big guys.

MS. SEPPI: They're trying to have that reinstated, a lot of our congressional people and our senators. We keep hoping that somehow that will pass and we'll be able to up our appropriation, which would certainly be helpful for us all; not just for Garfield, but other sites too.

MR. DUCH: Just a final comment.

Councilman Delaney was unable to be here this evening because of work obligations, but I would like to say this: We've been very fortunate in that Judith Enck, the Regional Administrator of the EPA, has been very supportive of the City of Garfield and has always considered us a priority.

I indicated before that we went and testified before Congress and before the Senate. And that was really at her request. She felt that Garfield should be a great living, breathing example of why Superfund funding is so important.

We have an election in November. There will be a new President in January. It is very important to us that Judith Enck stays as the Regional Administrator; we're fine, we have a supporter. We don't know who the next regional administrator will be, depending on who the President is.

So, from the City's perspective, we're going to have to keep an eye on who that is and make sure that if it's someone else we really, the Mayor and Council and I, have to make it known to that individual how important this is. We obviously would rely on our Congressmen and our Senators to get that message across.

But that's the only political fear that I have, that a national election could actually impact where we stand in the whole process. That's reality.

MR. NELSON: The EPA team

working on the Garfield site will certainly impress that message from inside as well. We'll certainly let them know how important the site is and the cooperation we've gotten that we should give back to the City.

We'll make sure whoever gets it gets that message.

MR. DUCH: Great. Thank you.

MS. SEPPI: Any more questions?

Thank you all. We really appreciate you being here tonight.

(Applause)

MS. SEPPI: Good questions. Don't hesitate to call any time. Our numbers are there.

(Time noted: 8:15 p.m.)

C E R T I F I C A T E

STATE OF NEW JERSEY)
) ss.
COUNTY OF HUDSON)

I, LINDA A. MARINO, RPR, CCR, a Shorthand (Stenotype) Reporter and Notary Public of the State of New Jersey, do hereby certify that the foregoing transcription of the public meeting held at the time and place aforesaid is a true and correct transcription of my shorthand notes.

I further certify that I am neither counsel for nor related to any party to said action, nor in any way interested in the result or outcome thereof.

IN WITNESS WHEREOF, I have hereunto set my hand this 6th day of June, 2016.

____

LINDA A. MARINO, RPR, CCR

Attachment D
Written Comments

NEW JERSEY CHAPTER
145 West Hanover St., Trenton, NJ 08618
TEL: [609] 656-7612 FAX: [609] 656-7618
www.SierraClub.org/NJ

June 7, 2016
Shane Nelson, Remedial Project Manager
U.S. EPA, Region 2
290 Broadway
New York, NY 10007-1866
(212) 637-3130
nelson.shane@epa.gov

Dear Mr. Nelson:

The New Jersey Sierra Club believes the U.S. Environmental Protection Agency plan to address groundwater contaminated with hexavalent chromium at the Garfield Groundwater Contamination Superfund site is not an appropriate response at the site. We believe it may not go far enough to remedy all of the toxic contamination because it is an experimental way of monitoring and selective site remediation. Even if it is a good plan, it may not work because the EPA doesn't have the funding. We believe no matter how good the plan is they might not have the funding to actually implement it because there is very little funding left for Superfund sites and for this site in particular.

The people of Garfield will continue to suffer at this site because this plan may not go far enough. This is one of the most toxic sites in New Jersey that directly affects hundreds of people who live above contaminated groundwater. We need a real clean-up plan to adequately address the extent of this pollution, which includes removing all of the toxic contamination—not just monitoring and conducting selective remediation in some people's basements.

Chromium is a toxic chemical that becomes more toxic when it mixes with drinking water. The chromium at this site is seeping into basements and drinking water wells. In 2010, hexavalent chromium exposure in Garfield was confirmed as a hazard to public health, primarily if people are exposed to chromium dust in basements. It may even be causing cancer and damage the nervous system for people in the community.

The Sierra Club has been involved since the chromium first appeared at a school in Garfield and now it is clear the chromium is contaminating the whole community, up to 500 properties and hundreds of people. The 2011 Department of Health report on Garfield's contamination should have been a warning bell that there is a problem that has to be dealt with and five years later we need immediate action.

The EPA must ensure adequate funding and an appropriate clean-up of the Garfield site to protect the human health of people who have been suffering for far too long. The state of New Jersey has dragged their feet on this site for years is still down playing the threat from chromium in Garfield. We need a real clean-up plan, but we also need the funding.

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Sincerely,

Jeff Tittel