RECORD OF DECISION AMENDMENT

Shieldalloy Metallurgical Corporation Superfund Site
Newfield, Gloucester/Cumberland Counties, New Jersey

Operable Unit 1: Non-Perchlorate Groundwater

United States Environmental Protection Agency

Region II
September 2015

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SITE NAME AND LOCATION

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Borough of Newfield, Gloucester County and City of Vineland Cumberland County, New Jersey
Operable Unit 1 (OU1) – Remediation of Non-perchlorate Groundwater

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) Amendment documents the U.S. Environmental Protection Agency's (EPA's) selection of a change in the groundwater remedy which was originally selected for the Shieldalloy Metallurgical Corporation Superfund site in 1996 (1996 ROD). The original remedy was, and this ROD Amendment is, chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. §§ 9601 – 9675, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) Part 300. This decision document explains the factual and legal basis for selecting a remedy to address the contaminated groundwater at the site.

This decision was based on the Administrative Record, which has been developed in accordance with Section 113 (k) of CERCLA, and which is available for review at the Newfield Public Library, Newfield, New Jersey and at the EPA, Region 2, Superfund Records Center in New York, New York. The Administrative Record Index (Appendix III to this ROD Amendment) identifies each of the items comprising the Administrative Record upon which the selection of the amended remedial action is based.

The State of New Jersey Department of Environmental Protection (NJDEP) was consulted on the planned amended remedy in accordance with Section 121(f) of CERCLA, 42 U.S.C. § 9621(f), and NJDEP concurs with the amended remedy (see Appendix IV for the NJDEP Concurrence letter).

RATIONALE FOR AMENDMENT

The 1996 ROD selected the extraction and treatment of contaminated groundwater. This ROD Amendment changes this requirement and now requires *in-situ* remediation to address contaminated groundwater at the site. This ROD Amendment is based on information developed as part of an optimization study of the pump-and-treat system that was selected in the 1996 ROD. The November 2010 OU1 Optimization Study, approved by EPA in February 2011, concluded that "*…the pace of cleanup associated with the pump-and-treat system is slow (and getting slower), and that the unit cost of treatment is high and getting higher. Further, the current treatment system is highly energy intensive*." More specifically, the study found that groundwater concentrations had been stable at asymptotic levels for over 10 years. This means that there has been no progress towards meeting cleanup goals. These findings led to the modification of the existing treatment plant in 2011 through installation of an ion exchange system to improve operating efficiency. The findings also led to implementation of a pilot program to evaluate the effectiveness of *in-situ* (in-place) remediation technologies to expedite aquifer cleanup. The *in-situ* pilot program has included extensive studies, small and large-scale injections, and evaluation of monitored natural attenuation (MNA).

ASSESSMENT OF THE SITE

The response action selected in this ROD Amendment for OU1 is necessary to protect public health or welfare and the environment from actual or threatened releases of hazardous substances from the site into the environment.

DESCRIPTION OF THE SELECTED REMEDY AS AMENDED

The response action described in this document addresses OU1 non-perchlorate contamination in groundwater. OU2 addresses non-perchlorate contamination in soils, surface water and sediments. Perchlorate contamination, in all media, will be addressed in operable unit 3 (OU3). The ROD Amendment incorporates and builds upon earlier cleanup actions at the site.

The 1996 selected remedy consisted of installation of a network of extraction wells that captured contaminated groundwater that was transferred to a treatment system located at the SMC Facility. The extracted groundwater was then subjected to various treatment processes to remove volatile organic compounds (VOCs) and metal contaminants. The treated groundwater was then discharged to the surface waters of the Hudson Branch of the Maurice River.

The major components of this ROD Amendment include:

- Discontinuing the operation of the existing groundwater pump and treat system.

- Injecting calcium polysulfide (CPS) into the high concentration target portions of the aquifer to reduce chromium concentrations.

- Injecting emulsified vegetable oil (EVO) into the high concentration target portions of the aquifer to reduce VOC concentrations, particularly trichloroethene (TCE).

- Implementing long-term monitoring of groundwater to confirm the degradation of chlorinated VOCs, the reduction of hexavalent chromium and the attenuation of the VOC and chromium plumes through MNA. Long-term monitoring will include MNA parameters (discussed in the Decision Summary) and will evaluate the ongoing effectiveness of the active *in-situ* treatments. Metal contaminants beryllium and vanadium present a noncancer health hazard that will be addressed by MNA and long-term monitoring.

- Establishing institutional controls in the form of a classification exception area (CEA)/Well Restriction Area (WRA), to restrict groundwater use and prohibit activities that could result in human exposure to beryllium, chromium, vanadium and VOCs in groundwater.

- Conducting a review of site conditions at least once every five years until the remediation goals are attained (policy review).

The amended remedy complies with EPA Region 2's Clean and Green Energy Policy. It supports the Green Remediation Principles by minimizing energy use, minimizing air emissions, and minimizing water use, and it is protective of the land and ecosystem.

DECLARATION OF STATUTORY DETERMINATIONS

The selected remedy meets the requirements for remedial actions set forth in CERCLA Section 121, 42 U.S.C. § 9621 in regard to the following:

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 action, is cost-effective and utilizes permanent solutions and alternative treatment technologies (or resource recovery) to the maximum extent practicable.

Part 2: Statutory Preference for Treatment

In-situ chemical treatment and enhanced biodegradation satisfy the statutory preference for treatment as a principal element of the remedy and addresses high concentration contaminated saturated soil.

Part 3: Five-Year Review Requirements

While this amended remedy will ultimately result in reduction of contaminant levels in groundwater to levels that would allow for unlimited use and unrestricted exposure, it will take longer than five years to achieve these levels. As a result, the site will be reviewed at least once every five years until such time as remedial action objectives (RAOs) and remediation goals are attained and human health and the environment are protected with unrestricted use.

ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD Amendment. Additional information can be found in the administrative record file located in the information repositories for the site.

- Baseline risk represented by the chemicals of concern may be found in the "Summary of Site Risks" section;
- A discussion of cleanup levels for chemicals of concern may be found in the "Remedial Action Objectives" section;
- Estimated capital, annual operation and maintenance (O&M), and total present worth costs are discussed in the "Description of Alternatives" section; and
- Key factors that led to selecting the amended remedy (i.e., how the selected remedy as amended provides the best balance of tradeoffs with respect to the balancing and modifying criteria) may be found in the "Comparative Analysis of Alternatives," "Basis for the ROD Amendment" and "Statutory Determinations" sections.

AUTHORIZING SIGNATURE

Walter E. Mugdan, Director
Emergency and Remedial Response Division
U.S. Environmental Protection Agency
Region II

Sept. 30, 2015
Date

PART2: DECISION SUMMARY

1.0 INTRODUCTION TO SITE AND STATEMENT OF PURPOSE

1.1 Site Name, Location and Description

The Shieldalloy Metallurgical Corporation (SMC) Superfund site is located at 35 South West Boulevard, in the Borough of Newfield, Gloucester County, New Jersey, with a small portion of the southwestern corner located in the City of Vineland, Cumberland County, New Jersey. See Figure 1 of Appendix I.

The site comprises two parcels, the "SMC facility" and the "farm parcel," and the Hudson Branch, an intermittent stream that discharges into Burnt Mill Pond.

SMC Facility The larger parcel is approximately 67.5 acres in size. The coordinates of the center of the site are 39°32'27.6" North latitude and 75°01'06.7" West longitude. The facility is currently used by SMC as office space. Portions are also leased by SMC to various construction companies and to the Borough of Newfield for warehousing. The facility is secured by a locked perimeter chain link fence. The facility is bordered to the north by a rail spur and an inactive landfill; to the east by a wooded area, residences and small businesses; to the south by residences located along Weymouth Road; and to the west by Conrail rail lines, South West Boulevard, and various light industries and residences.

The SMC facility consists of four main areas, the *former production area, former lagoons area, eastern storage area* and *southern area*, as well as the *natural resource restoration areas.* Figure 2 of Appendix I is a current layout of the facility.

The *former production area* is approximately 22 acres and is the area where the majority of manufacturing activities occurred. This area is largely covered with buildings and asphalt or concrete pavement.

The *former lagoons area* occupies 4.5 acres. It includes nine lagoons that stored wastewaters and were closed by SMC between 1994 and 1997, with NJDEP oversight. Lagoon closure and remediation activities included sludge removal, liner removal, contaminated soil removal, post-excavation sampling, and backfilling. The *former lagoons area* is covered by a clean soil cover and light vegetation, which includes small trees and grass.

The *eastern storage area* had been used to store drums containing residues of manufacturing processes. A 1.3-acre portion of the *eastern storage area* is currently uncapped and covered with some gravel and concrete debris.

The *southern area* includes undeveloped areas, an on-site impoundment and the former thermal pond area. The on-site impoundment receives a combination of facility storm water and treated water from the on-site groundwater treatment system, pursuant to New Jersey Pollutant

Discharge Elimination System (NJPDES) permit requirements. The water from the on-site impoundment is directed into a ditch flowing toward the Hudson Branch. The on-site impoundment was installed by SMC in the early 2000s by excavating existing soils. The former thermal pond area covers 0.77 acres and consists of a rectangular depression, approximately three to five feet deep, that is covered with vegetation including grass and small trees. During facility operations, the former thermal pond was used as an emergency holding reservoir for treated wastewater. Several parcels within the *southern area* were developed and included in the *natural resource restoration areas* (discussed below). The remainder of the southern area is undeveloped and covered with a vegetated cap, grass and small trees.

The *natural resource restoration areas* are located in a non-contiguous collection of parcels around the facility, generally focused on the eastern and southern areas and total nearly 10 acres. Remediation and restoration of these areas was governed by a 1997 Settlement Agreement of Environmental Claims and Issues by and between SMC and the United States (on behalf of the EPA) and the State of New Jersey (on behalf of NJDEP). In 1999 and 2000, caps comprised of clean soil and vegetation, including a variety of grasses, flowers, trees and bushes, were constructed in these areas. These vegetative caps provide habitat value and eliminate the potential for exposure to contaminated soil.

Farm Parcel The smaller farm parcel is 19.8 acres of noncontiguous farmland in the City of Vineland approximately 2,000 feet southwest of the SMC facility. The farm parcel has never been used for manufacturing activities. It is considered part of the site because it is land that was purchased by SMC for implementation of the OU1 remedy.

Hudson Branch The Hudson Branch, an intermittent stream, runs along the southern edge of the SMC facility and discharges to Burnt Mill Pond.

While not part of the site, two pumping wells (RW6S and RW6D) associated with the site are located on the “car wash” parcel on Weymouth Road.

The SMC facility and farm parcel are zoned industrial. The future land use of the site is anticipated to remain consistent with its current zoning. The site is located in a mixed residential, agricultural, commercial, and light industrial area. The closest residences are approximately 100 feet south of the facility. Burnt Mill Pond is used for recreational purposes. Groundwater is the primary source of drinking water in the area.

1.2 Lead and Support Agencies

EPA is the lead agency and the NJDEP is the support agency.

1.3 Statement of Purpose

An Amendment to the September 24, 1996, Record of Decision (1996 ROD) is necessary because of a fundamental change to the extraction and treatment of contaminated groundwater of the selected remedy. This ROD Amendment documents the basis for this fundamental change. This ROD Amendment is issued in accordance with Section 117 of CERCLA and 40 CFR 300.435(c)(2)(ii) of the National Oil and Hazardous Substances Contingency Plan (NCP).

1.4. Community Participation/Availability of Documents

In compliance with Section 117 of CERCLA and NCP Section 300.435(c)(2)(ii), on July 30, 2015, EPA released the Proposed Plan for the amendment of the cleanup of non-perchlorate groundwater to the public for comment. EPA made these documents available to the public in the administrative record repositories maintained at the EPA Region II office (290 Broadway, New York, New York 10007) and the Newfield Public Library, (115 Catawba Avenue, Newfield, New Jersey). EPA published a notice of availability for these documents in Vineland's *The Daily Journal* newspaper; posted the Proposed Plan on EPA's Region II website; and opened a public comment period on the documents from July 30, 2015, to August 28, 2015.

On August 12, 2015, EPA conducted a public meeting at the Newfield Borough Hall to inform local officials and interested citizens about the Superfund process, to review the completed and planned remedial activities at the site, and to respond to questions from area residents and other attendees. Responses to the comments received at the public meeting and in writing during the public comment period are included in the Responsiveness Summary (see Appendix V).

The ROD Amendment and supporting documentation will become part of the Administrative Record for the site, in accordance with the NCP 40 CFR 300.825 (a)(2). The Administrative Record Index is presented in Appendix III to this ROD Amendment. Information pertinent to EPA's decision-making process in selecting the cleanup plan in this ROD Amendment is available for public viewing at the information repositories at the following locations:

Newfield Public Library
115 Catawba Avenue
Newfield, New Jersey, 08344
(856)697-0415
Hours: Monday through Friday 10:00 a.m.-7:00 p.m.,
Friday 10:10 am-5:00 pm, Saturday 10:00 am-5:00 pm

U.S EPA Region 2, Superfund Record Center
290 Broadway, 18th Floor
New York, New York 10007
(212)637-4308
Hours: Monday through Friday 9:00 a.m.-5:00 p.m.

Information is also available for review on-line at:
http://www.epa.gov/region02/superfund/npl/shieldalloy

2.0 SITE HISTORY AND CONTAMINATION, AND 1996 SELECTED REMEDY

2.1 Site History and Contamination

Specialty glass manufacturing began at the SMC facility in the early 1900s. SMC purchased the facility in the early 1950s. From 1955 to 2006, SMC manufactured specialty steel and super alloy additives, primary aluminum master alloys, metal carbides, powdered metals and optical surfacing products at the facility. Production processes also included chromium metal, chromium oxide, vanadium pentoxide, ferro-vanadium, uranium oxide, thorium oxide, ferro-columbium and columbium nickel. General facility operations, product spills and wastewater discharges contributed to the contamination of the site.

Chromium contamination of the groundwater was first detected by NJDEP in 1970 in a Borough of Newfield municipal well and a private well. As a result, NJDEP directed SMC to perform groundwater investigations to determine the extent of the chromium contamination and to develop an appropriate remedial action. SMC purchased the farm parcel in 1970 to construct a recovery well as part of the groundwater extraction and treatment system.

A groundwater pump-and-treat system began operating in 1979, pumping from W8 (a well at the south west corner of the SMC facility), and treating the groundwater via an old ion exchange system. Groundwater recovery was switched from well W8 to well W9 to obtain more appropriate hydraulic control in 1983. Treated water was discharged into an on-site, unnamed tributary of the Hudson Branch stream, under a NJPDES permit.

In 1984, NJDEP and SMC entered into an administrative consent order requiring SMC to investigate groundwater at the site and to address the plume of groundwater contamination. In 1988, NJDEP directed SMC to modify and upgrade its groundwater extraction and treatment system and to expand the groundwater monitoring program. Later in 1988, NJDEP and SMC signed a second administrative consent order requiring SMC to upgrade the groundwater extraction and treatment system, to perform a site-wide study of the soil, and to close nine lagoons. At NJDEP's direction, SMC also took a number of response actions that resulted in the excavation of the lagoons, the removal of above-ground and underground storage tanks, and the capping of the industrial areas of the site.

In 1989, four recovery wells were added to the pump-and-treat system to better capture the chromium plume. The four new wells were as follows: Layne (at the SMC facility), RW6S and RW6D (the "car wash" wells on Weymouth Road); and RIW2 (at the farm parcel). Also, in 1989, SMC expanded the treatment system to include an air stripper, to address the secondary contaminant of concern, TCE, which is also present in the groundwater. The chromium-treatment portion of the system was changed to electrochemical precipitation in 1991. Also, in 1991, SMC completed a remedial investigation. The remedial investigation (RI) indicated that the groundwater, soil, surface water and sediments were contaminated with VOCs and metals. Former wastewater treatment lagoons were the primary source of the chromium groundwater contamination. The primary source of the TCE groundwater contamination at the SMC Facility was a former Manpro-Vibra Degreasing Unit. Supplemental RI activities were conducted in 1995 to delineate the extent of contamination. A feasibility study (FS) report was completed in 1996. In September 1996, the NJDEP issued a ROD for OU1 with EPA concurrence. The selected remedy includes modification of the existing groundwater remediation treatment system to optimize the capture of contaminated groundwater, air stripping to remove VOCs from the groundwater, electrochemical treatment with supplemental treatment methods, as needed, to remove inorganic contaminants, especially metals, and discharge of the treated groundwater to the surface waters of Hudson Branch.

In 2006, NJDEP entered into an administrative consent order with SMC and TRC Environmental Corporation (TRC), SMC's environmental consultant, for the completion of all Superfund cleanup activities at the site. The NJDEP was the lead agency for the site until 2008 when the lead was transferred to the EPA.

The EPA entered into an administrative order on consent (the 2010 Administrative Order) with SMC and TRC Environmental Corporation (TRC) in April 2010 to perform activities for OU1, including refining the delineation of the VOC plume. Under the oversight of EPA, TRC initiated the supplemental RI in January 2010, which included the installation and sampling of temporary and permanent wells. The draft final Supplemental RI report, which was approved by EPA in March 2014 concluded that delineation and characterization of the groundwater plume was complete.

The 2010 Administrative Order also requires TRC and SMC to perform certain response activities in connection with the other operable units at the site, OU2 and OU3. For OU2, TRC conducted a remedial investigation/feasibility study (RI/FS) that led to EPA issuing a ROD for OU2 on September 25, 2014. The OU2 ROD addresses soil, sediment and surface water for all contaminants except perchlorate. The OU2 remedy is currently in pre-remedial design phase. For OU3, the 2010 Administrative Order requires the completion by SMC of an RI/FS to address perchlorate at the site.

2.2 Original (1996) ROD Selected Remedy

In September 1996, the NJDEP issued a ROD for non-perchlorate groundwater for OU1, with EPA concurrence. The major components of the 1996 ROD are as follows:

- Modify the groundwater extraction system (using five extraction wells) to optimize the capture of contaminated groundwater;
- Air Stripping to remove volatile organic compounds from the recovered groundwater;
- Electrochemical treatment (rated at 400 gallons per minute) with Supplemental Treatment (as required) to remove inorganic contaminants, primarily chromium, from the recovered groundwater;
- Discharge of treated groundwater to surface waters of the Hudson Branch of the Maurice River; and
- Establishment of a Classification Exception Area (CEA).

3.0 BASIS FOR THE ROD AMENDMENT

An Amendment to the 1996 ROD is necessary because a fundamental change to the extraction and treatment of contaminated groundwater is needed. Since 1996, new information has been collected to support a change from the technology selected in the 1996 ROD.

This information is summarized as follows and discussed in more detail below:

- New information collected as part of an optimization study on the pump-and-treat system found that the groundwater pump-and-treat system provided reasonably good containment, but that concentration reduction rates had slowed to asymptotic conditions over the past 10 years.

- The nature and extent of contamination related to groundwater has been updated by the Supplemental Remedial Investigation.

- *In-situ* remediation treatability studies were conducted and implemented and were found to expedite aquifer cleanup beyond the abilities of pump-and-treat technologies to achieve cleanup goals faster.

- In addition to the *in-situ* treatment investigation, groundwater studies were performed to analyze whether and to what degree natural processes (referred to as “natural attenuation”) are reducing contaminant concentrations without active treatment. As discussed below, natural attenuation coupled with active treatment is an effective remedial component for this site.

- An updated risk assessment was conducted, which concluded that the concentrations of contaminants remaining continued to be associated with unacceptable levels of risk.

3.1 Optimization Study (2010)

In 2010, an optimization study was performed to evaluate the efficiency of the pump-and-treat system. The remediation system optimization evaluation focused on maximizing the efficiency of the pump-and-treat system, while maintaining protection of human health from exposure to site contaminants; expediting the cleanup; and identifying key steps to achieve the remedial RAOs defined in the OU1 ROD.

Currently, approximately sixty monitoring wells exist throughout and downgradient of the site. Site groundwater data collected monthly over the past 20 years were reviewed for five pumping wells in three locations (SMC facility, car wash and farm parcel) to determine the ability of the pump-and-treat system to meet RAOs in a timely fashion. The data review focused on chromium as the primary contaminant of concern and TCE as the secondary contaminant of concern. The plume maps utilized for the optimization study are presented in Figures 3 and 4 for hexavalent chromium (deep aquifer) and TCE (deep aquifer), respectively. The figures also include the locations of the pumping wells. The study found that the groundwater pump-and-treat system provided reasonably good containment, but that concentration reduction rates from the pump-and-treat system had slowed to asymptotic conditions since the year 2000. For example, hexavalent chromium concentrations at the SMC facility pumping wells and the car wash pumping wells were approximately 30,000 micrograms/liter (µg/L) in the 1980s but have leveled off at approximately 1,000 µg/L for the past 10 years, compared to a remediation goal of 70 µg/L (See Figures 5 and 6).

The results of the study concluded that the pump-and-treat system was slow, inefficient and not cost effective. The main treatment process, electrochemical precipitation, is extremely energy intensive, consuming as much electricity as 125 homes per day. These findings prompted the 2011 construction of a new replacement treatment plant with an ion exchange unit, which could provide over a 50% energy savings. The results of the optimization study also suggested that treatability studies be performed to evaluate the effectiveness of *in-situ* remedial technologies. Such technologies were expected to be more efficient and cost-effective and to expedite aquifer cleanup to achieve the RAOs faster than the pump-and-treat system. Because *in-situ* technologies can foster conditions suitable for MNA, a detailed MNA study was also recommended in conjunction with the *in-situ* pilot treatability program.

3.2 OU1 Supplemental Remedial Investigation (2010)

The OU1 Supplemental RI activities included the installation and sampling of temporary wells and permanent wells. The temporary wells were sampled at multiple vertical intervals (so these locations are referred to as vertical profiling, or VP, points).

Twenty VP samples, four piezometer samples and two monitoring well samples were collected as part of the 2010 supplemental remedial investigation. The analytical results associated with the vertical groundwater profiling effort at the site are presented in Table 1. The analytical results associated with the piezometer sampling and monitoring well sampling are presented in Tables 2 and 3, respectively, and are depicted on Figure 7. The groundwater samples were analyzed for metals (total chromium, hexavalent chromium) and VOCs.

Chromium

The 2010 supplemental remedial investigation identified a chromium groundwater plume extending from the SMC facility, past the car wash, to the farm parcel in both hexavalent and trivalent forms exceeding applicable drinking water standards. New Jersey groundwater quality standard (GWQS) for total chromium is 70 µg/L, and the Federal maximum contaminant level (MCL) for total chromium (the sum of all forms of chromium) is 100 µg/L. The chromium plume is approximately a half mile long and 100 to 400 feet wide. The chromium plume was generally broader at the SMC facility (because of the former sources), and narrower at the farm parcel, consistent with the fate and transport nature of the plume in a sandy aquifer. The total chromium plume for both the shallow (30 to 70 feet below ground surface) and deep groundwater aquifer zones (70 to 130 feet below ground surface) are included as Figures 8A and 8B.

Volatile Organic Compounds (VOCs)

VOCs detected during the 2010 supplemental investigation included: chloroform; 1,4-dichlorobenzene; 1,1-dichloroethane; 1,1-dichloroethene (1,1-DCE); 1,2-DCE; 1,1,1-trichloroethane; TCE; and tetrachloroethene (PCE). Three of the nine VOCs, TCE, PCE and 1,1-DCE, were detected above MCLs or GWQSs and are discussed below.

TCE

A TCE plume in the shallow groundwater aquifer zone is approximately 1,000 feet long, extending from the SMC facility near the former degreasing unit toward the car wash pumping wells, and is 500 feet wide. The highest concentration of TCE detected in the shallow zone is 207 µg/L, compared to the New Jersey MCL and GWQS of 1 µg/L and federal MCL of 5 µg/L.

A TCE plume in the deep aquifer zone extends approximately 10,000 feet from the SMC facility to beyond the farm parcel and is approximately 1 mile wide, with the highest concentration detected near the SMC facility at MW-SC34D of 50 µg/L. The TCE concentrations at the SMC facility are either stable or decreasing. Much of the deep TCE plume is relatively diffuse, with concentration ranges below 10 µg/L.

The sandy nature of the shallow and deep groundwater aquifer zones would ordinarily yield long, narrow plumes, as found in the shallow TCE plume. The data suggest that non-site-related TCE has contributed to the atypical width of the deep TCE plume; while no other TCE sources have been identified, the shape of the plume suggests that other TCE sources may have contributed to the plume. Based on the data collected, the VOC plume in the deep zone of the aquifer was determined to be from both the site and from other non-SMC sources, that appear to have been present immediately downgradient of the SMC facility proximate to Weymouth Road. These other sources appear to have released TCE, PCE, and other chlorinated VOCs. In the 1980s, NJDEP identified a number of potential sources of chlorinated VOCs in North Vineland, but concluded that none were worthy of further investigation. The OU1 supplemental remedial investigation generally supports this earlier conclusion, as none of the downgradient chlorinated VOC concentrations suggest the presence of a secondary residual source.

Because of its characteristics of low viscosity and higher density than water, the TCE plume migrates to lower depths as it moves downgradient. At this site, it has resulted in a layer of uncontaminated groundwater above the plume. This uncontaminated groundwater lens prevents volatilization and vapor intrusion from the TCE plume.

The TCE plume map for the shallow and deep groundwater aquifer zones are shown in Figures 9A and 9B, respectively.

PCE

PCE, a constituent not used by SMC, was present throughout the footprint of the TCE plume downgradient of the SMC facility, ranging from non-detect to 38 μg/L. PCE was not detected at the SMC facility. The PCE plume appears to be located in two general areas southwest and southeast of the SMC facility. The area southwest of the site represents the most significant PCE plume, which extends from the car wash area towards the west-southwest for nearly one and a half (1.5) miles. The PCE plume located southeast of the SMC facility is much smaller in areal extent and consists of much lower concentrations (maximum of 1.1 μg/L); it appears to be originating from an unknown source located east of the SMC facility. The highest PCE concentrations are found in the shallow groundwater aquifer in the car wash area (114 μg/L) and in the deep aquifer at the downgradient VP-3 location (38.6 μg/L at a depth of 95 to 100 feet below ground surface). The GWQS for PCE is 1 μg/L, and the federal MCL is 5 μg/L.

1,1-DCE

The only other chlorinated VOC detected in the groundwater at concentrations in excess of its respective GWQS (but not its MCL) was 1,1-DCE. 1,1-DCE was detected at two vertical profile samples, VP-16 (3 μg/L at a depth of 20 to 24 feet below ground surface) and VP-17 (2.5 μg/L at 45 to 49 feet below ground surface). The GWQS for 1,1-DCE is 1 μg/L, and the federal MCL is 7 μg/L.

3.3 *In-situ* Remediation Treatability Studies (2010-2014)

In-situ Remediation Program Overview

Based on the conclusions from the 2010 optimization study, the *in-situ* remediation pilot program goals were established to validate laboratory studies with progressively larger scale field injections in order to validate the *in-situ* remediation technology, reduce concentrations, reduce the time to cleanup, and foster natural attenuation. Bench-scale tests were conducted to evaluate a variety of *in-situ* remediation injection substances for chromium and TCE. For treatment of chromium, the primary contaminant of concern (COC), treatability testing results indicated that calcium polysulfide (CPS) would be an effective reagent to treat chromium-impacted groundwater. CPS was injected into the subsurface through wells to create a reducing (no oxygen) environment promoting the conversion of hexavalent chromium to the less toxic and less mobile trivalent chromium form and facilitating its precipitation as an insoluble solid.

For treatment of the secondary groundwater contaminant, TCE, treatability testing results indicated that emulsified vegetable oil (EVO) would be an effective amendment to treat TCE-impacted groundwater. EVO fosters biological transformation by providing microbes a carbon "food source" and an electron donor for respiration of TCE. These specialized microbes aid in the reductive dechlorination of TCE to harmless end products (*e.g.,* ethene and/or carbon dioxide). CPS and EVO injection tests targeting "single well" areas were conducted in 2010.

Years 2011 through 2014 included broader-scale and iterative CPS pilot test injections. Also, EVO injections to address TCE were performed in 2011.
The conceptual remedial scheme for chromium treatment included the installation of rows of injection wells perpendicular to groundwater flow (see Figure 10). The distance between injection rows was modeled for effective treatment of chromium between injection rows. CPS injected into the injection wells created an immediate reactive zone in and around the injection wells, and then CPS and geochemical changes “sweep” through downgradient aquifer treatment zones. This process is designed to dramatically shift the subsurface environment to both reduce dissolved chromium concentrations and foster long-term reductions in concentration via enhanced natural attenuation. Geochemical adjustments include creating favorable oxidation-reduction potential, favorable pH, and favorable dissolved oxygen conditions. Injections also release naturally occurring iron present in the soil into the groundwater from the aquifer matrix, which can further accelerate the reduction and precipitation of chromium. The CPS remains reactive for chromium remediation for a number of years. The *in-situ* pilot program included analysis of how long the CPS remains active in the subsurface, and how long after injection this “active remediation” would be expected to continue. To date, approximately 3.9 million pounds of 29% CPS solution have been injected into a network of over 100 injection wells, with a monitoring network of approximately 100 monitoring wells. Much of the plume is still under active remediation as a result of these injections.

In 2011, an EVO injection and a bioaugmentation pilot program on the SMC facility was applied, and appears to have remediated the on-site source zone area for TCE near MW-SC-20S and the former degreasing unit. Where the CPS is best injected in a line of wells perpendicular to groundwater flow, EVO injections work best to address the site source area via injection of a grid of temporary well points. Similar to CPS, the EVO creates a reactive and reducing zone where degradation of contaminants may be fostered for several years.

***In-situ* Remediation Results**

CPS was injected into the subsurface of high chromium-concentration areas of the SMC facility, the car wash and the farm parcel. Following treatment, chromium concentrations decreased by 98%-100% in many SMC facility monitoring wells. Average total chromium groundwater concentrations declined from 4,490 µg/L to 140 µg/L, and hexavalent chromium concentrations declined from 2,130 µg/L to 13 µg/L. At the farm parcel, CPS injections reduced total chromium concentrations from 5,024 µg/L to 347 µg/L. Near the car wash, CPS injections reduced total chromium concentrations from 1,144 µg/L to 196 µg/L. Overall, the plume footprint was reduced by more that 50 percent. See Figures 11 and 12 for three-dimensional representations depicting the chromium plume before and after injection of CPS. Due to the length of time that CPS remains in the system and is available to treat chromium, there is some evidence that the benefits of the CPS injections may continue for 5 to 10 years for the shallow groundwater aquifer zone and up to 20 to 35 years for the deep aquifer zone. In addition, as discussed below, the natural attenuation capacity of the aquifer is enhanced by CPS injections by mobilizing native iron (an electron donor) and improving geochemical conditions amenable to natural attenuation.

The EVO injections in the shallow groundwater aquifer zone at the SMC facility reduced TCE concentrations from 207 µg/L in 2010 to non-detect in 2012 and 2013. In some cases, VOC plumes rebound to pretreatment levels as the temporary effects of an *in-situ* treatment diminish; however, the non-detect results reported for the shallow groundwater aquifer zone over the two-year period strongly indicates that the concentration reduction is both permanent and stable. Figures 13 and 14 depict the TCE plumes after injection of EVO for the shallow and deep groundwater aquifer zones.

Both *in-situ* treatment programs successfully reduced contaminant concentrations significantly and have done so in a relatively short time frame. There is also evidence that the improvements are expected to be enduring, and that active remediation from the injections already performed will continue *in situ* for as much as three decades. *In-situ* remediation achieved up to a 60-fold reduction in plume concentration and has shrunk the overall size of the plumes after only nine months of injections, whereas the pump-and-treat system has achieved only a 2-fold reduction of contaminant concentrations in 20 years.

3.4 Assessment of Monitored Natural Attenuation (MNA) (2012-2014)

Various chemical and physical processes, collectively referred to as "natural attenuation," may be present at a site and result in reduced contaminant concentrations over time without further active remedial measures. EPA can select monitored natural attention (MNA), either as a remedial component or as a stand-alone remedy, if site-specific investigations identify that natural attenuation is occurring, that it is sustainable over time, and that the time frames for natural attenuation to reach remediation goals are comparable to active remedial measures appropriate for the site.

Consistent with EPA protocols, a four-tier analysis was conducted to evaluate whether and to what degree natural attenuation of site contaminants is occurring in the groundwater. Tier I is a demonstration of plume stability and attenuation; Tier II is an evaluation to determine the mechanism(s) and rate of attenuation; Tier III is an evaluation to determine the capacity and stability of the attenuation mechanisms; and Tier IV, after a remedy is selected that includes MNA, is the implementation of a long-term performance monitoring program to demonstrate that MNA is performing as predicted.

The Tier I evaluation showed that the contaminant plumes on site are stable or shrinking and the aquifer conditions are conducive to ongoing contaminant degradation, which support the viability of MNA. The Tier II evaluation confirmed that the primary mechanism for chromium attenuation processes are sorption onto iron oxide (and potentially clay minerals) in the aquifer and reduction/precipitation reactions with native iron. Iron found in the aquifer can reduce highly soluble (and more toxic) hexavalent chromium to generally insoluble (and less toxic) trivalent chromium.

The Tier II evaluation also found that biodegradation, sorption, and dispersion are the primary mechanism for chlorinated VOC degradation. Dissolved oxygen concentrations were found to be anoxic, which is favorable for VOC biodegradation. Low redox potential (<50 mv) is favorable to VOC degradation.

The mechanism and rate of natural attenuation calculated under Tier II for both chromium and chlorinated VOCs support the viability of MNA as a remedial component.

The Tier III assessment demonstrated that the aquifer has adequate capacity to attenuate the remaining contamination. The evaluation of both site stability during treatability testing, and site aquifer geochemistry support the viability of MNA. Modeling concluded that natural attenuation is viable for the site and that sentinel wells (select wells downgradient on the site) would be expected to remain below MCLs or GWQS over time.

A Tier IV monitoring plan was submitted in August 2014 and conditionally approved by EPA.

3.5 Beryllium and Vanadium Investigations (OU1 and OU2)

The potential for OU2 soils to act as a continuing source of groundwater contamination was evaluated as part of the OU2 supplemental remedial investigation by comparing facility soils data to generic NJDEP Impact to Groundwater (IGW) values. The comparison indicated that the concentrations of beryllium exceeded the IGW value and was found to be affecting groundwater locally near the SMC facility; however, data collected downgradient of the SMC facility and upgradient of the farm parcel showed that concentrations in groundwater of beryllium are below the GWQS, indicating that it is naturally attenuating. Vanadium does not have an NJDEP IGW value; however, the potential for vanadium to migrate through soil and into groundwater was also evaluated, due to the presence of vanadium in site soils and elevated concentrations of vanadium historically detected in groundwater in localized areas beneath the SMC facility. Recent sampling data shows that vanadium in the shallow groundwater aquifer zone immediately downgradient of the SMC facility was either not detected or was present at concentrations below the EPA risk-based tap water screening levels for vanadium compounds[1]. Further, beryllium and vanadium were sampled in select wells during the April 2015 sampling event and no exceedances of the GWQS were detected, confirming the RI conclusions that the footprint is very small.

3.6 Updated Risk Assessment

The 1995 human health risk assessment (HHRA) evaluated potential current/future risks to adult residents, adult industrial workers, and adult construction workers who could come in contact with contaminated groundwater. In 2015, an OU1 Risk Update was performed to assess the change in calculated cancer risks and noncancer health hazards based on changes in toxicity values for some COCs. The reasonably anticipated future land use for the site is the same as its current commercial/industrial land use.

[1] The EPA tap water screening number for vanadium compounds is lower (more conservative) than the screening number of vanadium pentoxide, so the analysis was based on vanadium compounds, to be conservative.

An ecological risk assessment for OU1 was not completed because no exposure pathways were identified for ecological receptors to come into contact with contaminated groundwater.

Human Health Risk Assessment

As part of the supplemental remedial investigation that led to this ROD Amendment, a four-step human health risk assessment process was used for assessing site-related cancer risks and noncancer health hazards. The four-step process is comprised of Hazard Identification of Chemicals of Potential Concern (COPCs), Exposure Assessment, Toxicity Assessment and Risk Characterization.

In the 2015 OU1 Risk Update, the following pathways were evaluated: current/future resident exposure via ingestion of groundwater and dermal contact with groundwater from private wells (shallow/deep). Cancer risks were calculated to be unacceptable for the adult resident (4×10^{-4} in shallow groundwater aquifer zone; 6×10^{-3} in deep groundwater aquifer zone) and for the child resident (2×10^{-4} in shallow groundwater aquifer zone; 3×10^{-3} in deep groundwater aquifer zone). The sole cancer risk driver is hexavalent chromium. TCE was not evaluated in the 2015 OU1 Risk Update, however, response action is warranted for TCE under CERLCA because groundwater at the site is a potential source of drinking water and TCE was detected in excess of both Federal and State MCLs.

Noncancer health hazards were calculated to be unacceptable for three metals for the future adult exposed to shallow groundwater and deep groundwater aquifer zones and to the future child exposed to shallow groundwater and deep groundwater aquifer zones, as follows:

		Beryllium	Chromium (IV)	Vanadium
Adult	Shallow aquifer zone	16		18
	Deep aquifer zone		14	2
Child	Shallow aquifer zone	23		28
	Deep aquifer zone		22	3

The 1995 HHRA and 2015 Risk Update concluded that cancer risks and noncancer health hazards from exposure to site-related groundwater are unacceptable for residents under a hypothetical potential future use scenario. Residents currently do not drink the groundwater impacted by site contaminants; however, Superfund requires that exposures be calculated assuming that no additional action is taken at the site, as a conservative and protective analysis.

In response to the new information summarized here, TRC developed new alternatives that were evaluated in a focused feasibility study (FFS).

4.0 REMEDIAL ACTION OBJECTIVES

After considering potential changes in applicable or relevant and appropriate requirements (ARARs) for groundwater that may have occurred since 1996, the RAOs that were identified in the 1996 ROD are still appropriate and are identified below:

- Prevent exposure, due to groundwater ingestion, to groundwater contaminants attributable to the SMC facility which have been detected at levels exceeding ARARs;

- Prevent migration of groundwater contamination; and

- Remediate the groundwater contamination attributable to the SMC facility to achieve ARARs.

Remediation Goals

Remediation goals were developed to protect human health and the environment and thereby address the unacceptable risks identified in the updated risk assessment. Remediation goals for groundwater were developed to meet the site-specific RAOs, and are the more stringent of the federal MCLs and the State MCLs and GWQS, which are the ARARs identified for the site.

Constituent in Groundwater	Remediation Goal (µg/L)
Beryllium	1
1,1-DCE	2
TCE	1
Total Chromium	70
Vanadium	60

EPA has concluded that ecological remediation goals are not required for groundwater, and that vapor intrusion is not expected to be an area of concern for the remaining VOC plumes. Please refer to Section 3 of this Decision Summary for the basis of these conclusions.

5.0 DESCRIPTION OF ALTERNATIVES FOR ROD AMENDMENT

Two components of the 1996 ROD, the need for institutional controls and five-year reviews, remain unchanged; however, they are discussed in the context of each of the alternatives.

Alternative 1: No Further Action

The no action alternative is required by the NCP and EPA guidance as a baseline with which to compare the other remedial action alternatives. Alternative 1 is not protective of human health and the environment because it does not include any measures to prevent ingestion of contaminated groundwater, reduce the cancer risks and noncancer health hazards, or restore the groundwater. Therefore, this alternative will not be evaluated in the comparative analysis section, below.

Alternative 2: Groundwater Extraction, Treatment (Pump-and-Treat), Discharge (1996 ROD) Institutional Controls, Long-Term Monitoring and Five-Year Reviews

Alternative 2 is the remedy selected in the 1996 ROD, which is the groundwater pump-and-treat system that operated from 1989 to 2013. For purposes of alternative planning and evaluation, it is assumed that pumping rates will be consistent with the rates required in the ROD. It is possible that pumping rates could be reduced, or that the system could be operated in a pulsed-manner (which could reduce O&M costs, to a degree) but there is no data available to select an alternative rate as a basis for cost estimation.

- Groundwater Extraction-Five extraction wells installed in the shallow and deep groundwater aquifer zones, pumping an estimated 400 gallons per minute to capture contaminated groundwater. The wells are located at the following locations: Two wells on the SMC facility, two wells on the car wash parcel and one well at the farm parcel.

- Groundwater Treatment- Air stripping to remove VOCs from the recovered groundwater, electrochemical precipitation treatment (more recently modified to ion exchange) to remove chromium from the recovered groundwater. The treated groundwater is then discharged to the surface waters of the Hudson Branch of the Maurice River pursuant with a NJPDES permit.

- Institutional controls- Use of contaminated groundwater is prohibited through the use of an existing well restriction area (WRA). A classification exception area (CEA) was selected to be established by NJDEP. The CEA defines the area of the aquifer that is and will continue to be impacted above federal MCLs or more stringent State standards; the CEA would remain in effect until contaminant concentrations have decreased to below these standards. The establishment of the WRA may require mandatory connection with the public water system for existing or potential future potable water users.

- Long-term Monitoring – Groundwater would continue to be monitored, similar to the data collected monthly over the past 20 years (semiannually since 2010) to assess contaminant status and to verify that contaminated groundwater is not migrating beyond the capture zone of the extraction wells.

- Five-Year Reviews – Because contaminants are present on the site above levels that allow for unrestricted use and unlimited exposure, a review of site groundwater conditions would be required at least once every five years until the GWQS are met.

The estimated cost to implement the 1996 ROD remedy for OU1 was $9.4 million in 1996 dollars, which is approximately equivalent to $27.1 million in 2015 dollars when adjusted for inflation.

Alternative 3: *In-Situ* Remediation, Monitored Natural Attenuation, Institutional Controls, Long-Term Monitoring and Five-Year Reviews

Alternative 3 includes active *in-situ* treatment of chromium and chlorinated VOCs in the shallow and deep groundwater aquifer zones at the SMC facility, farm parcel and car wash area, and MNA in the remainder of the shallow and deep groundwater plumes. Much of the active remediation to be performed under this alternative has already implemented through the *in-situ* remediation pilot study from 2010 to 2014, as described above.

- *In-Situ* Remediation-Treatment reagents are injected into the groundwater to target the area of the aquifer with the highest concentrations of chromium and TCE. For chromium, the injection of CPS, and for TCE, the injection of EVO, reduce concentrations within the shallow and deep aquifers. Continued contaminant reduction long after the initial injections is expected, and based upon site-specific data, in many areas of the site, active remediation is ongoing. In addition to the reactive stage of the CPS and EVO treatments, these *in-situ* treatments appear to support aquifer conditions favorable to MNA.

- Monitored Natural Attenuation- *In-situ* treatment is effective above certain concentration ranges but has diminishing effectiveness in the diffuse fringes of the plume, and, for the areas actively treated, when the residual concentrations remaining are very low (e.g., less than 10 to 25 μg/L for TCE). Based upon site-specific studies, after implementation of the active (*in-situ*) treatment, contaminants in the groundwater will continue to gradually diminish over time as the result of natural ongoing biological and geochemical processes. The viability of MNA to further reduce concentrations and meet remediation goals has been demonstrated.

- Institutional Controls - Similar to Alternative 2, institutional controls in the form of a CEA/WRA would be implemented to prevent exposure to contaminated groundwater.

- Long-Term Monitoring- Monitoring of groundwater to verify that MNA for hexavalent chromium and chlorinated VOCs is proceeding as expected, and that beryllium and vanadium concentrations continue to diminish. Monitoring over time would verify the reduction of the VOC and chromium plumes to ensure that these constituents are not migrating, monitor MNA parameters, and evaluate the ongoing effectiveness of active treatment. Long-term monitoring would include the establishment of sentinel wells downgradient of the site to ensure that the plume is not expanding.

- Five-Year Reviews – Similar to Alternative 2, because contaminants are present on the site above levels that allow for unrestricted use and unlimited exposure, a review of site groundwater conditions is required at least once every five years, until the RAOs and remediation goals are met.

The estimated cost is $9.1 million, of which $8.8 million has already been spent to implement the *in-situ* injection program.

5.1 Change in Expected Outcome

Both the 1996 ROD and the ROD Amendment theoretically reach the same end result with respect to groundwater: reducing contaminant levels to the federal MCLs and State standards. As a result, there is no change to the expected outcome that will result from this ROD Amendment. However, the amended remedy will be used to remediate contaminated groundwater and will restore the aquifer as a potential source of drinking water in a shorter time period than the 1996 ROD.

6.0 COMPARATIVE ANALYSIS

A comparative evaluation of the change described in this amendment with the 1996 Operable Unit 1 ROD was conducted employing the nine criteria defined in the NCP as the framework for identifying technical and administrative differences for consideration. Because this is an Amendment to the 1996 ROD, only that part of the remedial action which is proposed for change (the pump-and-treat system vs. *in situ* treatment, long-term monitoring, and MNA) is evaluated in this section. Those portions (institutional controls and five-year reviews) of the 1996 ROD which are not being changed remain in effect under the 1996 ROD.

The nine criteria are summarized as follows:

Threshold Criteria

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

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

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

Primary Balancing Criteria

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

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

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

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

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

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

Modifying Criteria

The modifying criteria are used on the final evaluation of remedial alternatives generally after EPA has received public comment on the Proposed Plan.

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

9. Community Acceptance addresses the public's general response to the alternatives described in the Proposed Plan.

1. *Overall protection of human health and the environment.*

The original remedy (Alternative 2) provides overall protection of human health and the environment through the extraction and treatment of contaminated groundwater until the RAOs are attained. This remedy also prevents the potential for further migration of contaminated groundwater to potential downgradient receptors.
Alternative 3 provides overall protection of human health and the environment by chemical reduction of hexavalent chromium and enhanced biodegradation of chlorinated VOCs in groundwater to meet the RAOs. *In-situ* injections, including those already performed, are expected to address the high concentration areas of the groundwater plume and, when combined

with MNA, will attain the RAOs sooner than Alternative 3. Elimination of the high concentrations of VOCs and chromium will also result in the faster natural attenuation of contaminants in the remainder of the groundwater plumes. Modeled predictions of plume performance indicate that the plume with not expand further and can be expected to start to contract now that the highest groundwater concentrations have been removed.

2. Compliance with Applicable or Relevant and Appropriate (ARARs).

The 1996 selected remedy would achieve ARARs including the chemical-specific ARARs for groundwater, which are the New Jersey MCLs (N.J.A.C. 7:10) and GWQS (N.J.A.C. 7:9C), and the federal MCLs published under the Safe Drinking Water Act (40 CFR 141.11-16 and 141.60-63). The 1996 selected remedy would also achieve action specific ARARS pertaining to discharge to surface water, which are the Ambient Water Quality Criteria (40 CFR 131.36(b)(1)) and the NJPDES Permit/Discharge Requirements (N.J.A.C. 7:14A-2.1). In addition, action-specific ARARs include the New Jersey Water Pollution Control Act Ground Water Quality Standards (N.J.A.C. 7:9C) procedures and standards for the establishment of a Classification Exception Area.

Alternative 3 would also achieve the chemical-specific ARARs. The action-specific ARARs pertaining to groundwater discharge to surface water would no longer apply.

3. Long-Term Effectiveness and Permanence.

The 1996 selected remedy provides permanent reduction in the contaminant mass and, therefore, will reduce risks to acceptable levels in the long term. This alternative uses physical groundwater extraction and treatment to permanently decrease contaminant concentrations in the groundwater aquifer until RAOs are attained.

Alternative 3 is preferred because it would offer equivalent long-term effectiveness but achieve the RAOs more quickly, as the *in-situ* remediation treatability studies already have been demonstrated to substantially reduced contamination.

4. Reduction of Contaminant Toxicity, Mobility or Volume Through Treatment.

For Alternative 2, pumping for plume containment would reduce the mobility of contaminants in groundwater and ensure that no new areas become contaminated. The volume of contaminated groundwater would not be expected to be reduced except after a very long time period.

Alternative 3 includes chemical treatment of the groundwater plume mass coupled enhanced biodegradation to reduce toxicity, mobility, and volume. As demonstrated by the treatability studies, the amended remedy through the *in-situ* remediation treatment by injections of CPS and EVO, was very successful in substantially reducing the toxicity, mobility and volume of contaminants in groundwater in a much shorter time frame.

5. *Short-Term Effectiveness.*

Although pump-and-treat technologies have been successfully implemented at other sites, site-specific conditions (e.g., geochemistry, aquifer conditions, type of contaminants) have resulted in the pump-and-treat system reaching asymptotic levels in the aquifer after almost 20 years of pumping. Preliminary modeling of Alternative 2 indicates that RAOs will not be met for hundreds of years.

Alternative 2 was effective in the short-term. This Alternative was proven to have minimal potential risks or hazards associated with it.

Alternative 3 is effective in the short-term. This alternative, which more aggressively treats the contamination via the *in-situ* injections, is expected to achieve RAOs more quickly than the pump-and-treat remedy, which, as stated previously, is no longer efficiently reducing groundwater concentrations. The minimal potential risks associated with implementing this alternative can be reduced using administrative and engineering control, health and safety measures, and proper personal protective equipment. Based on preliminary modeling, Alternative 3 is estimated to achieve the RAOs and remediation goals in substantially less time than Alternative 2.

6. *Implementability.*

Alternative 2 was considered implementable at the time of the original decision. More than 25 years of experience with this remedy has demonstrated its overall implementability. However, the pump-and-treat operation produces a significant amount of waste sludge, which must be sent to a landfill off-site.

In-situ remediation associated with Alternative 3 has been demonstrated to be implementable with the injections performed as part of treatability studies conducted from 2010 to 2014. This alternative has significantly lower energy demands with very little waste generated.

7. Cost.

The estimated cost to implement the 1996 ROD remedy for OU1 was $9.4 million in 1996 dollars ($27.1 million in 2015 dollars).

Capital cost	*Annual Costs*	*Present Worth*
$1.600,000	*$850,000*	*$27,050,000*

The estimated capital, annual O&M, and present-worth costs are presented below for Alternative 3. Alternative 3 is more cost effective than the 1996 remedy. The $8.8 million in capital phase costs has already been expended to complete the pilot *in-situ* injection program.

Capital cost	*O&M Costs*	*Present Worth*
$8,800,000	*$325,000,*	*$9,125,000*

8. State Acceptance.

The State of New Jersey concurs with the amended remedy. Support agency comments were addressed informally through the consultation process, prior to the issuance of this ROD Amendment. A copy of the state concurrence letter is attached as Appendix IV.

9. *Community Acceptance*.

Appendix IV, the Responsiveness Summary to the ROD Amendment provides responses to specific comments received during the 30-day public comment period.

7.0 SELECTED REMEDY

Based upon the requirements of CERCLA, the results of the site investigations, the detailed analysis of the alternatives, and public comments, EPA has determined that Alternative 3 satisfies the requirements of Section 121 of CERCLA, 42 U.S.C. § 9621, and provides the best balance of tradeoffs among the remedial alternatives with respect to the NCP's nine evaluation criteria, 40 CFR § 300.430(e)(9).

The major components of this ROD Amendment include:

- Discontinuing the operation of the existing groundwater pump and treat system.

- Injecting calcium polysulfide (CPS) into the high concentration target portions of the aquifer to reduce chromium concentrations.

- Injecting emulsified vegetable oil (EVO) into the high concentration target portions of the aquifer to reduce VOC concentrations, in particular TCE.

- Implementing long-term monitoring of groundwater to confirm the degradation of chlorinated VOCs, the reduction of hexavalent chromium and the attenuation of the VOC and chromium plumes through MNA. Long-term monitoring will include MNA parameters and will evaluate the ongoing effectiveness of the active *in-situ* treatments. Metal contaminants beryllium and vanadium present a noncancer health hazard that will be addressed by MNA and long-term monitoring.

- Establishing institutional controls in the form of classification exception area (CEA)/Well Restriction Area (WRA), to restrict the groundwater use and prohibit activities that could result in human exposure to beryllium, chromium, vanadium and VOCs in groundwater.

- Reviewing site conditions at least once every five years, as required by CERCLA, until the RAOs and remediation goals are met.

Active remediation derived from the *in-situ* CPS treatment for chromium is ongoing, and is expected to continue at the SMC facility and the portions of the plume between the SMC facility and the farm parcel, for 10 to 35 years. The source of TCE in the shallow groundwater aquifer at the SMC facility appears to have been remediated through *in-situ* EVO treatments.

The Selected Remedy expects that contaminant concentrations in the untreated portions of the aquifer and then within the active treatment zone after *in-situ* treatment is no longer actively treating the COCs, will gradually diminish over time through natural attenuation. Both biotic and abiotic natural degradation processes will gradually attenuate the contaminant mass over an extended period, until all groundwater concentrations are decreased to below remediation goals.

In the event that monitoring data, such as concentration trends, are inconsistent with the trends predicted for residual concentrations in the August 2014 MNA monitoring plan, or if exceedances of the remediation goals (e.g., 70 µg/L for total chromium, 1 µg/L for TCE) are found at sentinel wells, additional actions may be required. Under the August 2014 MNA monitoring plan, these conditions would require the recommendation of additional steps for implementation, such as further sampling or modeling, or additional *in-situ* injections.

8.0 STATUTORY DETERMINATIONS

As was previously noted, CERCLA §121(b)(1) mandates that a remedial action 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 CERCLA §121(d)(4). The following sections discuss how this ROD Amendment meets these legal requirements, is consistent with CERCLA Section 121 and, to the extent practicable, the NCP. This ROD Amendment is protective of human health and the environment, attains ARARs, and is cost-effective.

8.1 Protection of Human Health and the Environment

The amended remedy will be protective of human health and the environment by eliminating, reducing, or controlling exposures to human health and the environment through treatment, institutional controls, and long-term monitoring. More specifically, *in-situ* remediation has and will continue to decrease contaminant mass in the groundwater plume, after which natural attenuation will gradually decrease contaminant levels to meet the RAOs and remediation goals. Institutional controls and long-term monitoring will reduce the threat posed by the potential use of contaminated groundwater until the RAOs and remediation goals are reached.

The remedy selected in this ROD Amendment will reduce potential human health risk levels such that they do not exceed EPA's acceptable risk range of 10^{-4} to 10^{-6} for incremental carcinogenic risk. The remedy will ensure that the non-carcinogenic hazard is below a level of concern because the calculated HI will not exceed 1. In addition, groundwater will be restored to acceptable levels.

Implementation of the amended remedy will not pose any unacceptable short-term risks.

8.2 Compliance with ARARs

The amended remedy is expected to achieve federal MCLs or more stringent State standards for beryllium, chromium, TCE, and vanadium in groundwater. Specifically, the chemical-specific ARARs for groundwater, which are the New Jersey MCLs (N.J.A.C. 7:10) and GWQS (N.J.A.C. 7:9C), and the federal MCLs published under the Safe Drinking Water Act (40 CFR 141.11-16 and 141.60-63).

The amended remedy will also comply with action-specific ARARs, including the establishment of institutional controls pursuant to N.J.A.C. 7:26C-8.3 in the form of CEA/WRA to restrict the groundwater use and prohibit activities that could result in human exposure to beryllium, chromium, vanadium and VOCs in groundwater. Upon establishment of a CEA, NJDEP identifies the region within the CEA and can restrict groundwater use with the WRA. Table 4A of Appendix II provide a list of the ARARs.

8.3 Cost Effectiveness

EPA has determined that the amended remedy is cost-effective and represents a reasonable value. In making this determination, the following definition was used: "… remedy shall be cost-effective if its costs are proportional to its overall effectiveness" (40 C.F.R. §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 amended remedy is considered cost-effective because it is a permanent solution that reduces risk to acceptable levels sooner and at less expense than the existing remedy. Detailed cost estimates for the Selected Remedy may be found in Table 5 and 5A of Appendix II.

EPA has determined that the remedy selected in this ROD Amendment is cost effective as it meets both threshold criteria and is reasonable given the relationship between the overall effectiveness afforded by the existing pump-and-treat remedy.

8.4 Utilization of Permanent Solutions and Alternative Treatment Technologies

The amended remedy provides significant long-term effectiveness and permanence by reducing the contaminant mass in the most contaminated areas of the groundwater plume. The amended remedy employs *in-situ* treatment methods that result in the permanent degradation of the contaminants of concern in the groundwater plume thereby reducing toxicity, mobility or volume through treatment. The byproducts of degradation cannot re-form or be converted to more toxic forms and, therefore, the amended remedy represents a permanent solution to site contamination. Active treatment and degradation of contaminants prevent future migration of these contaminants in groundwater.

The amended remedy will permanently reduce the levels of contaminants in the groundwater plume to meet the RAOs and remediation goals.

It is anticipated that the amended remedy will attain the remediation goals sooner when compared to the existing pump-and-treat remedy.

8.5 Preference for Treatment as a Principal Element

Principal threat wastes are source materials that include or contain hazardous substances that act as a reservoir for the migration of contamination to groundwater, surface water or air, or act as a source for direct exposure. These materials are considered to be highly toxic or highly mobile and, generally, cannot be reliably contained. At this site, principal threat waste was present in the lagoons and was removed in 1994-1997. Contaminated groundwater generally is not considered to be a source material; however, non-aqueous phase liquids (NAPLs) in groundwater may be viewed as source material. NAPLs are hydrocarbons that exist as a separate, immiscible phase when in contact with water and/or air. NAPLs are not present in groundwater at the site.

8.6 Five-Year Review Requirements

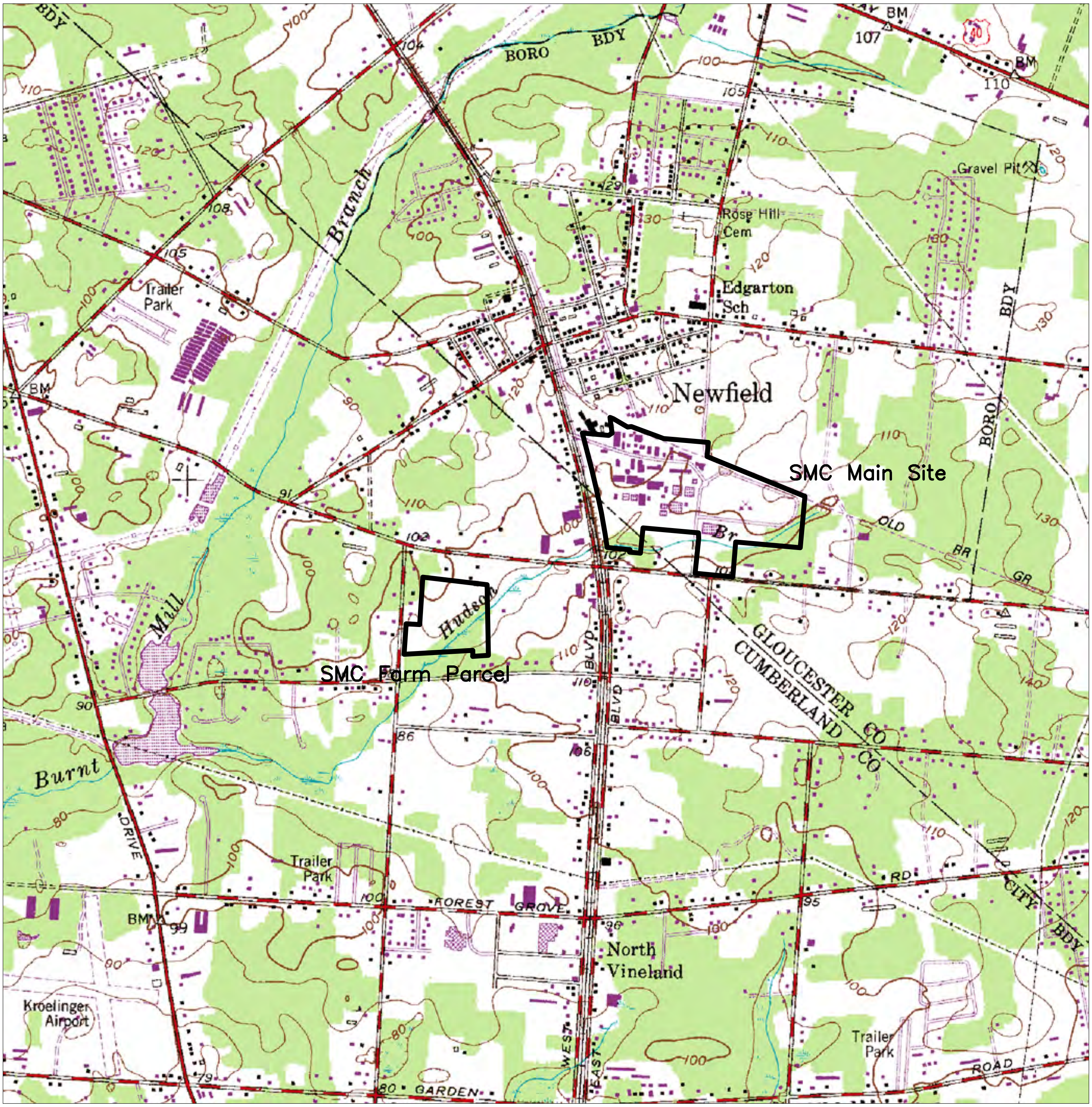
While this amended remedy will ultimately result in reduction of contaminant levels in groundwater to levels that would allow for unlimited use and unrestricted exposure, it will take longer than five years to achieve these levels. As a result, the site will be reviewed at least once every five years until such time as RAOs and remediation goals are attained and human health and the environment are protected with unrestricted use.

The five-year reviews for the site will also evaluate potential health risks (residential drinking water wells) posed by groundwater based on periodic monitoring results, updated toxicity factors for contaminants of concern, status of natural attenuation progress in the untreated portions of the groundwater plumes.

9.0 DOCUMENTATION OF SIGNIFICANT CHANGES PUBLIC PARTICIPATION

The Proposed Plan identified Alternative 3, *In-Situ* Remediation, Monitored Natural Attenuation, Institutional Controls, Long-Term Monitoring and Five-Year Reviews, as the preferred alternative for the site. Upon review of all comments submitted during the public comment period from July 30 to August 28, 2015, and at the public meeting on August 12, 2015, EPA has determined that no significant changes to the selected remedy, as it was presented in the Proposed Plan, are warranted.

APPENDIX I
FIGURES



SOURCE: NEWFIELD, N.J. QUADRANGLE, 1953, PHOTOREVISED 1994,
7.5 MINUTE SERIES (USGS TOPOGRAPHIC MAP)

SITE PROPERTY BOUNDARY

N

0 2000 FT.

APPROXIMATE SCALE

QUADRANGLE LOCATION

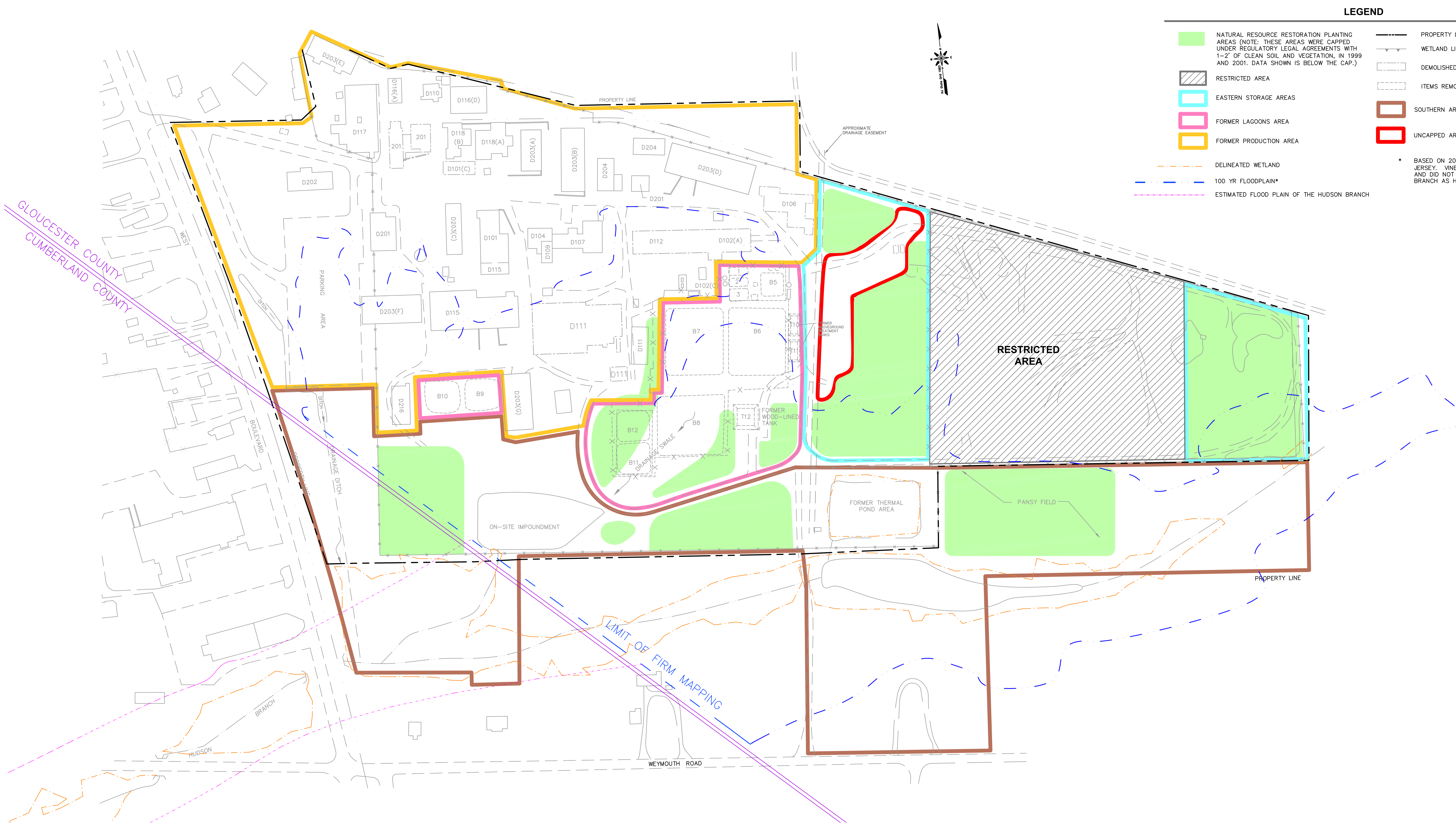
TRC ENVIRONMENTAL CORP.
1601 Market Street, Suite 2555
Philadelphia, PA 19103

SITE LOCATION MAP

SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

JOB NO.: 2710ES–112434

YK/ODL	DATE: SEPTEMBER 2015	FIGURE: 1



0 125' 250'
GRAPHIC SCALE

SOURCE:
BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA. AND ON-SITE OBSERVATIONS.

LACROCE PROPERTY BOUNDARY BASED ON TAX MAP–CITY OF VINELAND, OCTOBER 1, 1971.

ORTHOPHOTOS FROM NEW JERSEY IMAGE WAREHOUSE WEB SITE, PUBLISHED 7/31/2003 WITH PHOTO TAKEN IN 2002.

VINELAND'S LAST FIS WAS IN 1982 AND DID NOT CLASSIFY THE UPPER HUDSON BRANCH AS HAVING ANY 100 YR FLOOD RISK.

FILE: C:\USERS\TWARDROP\DESKTOP\CAD FIXES\SITE PLAN_APRIL2015.DWG, DATE: 04/15/2015 03:02:07PM

TRC ENVIRONMENTAL CORP.
1601 Market Street, Suite 2555
Philadelphia, PA 19103

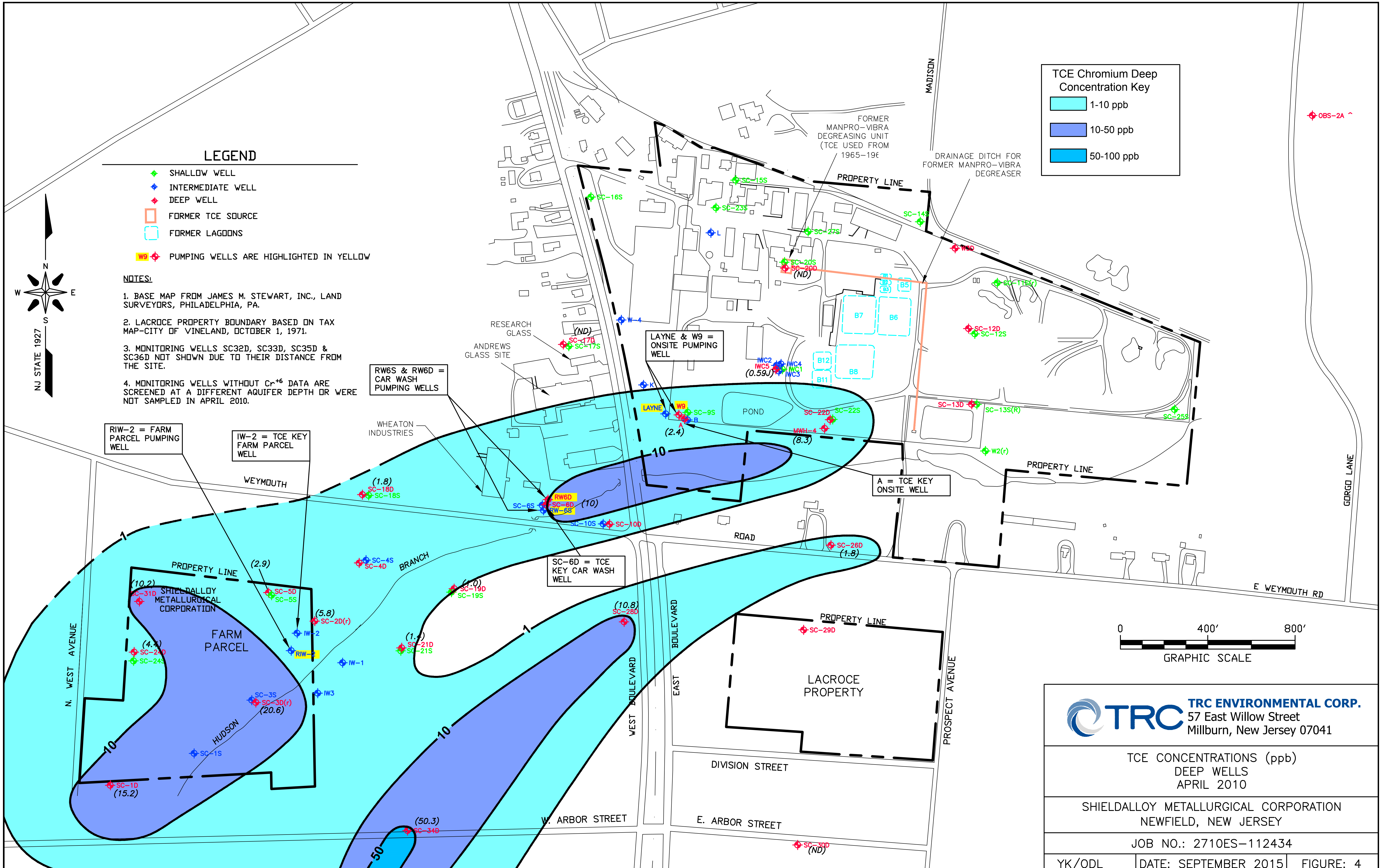
SITE PLAN

SHIELDALLOY METALLURGICAL CORPORATION
35 SOUTH WEST BLVD
NEWFIELD, NEW JERSEY

JOB NUMBER: 112434

DD/PZ	DATE: SEPTEMBER 2015	FIGURE: 2

FILE: \\NTAPA-ANNARBOR\AAM-VOL2\CADD\PJT\00_TRC\SHIELDALLOY\112434\0000\CR+6 DEEP OPTIMIZATION.DWG, DATE: 09/02/2015 11:41:45AM



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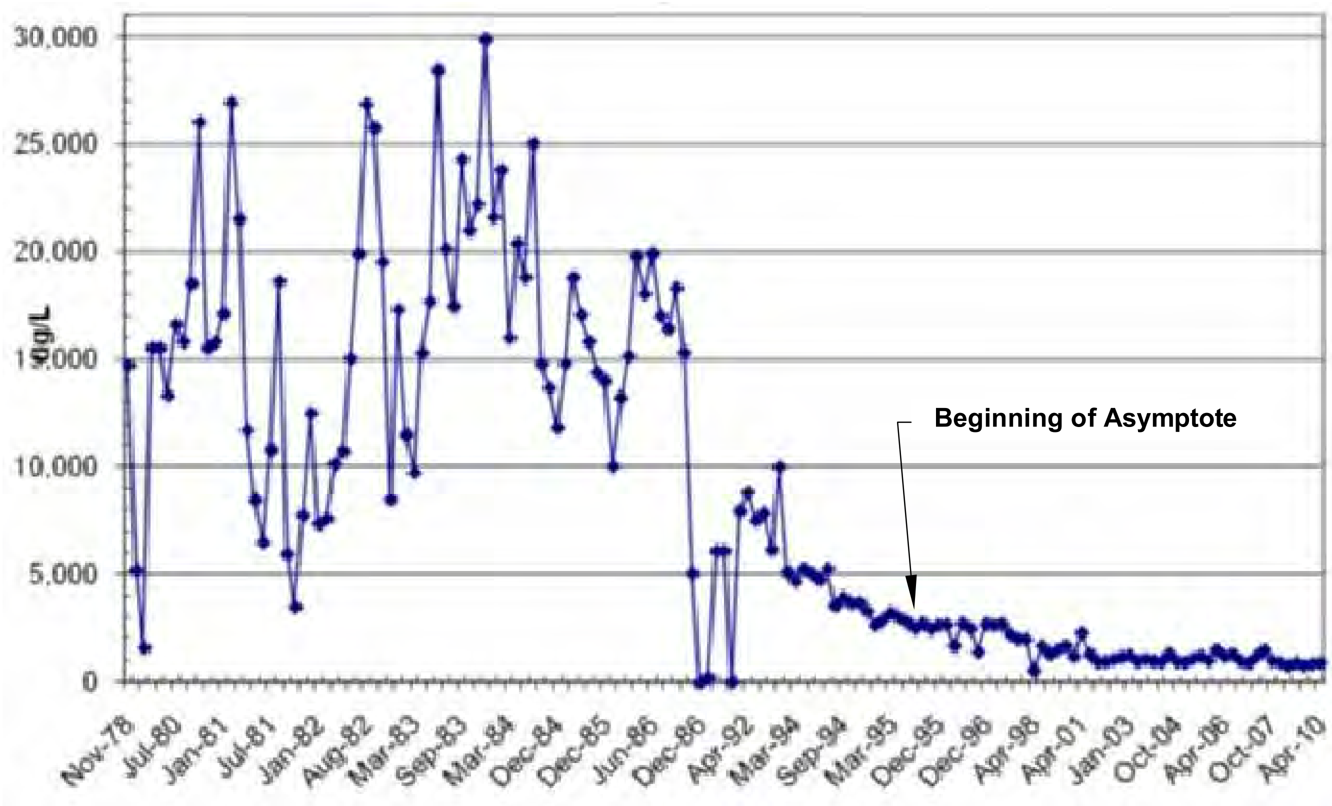
CHROMIUM (VI) CONCENTRATIONS AT FACILITY



TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PROJECT: SHIELDALLOY METALLURGICAL CORP.
35 SOUTH WEST BLVD.
NEWFIELD, NEW JERSEY

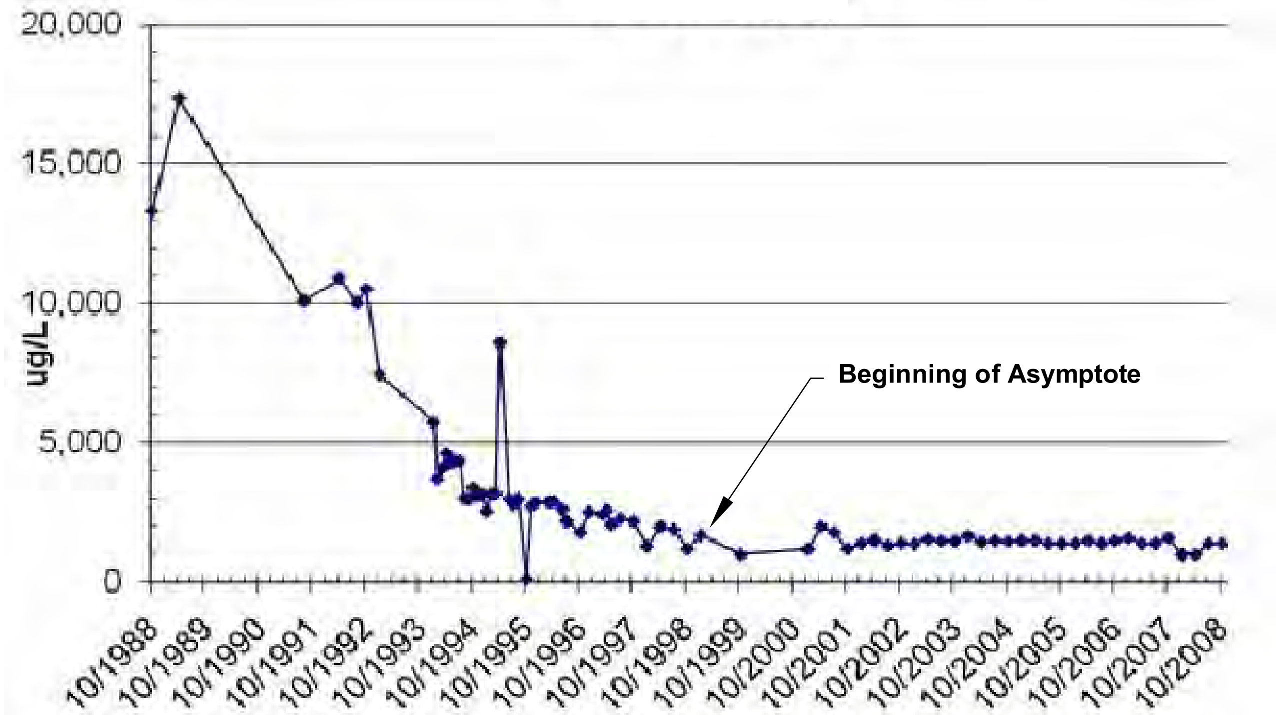
TITLE:
FACILITY PARCEL
CHROMIUM (VI) CONCENTRATIONS

DRAWN BY:	DD/DGS
APPROVED BY:	-
PROJ. NO.	112434.00OU2.003050
FILE NO.	112434.0000.05-06.dwg
DATE:	MAY 2015

FIGURE 5

PLOT DATA
Drawing Name: J:_TRC\Shieldalloy\112434\0000\112434.0000.05-06.dwg
Operator Name: STEHLE, DIANAH
Drawing Plot Scale: 0.386863
Dwg Size: 0.54 Mb
Plot Date: May 14, 2015
Plot Time: 5:40 AM
Attached Xrefs:
Attached Images: GRAPH Facility 2015 (2); GRAPH Farm Parcel 2015;
Layout: FIG05 CR Facility

CHROMIUM (VI) CONCENTRATIONS AT FARM PARCEL



Attached Xrefs: GRAPH Facility 2015 (2); GRAPH Farm Parcel 2015;
Attached Images: FIG06 CR Farm
Layout:

Dwg Size: 0.54 Mb
Plot Date: May 14, 2015
Plot Time: 5:39 AM

PLOT DATA
Drawing Name: J:_TRC\Shieldalloy\112434\0000\112434.0000.05-06.dwg
Operator Name: STEHLE, DIANAH
Drawing Plot Scale: 0.386863

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

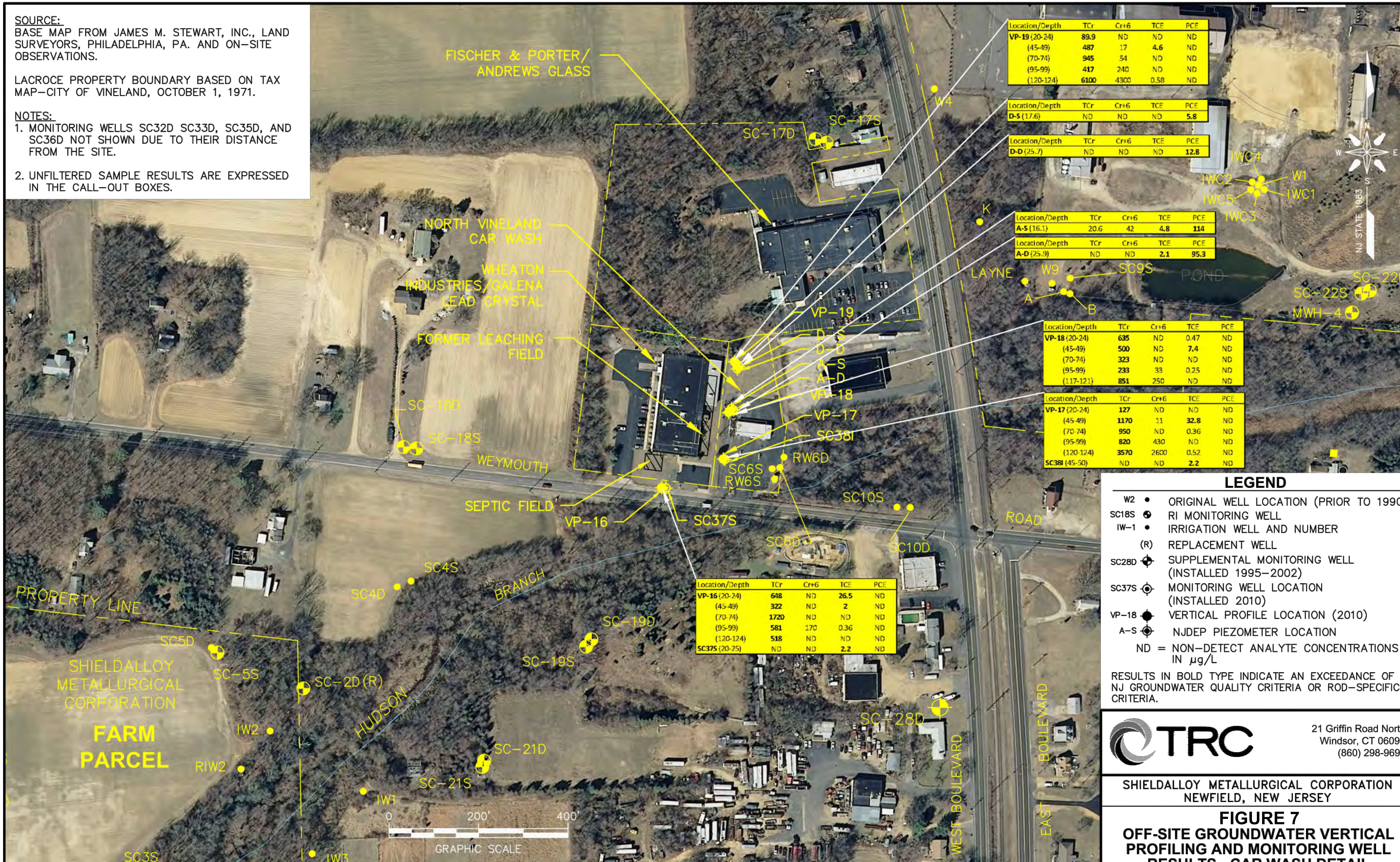
PROJECT: SHIELDALLOY METALLURGICAL CORP. 35 SOUTH WEST BLVD. NEWFIELD, NEW JERSEY	DRAWN BY: DD/DGS APPROVED BY: -
TITLE: FARM PARCEL CHROMIUM (VI) CONCENTRATIONS	PROJ. NO. 112434.00OU2.003050 FILE NO. 112434.0000.05-06.dwg DATE: MAY 2015

FIGURE 6

SOURCE:
BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA. AND ON-SITE OBSERVATIONS.

LACROCE PROPERTY BOUNDARY BASED ON TAX MAP-CITY OF VINELAND, OCTOBER 1, 1971.

NOTES:
1. MONITORING WELLS SC32D SC33D, SC35D, AND SC36D NOT SHOWN DUE TO THEIR DISTANCE FROM THE SITE.
2. UNFILTERED SAMPLE RESULTS ARE EXPRESSED IN THE CALL-OUT BOXES.



Location/Depth	TCr	Cr+6	TCE	PCE
VP-19 (20-24)	**89.9**	ND	ND	ND
(45-49)	**487**	17	**4.6**	ND
(70-74)	**945**	54	ND	ND
(95-99)	**417**	240	ND	ND
(120-124)	**6100**	4300	0.58	ND

Location/Depth	TCr	Cr+6	TCE	PCE
D-S (17.6)	ND	ND	ND	**5.8**

Location/Depth	TCr	Cr+6	TCE	PCE
D-D (25.7)	ND	ND	ND	**12.8**

Location/Depth	TCr	Cr+6	TCE	PCE
A-S (16.1)	20.6	42	**4.8**	**114**

Location/Depth	TCr	Cr+6	TCE	PCE
A-D (25.9)	ND	ND	**2.1**	**95.3**

Location/Depth	TCr	Cr+6	TCE	PCE
VP-18 (20-24)	**635**	ND	0.47	ND
(45-49)	**500**	ND	**7.4**	ND
(70-74)	**323**	ND	ND	ND
(95-99)	**233**	33	0.25	ND
(117-121)	**851**	250	ND	ND

Location/Depth	TCr	Cr+6	TCE	PCE
VP-17 (20-24)	**127**	ND	ND	ND
(45-49)	**1170**	11	**32.8**	ND
(70-74)	**950**	ND	0.36	ND
(95-99)	**820**	430	ND	ND
(120-124)	**3570**	2600	0.52	ND
SC38I (45-50)	ND	ND	**2.2**	ND

Location/Depth	TCr	Cr+6	TCE	PCE
VP-16 (20-24)	**648**	ND	**26.5**	ND
(45-49)	**322**	ND	**2**	ND
(70-74)	**1720**	ND	ND	ND
(95-99)	**581**	170	0.36	ND
(120-124)	**518**	ND	ND	ND
SC37S (20-25)	ND	ND	**2.2**	ND

LEGEND

W2 • ORIGINAL WELL LOCATION (PRIOR TO 1990)
SC18S RI MONITORING WELL
IW-1 • IRRIGATION WELL AND NUMBER
(R) REPLACEMENT WELL
SC28D SUPPLEMENTAL MONITORING WELL (INSTALLED 1995-2002)
SC37S MONITORING WELL LOCATION (INSTALLED 2010)
VP-18 VERTICAL PROFILE LOCATION (2010)
A-S NJDEP PIEZOMETER LOCATION
ND = NON-DETECT ANALYTE CONCENTRATIONS IN $\mu g/L$

RESULTS IN BOLD TYPE INDICATE AN EXCEEDANCE OF NJ GROUNDWATER QUALITY CRITERIA OR ROD-SPECIFIC CRITERIA.

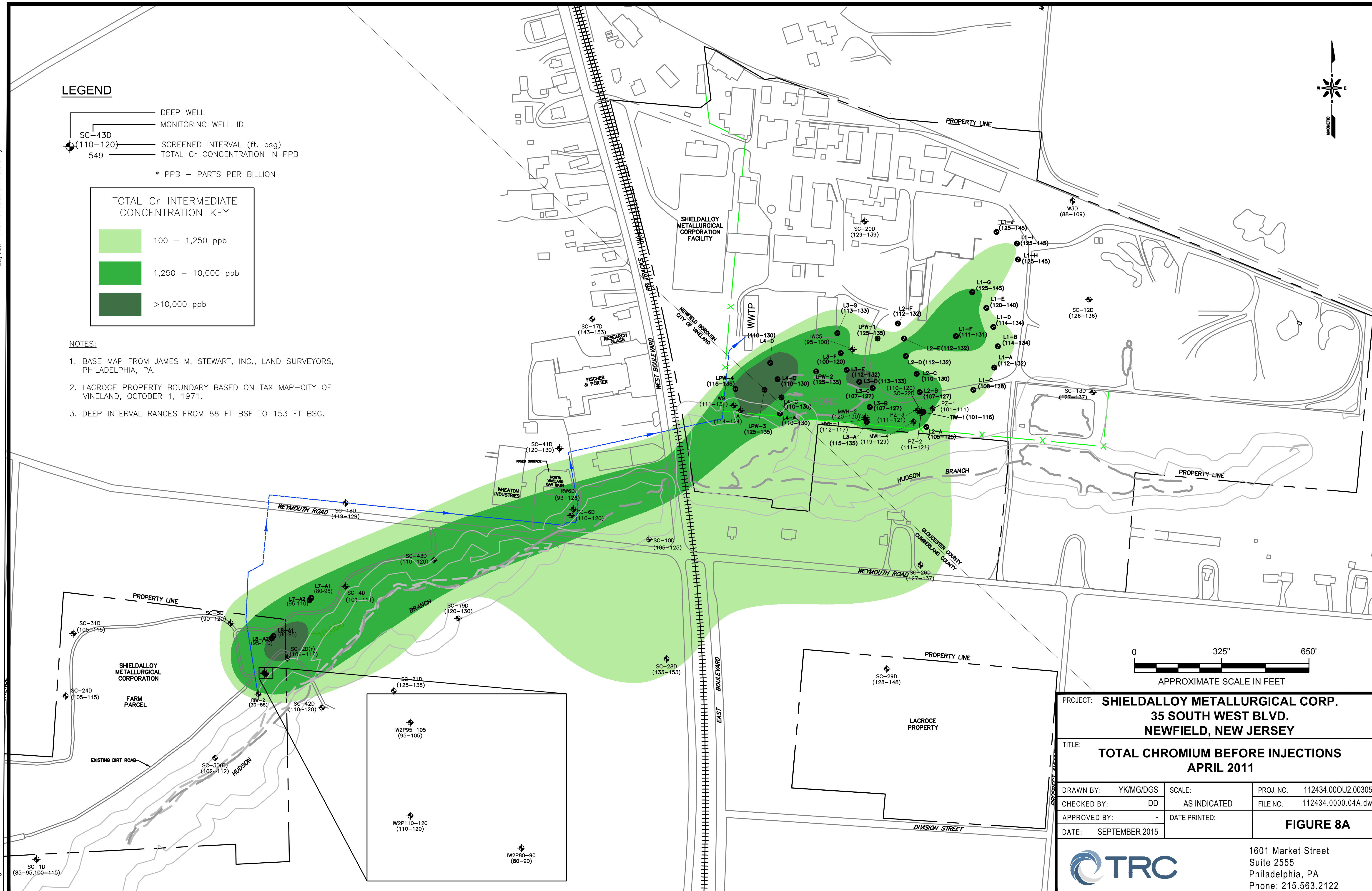
TRC
21 Griffin Road North
Windsor, CT 06095
(860) 298-9692

SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

FIGURE 7
OFF-SITE GROUNDWATER VERTICAL PROFILING AND MONITORING WELL RESULTS - CAR WASH DETAIL

Date: 09/2015 | Project No. 112434-00GWAT-002236

J:\CAD\112434\00GWAT\002235\Phase II Supp Off-Site GW Inv\
Figure 3-4 & 3-5.dwg Layout:Figure 3-4 January 19, 2011-1:11PM KHollenbeck

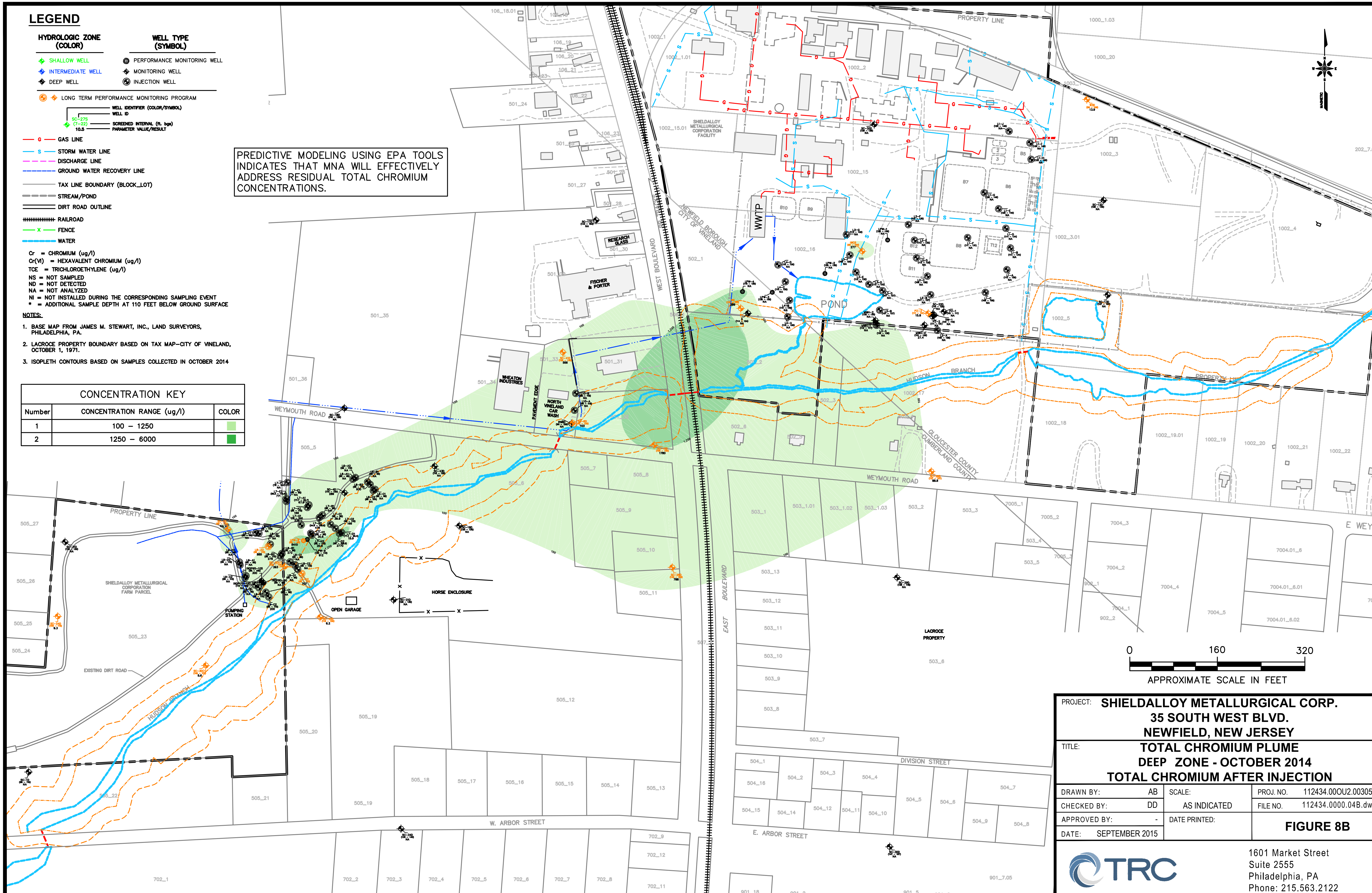


PROJECT: **SHIELDALLOY METALLURGICAL CORP.**
35 SOUTH WEST BLVD.
NEWFIELD, NEW JERSEY

TITLE: **TOTAL CHROMIUM BEFORE INJECTIONS**
APRIL 2011

DRAWN BY: YK/MG/DGS	SCALE:	PROJ. NO.	112434.00OU2.003050
CHECKED BY: DD	AS INDICATED	FILE NO.	112434.0000.04A.dwg
APPROVED BY: -	DATE PRINTED:	FIGURE 8A	
DATE: SEPTEMBER 2015			

TRC
1601 Market Street
Suite 2555
Philadelphia, PA
Phone: 215.563.2122



LEGEND

HYDROLOGIC ZONE (COLOR)

- SHALLOW WELL
- INTERMEDIATE WELL
- DEEP WELL

WELL TYPE (SYMBOL)

- PERFORMANCE MONITORING WELL
- MONITORING WELL
- INJECTION WELL

LONG TERM PERFORMANCE MONITORING PROGRAM

WELL IDENTIFIER (COLOR/SYMBOL)
WELL ID
SC-275
(7-22) SCREENED INTERVAL (ft. bgs)
10.5 PARAMETER VALUE/RESULT

- G — GAS LINE
- S — STORM WATER LINE
- DISCHARGE LINE
- GROUND WATER RECOVERY LINE
- TAX LINE BOUNDARY (BLOCK_LOT)
- STREAM/POND
- DIRT ROAD OUTLINE
- RAILROAD
- X — FENCE
- WATER

Cr = CHROMIUM (ug/l)
Cr(VI) = HEXAVALENT CHROMIUM (ug/l)
TCE = TRICHLOROETHYLENE (ug/l)
NS = NOT SAMPLED
ND = NOT DETECTED
NA = NOT ANALYZED
NI = NOT INSTALLED DURING THE CORRESPONDING SAMPLING EVENT
* = ADDITIONAL SAMPLE DEPTH AT 110 FEET BELOW GROUND SURFACE

NOTES:

1. BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA.
2. LACROCE PROPERTY BOUNDARY BASED ON TAX MAP-CITY OF VINELAND, OCTOBER 1, 1971.
3. ISOPLETH CONTOURS BASED ON SAMPLES COLLECTED IN OCTOBER 2014

CONCENTRATION KEY

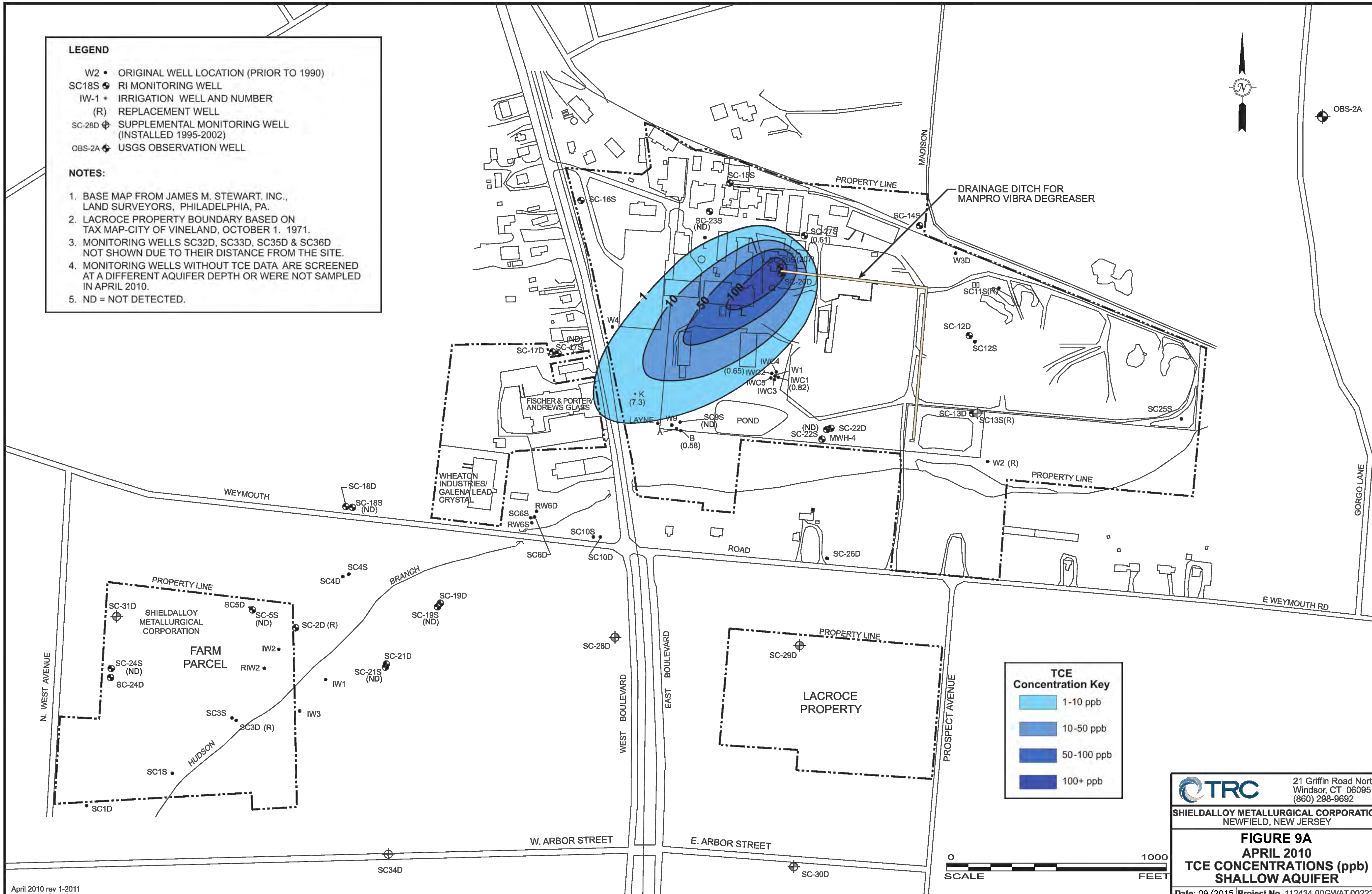
Number	CONCENTRATION RANGE (ug/l)	COLOR
1	100 – 1250	light green
2	1250 – 6000	dark green

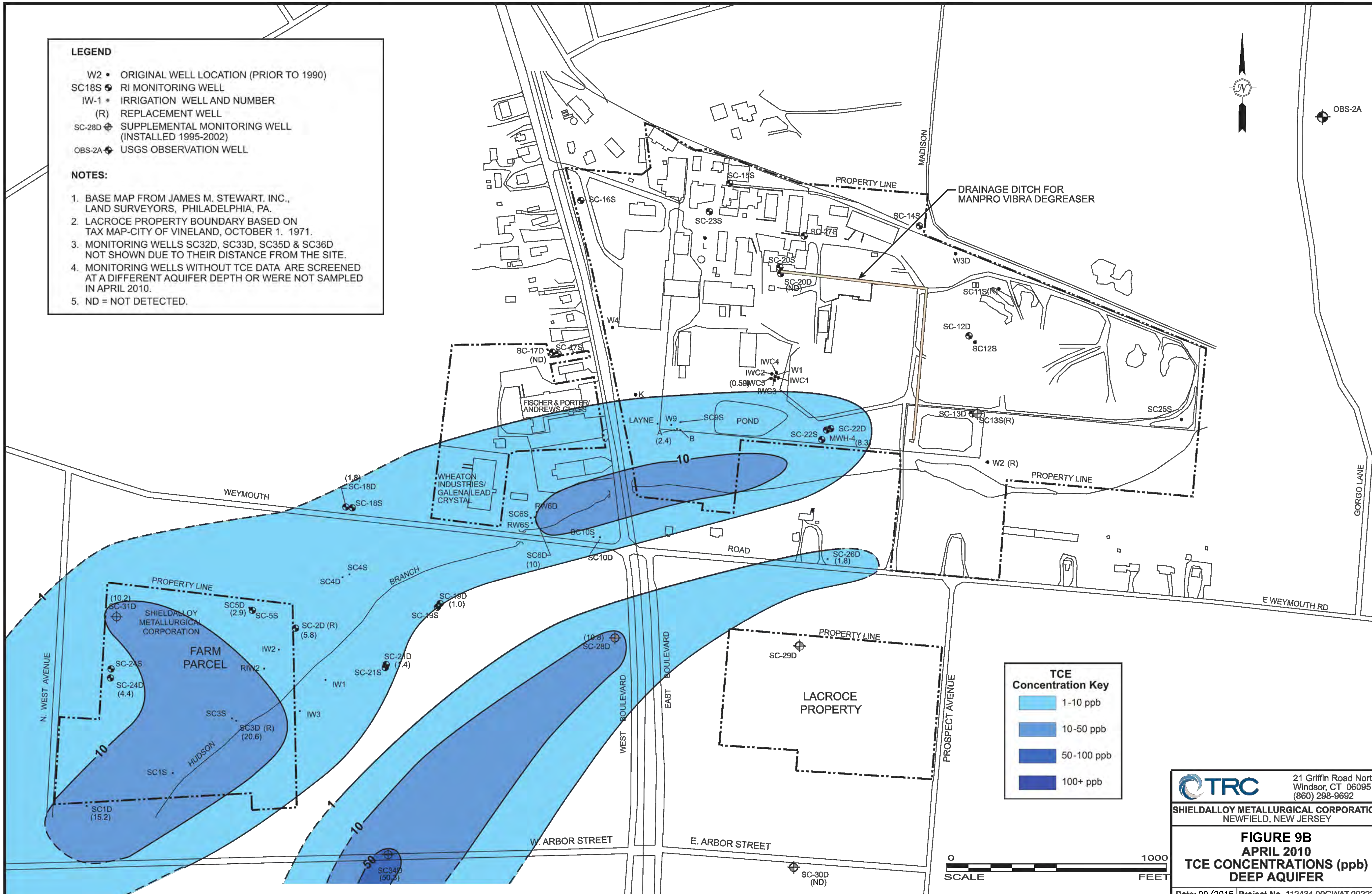
PROJECT:	SHIELDALLOY METALLURGICAL CORP. 35 SOUTH WEST BLVD. NEWFIELD, NEW JERSEY
TITLE:	TOTAL CHROMIUM PLUME DEEP ZONE - OCTOBER 2014 TOTAL CHROMIUM AFTER INJECTION

DRAWN BY: AB	SCALE:	PROJ. NO.	112434.00OU2.003050
CHECKED BY: DD	AS INDICATED	FILE NO.	112434.0000.04B.dwg
APPROVED BY: -	DATE PRINTED:	FIGURE 8B	
DATE: SEPTEMBER 2015			

TRC
1601 Market Street
Suite 2555
Philadelphia, PA
Phone: 215.563.2122

Attached Xrefs: BASEMAP 2014_06 FOR WELLS BASE
Attached Images: D17D7; D17D8;
Layout: FIG04B CR L Zone After Inj
Dwg Size: 2.65 Mb
Plot Date: September 1, 2015
Plot Time: 7:10 PM
PLOT DATA
Drawing Name: \\ntapa-annarbor\aam-vol2\CADD\PJT\00_TRC\Shieldalloy\112434\0000\112434.0000.04B.dwg
Operator Name: ALBERTS, SCOTT
Drawing Plot Scale: 0.386863


LEGEND
W2 • ORIGINAL WELL LOCATION (PRIOR TO 1990)
SC18S RI MONITORING WELL
IW-1 • IRRIGATION WELL AND NUMBER
(R) REPLACEMENT WELL
SC-28D SUPPLEMENTAL MONITORING WELL (INSTALLED 1995-2002)
OBS-2A USGS OBSERVATION WELL
NOTES:
1. BASE MAP FROM JAMES M. STEWART. INC., LAND SURVEYORS, PHILADELPHIA, PA.
2. LACROCE PROPERTY BOUNDARY BASED ON TAX MAP-CITY OF VINELAND, OCTOBER 1. 1971.
3. MONITORING WELLS SC32D, SC33D, SC35D & SC36D NOT SHOWN DUE TO THEIR DISTANCE FROM THE SITE.
4. MONITORING WELLS WITHOUT TCE DATA ARE SCREENED AT A DIFFERENT AQUIFER DEPTH OR WERE NOT SAMPLED IN APRIL 2010.
5. ND = NOT DETECTED.
N
OBS-2A
DRAINAGE DITCH FOR MANPRO VIBRA DEGREASER
PROPERTY LINE
MADISON
SC-15S
SC-16S
SC-23S (ND)
SC-27S (0.61)
SC-14S
W3D
SC-20S (207)
SC-20D
SC11S(R)
SC-12D
SC12S
1
10
50
100
W4
SC-17D
SC-47S (ND)
IWC4
W1
IWC2 (0.65)
IWC5
IWC1 (0.82)
IWC3
K (7.3)
FISCHER & PORTER/ ANDREWS GLASS
LAYNE
W9
SC9S (ND)
POND
A
B (0.58)
SC-22D
SC-22S (ND)
MWH-4
SC-13D
SC13S(R)
SC25S
W2 (R)
PROPERTY LINE
WEYMOUTH
SC-18D
SC-18S (ND)
WHEATON INDUSTRIES/ GALENA LEAD CRYSTAL
RW6D
SC6S
RW6S
SC10S
SC6D
SC10D
ROAD
SC-26D
GORGO LANE
E WEYMOUTH RD
SC4S
SC4D
BRANCH
SC-19D
SC-19S (ND)
PROPERTY LINE
SC-31D
SHIELDALLOY METALLURGICAL CORPORATION
SC5D
SC-5S (ND)
SC-2D (R)
FARM PARCEL
IW2
SC-24S (ND)
SC-24D
RIW2
SC-21D
SC-21S (ND)
IW1
SC-28D
IW3
SC3S
SC3D (R)
HUDSON
SC1S
SC1D
N. WEST AVENUE
WEST BOULEVARD
EAST BOULEVARD
PROPERTY LINE
SC-29D
LACROCE PROPERTY
PROSPECT AVENUE
TCE Concentration Key
1-10 ppb
10-50 ppb
50-100 ppb
100+ ppb
W. ARBOR STREET
E. ARBOR STREET
SC34D
SC-30D
0
1000
SCALE
FEET
TRC
21 Griffin Road North
Windsor, CT 06095
(860) 298-9692
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY
FIGURE 9A
APRIL 2010
TCE CONCENTRATIONS (ppb)
SHALLOW AQUIFER
Date: 09/2015
Project No. 112434.00GWAT.002236
April 2010 rev 1-2011



LEGEND
W2 • ORIGINAL WELL LOCATION (PRIOR TO 1990)
SC18S RI MONITORING WELL
IW-1 • IRRIGATION WELL AND NUMBER
(R) REPLACEMENT WELL
SC-28D SUPPLEMENTAL MONITORING WELL (INSTALLED 1995-2002)
OBS-2A USGS OBSERVATION WELL
NOTES:
1. BASE MAP FROM JAMES M. STEWART. INC., LAND SURVEYORS, PHILADELPHIA, PA.
2. LACROCE PROPERTY BOUNDARY BASED ON TAX MAP-CITY OF VINELAND, OCTOBER 1. 1971.
3. MONITORING WELLS SC32D, SC33D, SC35D & SC36D NOT SHOWN DUE TO THEIR DISTANCE FROM THE SITE.
4. MONITORING WELLS WITHOUT TCE DATA ARE SCREENED AT A DIFFERENT AQUIFER DEPTH OR WERE NOT SAMPLED IN APRIL 2010.
5. ND = NOT DETECTED.
DRAINAGE DITCH FOR MANPRO VIBRA DEGREASER
PROPERTY LINE
MADISON
OBS-2A
SC-15S
SC-16S
SC-23S
SC-27S
SC-14S
W3D
SC-20S
SC-20D (ND)
SC11S(R)
SC-12D
SC12S
W4
SC-17D (ND)
SC-47S
IWC4
IWC2
W1
IWC1
(0.59)IWC5
IWC3
K
FISCHER & PORTER/ ANDREWS GLASS
LAYNE
W9
SC9S
POND
A (2.4)
B
SC-22S
SC-22D
MWH-4 (8.3)
SC-13D
SC13S(R)
SC25S
W2 (R)
PROPERTY LINE
(1.8) SC-18D
SC-18S
WHEATON INDUSTRIES/ GALENA LEAD CRYSTAL
RW6D
SC6S
RW6S
SC10S
SC6D (10)
SC10D
WEYMOUTH
ROAD
SC-26D (1.8)
E WEYMOUTH RD
GORGO LANE
SC4S
SC4D
BRANCH
SC-19D (1.0)
SC-19S
PROPERTY LINE
(10.2) SC-31D
SHIELDALLOY METALLURGICAL CORPORATION
SC5D (2.9)
SC-5S
SC-2D (R) (5.8)
FARM PARCEL
IW2
RW2
SC-24S
SC-24D (4.4)
IW1
SC-21D (1.4)
SC-21S
IW3
SC3S
SC3D (R) (20.6)
HUDSON
SC1S
SC1D (15.2)
N. WEST AVENUE
(10.8) SC-28D
WEST BOULEVARD
EAST BOULEVARD
PROPERTY LINE
SC-29D
LACROCE PROPERTY
PROSPECT AVENUE
W. ARBOR STREET
E. ARBOR STREET
SC34D (50.3)
SC-30D (ND)
1
10
50
TCE Concentration Key
1-10 ppb
10-50 ppb
50-100 ppb
100+ ppb
0 1000
SCALE FEET
TRC
21 Griffin Road North
Windsor, CT 06095
(860) 298-9692
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY
FIGURE 9B
APRIL 2010
TCE CONCENTRATIONS (ppb)
DEEP AQUIFER
Date: 09/2015
Project No. 112434.00GWAT.002236

LEGEND

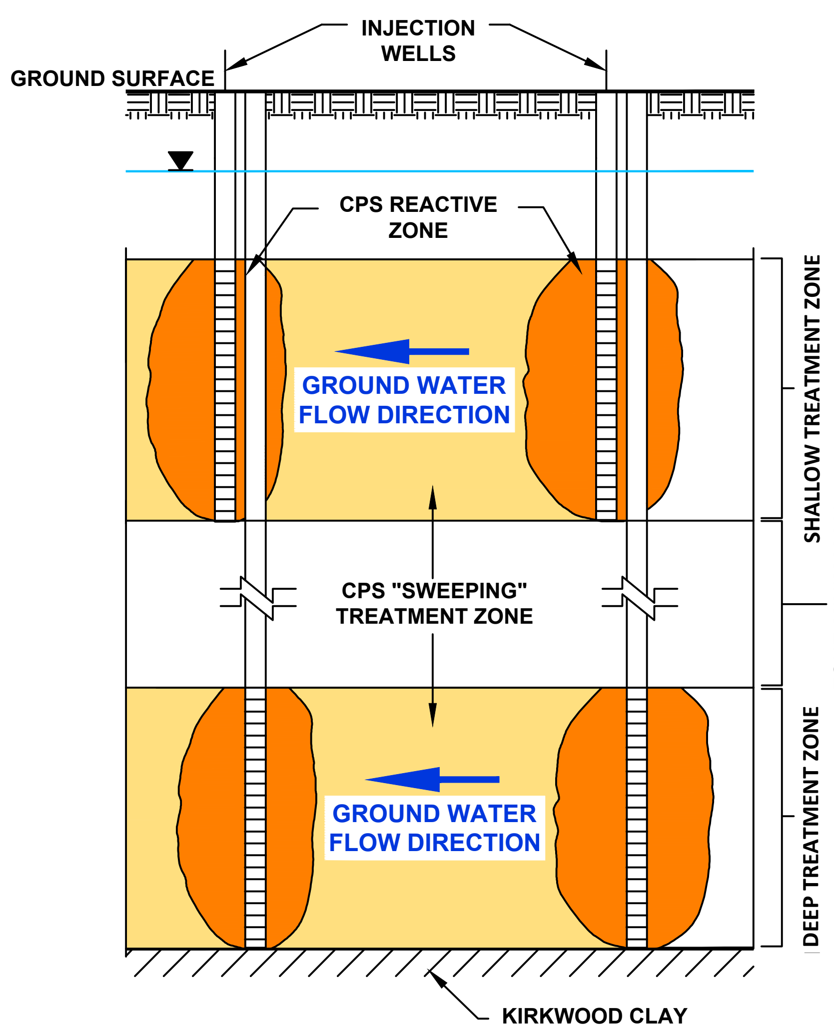
- SHALLOW WELL
- INTERMEDIATE WELL
- DEEP WELL
- UPW-1 UPPER ZONE PERFORMANCE MONITORING WELL
- U2-A UPPER ZONE INJECTION WELL (INSTALLED)
- (93-126) SCREENED INTERVAL (ft bsg)

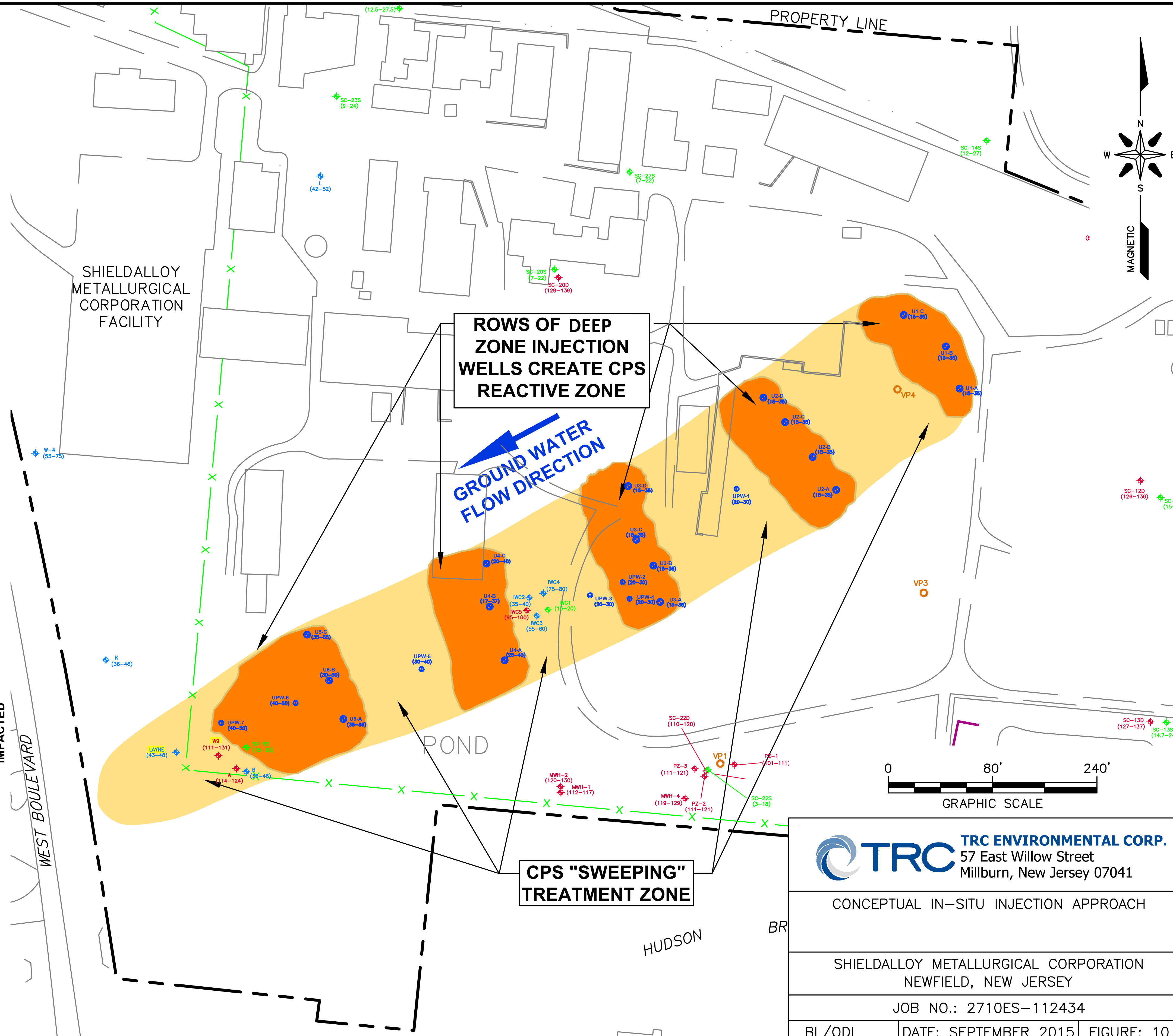
NOTES:

1. BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA.
2. LACROCE PROPERTY BOUNDARY BASED ON TAX MAP-CITY OF VINELAND, OCTOBER 1, 1971.
3. SIMILAR "SWEEPING" TREATMENT PROCESS OCCURS AT CAR WASH AND FARM PARCEL.

CONCEPTUAL CROSS SECTION FOR SHALLOW AND DEEP ZONES

N.T.S.





TRC ENVIRONMENTAL CORP.
57 East Willow Street
Millburn, New Jersey 07041

CONCEPTUAL IN-SITU INJECTION APPROACH

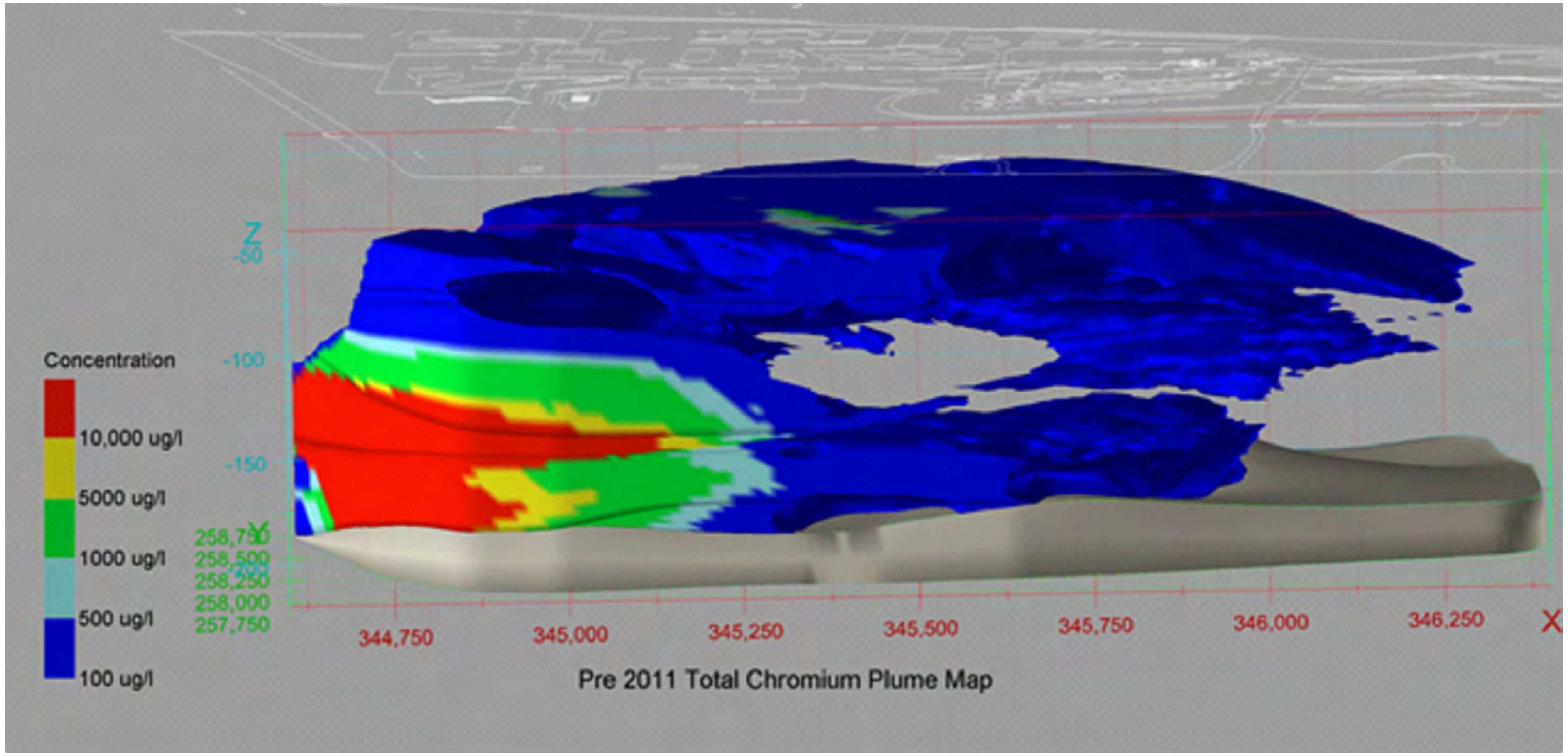
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

JOB NO.: 2710ES-112434

BL/ODL | DATE: SEPTEMBER 2015 | FIGURE: 10

FILE: \\NTAPA-ANNARBOR\AAM-VOL2\CADD\PJT\00_TRC\SHIELDALLOY\112434\0000\FIGURE 2A 2011 POST INJ UPPER ZONE CONCEPTUAL REMEDIATION PILIOT PROGRAM IN SITE EPA PRES.DWG, DATE: 09/02/2015 11:58:52AM

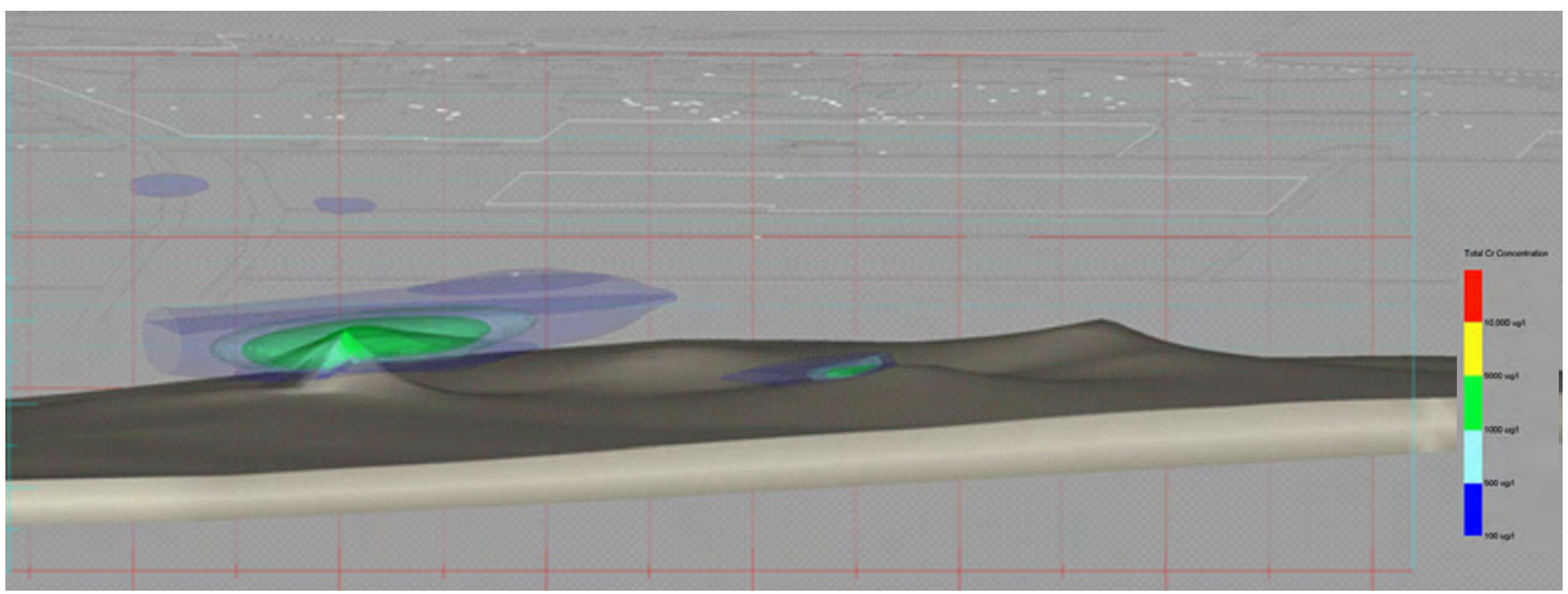
FACILITY
2011 TOTAL CHROMIUM CONCENTRATIONS BEFORE INJECTIONS



NOTES

1. RED SHADING REPRESENTS HIGHEST CHROMIUM CONCENTRATION.
2. THE GRAY SHADED VOLUME REPRESENTS THE SURFACE OF THE KIRKWOOD CLAY, WHICH IS A CONFINING LAYER THAT PREVENTS CONTAMINATION FROM TRAVELING DEEPER.

FACILITY
OCTOBER 2012 TOTAL CHROMIUM CONCENTRATIONS POST INJECTIONS



NOTES

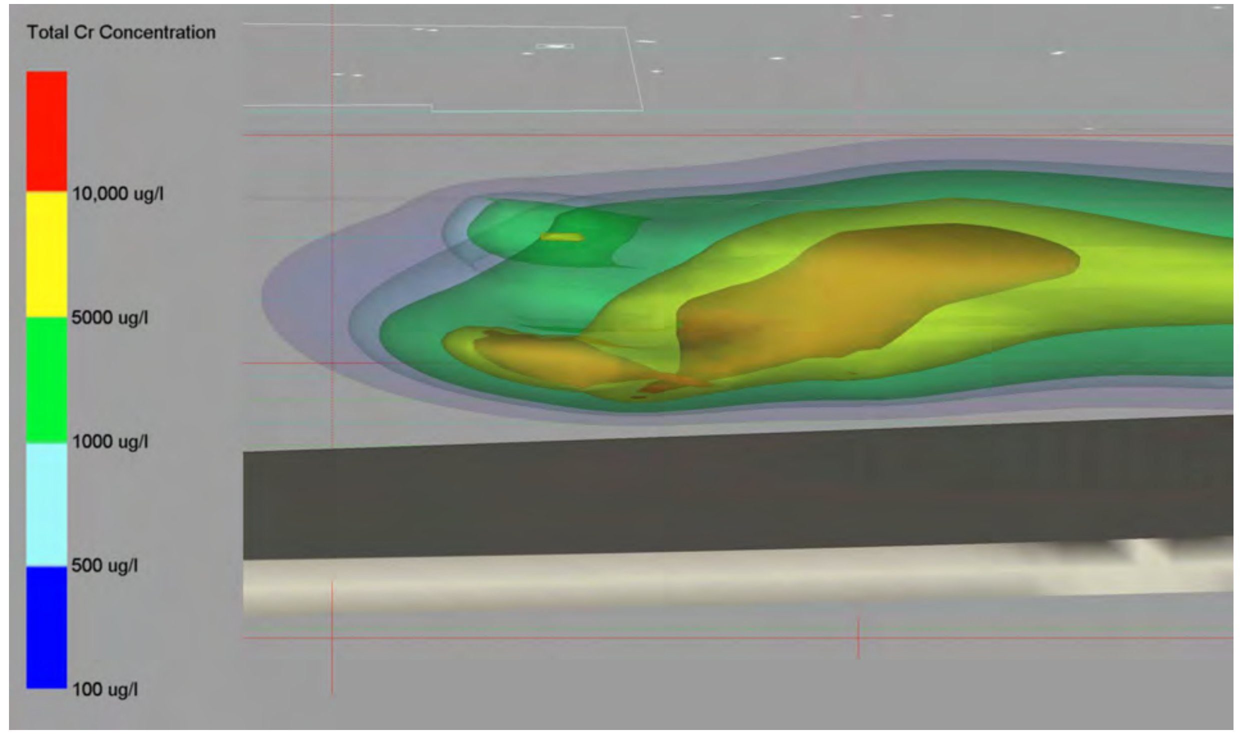
1. HIGHEST CONCENTRATIONS (RED SHADING) HAVE BEEN REMEDIATED.
2. MANY WELLS NO LONGER HAVE CHROMIUM CONCENTRATIONS OR IMPACTS ABOVE 100 ug/L.
3. FOOTPRINT OF HIGH CONCENTRATION IMPACTS GREATLY REDUCED.
4. MORE RECENT ANALYTICAL DATA (APRIL 2015) SHOWS ADDITIONAL IMPROVEMENTS.

PROJECT: SHIELDALLOY METALLURGICAL CORP. 35 SOUTH WEST BLVD. NEWFIELD, NEW JERSEY		
TITLE: 3D REPRESENTATION OF CHROMIUM IN GROUNDWATER BEFORE AND AFTER INJECTIONS - FACILITY		
DRAWN BY: DD/DGS	SCALE: AS INDICATED	PROJ. NO. 112434.00OU2.003050
CHECKED BY: DD		FILE NO. 112434.0000.07-08.dwg
APPROVED BY: -	DATE PRINTED:	FIGURE 11
DATE: SEPTEMBER 2015		

TRC
1601 Market Street
Suite 2555
Philadelphia, PA
Phone: 215.563.2122

PLOT DATA
Drawing Name: \\ntapa-annarbor\aam-vol2\CADD\PJT\00_TRC\Shieldalloy\112434\0000\112434.0000.07-08.dwg
Operator Name: ALBERTS, SCOTT
Drawing Plot Scale: 0.386863
Dwg Size: 3.10 Mb
Plot Date: September 2, 2015
Plot Time: 11:28 AM
Attached Xrefs:
Attached Images:
Layout: FIG07 Facility Inj

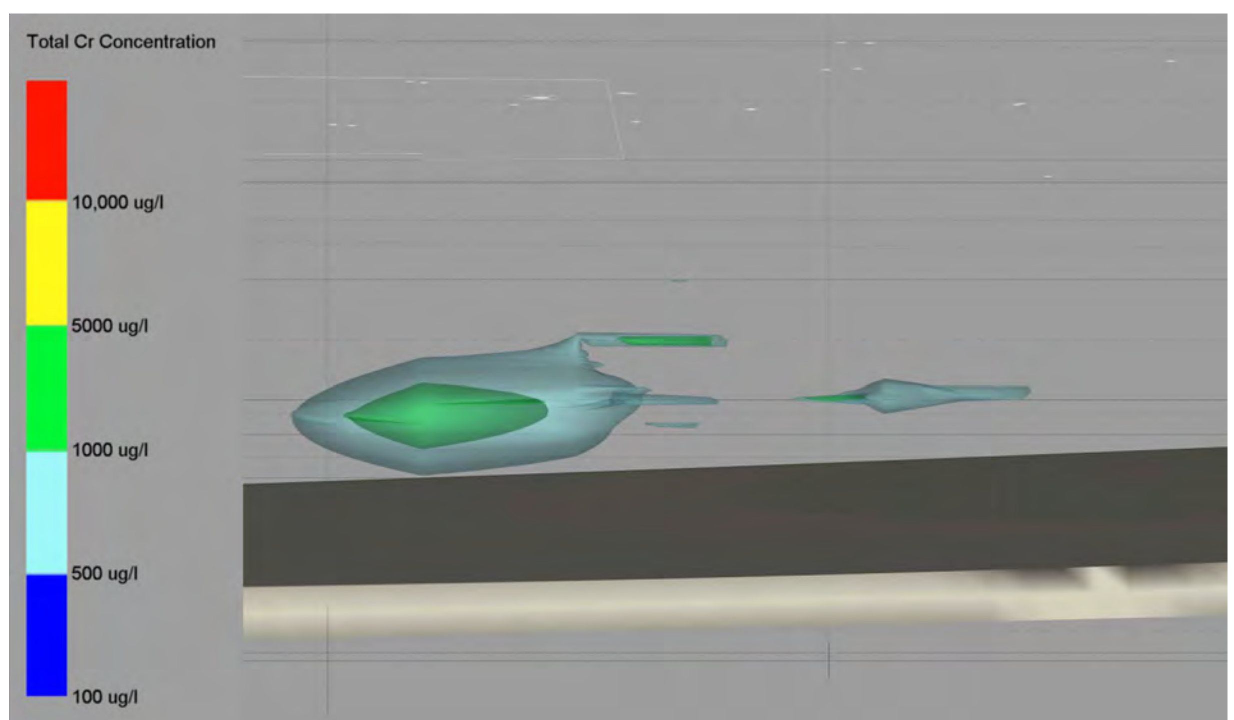
FARM PARCEL
APRIL 2012 TOTAL CHROMIUM CONCENTRATIONS BEFORE INJECTIONS



NOTES

1. ORANGE SHADING REPRESENTS HIGHEST CHROMIUM CONCENTRATION.
2. THE GRAY SHADED VOLUME REPRESENTS THE SURFACE OF THE KIRKWOOD CLAY, WHICH IS A CONFINING LAYER THAT PREVENTS CONTAMINATION FROM TRAVELING DEEPER.

FARM PARCEL
OCTOBER 2014 TOTAL CHROMIUM CONCENTRATIONS POST INJECTIONS



NOTES

1. HIGHEST CONCENTRATIONS (RED SHADING) HAVE BEEN REMEDIATED.
2. MANY WELLS NO LONGER HAVE CHROMIUM CONCENTRATIONS OR IMPACTS ABOVE 100 ug/L.
3. FOOTPRINT OF HIGH CONCENTRATION IMPACTS GREATLY REDUCED.
4. MORE RECENT ANALYTICAL DATA (APRIL 2015) SHOWS ADDITIONAL IMPROVEMENTS.

PROJECT: SHIELDALLOY METALLURGICAL CORP. 35 SOUTH WEST BLVD. NEWFIELD, NEW JERSEY			
TITLE: 3D REPRESENTATION OF CHROMIUM IN GROUNDWATER BEFORE AND AFTER INJECTIONS - FARM PARCEL			
DRAWN BY: DD/DGS	SCALE:	PROJ. NO. 112434.00OU2.003050	
CHECKED BY: DD	AS INDICATED	FILE NO. 112434.0000.07-08.dwg	
APPROVED BY: -	DATE PRINTED:	FIGURE 12	
DATE: SEPTEMBER 2015			

TRC
1601 Market Street
Suite 2555
Philadelphia, PA
Phone: 215.563.2122

PLOT DATA
Drawing Name: \\ntapa-annarbor\aam-vol2\CADD\PJT00_TRC\Shieldalloy\112434\0000\112434.0000.07-08.dwg
Operator Name: ALBERTS, SCOTT
Drawing Plot Scale: 0.386863
Dwg Size: 3.10 Mb
Plot Date: September 2, 2015
Plot Time: 11:24 AM
Attached Xrefs:
Attached Images:
Layout: FIG08 Farm Inj

PREDICTIVE MODELING USING EPA TOOLS INDICATES THAT MNA WILL EFFECTIVELY ADDRESS RESIDUAL TOTAL CHROMIUM CONCENTRATIONS.

LEGEND

HYDROLOGIC ZONE (COLOR)

- SHALLOW WELL
- INTERMEDIATE WELL
- DEEP WELL

WELL TYPE (SYMBOL)

- PERFORMANCE MONITORING WELL
- MONITORING WELL
- INJECTION WELL

LONG TERM PERFORMANCE MONITORING PROGRAM

SC-27S — WELL IDENTIFIER (COLOR/SYMBOL); WELL ID
(7-22) — SCREENED INTERVAL (ft. bgs)
10.5 — PARAMETER VALUE/RESULT

- G — GAS LINE
- S — STORM WATER LINE
- DISCHARGE LINE
- GROUND WATER RECOVERY LINE
- TAX LINE BOUNDARY (BLOCK_LOT)
- STREAM/POND
- DIRT ROAD OUTLINE
- RAILROAD
- X — FENCE
- WATER

Cr = CHROMIUM (ug/l)
Cr(VI) = HEXAVALENT CHROMIUM (ug/l)
TCE = TRICHLOROETHYLENE (ug/l)
NS = NOT SAMPLED
ND = NOT DETECTED
NA = NOT ANALYZED
NI = NOT INSTALLED DURING THE CORRESPONDING SAMPLING EVENT
* = ADDITIONAL SAMPLE DEPTH AT 110 FEET BELOW GROUND SURFACE

NOTES:

1. BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA.
2. LACROCE PROPERTY BOUNDARY BASED ON TAX MAP-CITY OF VINELAND, OCTOBER 1, 1971.
3. ISOPLETH CONTOURS BASED ON SAMPLES COLLECTED IN OCTOBER 2014

CONCENTRATION KEY

Number	CONCENTRATION RANGE (ug/l)	COLOR
1	100 - 1250	
2	1250 - 5410	

TRC ENVIRONMENTAL CORP.
41 Spring Street New
Providence, NJ 07974

TOTAL CHROMIUM GROUNDWATER PLUME
DEEP ZONE - OCTOBER 2014

SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY
JOB NO.: 112434

AB	MARCH 2015	FIGURE: 13

FILE: \\MILLBURN-FP2\E2\DRAFTING FILES\CAD FILES\WORK\2710ES\2015_03 OU1 FFS\2015_03 - C30 TOTAL CHROME.DWG 03/20/15 10:32:17AM, anbrown, LAYOUT:LOWER

FILE: \\MILLBURN-FP2\E2\DRAFTING FILES\CAD FILES\WORK\2710ES\2015_03 OU1 FFS\2015_03 - C30 TCE.DWG 03/20/15 02:32:15PM, anbrown, LAYOUT:UPPER

APPENDIX II
TABLES

TABLE 1
VERTICAL GROUNDWATER PROFILING ANALYTICAL RESULTS (2010 Investigation)
OU1 Supplemental RI
Shieldalloy Metallurgical Corporation
Newfield, New Jersey

Sample ID	Units	VP-16 (20-24)	VP-16 (45-49)	VP-16 (70-74)	VP-16 (95-99)	VP-16 (120-124)	VP-17 (20-24)	VP-17 (45-49)	VP-17 (70-74)	VP-17 (95-99)	VP-17 (120-124)	New Jersey Ground Water Quality Standards[1]	Federal Drinking Water Maximum Contaminant Levels
Approximate Ground Surface Elevation (ftmsl)		91	91	91	91	91	91	91	91	91	91		
Depth Interval (ftbgs)		20-24	45-49	70-74	95-99	120-124	20-24	45-49	70-74	95-99	120-124		
Approximate Sample Elevation (ftmsl)		71 to 67	46 to 42	21 to 17	-4 to -8	-29 to -33	71 to 67	46 to 42	21 to 17	-4 to -8	-29 to -33		
Date Sampled		10/5/2010	10/5/2010	10/5/2010	10/4/2010	10/4/2010	10/7/2010	10/7/2010	10/7/2010	10/7/2010	10/7/2010		
Volatile Organic Compounds (VOCS)													
Chloroform	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	0.34 J	ND	70	80
1,4-Dichlorobenzene	ug/L	0.75 J	ND	ND	ND	ND	ND	0.39 J	ND	ND	ND	75	75
1,1-Dichloroethane	ug/L	ND	0.62 J	2.1	1	ND	ND	ND	2	2.7	ND	50	--
1,1-Dichloroethene	ug/L	3	ND	0.48 J	ND	ND	ND	2.5	0.44 J	0.64 J	ND	1	7
cis 1,2-Dichloroethene	ug/L	9	ND	ND	ND	ND	ND	13.7	ND	ND	ND	70	70
1,1,1-Trichloroethane	ug/L	3.9	0.35 J	0.86 J	ND	ND	ND	3.7	0.87 J	1.4	ND	30	200
Trichloroethene	ug/L	26.5	2	ND	0.36	ND	ND	32.8	0.36 J	ND	0.52 J	1	5
Total TICs	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--
Inorganics													
Unfiltered													
Total Chromium	ug/L	648	322	1,720	581	518	127	1,170	950	820	3,570	100	100
Hexavalent Chromium (Cr^{+6})	ug/L	<10	<10	<10	170	<10	<10	11	<10	430	2,600	--	--
Filtered													
Total Chromium	ug/L	10.7	<10	182	178	243	<10	92	115	502	2,600	100	100
Hexavalent Chromium (Cr^{+6})	ug/L	<10	<10	140	120	<10	<10	<10	100	540	2,900	--	--

Sample ID	Units	VP-18 (20-24)	VP-18 (45-49)	VP-18 (70-74)	VP-18 (95-99)	VP-18 (117-121)	VP-19 (20-24)	VP-19 (45-49)	VP-19 (70-74)	VP-19 (95-99)	VP-19 (120-124)	New Jersey Ground Water Quality Standards[1]	Federal Drinking Water Maximum Contaminant Levels
Approximate Ground Surface Elevation (ftmsl)		92	92	92	92	92	93	93	93	93	93		
Depth Interval (ftbgs)		20-24	45-49	70-74	95-99	117-121	20-24	45-49	70-74	95-99	120-124		
Approximate Sample Elevation (ftmsl)		72 to 68	47 to 43	22 to 18	-3 to -7	-28 to -32	73 to 69	48 to 44	29 to 19	-2 to -6	-27 to -31		
Date Sampled		10/6/2010	10/6/2010	10/6/2010	10/6/2010	10/6/2010	10/8/2010	10/8/2010	10/8/2010	10/8/2010	10/8/2010		
Volatile Organic Compounds (VOCS)													
Chloroform	ug/L	ND	ND	ND	0.31 J	ND	ND	ND	ND	ND	ND	70	80
1,4-Dichlorobenzene	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	75	75
1,1-Dichloroethane	ug/L	ND	ND	1.6	ND	ND	ND	ND	ND	2.4	0.49 J	50	--
1,1-Dichloroethene	ug/L	ND	0.45 J	ND	0.45 J	ND	ND	ND	ND	ND	ND	1	7
cis 1,2-Dichloroethene	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	70	70
1,1,1-Trichloroethane	ug/L	ND	1.7	0.60 J	0.91 J	ND	ND	0.57 J	ND	1	ND	30	200
Trichloroethene	ug/L	0.47 J	7.4	ND	0.25 J	ND	ND	4.6	ND	ND	0.58 J	1	5
Total TICs	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--
Inorganics													
Unfiltered													
Total Chromium	ug/L	635	500	323	233	851	89.9	487	945	417	6,100	100	100
Hexavalent Chromium (Cr^{+6})	ug/L	<10	<10	<10	33	250	<10	17	54	240	4,300	--	--
Filtered													
Total Chromium	ug/L	<10	<10	38.5	39.2	467	<10	<10	<10	261	4,600	100	100
Hexavalent Chromium (Cr^{+6})	ug/L	<10	<10	22	76	320	<10	<10	<10	220	4,300	--	--

NOTES:
Gray shaded results indicate an exceedance of the New Jersey Ground Water Quality Standards (N.J.A.C. 7:9C) or site-specific clean-up criterion.
Underlined results indicate an exceedance of the Federal Drinking Water Maximum Contaminant Levels (40 CFR, Chapter 1, Part 141).
All laboratory analyses conducted by New Jersey-certified Accutest Laboratories of Dayton, New Jersey
(1) - Ground water clean-up criterion for total chromium specified in the Record of Decision (September 1996) of 100 ug/L.
VOC TICs - Tentatively Identified Compounds
ND - Non-detect
ftbgs - feet below ground surface
ug/L - micrograms per liter (parts per billion)

TABLE 2

NJDEP PIEZOMETER ANALYTICAL RESULTS

OU1 Supplemental RI
Shieldalloy Metallurgical Corporation
Newfield, NJ

Sample ID Well Depth (feet) Sample Date Notes	Units	Well A-S 16.1 10/5/2010	Well A-D 25.9 10/5/2010	Well D-S 17.6 10/5/2010	Well D-D 25.7 10/5/2010	New Jersey Groundwater Quality Standards (1)	Federal Drinking Water Maximum Contaminant Levels
Volatile Organic Compounds (VOCs)							
cis 1,2-Dichloroethene	µg/L	17.2	8.1	0.37J	1	70	70
Tetrachloroethene	µg/L	**114**	**95.3**	**5.8**	**12.8**	0.4	5
1,1,1-Trichloroethane	µg/L	ND	0.44J	ND	ND	30	200
Trichloroethene	µg/L	**4.8**	**2.1**	ND	ND	1	5
VOC TICs	µg/L	ND	ND	ND	ND	--	--
Inorganics							
Chromium	µg/L	20.6	ND	ND	ND	100	100
Hexavalent Chromium (Cr^{+6})	µg/L	42	ND	ND	ND	--	--

NOTES:

Gray shaded results indicate an exceedance of the New Jersey Ground Water Quality Standards (N.J.A.C. 7:9C) or site-specific clean-up criterion.

Underlined results indicate an exceedance of the Federal Drinking Water Maximum Contaminant Levels (40 CFR, Chapter 1, Part 141).

All laboratory analyses conducted by New Jersey-certified Accutest Laboratories of Dayton, New Jersey.

(1) - Ground water clean-up criterion for total chromium specified in the Record of Decision (September 1996) of 100 ug/L.

VOC TICs - Tentatively Identified Compounds

ND - Non-detect

J - Estimated value.

ug/L - micrograms per liter (parts per billion)

TABLE 3

MONITORING WELL ANALYTICAL RESULTS (2010 Investigation)

OU1 Supplemental RI

Shieldalloy Metallurgical Corporation

Newfield, New Jersey

Sample ID **Approximate Ground Surface Elevation (ftmsl)** **Depth Interval** **Approximate Sample Elevation (ftmsl)** **Date Sampled**	**Units**	SC-37S 90 20 -25 70-65 11/4/2010	SC-38I 91 45 - 50 46-31 11/4/2010	New Jersey Ground Water Quality Standards (1)	Federal Drinking Water Maximum Contaminant Levels
Notes					
Volatile Organic Compounds (VOCs)					
Chloroform	ug/L	0.30 J	ND	70	80
1,2-Dichloroethene	ug/L	0.83 J	2.2	70	70
Trichloroethene	ug/L	**2.2**	**2.2**	1	5
Total TICs	ug/L	12.94	243.99	--	--
INORGANICS					
Total Chromium	ug/L	ND	ND	100	100
Hexavalent Chromium (Cr^{+6})	ug/L	ND	ND	--	--

NOTES:

Gray shaded results indicate an exceedance of the New Jersey Ground Water Quality Standards (N.J.A.C. 7:9C) or site-specific clean-up criterion.

Underlined results indicate an exceedance of the Federal Drinking Water Maximum Contaminant Levels (40 CFR, Chapter 1, Part 141).

All laboratory analyses conducted by New Jersey-certified Accutest Laboratories of Dayton, New Jersey.

(1) - Ground water clean-up criterion for total chromium specified in the Record of Decision (September 1996) of 100 ug/L.

VOC TICs - Tentatively Identified Compounds

ND - Non-detect

J - Estimated value.

ug/L - micrograms per liter (parts per billion)

The trip blank "TB" associated with the November 4, 2010 monitoring well sampling yielded no VOC detections.

Table 4A Groundwater ARARs				
TYPE OF ARAR	**REGULATORY/ REQUIREMENT**	**REGULATION /CITATION**	**APPLICABILITY/ RELEVANCE**	**SITE-SPECIFIC ARAR**
Chemical-Specific ARARs				
Federal	Safe Drinking Water Act	MCLs (40 CFR 141.11-.16, and 141.60-.63)	Drinking water standards which apply to specific contaminants that have been determined to have an adverse impact on human health	ARAR for various contaminants in groundwater.
State	NJ Safe Drinking Water Act	NJ MCLs (NJAC 7:10-5 and -16)	NJDEP sets standards for maximum permissible levels allowable for public water systems	ARAR for various contaminants in groundwater.
	NJ Water Pollution Control Act	NJ GWQS (NJAC 7:9C-1.7)	State-designated levels of constituents when not exceeded, will not prohibit or significantly impair a designated use of water	ARAR for remediation of groundwater.
Action-Specific ARAR				
State	NJ Water Pollution Control Act	NJ GWQS (NJAC 7:9C-1.6)	State procedures and standards for establishment of a Classification Exception Area/Well Restriction Area	ARAR for establishing ICs for groundwater remediation.
	NJ Water Pollution Control Act	NJPDES NJAC 7:14A-7.5	State procedures for authorization of discharges to ground water by permit-by-rule	ARAR for discharges to ground water from underground injection activities

Table 5

Conceptual Cost Estimate

OU1 FFS Remedial Alternative #3: In Situ Remediation

Shieldalloy Metallurgical Superfund Site; Newfield, NJ

Remedial Alternative Description:

Injections to treat in situ. Monitoring to confirm active treatment, then confirm ongoing natural attenuation. CEA/WR.

CAPITAL COST

Item	Estimated Quantity	Units	Unit Price	Total Cost (rounded)
Injections	1.0	LS	$ 5,500,000	$ 5,500,000
		Subtotal Direct Construction Costs		$ 5,500,000
		Contingency	20%	$ 1,100,000
		Project Management	10%	$ 550,000
		Remedial Design	10%	$ 550,000
		Engineering and Construction Management	10%	$ 550,000
		Legal and Administrative	5%	$ 275,000
		EPA Oversight Fees	5%	$ 275,000
		TOTAL CONSTRUCTION COSTS (rounded)		**$ 8,800,000**

O&M Costs

Item	Frequency	Quantity	Units	Rate/Cost Per Event	Total Cost (rounded)
Groundwater monitoring--years 1 and 2	semiannual	4	LS	$ 15,000	$ 60,000
Groundwater monitoring--years 3-5	annual	3	LS	$ 15,000	$ 45,000
Groundwater monitoring--6-10	biennual	5	LS	$ 15,000	$ 75,000
Groundwater monitoring--years 11-30	every 5 years	5	LS	$ 15,000	$ 75,000
5-year review	every 5 years	5	LS	$ 10,000	$ 50,000
			Sub-Total OM&M (30 Years):		$ 305,000
			Contingency	20%	$ 61,000
			Project Management	10%	$ 31,000
			Remedial Design	10%	$ 31,000
			Construction Management	10%	$ 31,000
			Legal and Administrative	5%	$ 15,000
			EPA Oversight Fees	5%	$ 15,000
			TOTAL OM&M COSTS (rounded):		**$ 490,000**
			TOTAL PROJECT COSTS (UNADJUSTED For NPV):		**$ 9,290,000**

NPV ANALYSIS

Sub-Total OM&M (30 Years from next table):		$ 203,100
O&M COST MARKUPS		
Contingency	20%	$ 40,620
Project Management	10%	$ 20,310
Remedial Design	10%	$ 20,310
Construction Management	10%	$ 20,310
Legal and Administrative	5%	$ 10,155
EPA Oversight Fees	5%	$ 10,155
TOTAL OM&M COSTS (rounded):		$ 325,000
TOTAL PRESENT VALUE PROJECT COSTS:		**$ 9,125,000**

Table 5A

Conceptual Cost Estimate

OU1 FFS Remedial Alternative #3: In Situ, NPV

Shieldalloy Metallurgical Superfund Site; Newfield, NJ

YEAR	CAPITAL COST	OM&M COSTS (W/CONTINGENCY)						Total Annual Cost (Rounded, Not Adjusted for Inflation)	PRESENT VALUE (AT 7% DISCOUNT RATE)
		Annual OM&M			Periodic OM&M				
		Monitoring				Monitoring	5-year review		
0	**$ 8,800,000**			$ -		$ -			**$ 8,800,000**
1		$ 15,000				$ 45,000		$ 60,000	$56,075
2		$ 15,000				$ 45,000		$ 60,000	$52,406
3		$ 15,000						$ 15,000	$12,244
4		$ 15,000						$ 15,000	$11,443
5		$ 15,000					$ 10,000	$ 25,000	$17,825
6								$ -	$0
7		$ 15,000						$ 15,000	$9,341
8								$ -	$0
9		$ 15,000						$ 15,000	$8,159
10							$ 10,000	$ 10,000	$5,083
11		$ 15,000						$ 15,000	$7,126
12								$ -	$0
13								$ -	$0
14								$ -	$0
15		$ 15,000				$ -	$ 10,000	$ 25,000	$9,061
16								$ -	$0
17								$ -	$0
18								$ -	$0
19								$ -	$0
20		$ 15,000				$ -	$ 10,000	$ 25,000	$6,460
21								$ -	$0
22								$ -	$0
23								$ -	$0
24								$ -	$0
25		$ 15,000				$ -	$ 10,000	$ 25,000	$4,606
26								$ -	$0
27								$ -	$0
28								$ -	$0
29								$ -	$0
30		$ 15,000				$ -	$ 10,000	$ 25,000	$3,284
	7%	Discount Factor					Total Unadjusted Costs:	$ 330,000	
							Total Discounted OM&M Costs (rounded):		**$203,100**

APPENDIX III
ADMINISTRATIVE RECORD INDEX

ADMINISTRATIVE RECORD INDEX OF DOCUMENTS

FINAL
09/30/2015
REGION ID: 02

Site Name: SHIELDALLOY CORPORATION
CERCLIS ID: NJD002365930
OUID: 01
SSID: 02B7
Action: RECORD OF DECISION AMENDMENT

DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Addressee Name:	Addressee Organization:	Author Name:	Author Organization:
319340	09/30/2015	ADMINISTRATIVE RECORD INDEX FOR OU1 - RECORD OF DECISION AMENDMENT FOR THE SHIELDALLOY CORPORATION SITE	2	[AR INDEX]	[]	[]	[,]	[US ENVIRONMENTAL PROTECTION AGENCY]
319222	11/15/2010	REMEDIAL SYSTEM OPTIMIZATION STUDY FOR OU1 FOR THE SHIELDALLOY CORPORATION SITE	22	[REPORT]	[HENRY, SHERREL D]	[US ENVIRONMENTAL PROTECTION AGENCY]	[HANSEN, PATRICK J]	[TRC ENVIRONMENTAL INCORPORATED]
319228	01/01/2011	DRAFT OU1 SUPPLEMENTAL REMEDIAL INVESTIGATION REPORT FOR THE SHIELDALLOY CORPORATION SITE	448	[REPORT]	[]	[]	[,]	[TRC ENGINEERS INCORPORATED]
319224	02/14/2013	DRAFT PROCEDURAL ASSESSMENT OF MNA OF CHROMIUM IN GROUNDWATER FOR THE SHIELDALLOY CORPORATION SITE	65	[MEMORANDUM]	[GAFFIGAN, DONNA L, HENRY, SHERREL D, MODICA, EDWARD]	[NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION, US ENVIRONMENTAL PROTECTION AGENCY]	[HANSEN, PATRICK J]	[TRC ENVIRONMENTAL INCORPORATED]
319227	05/28/2013	MONITORED NATURAL ATTENUATION MODEL EVALUATION - RESULTS OF COMPUTER MODELING FOR THE SHIELDALLOY CORPORATION SITE	101	[MEMORANDUM]	[]	[]	[,]	[TRC ENVIRONMENTAL CORPORATION]
319226	03/31/2014	DRAFT IN SITU REMEDIATION PILOT PROGRAM EVALUATION REPORT FOR OU1 FOR THE SHIELDALLOY CORPORATION SITE	186	[REPORT]	[]	[]	[,]	[TRC ENVIRONMENTAL INCORPORATED]
319223	08/01/2014	DRAFT ROUTINE GROUNDWATER MONITORING PLAN FOR OU1 - REVISION NO. 1 FOR THE SHIELDALLOY CORPORATION SITE	40	[PLAN]	[]	[]	[,]	[TRC ENVIRONMENTAL CORPORATION]
319511	01/15/2015	TRC ENVIRONMENTAL, INCORPORATED RESPONDING TO US EPA LETTER DATED 11/14/2014 UPDATE TO OU 1 RISK CALCULATIONS FOR THE SHIELDALLOY CORPORATION SITE	26	[LETTER]	[HENRY, SHERREL D]	[US ENVIRONMENTAL PROTECTION AGENCY]	[HANSEN, PATRICK J]	[TRC ENVIRONMENTAL INCORPORATED]

319340

ADMINISTRATIVE RECORD INDEX OF DOCUMENTS

FINAL

09/30/2015 **REGION ID: 02**

Site Name: SHIELDALLOY CORPORATION
CERCLIS ID: NJD002365930
OUID: 01
SSID: 02B7
Action: RECORD OF DECISION AMENDMENT

DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Addressee Name:	Addressee Organization:	Author Name:	Author Organization:
319221	03/20/2015	FINAL DRAFT FOCUSED FEASIBILITY STUDY REPORT FOR OU1 FOR THE SHIELDALLOY CORPORATION SITE	65	[REPORT]	[]	[]	[,]	[TRC ENVIRONMENTAL INCORPORATED]
350386	07/28/2015	PROPOSED PLAN FOR OU1 FOR THE SHIELDALLOY CORPORATION SITE	16	[PLAN]	[]	[]	[,]	[US ENVIRONMENTAL PROTECTION AGENCY]
372883	03/31/2015	FINAL DRAFT FOCUSED FEASIBILITY STUDY ADDENDUM FOR OU1 FOR THE SHIELDALLOY CORPORATION SITE	2	[REPORT]	[HENRY, SHERREL D]	[US ENVIRONMENTAL PROTECTION AGENCY]	[HANSEN, PATRICK J]	[TRC COMPANIES INCORPORATED]

APPENDIX IV
STATE LETTER OF CONCURRENCE

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Site Remediation Program
Mail Code 401-406
P.O. Box 420
Trenton, New Jersey 08625-0420
Telephone: 609-292-1250

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

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

SEP 30 2015

RE: OU1 Record of Decision Amendment
Shieldalloy Metallurgical Corporation
35 South West Blvd
Newfield, Gloucester County, New Hersey
SRP PI# 000297
RPC060001

Dear Mr. Mugdan:

The New Jersey Department of Environmental Protection (Department) has completed its review of the Record of Decision (ROD) Amendment for the Shieldalloy Metallurgical Corporation (SMC) Site, Operable Unit 1 (OU1), which addresses non-perchlorate contaminated groundwater. The ROD Amendment was prepared by the U.S. Environmental Protection Agency (EPA) Region II. EPA is changing the groundwater remedy that was originally selected for the SMC Site in the 1996 ROD. The Department concurs with the remedy selected to amend the ROD, namely Alternative 3 – *In Situ* Remediation, Monitored Natural Attenuation, (MNA) Institutional Controls, Long-Term Monitoring and Five-Year Reviews.

The remedy selected to amend the ROD was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on the Administrative Record file for this site. The response action selected in this ROD Amendment is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

The remedy selected to address groundwater, employs chemical treatment, enhanced biodegradation and MNA, and includes the following major components:

- Discontinuing the operation of the existing groundwater pump and treat system.

- Injecting calcium polysulfide (CPS) into the high concentration target portions of the aquifer to reduce chromium concentrations.

- Injecting emulsified vegetable oil (EVO) into the high concentration target portions of the aquifer to reduce volatile organic compounds (VOCs) concentrations, specifically trichloroethene (TCE).

- Implementing long-term monitoring of groundwater to monitor the degradation of TCE, the reduction of hexavalent chromium to the less toxic and less mobile trivalent chromium, to monitor the attenuation of the VOC and chromium plumes, to monitor MNA parameters, and to evaluate the ongoing effectiveness of the treatments. Secondary contaminants beryllium and vanadium present a non-cancer health hazard that will be addressed by MNA and long-term monitoring.

- Establishing institutional controls in the form of a Classification Exception Area (CEA)/Well Restriction Area (WRA), to restrict the groundwater use and prohibit activities that could result in human exposure to chromium and VOCs in groundwater.

- Reviewing site conditions at least once every five years, as required by CERCLA, until the Remedial Action Objectives (RAOs) and remediation goals (RGs) are met.

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 action, is cost effective, and uses permanent solutions and treatment technologies to the maximum extent practicable.

The Department appreciates the opportunity to participate in the decision making process to select an appropriate remedy. If you have any questions, please call me at 609-292-1250.

Sincerely,

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

CC: Donna Gaffigan, Case Manager, NJDEP/BCM

SHIELDALLOY METALLURGICAL CORPORATION SUPERFUND SITE
OU1 RECORD OF DECISION (ROD) AMENDMENT

APPENDIX V

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY
SHEILDALLOY METALURICAL CORPORATION SUPERFUND SITE
OU1 RECORD OF DECISIONAMENDMENT

September 2015

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RESPONSIVENESS SUMMARY

OU1 RECORD OF DECISION AMENDMENT
SHIELDALLOY METALLURGICAL CORPORATION SUPERFUND SITE
NEWFIELD, GLOUSTER/CUMBERLAND COUNTIES, NEW JERSEY

September 2015

INTRODUCTION

This Responsiveness Summary provides a summary of comments received during the public comment period related to the Proposed Plan for Operable Unit (OU) 1 for the Shieldalloy Metallurgical Corporation Superfund Site and provides the U.S Environmental Protection Agency's (EPA's) responses to those comments. All comments summarized in this document have been considered in EPA's final decision in the selection of a remedy to address the contamination at the site.

SUMMARY OF COMMMUNITY RELATIONS ACTIVITIES

EPA released the Proposed Plan for public comment, along with a press release, on July 30, 2015. The Proposed Plan and other site-related documents were made available to the public in the administrative record file repositories at the Newfield Public Library and at the EPA Region 2 Superfund Records Center located at 290 Broadway, New York, New York (see Appendix III of the ROD Amendment). EPA published a notice in the local paper, *Vineland's Daily Journal*, on July 30, 2015. The notice announced the availability of the Proposed Plan and the supporting documents, a public meeting on August 12, 2015 at the Newfield Borough Hall in Newfield, New Jersey, and a public comment period through August 28, 2015. At the August 12, 2015 public meeting, EPA presented the results of the supplemental remedial investigation/feasibility study (RI/FS) and the Proposed Plan and answered questions from the community.

The Proposed Plan can be found in Appendix V-a. The public notice is in Appendix V-b. The sign-in sheets of the public meeting are in Appendix V-c. The transcript of the public meeting is in Appendix V-d. The written comments submitted during the comment period are contained in Appendix V-e.

SUMMARY OF COMMENTS AND RESPONSES

Comments were received at the August 12, 2015 public meeting and in writing (letters). Written and oral comments presented different views, with parties such as TRC Environmental Corporation (TRC) supporting EPA's preferred alternative and other parties, including the City of Vineland, opposing EPA's preferred alternative. A summary of the comments provided at the public meeting and in writing, as well as EPA's responses to them, are provided below.

REMEDIAL STUDIES

<u>Optimization Study (2010-2011)</u>

Comment #1: A representative of the City of Vineland asked whether, before looking at other technologies, EPA had considered installing additional wells downgradient to keep track of the plume and treat it. This commenter also asked if five wells were adequate for controlling the plume, and stated that he believed five wells were inadequate because the remedial design was not based on delineation of the horizontal extent of the plume. Another commenter stated that there were currently not enough wells.

EPA Response to Comment #1: The optimization study for the pump and treat system was performed prior to assessing other technologies and included evaluation of the groundwater pumping systems (five pumping wells) and the groundwater treatment systems (air stripper for volatile organic compounds (VOC's) and electrochemical precipitation treatment for metals). The optimization study found that the five extraction wells provided reasonably good containment and were adequate for controlling the groundwater plume but that concentration reduction rates from the pump-and-treat system had leveled off at 1,000 micrograms per liter (ug/L) for over 10 years. This leveling-off effect was found within the zone of influence of the existing five pumping wells. Since the concentrations were no longer being reduced within the range of the existing five pumping wells, EPA determined that additional pumping wells would eventually lead to the same leveling-off effect.

Comment #2: A commenter asked if it would make sense to pump the contaminated groundwater out and take it off site to a hazardous waste facility.

EPA Response to Comment #2: The optimization study found that pumping the contaminated groundwater was no longer effective in reducing contamination levels within the groundwater plume. Changing the treatment option for addressing contaminated groundwater once it is pumped out of the ground, from active treatment by an on-site air stripper and electrochemical precipitation to off-site disposal at a hazardous waste facility, would not address the fact that, with the pumping technology, contaminant concentrations within the plume have leveled off above acceptable concentrations.

Comment #3: A commenter asked if the five wells were monitoring wells or extracting wells. The same commenter asked if a longer time to pump out the contaminated groundwater would mean more time for contaminants to leach into the groundwater.

EPA Response to Comment # 3: The five wells mentioned were extraction (i.e., pumping) wells. More than 100 monitoring wells exist throughout and downgradient of the site. The concept of leaching suggests transfer of contamination from soil to groundwater. At the site, the original sources of chromium were the unlined lagoons, and the main source of trichloroethene (TCE) was the former Manpro-Vibra Degreasing Unit. The lagoons were remediated, and soil samples collected as part of the OU2 remedial investigation did not detect any detections of VOCs, including TCE, above screening values. Therefore, soil at the site is not a continuing source of contamination to the groundwater.

Comment #4: A commenter asked if more extraction wells would get the contamination out faster.

EPA Response to Comment #4: Increasing the number of extraction wells within the plume would increase the volume of water that needs to be treated but would not be expected to shorten the amount of time needed to clean up the groundwater plume. Thus, additional extraction wells would result in an overall decrease in the efficiency of the pump and treat system.

OU1 Supplemental Remedial Investigation (2010)

Comment #5. A representative of the City of Vineland asked if EPA had reviewed public records or otherwise identified the source(s) of tetrachloroethene (PCE) in groundwater. Another commenter suggested EPA had to find the source of the PCE to stop it from leaching into the ground, and asked why the location of a former dry cleaner had not been investigated.

EPA Response to Comment #5. EPA has reviewed available information regarding the PCE in groundwater, including the North Vineland Groundwater Contamination Study conducted by NJDEP in the 1980s. Appendix A of the 2011 Supplemental Remedial Investigation Report identifies potential sources of PCE in groundwater. The potential sources, which include the former dry cleaner, are not site-related.

In-situ Remediation Treatability Studies (2010-2014)

Comment #6: A representative of the City of Vineland asked whether pumping and treating was continued during the bench scale study.

EPA Response to Comment #6: Pumping and treating continued during the bench scale study, which was conducted in the laboratory. During the bench scale study, contaminated groundwater from the site was brought to the laboratory to test the effectiveness of different injection substances in remediating the contamination. Following the success of the bench scale study in the laboratory, the pump-and-treat system was turned off and the *in-situ* injections were tested at the site to assess their effectiveness under field conditions.

Comment #7: A commenter wanted to know how many locations received emulsified vegetable oil (EVO) injections, how many times each location was injected, and how many gallons were used.

EPA Response to Comment #7: Approximately 4,000 gallons of EVO solution were injected over three days in one area near the former source of the TCE.

Comment #8: A representative of the City of Vineland asked how EPA accounted for the effect of not pumping and treating during the active *in-situ* injections, and whether the pumping was restarted after the injection.

EPA Response to Comment #8: The pump-and-treat system was turned off prior to starting the *in-situ* injections to test the effectiveness of *in-situ* remediation. This was appropriate, given that *in-situ* injections and pump-and-treat would not be used at the same time. The pump-and-treat system was not restarted after the *in-situ* injections because initial data showed that the injections were successful in reducing groundwater contamination levels, and pumping would remove the injected substances and curtail the effectiveness of the *in-situ* remediation.

Comment #9: A commenter asked whether it was possible to use the *in-situ* remediation products with a pump-and-treat system. TRC stated in a comment letter that using the pump-and-treat remedy with the *in-situ* injections would actually be more injurious to the more effective and beneficial treatment reagents that are presently treating the groundwater; and further that the two remedies are mutually exclusive and cannot both be implemented together.

EPA Response to Comment #9: Using a pump-and-treat system and *in-situ* injections is considered counterproductive. The *in-situ* injections are designed to work in the ground over many years. If the pump-and-treat system was combined with *in-situ* remediation, the extraction wells would pump the *in-situ* reagents out of the ground before they were able to clean up the groundwater contamination.

Comment #10: Several commenters asked for details regarding the emulsified vegetable oil product. A representative of the City of Vineland asked what product was injected. Similarly, another commenter wanted to know exactly what the label was and if it was Wesson oil. Another commenter wanted to know if there was any harmful reaction from injecting the products into the ground.

EPA Response to Comment #10: The EVO that was injected is Emulsified Vegetable (soy bean) Oil manufactured by Terra Systems Inc. There are no adverse effects from injecting this product into the ground. The New Jersey Department of Environmental Protection (NJDEP) issued a permit equivalency for the *in-situ* injections.

Comment #11: A commenter wanted to know if there are other facilities or Superfund sites with similar contamination that used the same treatments and how well they worked. Another commenter wanted information on other cases in the country with comparable situations.

EPA Response to Comment #11: The following table shows examples from five sites that exhibited similar contamination as the Shieldalloy Metallurgical Corporation (SMC) site:

Site Name	Site Location	EPA Region	Contaminants	Remedy
New Hampshire Plating	Merrimack, NH	1	Chromium and TCE	MNA and ICs
Foote Mineral Co	East Whiteland Township, PA	3	Chromium	MNA and ICs
Palmetto Wood Preserving	Dixiana, SC	4	Chromium	In-situ injections, ICs
Frontier Hard Chrome, Inc OU1/OU2	Vancouver, WA	10	Chromium, TCE	In-situ injections, ICs

Comment_#12: TRC stated in a letter that the Responsiveness Summary should clarify for the public that the *in-situ* injection program has already been performed during the small and large-scale pilot program in an effort to aggressively remove the contaminant mass in a way that pump and treat could not.

EPA Response to Comment #12: Comment acknowledged. The *in-situ* injection studies at bench scale and at full-scale in the field were conducted because the pump and treat remedy, even when optimized, was not performing adequately to meet the remediation goals of the 1996 ROD.

Comment #13: A commenter asked why EPA believes the plume is now at steady state conditions.

EPA Response to Comment #13: The groundwater plume is considered to be at steady state conditions because it is not expanding in length, width or depth, as demonstrated by the groundwater monitoring data collected from more than 100 wells and by the results of groundwater modeling.

<u>Assessment of Monitored Natural Attenuation (MNA) (2012-2014)</u>

Comment #14: A commenter stated that natural attenuation has not worked.

EPA Response to Comment #14: Consistent with EPA protocols, a four-tier analysis was conducted to evaluate the effectiveness of MNA for the site. Tier I is a demonstration of plume stability (steady state) and attenuation, Tier II is an evaluation to determine the mechanism(s) and rate of attenuation, Tier III is an evaluation to determine the capacity and stability of the attenuation mechanism(s) and Tier IV is the implementation of a long-term performance monitoring program.

For Tier I, the assessment of plume stability was performed via a statistical analysis of eight quarters of data. As required, plume stability was demonstrated using the Mann-Kendall Statistical Test for Trend. The area of the plume between the car wash and the farm parcel was chosen for study because this area of the plume, during the period of time selected, was outside of the influence of pumping (and pre-dated the injections), and was, therefore, indicative of MNA processes. Four monitoring wells (i.e., SC-4S, SC-4D, SC-10D, and SC-28D) exist in the study area and have good data sets of chromium over time. As required by EPA guidance, for each well, the most recent eight rounds of data were evaluated for each individual quarter in 2014 (January, April, July, and October) to address potential seasonal influences in the data. The results of the Mann-Kendall analysis indicate the following: SC-4D: Decreasing trend (at >95% confidence level); SC-10D: Stable to Decreasing trend (at 90% to >95% confidence level); SC-28D: stable to decreasing trend (at 80% to >95% confidence level); and SC-4S: stable (at 80% confidence level). Based on these results it was concluded that the plume in the study area is stable and is at steady state conditions.

Prior to this ROD Amendment, natural attenuation was not the selected remedy for the site. MNA is selected only when contaminant sources have been removed and only low concentrations of contaminants remain in soil or groundwater. Natural attenuation relies on natural processes to decrease or "attenuate" concentrations of contaminants in groundwater. Natural attenuation occurs at most contaminated sites, including the SMC site. However, the right conditions must exist underground in order to select MNA as a remedy for a site. When the source is no longer present, as is the case at the SMC site, natural processes are able to remove the remaining, smaller amount of contaminants in the groundwater. The mechanism and rate of natural attenuation calculated under Tier II for both chromium and chlorinated VOCs support the viability of MNA as a remedy for the site. The site is monitored regularly to make sure that contaminants attenuate fast enough to meet site cleanup objectives and that contaminants are not spreading.

FEASIBILITY STUDY and PROPOSED PLAN

Remedial Action Objectives and Preliminary Remediation Goals

Comment #15: A representative of the City of Vineland asked how long it will take to meet the preliminary remediation goals (PRGs).

EPA Response to Comment #15: Alternative 1, No Further Action, is not expected to attain the PRGs. Although pump-and-treat technologies have been successfully implemented at other sites, site-specific conditions (e.g., geochemistry, aquifer conditions, type of contaminants) have resulted in the pump-and-treat system reaching asymptotic levels in the aquifer after almost 20 years of pumping. Preliminary modeling of Alternative 2, pump-and-treat, indicates that RAOs will not be met for hundreds of years. Alternative 3, which more aggressively treats the contamination via the *in-situ* injections, is expected to achieve RAOs more quickly than the pump-and-treat remedy, which is no longer efficiently reducing groundwater concentrations.

Alternative 2: Pump-and-Treat (1996 ROD), Institutional Controls (ICs), Long-Term Monitoring and Five-Year Reviews

Comment #16: A representative of the City of Vineland stated support for continued and expanded use of a pump-and-treat system. Another commenter, TRC, stated in a letter that a larger pump-and-treat system would simply achieve asymptotes (leveling off of contaminant concentrations, with little or no further reduction in contaminant concentrations) with much greater energy use, and much more wasted water, at higher cost.

EPA Response to Comment #16: Comments acknowledged. The optimization study conducted in 2010 found that the pump-and-treat system was no longer effective in reducing the concentrations of contaminants in groundwater. For example, hexavalent chromium concentrations at the SMC facility pumping wells and the car wash pumping wells were approximately 30,000 micrograms/liter (µg/L) in the 1980s and leveled off at approximately 1,000 µg/L for the past 10 years, compared to a cleanup goal of 70 µg/L. With regard to expanded pump-and-treat, the leveling-off effect was found within the zone of influence of the existing five pumping wells. Since the concentrations were no longer being reduced within the range of the existing five pumping wells, EPA determined that additional pumping wells would eventually lead to the same leveling-off effect.

Comment #17: A commenter asked whether the extraction of contaminated water through pumping wells resulted in fresh water intrusion.

EPA Response to Comment #17: It is assumed that the term 'fresh water intrusion' refers to the fresh or unaffected groundwater drawn into a pumping well's zone of capture to replace evacuated contaminated groundwater. In the pump-and-treat system, contaminated water is extracted and groundwater farther from the pumping well moves in to replace the extracted groundwater. Eventually, fresh or unaffected groundwater beyond the footprint of the plume will be drawn in to replace the extracted groundwater. The diminishing concentrations observed over time in pumping wells reflects the diluting effect of fresh groundwater being pulled into the capture zone of the extraction wells.

Alternative 3: *In-situ* Remediation, MNA, Institutional Controls (IC's), Long-Term Monitoring and Five-Year Reviews.

Comment #18: A representative of the City of Vineland asked how Alternative 3 would keep the plume from migrating without pumping wells.

EPA Response to Comment #18: Hydraulic control of the plume by pumping is not necessary to keep the contaminated groundwater from migrating because the plume is shrinking under natural gradient (non-pumping) conditions due to the success of the *in-situ* remediation. Overall, the plume footprint has been reduced by more that 50 percent in the three years of monitoring following the 2010 treatability study injections. Further, the SMC MNA model concluded that if no active remediation (pumping or injections) were performed after the 2013 injections, MNA would successfully maintain containment of the groundwater plume and would provide on-going reduction of chromium and VOC concentrations in the plume.

Comment #19: A representative of the City of Vineland stated that the City of Vineland is not at all pleased with the time frame for Alternative 3 to reach acceptable levels, and suggested that the public should not have to wait for this timeframe. Another commenter asked EPA to confirm that there is no remedy or technology that would attain PRGs at the site in less time.

EPA Response to Comment #19: Comments acknowledged. Unfortunately, at this time there are no technologies or alternatives available that will clean up the groundwater contamination at the site more quickly.

Comment #20: A commenter stated that *in-situ* treatment seems to be very effective and asked for EPA to be more aggressive and put injections in more areas. This commenter asked how many points (locations) would be injected. Another commenter asked why EPA would wait to do another injection when it was so successful.

EPA Response to Comment #20: The number and location of injection wells was carefully planned during the design of the pilot study. The effectiveness of the reagents CPS and the EVO continues for many years after the injection, so the residence time of the materials in the groundwater is an important part of the remedy. EPA will continue to monitor the materials in the groundwater to evaluate if they continue to decrease the concentrations of the chromium and VOCs. Further injections will be considered if necessary.

Comment #21: A commenter stated that there are institutional controls and the property can never be used.

EPA Response to Comment #21: Under the selected remedy, Alternative 3, ICs in the form of a classification exception area (CEA)/well restriction area (WRA) will be implemented to prevent exposure to contaminated groundwater until the remediation goals have been attained. ICs for soil were addressed in the OU2 ROD and are not part of this action.

Comment #22: A commenter asked if the monitoring results would go directly to the townships of Newfield or Vineland, and if they would be published.

EPA Response to Comment #22: Copies of the groundwater monitoring results will be available for public inspection at the local repository that EPA maintains at the Newfield Library (115 Catawba Avenue, Newfield, New Jersey). Monitoring results can be sent directly to municipalities upon request.

Comment #23: A commenter asked if there was a benchmark or goal (target concentrations) for the five-year review.

EPA Response to Comment #23: There is no benchmark or target goal for performance of the five-year review. Rather, pursuant to Section 121(c) of Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), a site must be reviewed at least once every five years until such time as performance standards are attained and human health and the environment are protected with unrestricted use.

Comment #24: A commenter asked if EPA would know whether the *in-situ* treatments were successful before five years.

EPA Response to Comment #24: Groundwater monitoring data have shown that the *in-situ* injections are successful. Following the *in-situ* treatability study, chromium concentrations were reduced by 98%-100% in many SMC facility monitoring wells. Average groundwater concentrations declined from 4,490 micrograms per liter (µg/L) to 140 µg/L for total chromium and from 2,130 µg/L to 13 µg/L for hexavalent chromium. At the farm parcel, total chromium concentrations were reduced from 5,024 µg/L to 347 µg/L. Near the car wash, total chromium concentrations were reduced from 1,144 µg/L to 196 µg/L. Overall, the plume footprint has been reduced by more that 50 percent in the three years of monitoring following the 2010 treatability study injections. Additional monitoring will be conducted to evaluate the continued effectiveness of the *in-situ* remediation.

Comment #25: TRC commented in a letter that the preferred alternative best meets the requirements of the NCP remedy selection criteria that EPA must weigh and balance as a whole in identifying a final remedy for OU1.

EPA Response to Comment #25: Comment acknowledged.

Comment #26: The City of Vineland stated that the preferred alternative does not appear to adequately protect the health and safety of the City's residents or the natural environment surrounding important public resources including Burnt Mill Pond. TRC in a letter commented that the preferred alternative, Alternative 3, satisfies the two threshold remedy selection criteria of overall protection of human health and the environment and compliance with applicable or relevant and appropriate requirements.

EPA Response to Comment #26: Comments acknowledged. EPA identified Alternative 3 as its preferred alternative for the reasons provided in the Proposed Plan. The preferred alternative is protective of human health and the environment and is selected as the remedy for OU1 in this ROD Amendment.

Comment #27: TRC stated in a letter that Alternative 3 is preferred with respect to the balancing criterion of long-term effectiveness and permanence because it would offer long-term effectiveness more quickly, as the *in-situ* remediation treatability studies already have substantially reduced contamination and significantly expedited the cleanup time. TRC added that EPA's statements at the public meeting confirmed and reinforced this point and quoted the meeting transcript.

EPA Response to Comment #27: Comment acknowledged.

Comment #28: TRC stated in a letter that Alternative 3 is far superior to Alternative 2 with respect to the balancing criterion of reduction of toxicity, mobility or volume through treatment. TRC noted that the asymptotes (leveling off of concentrations at 1,000 µg/L for 10 years) were within the radius of the pumping wells, and that outside of the radius concentrations barely decreased at all over 20 years and were as high as 40,000 µg/L until the *in-situ* remediation studies were conducted. TRC noted that Alternative 3 achieves a reduction in the mobility of contaminants by changing the valence state of the chromium to a form that is extremely conductive of MNA mechanisms. TRC also stated that Alternative 3 (the combination of active remediation attributable to the injections coupled with MNA processes) will effectively contain the plume.

EPA Response to Comment #28: Comment acknowledged.

Comment #29: TRC stated in a letter that Alternative 3 is superior to Alternative 2 with respect to short-term effectiveness because Alternative 3 more aggressively treats the contamination via *in-situ* injections and is expected to achieve the RAOs and PRGs in a shorter amount of time.

EPA Response to Comment #29: Comment acknowledged.

Comment #30: TRC commented that Alternative 3 is superior to Alternative 2 with respect to implementability because pump-and-treat, while it can be implemented, has proven to have limited efficacy and has outlived its useful life and represents the wrong technology for the site.

EPA Response to Comment #30: Comment acknowledged.

Comment #31: TRC stated in a letter that Alternative 3 is a "greener" remedial alternative when compared to Alternative 2 and noted that the focus feasibility study (FFS) ranks the alternative and found that Alternative 3 represents that most sustainable green remediation alternative and best comports with EPA's green remediation objectives.

EPA Response to Comment #31: Comment acknowledged.

COST

Comment #32: A commenter asked for clarification regarding the role of cost in identifying the preferred alternative (bang for buck).

EPA Response to Comment #32: The NCP at 40 Code of Federal Regulations (CFR) § 300.430(f)(1)(ii)(D) provides that "a remedy shall be cost effective if its costs are proportional to its overall effectiveness." In fact, the preamble to the NCP states that if "remedies examined are equally feasible, reliable, and provide the same level of protection, the agency will select the least expensive remedy." The NCP notes at 40 CFR§ 300.430(e)(7)(iii) that alternatives may be eliminated if costs are grossly excessive compared to their overall effectiveness. EPA's *Guidance to Conducting RI/FS Under Superfund* precludes the selection of a higher cost Remedial Alternative where there is no proportional value. EPA's *Role of Cost in the Superfund Remedy Selection Process* indicates that "cost is a central factor in all Superfund selection decisions." During the early stages of a feasibility study, cost is one of the three screening criteria (the others being effectiveness and implementability) used to identify technologies and develop alternatives. In the later detailed analysis of alternatives, cost is one of the five balancing criteria in the nine criteria for remedy selection. In the detailed analysis of alternatives, each alternative's capital, operational, and maintenance costs are compared. Although cost is a central factor in remedy selection, the two threshold criteria of overall protection of human health and the environment, and compliance with applicable or relevant and appropriate requirements (ARARs) carry more weight than cost in remedy selection.

Comment #33: A commenter asked who is paying for the cleanup and for the oil, and whether it was taxpayer money.

EPA Response to Comment #33: The Superfund law has enforcement provisions for identifying entities legally responsible for contamination at a site and having those parties pay for the investigation or cleanup of a site. Where viable potentially responsible parties (PRPs) cannot be identified or do not have the finances to pay for the cleanup, the federal and state government share in the cleanup costs. A PRP has paid for past response actions and investigations performed to date at the site, and has expressed a willingness to fund additional cleanup actions.

Comment #34: A commenter suggested that EPA was trying to strike a deal with Shieldalloy and pay less.

EPA Response to Comment #34: The amended remedy was chosen by EPA based upon the requirements of CERCLA, the results of the site investigations (including the optimization study, the *in-situ* treatability study, and the MNA evaluation), and the detailed analysis of the alternatives. EPA has determined that Alternative 3 satisfies the requirements of Section 121 of CERCLA, 42 U.S.C. § 9621, and provides the best balance of tradeoffs among the remedial alternatives with respect to the NCP's nine evaluation criteria, 40 CFR § 300.430(e)(9).

Comment #35: TRC stated in a letter that any reasonable evaluation of the EPA-approved FFS, the discussion in the Proposed Plan, and the application of the balancing criteria in the NCP can only yield the conclusion that Alternative 3 (present value $9 million) must be selected over Alternative 2 (present value $27 million). TRC further stated that it is impossible for Alternative 2 to be considered cost-effective because it is three times more costly than Alternative 3 without providing greater overall effectiveness (i.e., its costs are not proportional to its overall benefits or effectiveness.

EPA Response to Comment #35: Comment acknowledged.

Comment #36: TRC commented that EPA should clarify that the $490,000 cost of Alternative 3 that has not yet been implemented through the *in-situ* injection studies is attributable to costs for the monitored natural attenuation component of the alternative.

EPA Response to Comment #36: Comment acknowledged.

USE OF GROUNDWATER RESOURCES

Comment #37: A commenter asked how far away from the contamination are people allowed to water (for irrigation) and if EPA is sure irrigation wells are not in the target site (plume).

EPA Response to Comment #37: Under the selected remedy, Alternative 3, ICs in the form of CEA/WRA will be implemented to prevent exposure to contaminated groundwater until the remediation goals have been attained. The selected remedy will not limit use of groundwater for irrigation outside of the boundary of the CEA/WRA. EPA is not aware of any irrigation or potable wells currently active in the contaminant plume.

Comment #38: A commenter asked if a public supply well near Delsea Drive (Vineland Well #10) is contaminated because it is near the groundwater plume from the site. The same commenter stated that the well is closed.

EPA Response to Comment #38: Vineland Well # 10 is located within the area where concentrations of VOC exceed the New Jersey Groundwater Quality Standards. However, the City of Vineland operates a treatment system (air stripper) at Well #10 which removes VOCs from the water prior to its distribution to the public. Vineland Well #10 is not closed. It is used in a seasonal/supportive capacity, so it is pumped occasionally rather than continually

PUBLIC COMMENT PERIOD

Comment #39: A commenter asked why EPA was giving a presentation and taking public comment on a future change to the remedy, when EPA has already made the change.

EPA Response to Comment #39: The *in-situ* injections that have already occurred were part of the treatability study to assess the effectiveness of the *in-situ* remediation. The presentation, public meeting and public comment period are part of the public process that EPA uses to assess community acceptance prior to selection of a remedy for a Superfund site.

BURNT MILL POND

Comment #40: A commenter asked if EPA had tested the surface water and sediment in Burnt Mill Pond. Similarly, another commenter asked if the Burnt Mill Pond is contaminated. A commenter asked about soil and sediments at the site. The City of Vineland stated that the City still has concerns related to the recently issued ROD for OU2, which does not appear to include a remedial action for Burnt Mill Pond.

EPA Response to Comment #40. Surface water and sediment of Burnt Mill Pond and facility soils are part of OU2 of the site, not this OU1, so these comments are beyond the scope of this public comment period and responsiveness summary. Be that as it may, the following information is provided: Burnt Mill Pond sediment was sampled at locations along the channel at the bottom of Burnt Mill Pond. These sample locations were selected because a fate and transport analysis indicated that, if site material were being transported, it would be transported primarily along the channel and channel sediments would be expected to have the highest concentration of contaminants. Samples collected from the channel locations did not present a risk; therefore, other locations would not be expected to present a risk.

Further, as part of OU1, EPA closely studied groundwater proximate to Burnt Mill Pond. Three wells (VP-1, 2, 3) nearer to Burnt Mill Pond each showed PCE (a solvent not used at the site) concentrations in groundwater. PCE was also detected in other wells at non-site locations south of the SMC site and west of the SMC site. TCE is a breakdown product of PCE; where PCE exists, you would expect to find TCE. TCE was found in two of these three wells, but far deeper (at least 35 feet below grade, as much as 120 feet below grade) than Burnt Mill Pond. Because of its characteristics of low viscosity and higher density than water, the TCE plume migrates to lower depths as it moves downgradient. At this site, it has resulted in a layer of uncontaminated groundwater above the plume. This uncontaminated groundwater lens lies below the pond, over the deeper groundwater aquifer zone, and prevents volatilization and vapor intrusion from the deep groundwater aquifer zone thus protecting the pond. Further, the OU2 RI concluded that no VOCs above regulatory values were detected in the streams flowing into Burnt Mill Pond.

APPENDIX V-a

PROPOSED PLAN

Shieldalloy Metallurgical Corporation Superfund Site

Newfield, Gloucester/Cumberland Counties, New Jersey

Superfund Proposed Plan *July 2015*

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan describes the alternatives considered for amending the approach to cleaning up non-perchlorate groundwater contamination at the Shieldalloy Metallurgical Corporation (SMC) Superfund site and identifies the preferred remedy with the rationale for this preference.

This Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA), the lead agency for the site, in consultation with the Department of Environmental Protection (NJDEP), the support agency. The EPA is issuing this Proposed Plan in accordance with Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA) and Sections 300.430(f) and 300.435(c) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

The nature and extent of the non-perchlorate groundwater contamination at the site and the remedial alternatives summarized in this Proposed Plan are described in detail in three documents: the January 2011 S*upplemental Remedial Investigation (Supplemental RI) Report*, the March 2014 *OU1 In Situ Remediation Pilot Program Evaluation Report*, and the March 2015 *Final Draft Focused Feasibility Study (FFS) Report*. These and other documents are part of the publicly available administrative record file. The EPA encourages the public to review these reports to gain a more comprehensive understanding of the site and the Superfund activities that have been conducted.

The Proposed Plan is being provided as a supplement to the above-noted documents to inform the public of the EPA's preferred remedy and to solicit public comments pertaining to all of the remedial alternatives evaluated, including the preferred alternative. The current remedy, selected in a 1996 Record of Decision (ROD), includes a groundwater pump-and-treat system with groundwater extraction, aboveground treatment, and on-site discharge of treated water.

MARK YOUR CALENDAR

Public Comment Period:

July 30 to August 28, 2015

EPA will accept written comments on the Proposed Plan during the public comment period. Written comments should be addressed to:

Sherrel Henry, Remedial Project Manager
U.S, Environmental Protection Agency
290 Broadway, 20th Floor
New York, NY 10007
Fax: (212) 637-4866
Email:henry.sherrel@epa.gov

Written comments must be postmarked no later than August 28, 2015.

Public Meeting

EPA will hold a public meeting to explain the Proposed Plan. Oral and written comments will also be accepted at the meeting. The meeting will be held as follows:

Newfield Borough Hall
18 Catawba Avenue, Newfield, NJ

August 12, at 7:00 pm

350386

The preferred alternative identified in this Proposed Plan would amend that ROD to instead require *in-situ* remediation, monitored natural attenuation (MNA), groundwater monitoring and institutional controls. The estimated present-worth cost of the preferred alternative is $9,125,000, a portion of which already has been expended to implement the *in-situ* remediation pilot program.

COMMUNITY ROLE IN SELECTION PROCESS

This Proposed Plan is being issued to inform the public of the EPA's proposed alternative and to solicit public comments pertaining to all of the remedial alternatives evaluated, including the preferred alternative. Changes to the proposed alternative, or a change to another alternative, may be made if public comments or additional data indicate that such a change would result in a more appropriate remedial action. The final decision regarding the selected remedy will be made after the EPA has taken into consideration all public comments. The EPA is soliciting public comments on all of the alternatives considered in the Proposed Plan, because the EPA may select a remedy other than the proposed alternative. This Proposed Plan has been made available to the public for a public comment period that concludes on August 28, 2015.

A public meeting will be held during the public comment period to present the conclusions of the Supplemental RI, the OU1 In situ Remediation Pilot Program Evaluation Report and the FFS, to elaborate further on the reasons for proposing the preferred alternative, and to receive public comments. The public meeting will include a presentation by EPA of the preferred alternative and other cleanup options.

Information on the public meeting and submitting written comments can be found in the "Mark Your Calendar" text box on Page 1.

Comments received at the public meeting, as well as written comments received during the comment period, will be documented in the Responsiveness Summary section of the ROD Amendment. The ROD Amendment is the document that explains which alternative has been selected and the basis for the selection of the remedy.

SCOPE AND ROLE OF ACTION

The site is divided into three operable units. Remediation originally was separated into perchlorate and non-perchlorate segments by NJDEP, with concurrence from the EPA. Perchlorate is both a naturally occurring and synthetic chemical that is used to produce rocket fuel, fireworks, flares and explosives. SMC used perchlorate in some of its manufacturing processes at the site.

Operable Unit 1 (OU1), which is the subject of this Proposed Plan, consists of the non-perchlorate contamination in the groundwater at the site. The main contaminants of concern for OU1 are chromium (Cr) and trichloroethene (TCE). NJDEP issued a ROD for OU1 in 1996, with EPA's concurrence. This Proposed Plan identifies the proposed amendment to the 1996 selected remedy for OU1, which will be finalized in an OU1 ROD Amendment following consideration of the comments received during the public comment period.

OU2 consists of the non-perchlorate contamination in the soil, surface water and sediment. The main contaminants of concern for OU2 are chromium and vanadium in soil and sediment. A remedy for OU2 was selected in a ROD signed by the EPA in September 2014.

OU3 consists of the perchlorate contamination in any medium (groundwater, soil, surface water, sediment, etc.) and is in the remedial investigation/feasibility study phase. A remedy for OU3 is expected to be the final ROD to be issued for the site.

Radiological contamination is present in a restricted area on the SMC facility. The radiological contamination is not part of the Superfund site and is being addressed by NJDEP, as authorized by the U.S. Nuclear Regulatory Commission (NRC). To prevent any exposure to the radioactive contamination, the restricted area is surrounded by a chain link fence with barbed wire and is posted with specific signage. Inside the perimeter fence is a storage area with slags and dusts containing low levels of radioactive isotopes generated during past facility operations. Further information about the environmental response actions to address the radiological contamination is available from NJDEP.

SITE BACKGROUND

Site Description

The site is comprised of two land parcels, the SMC facility and the farm parcel, and a surface water feature, the Hudson Branch, which is an intermittent stream that discharges into Burnt Mill Pond (see Figure 1).

SMC Facility The larger parcel is the 67.5-acre SMC facility located at 35 South West Boulevard, in the Borough of Newfield, Gloucester County, New Jersey, with a small portion of the southwestern corner located in the City of Vineland, Cumberland County, New Jersey. The facility is currently used by SMC as office space. Portions are also leased by SMC to various construction companies and to Newfield Borough for warehousing. The facility is secured by a locked perimeter chain link fence. The facility is bordered to the north by farms, a rail spur and an inactive landfill; to the east by a wooded area, residences and small businesses; to the south by residences located along Weymouth Road; and to the west by Conrail rail lines, South West Boulevard, and various light industries and residences. The facility parking lot along the western property boundary lies outside of the chain link fence to allow visitor and administrative access.

The SMC facility consists of four main areas, the *former production area, former lagoons area, eastern storage area and southern area*, as well as the *natural resource restoration areas* (see Figure 2).

The *former production area* is approximately 22 acres and is the area where the majority of manufacturing activities occurred. A metal degreasing unit, referred to as the Manpro-Vibra Degreasing Unit, was operated from 1965 to 1967 and used TCE as a degreasing compound.

The *former lagoons area* occupies 4.5 acres. It includes nine lagoons that stored wastewaters and were closed by SMC between 1994 to 1997 under NJDEP oversight. The former lagoons area is covered by a clean soil cover and light vegetation, which includes small trees and grass.

The *eastern storage area* had been used to store drums containing byproducts of the manufacturing processes. A 1.3-acre portion of the eastern storage area is uncapped and covered with some gravel and concrete debris.

The *southern area* includes undeveloped areas, an on-site impoundment and a former thermal pond area. The on-site impoundment receives a combination of facility storm water and treated water from the on-site groundwater treatment system pursuant to New Jersey Discharge Elimination System (NJDES) permit requirements. The water from the on-site impoundment is directed into a ditch flowing toward Hudson Branch. The on-site impoundment was installed by SMC in the early 2000s by excavating existing soils. The former thermal pond area covers 0.77 acres and consists of a rectangular depression, approximately three to five feet deep, that is covered with vegetation including grass and small trees. During facility operations, the former thermal pond was used as an emergency holding reservoir for treated wastewater. Several areas were developed and included in natural resource restoration areas (discussed below). The remainder of the southern area is undeveloped and covered with a vegetated cap, grass and small trees. In 1990, a spill of chromium wastewater, referred to as the tank T12 chromium wastewater spill, occurred in the southern area.

The *natural resources restoration areas* are located in a noncontiguous collection of areas around the facility, generally focused on the eastern and southern areas and total nearly 10 acres (see Figure 2). These areas are the subject of a Settlement Agreement of Environmental Claims and Issued by and between SMC and the United States of America (on behalf of the EPA) and the State of New Jersey (on behalf of NJDEP). In 1999 and 2000, caps comprised of clean soil and vegetation, including a variety of grass, flowers, trees and bushes, were constructed in these areas. These vegetative caps provide habitat value and eliminate the potential for exposure to contaminated soil.

Farm Parcel The farm parcel is 19.8 acres of noncontiguous farmland in the City of Vineland approximately 2,000 feet southwest of the facility. The farm parcel is used for access to perform groundwater remediation activities under OU1. The farm parcel has never been used for manufacturing activities. It is considered part of the site because it is land that is needed to implement the OU1 remedy.

Hudson Branch The Hudson Branch, an intermittent stream, runs along the southern edge of the facility and discharges to Burnt Mill Pond.

The SMC facility and farm parcel are zoned industrial. The future land use of the site is anticipated to remain consistent with its current zoning. The site is located in a mixed residential, agricultural, commercial, and light industrial area. The closest residences are approximately 100 feet south of the facility. Groundwater is the primary source of drinking water in the area.

Site History

Specialty glass manufacturing began at the facility in the early 1900s. Shieldalloy Metallurgical Corporation purchased the facility in the early 1950s. From 1955 to 2006, SMC manufactured specialty steel and super alloy additives, primary aluminum master alloys, metal carbides, powdered metals and optical surfacing products at the facility. Production processes also included chromium metal, chromium oxide, vanadium pentoxide, ferro-vanadium, uranium oxide, thorium oxide, ferro-columbium and columbium nickel. General facility operations, product spills and wastewater discharges contributed to the contamination of the site.

Chromium contamination of the groundwater was first detected by NJDEP in 1970 in a Borough of Newfield municipal well and a private well. Site investigations dating back to 1972 identified groundwater contamination at the site with chromium as the primary contaminant of concern and TCE, used at the site for degreasing operations, as the secondary contaminant of concern, although other volatile organic chemicals (VOCs) were also detected. As a result, NJDEP directed SMC to perform groundwater investigations to determine the extent of the chromium contamination and to develop an appropriate remedial action. SMC purchased the farm parcel in 1970 to construct a groundwater extraction and treatment system. A focused pump-and-treat system began operating in 1979, pumping and treating chromium-contaminated groundwater via an old ion exchange system. Treated water was discharged into an on-site, unnamed tributary of the Hudson Branch stream, under a New Jersey Pollution Discharge Elimination System (NJPDES) permit.

In September, 1983, the SMC site was proposed for inclusion on the National Priorities List (NPL) pursuant to Superfund law. The site was added to the NPL in September 1984. Ground water samples taken by SMC between 1984 and 1987 revealed the presence of VOCs. In 1989, four extraction wells were added to better capture the chromium plume and the treatment system was expanded to include an air stripper to address the TCE in the recovered groundwater. The metals treatment portion of the system was upgraded to electrochemical precipitation in 1991. Also in 1991, SMC completed a remedial investigation. The remedial investigation indicated that the groundwater, soil, surface water and sediments were contaminated with VOCs and metals. Supplemental remedial investigation activities were conducted in 1995 to delineate the extent of contamination. A feasibility study report was completed in 1996.

In September 1996, the NJDEP issued a ROD for OU1 with EPA concurrence. The major components of the 1996 ROD are as follows:

- Modify the Ground Water Extraction System (using five extraction wells) to optimize the capture of contaminated ground water;
- Air Stripping to remove volatile organic compounds from the recovered groundwater;

- Electrochemical treatment with supplemental treatment methods(as required) to remove inorganic contaminants, especially metals, from the recovered groundwater; and
- The permitted discharge of treated ground-water to surface waters of the Hudson Branch of the Maurice River.

Enforcement History

In 1984, NJDEP and SMC entered into an administrative consent order requiring SMC to investigate groundwater at the site and to address the plume of groundwater contamination. In 1988, NJDEP directed SMC to modify and upgrade its pump-and-treat system and to expand the groundwater monitoring program. Later in 1988, NJDEP and SMC entered into a second administrative consent order in which SMC agreed to upgrade the groundwater extraction and treatment system, to perform a site-wide study of the soil, and to close and remediate the nine wastewater lagoons. Under NJDEP's oversight, SMC also took a number of response actions that resulted in the removal of above-ground and underground storage tanks, and the capping of the industrial areas of the site. In 2006, NJDEP entered into an administrative consent order with SMC and TRC Environmental Corporation (TRC) for the completion of all Superfund cleanup activities at the site.

In 2010, the lead oversight was transferred from NJDEP to the EPA. The EPA entered into an administrative order on consent (2010 Administrative Order) with SMC and TRC in April 2010 to perform activities for OU1, which is the subject of this Proposed Plan, OU2 and OU3.

SITE CHARACTERISTICS

Site Geology and Hydrogeology

Three surficial geologic units underlie the site: the Bridgeton Formation, Cohansey Formation and Kirkwood Formation. The Bridgeton Formation consists of up to 28 feet of brown sand. Below the Bridgeton Formation is the Cohansey Formation, which consists of coarse sand and little silt in the upper 40 feet and generally finer sand and some clay and silt lenses in the lower 60 to 80 feet. Below the Cohansey Formation is the Kirkwood Formation, which consists of a vertically confining gray clay and silt layer that was encountered at the site at 121 to 153 feet below ground surface. The thickness of the unsaturated soils ranges from a few feet near the Hudson Branch to 17 feet in the northern part of the site. Bedrock was not encountered during site investigations but is estimated at approximately 2,000 feet below ground surface.

Hydraulically, the Cohansey Formation behaves as a single heterogeneous, water table aquifer. Depth to groundwater at the site ranges from approximately four to 16 feet. Groundwater flow direction is to the southwest, from the site towards the farm parcel.

NJDEP has designated the area downgradient of the site as a well restriction area (WRA), and the City of Vineland passed ordinances requiring mandatory connection to public water. Public water is provided throughout the downgradient areas of the site. The closest location of a public well is approximately 3,000 feet north of the site, which is side-gradient of the site.

The groundwater is classified as Class II-A. The primary designated use for Class II-A groundwater is potable water and conversion (through conventional water supply treatment, mixing or other similar techniques) to potable water. Secondary designated uses include agricultural and industrial water.

RESULTS OF THE REMEDIAL STUDIES

The pump-and-treat system was operated at the site from 1979 to 2013. From 2007 to 2014, several studies were undertaken to assess system performance, to evaluate site conditions and the viability of monitored natural attenuation, and to test *in-situ* cleanup methods. The results of these studies are summarized below.

Optimization Study (2010)

In 2010, an optimization study was performed to evaluate the efficiency of the pump-and-treat system. Site groundwater data collected monthly over the past 20 years were reviewed for five pumping wells in three locations (facility, car wash and farm parcel) to determine the ability of the pump-and-treat system to meet remedial action objectives (RAOs) in a timely fashion. The data review focused on chromium as the primary contaminant of concern and TCE as the secondary contaminant of concern. The study found that the groundwater pump-and-treat system provided reasonably good containment, but that concentration reduction rates from the pump-and-treat had slowed to asymptotic conditions since the year 2000. For example, hexavalent chromium concentrations at the SMC facility pumping wells and the car wash pumping wells were approximately 30,000 micrograms/liter (µg/L) in the 1980s and leveled off at approximately 1,000 µg/L for the past 10 years, compared to a cleanup goal of 70 µg/L.[1] The results of the study concluded that the pump-and-treat system was slow, inefficient and not cost effective. The main treatment process, electrochemical precipitation, is extremely energy intensive, consuming as much electricity as 125 homes every day, 365 days per year. These findings prompted the 2011 construction of a new replacement treatment plant with an ion exchange unit, which could provide over a 50% energy savings. The results of the optimization study also suggested that treatability studies be performed to evaluate the effectiveness of *in-situ* remedial technologies. Such technologies were expected to be more efficient and cost-effective and would expedite aquifer cleanup to achieve the RAOs faster than the pump-and-treat system. Because *in-situ* technologies can foster conditions suitable for MNA, a detailed MNA study was also recommended in conjunction with the *in-situ* pilot treatability program.

The optimization study is presented in the *SMC 2010 OU1 Remedial System Optimization Study*.

OU1 Supplemental Remedial Investigation (2010)

Supplemental field work for OU1 was conducted in October and November 2010. The main purpose of this work was to delineate the extent of groundwater contamination (Cr and VOCs, primarily TCE) and to install sentinel wells. Another purpose was to evaluate groundwater contamination near the site to determine if it was related to the site, or whether it was a result of other contaminant sources. Activities included the installation and sampling of 25 vertical profiling temporary wells and nine permanent sentinel wells located beyond the downgradient extent of groundwater contamination.

The supplemental remedial design investigation showed that the chromium plume is approximately 2,600 feet long, extending from the SMC facility past the car wash to the Farm Parcel. The chromium plume is 400 feet wide near the SMC facility and narrows to 100 feet wide near the Farm Parcel and descends to a depth of 110 feet below ground surface.

The TCE plume in the shallow aquifer zone (30 to 70 feet below ground surface) is approximately 1,000 feet long, extending from the SMC facility near the former Manpro-Vibra Degreasing Unit toward the car wash, and is 500 feet wide. The highest concentration of TCE detected is 207 µg/L compared to the NJ MCL and groundwater quality standard (GWQS) of 1 µg/L and Federal MCL of 5 µg/L. A TCE plume in the deep aquifer zone (70 to 130 feet below ground surface) extends approximately 10,000 feet from the SMC facility to beyond the Farm Parcel and is approximately 5,280 feet wide, with the highest concentration detected at 50 µg/L. The TCE concentrations at the SMC Facility are either stable or decreasing. The sandy nature of the shallow and deep aquifer zones would ordinarily yield long, narrow plumes, and data suggest that non-site related TCE is contributing to the atypical width of the TCE plumes. Because of its characteristics of low viscosity and higher density than water, the TCE plume migrates to lower

1 Note, that NJ Ground Water Quality Standard (70 µg/L) and the NJ and Federal maximum contaminant level (100 µg/L) are based on total chromium (hexavalent chromium and trivalent chromium).

depths as it moves downgradient. This results in a layer of uncontaminated groundwater above the plume. This uncontaminated groundwater lens prevents volatilization and vapor intrusion from the TCE plume.

The supplemental remedial investigation is presented in the 2011Supplemental Remedial Investigation Report.

In-situ Remediation (ISR) Treatability Studies (2010-2014)

From 2010 to 2014, bench-scale tests were conducted to evaluate a variety of in-situ remediation injection substances for chromium and TCE, expanding upon studies begun in 2007.

For treatment of chromium, treatability testing results indicated that calcium polysulfide (CPS) would be an effective reagent to treat chromium-impacted groundwater. On the SMC Facility, the car wash and the Farm Parcel, CPS was injected into the subsurface through wells to create a reducing (no oxygen) environment promoting the conversion of the hexavalent chromium (Cr(VI)) to the less toxic and less mobile trivalent chromium (Cr(III)) form and facilitating its precipitation as an insoluble solid. Following treatment, chromium concentrations were reduced by 98%-100% in many SMC Facility monitoring wells. Average chromium and Cr(VI) groundwater concentrations declined from 4,490 µg/L to 140 µg/L for total chromium and from 2,130 µg/L to 13 µg/L for Cr(VI). At the Farm Parcel, CPS injections reduced total chromium concentrations from 5,024 µg/L to 347 µg/L. Near the car wash, CPS injections reduced total chromium concentrations from 1,144 µg/L to 196 µg/L. Overall, the plume footprint was reduced by more that 50 percent. Due to the length of time that CPS remains in the system and is available to precipitate the chromium as a solid, the benefits of the CPS injections are estimated to continue for 5 to 10 years for the upper zone and 20 to 35 years for the lower zone.

For treatment of TCE, treatability testing results indicated that emulsified vegetable oil (EVO) would be an effective amendment to treat TCE-impacted groundwater. EVO contains nutrients and fosters biological transformation by providing naturally occurring microbes with a carbon "food source" and an electron donor for respiration of TCE. On the SMC facility, EVO was injected into the subsurface through wells to enhance the reductive dechlorination process in the groundwater, and thereby convert the TCE, ultimately, to non-toxic end products (ethene and/or CO_2). The EVO injections at the SMC Facility reduced TCE concentrations from 207 µg/L in 2010 to non-detect in 2012 and 2013. The non-detect concentrations over the two year period indicates that the concentration reduction is stable.

The *in-situ* remediation pilot treatability studies are presented in the March 2014 In Situ Pilot Program Progress and Evaluation Report.

Assessment of Monitored Natural Attenuation (MNA) (2012-2014)

Consistent with EPA protocols, a four-tier analysis was conducted to evaluate the effectiveness of MNA for the site. Tier I is a demonstration of plume stability and attenuation, Tier II is an evaluation to determine the mechanism(s) and rate of attenuation, Tier III is an evaluation to determine the capacity and stability of the attenuation mechanism(s) and Tier IV is the implementation of a long-term performance monitoring program.

The Tier I evaluation showed that the contaminant plumes on site are stable or shrinking and the aquifer conditions are conducive to ongoing contaminant degradation, which support the viability of MNA. The Tier II evaluation confirmed that the primary mechanism for chromium attenuation processes are sorption onto iron and reduction/precipitation reactions with native iron. The mechanism and rate of MNA calculated support the viability of MNA. The Tier III assessment demonstrated that the aquifer has adequate capacity to attenuate the remaining contamination. The evaluation of site stability during treatability testing and site aquifer geochemistry support the viability of MNA. Modeling concluded that MNA is viable for the site and would keep sentinel wells (select wells downgradient on the Farm Parcel) below regulatory standards over time.

A Tier IV monitoring plan was submitted in August 2014 and conditionally approved by the EPA. In the event that monitoring data such as concentration trends are inconsistent with the allowable residual concentrations or with 70 µg/L total chromium at sentinel wells, the monitoring report is required to recommend additional steps for implementation, such as further sampling, pilot studies or modeling.

The assessment of MNA is presented in three documents: February 14, 2013 *Procedural Assessment of MNA of Chromium in Groundwater at the SMC Site* memorandum, May28, 2013 *SMC MNA Model* memorandum and the August 2014 *OU1 Routine Groundwater Monitoring Plan*.

SUMMARY OF SITE RISKS

The 1995 human health risk assessment (HHRA) evaluated potential current/future risks to adult residents, adult industrial workers, and adult construction workers who could come in contact with contaminated groundwater. In 2015, an OU1 Risk Update was performed to assess the change in calculated cancer risks and non-cancer health hazards based on changes in toxicity values for some contaminants of concern. The reasonably anticipated future land use for the site is the same as its current commercial/industrial land use.

An ecological risk assessment for OU1 was not completed because no exposure pathways were identified for ecological receptors to come into contact with contaminated groundwater.

Human Health Risk Assessment

As part of the OU1 ROD amendment investigation, four-step human health risk assessment process was used for assessing site-related cancer risks and noncancer health hazards. The four-step process is comprised of Hazard Identification of Chemicals of Potential Concern (COPCs), Exposure Assessment, Toxicity Assessment and Risk Characterization (see textbox, "What Is Risk and How Is It Calculated?").

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 to assess site-related human health risks for reasonable maximum exposure (RME) scenarios.

Hazard Identification: In this step, the chemicals of potential concern (COPCs) at a site in various media (*e.g.,* soil, surface water, and sediment) are identified based on such factors as toxicity, frequency of occurrence, 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 contaminated soil. Factors relating to the exposure assessment include, but are not limited to, the concentrations that people might be exposed to and the potential frequency and duration of 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 non-cancer 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 chemicals are capable of causing both cancer and non-cancer health effects.

Risk Characterization: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks. Exposures are evaluated based on the potential risk of developing cancer and the potential for non-cancer 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 explained in the Exposure Assessment. Current guidelines for acceptable exposures are an individual lifetime excess cancer risk in the range of 10^{-4} to 10^{-6} (corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk) with 10^{-6} being the point of departure. For non-cancer health effects, a hazard index (HI) is calculated. An HI represents the sum of the individual exposure levels compared to their corresponding reference doses. The key concept for a non-cancer HI is that a threshold level (measured as an HI of less than 1) exists below which non-cancer health effects are not expected to occur.

In the 2015 OU1 Risk Update, the following pathways were evaluated: current/future resident exposed via ingestion of groundwater and dermal contact with groundwater from private wells (shallow/deep). Cancer risks were calculated to be unacceptable for the adult resident (4 x 10^{-4} in shallow groundwater; 6 x 10^{-3} in deep groundwater) and for the child resident (2 x 10^{-4} in shallow groundwater; 3 x 10^{-3} in deep groundwater). The sole cancer risk driver is chromium (VI).

Noncancer health hazards were calculated to be unacceptable for the future adult exposed to shallow groundwater and deep groundwater and to the future child exposed to shallow groundwater and deep groundwater, as follows:

		Beryllium	Boron	Chromium IV	Vanadium
Adult	shallow	16	2		18
	deep			14	2
Child	shallow	23	4		28
	deep			22	3

The 1995 HHRA and 2015 Risk Update concluded that cancer risks and noncancer health hazards from exposure to site-related groundwater are unacceptable for residents under a hypothetical potential future use scenario. Residents currently do not drink the groundwater impacted by site contaminants; however, Superfund requires that exposures be calculated assuming that no additional action is taken at the site, as a conservative and protective analysis.

FEASIBILITY STUDY

The feasibility study (FS) is the mechanism for the evaluation of alternative remedial actions. During the FS phase, RAOs are developed, preliminary remediation goals (PRGs) are identified, technologies are screened based on overall implementability, effectiveness and cost, and remedial alternative are assembled and analyzed in details with respect to the nine criteria for remedy selection under CERCLA.

Detailed information is available in the March 2015 *Final Draft Focused Feasibility Study*.

Remedial Action Objectives

RAOs describe what the proposed site cleanup is expected to accomplish. These objectives are based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs), to-be-considered standards and guidance, and site-specific risk-based levels. The RAOs that were identified in the 1994 FFS, are still appropriate and are identified below:

- Prevent exposure, due to ground-water ingestion, to groundwater contaminants attributable to the SMC facility which have been detected at levels exceeding ARARs;
- Prevent migration of groundwater contamination; and
- Remediate the groundwater contamination attributable to the SMC Facility to achieve ARARs.

Preliminary Remediation Goals

The PRGs will become final remediation goals when EPA makes a final decision to select an amended remedy of OU1 of the site, after taking into consideration public comments. The PRGs for groundwater were developed to meet the site-specific RAOs, and are the more stringent of the Federal MCLs and the State MCLs and NJGWQS, which are the ARARS identified for the site.

Constituent in Groundwater	PRG (µg/L)
Total Chromium	70
TCE	1

Remedial Alternatives

CERCLA §121(b)(1), 42 U.S.C. §9621(b)(1), mandates that remedial actions be protective of human health and the environment, be cost-effective, and use permanent solutions, alternative treatment technologies, and resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which use, as a principal element, treatment to permanently and significantly reduce the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants at a site. CERCLA §121(d), 42 U.S.C. §9621(d), further specifies that a remedial action must require a level or standard of control of the hazardous substances, pollutants, and contaminants, which at least attains ARARs under federal and state laws, unless a waiver can be justified pursuant to CERCLA §121(d)(4), 42 U.S.C. §9621(d)(4).

Principal threat wastes are source materials that include or contain hazardous substances that act as a reservoir for the migration of contamination to groundwater, surface water or air, or act as a source for direct exposure. These materials are considered to be highly toxic or highly mobile and, generally, cannot be reliably contained. At this site, principal threat waste was present in the lagoons and was removed in 1994-1997. Contaminated groundwater generally is not considered to be a source material; however, non-aqueous phase liquids (NAPLs) in groundwater may be viewed as source material. NAPLs are hydrocarbons that exist as a separate, immiscible phase when in contact with water and/or air. NAPLs are not present in groundwater at the site.

Remedial alternatives for the site are summarized below. Capital costs are those expenditures that are required to construct a remedial alternative. Operation and maintenance costs are those post-construction costs necessary to ensure or verify the continued effectiveness of a remedial alternative and are estimated on an annual basis. Present worth is the amount of money which, if invested in the current year, would be sufficient to cover all the costs over time associated with a project, calculated using a discount rate of seven percent and a 30-year time interval. Construction time is the time required to construct and implement the alternative and does not include the time required to design the remedy, negotiate performance of the remedy, or procure contracts for design and construction.

Remedial Alternatives	
Alternative	**Description**
1	No Further Action
2	Pump-and-Treat (1996 ROD)
3	In-Situ Remediation

Alternative 1: No Further Action

Capital Cost	$0
Operation & Maintenance (O&M) Cost	$0
Present Worth Cost	$0
Construction Time	0 months

A no action alternative is required by the NCP and EPA guidance as a baseline with which to compare the other remedial action alternatives. Alternative 1 is not protective of human health and the environment because it does not include any measures to prevent ingestion of contaminated groundwater, reduce the cancer risks and noncancer health hazards, or restore the groundwater.

Because Alternative 1 would result in contaminants remaining above levels that allow for unrestricted use and unlimited exposure, a review of site conditions would be conducted at least once every five years, as required by CERCLA.

Alternative 2: Pump-and-Treat (1996 ROD) IC's, Long-Term Monitoring and Five-Year Reviews

	1996 ROD Estimate	2015 Estimate
Capital Cost	$106,000	$1,600,000
O&M Cost	$750,000	$850,000
Present Worth Cost:	$9,400,000	$27,050,000
Construction Time	0 months	0 months

Alternative 2 is the remedy selected in the 1996 ROD, which is the groundwater pump-and-treat system that operated from 1989 to 2013. It includes five extraction wells to capture contaminated groundwater, air stripping to remove VOCs from the recovered groundwater, electrochemical precipitation treatment (more recently modified to ion exchange) to remove chromium from the recovered groundwater, discharge of treated ground water to surface waters of the Hudson Branch of the Maurice River, monitoring. Alternative 2 also includes implementation of a classification exception area (CEA)/Well Restriction Area (WRA), as an institutional control (IC). Groundwater will be monitored to evaluate the effectiveness of the pump-and-treat system in capturing the contaminated groundwater.

Because Alternative 2 would result in contaminants remaining above levels that allow for unrestricted use and unlimited exposure, a review of site conditions would be conducted at least once every five years, until the RAOs and PRGs are met.

Alternative 3: *In-Situ* Remediation, MNA, IC's, Long-Term Monitoring and Five-Year Reviews

Capital Cost	$8,800,000
Remaining Capital Cost	$2,200,000
O&M Cost	$490,000
Present Worth Cost:	$9,125,000
Construction Time	0 months

Alternative 3 includes *in-situ* remediation of chromium and TCE in the shallow and deep groundwater at the SMC facility, farm parcel and car wash area, and MNA in the remainder of the shallow and deep groundwater plumes. Much of this alternative was implemented as an *in-situ* remediation pilot study from 2010 to 2014, as described above. Treatment reagents were injected into the groundwater to target the area of the aquifer with the highest concentrations of chromium and TCE. Chromium and TCE concentrations were significantly reduced and continued reduction is expected because, in many areas of the site, active remediation is on-going. In addition, the viability of MNA to further reduce concentrations and meet PRGs has been demonstrated. Institutional controls (ICs) in the form of a CEA/WRA would be implemented to prevent exposure to contaminated groundwater. Long-term monitoring of groundwater would be required to evaluate the effectiveness of MNA.

Because Alternative 3 would result in contaminants remaining above levels that allow for unrestricted use and unlimited exposure, a review of site conditions would be conducted at least once every five years, until RAOs and PRGs are met.

COMPARATIVE ANALYSIS OF ALTERNATIVES

In the FFS, each alternative is assessed against the evaluation criteria for Superfund remedial alternatives and is compared to the other alternatives under consideration with respect to the Superfund evaluation criteria. A description of each criterion is provided in the text box. A summary of the comparative analysis is provided in Table 1 of the 2015 *Final Draft Focused Feasibility Study*.

***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.*

Overall Protection of Human Health and the Environment

Alternative 1 would provide no further action and is not protective of human health or the environment.

Alternatives 2 and 3 employ active technologies to address the groundwater contamination. Alternative 2 would protect human health and the environment through a pump-and-treat system to prevent migration and eventually reach the RAOs, as well as institutional controls to prevent exposure to contaminated groundwater. Alternative 3 would protect human health and the environment through *in-situ* remediation, MNA and institutional controls. The long-term monitoring program for groundwater would monitor the migration and fate of the contaminants and ensure that human health is protected. The NJDEP will establish a CEA/WRA, pursuant to 7:26C-7.3, which limits groundwater use in a defined area. Currently, the City of Vineland has ordinances that are protective of the majority of the OU1 plume (the portion of OU1 in Newfield is not addressed by this control).

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Alternative 1 would not comply with applicable or relevant and appropriate requirements (ARARs), such as the chemical-specific ARARs for groundwater, which are the New Jersey MCLs (N.J.A.C. 7:10) and GWQS (N.J.A.C. 7:9C), and the federal MCLs published under the Safe Drinking Water Act (40 CFR 141.11-16 and 141.60-63).

Alternatives 2 and 3 would comply with chemical-specific ARARs. Alternative 2 would comply with the action-specific ARARs such as air emissions from the air stripper, and discharges of treated groundwater pursuant to the substantive requirements of the New Jersey Pollutant Discharge Elimination System regulations (N.J.A.C. 7:14A).

***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.*

Long-Term Effectiveness and Permanence

Alternative 1 would not provide long-term effectiveness and permanence because groundwater impacts would not be addressed.

Alternatives 2 and 3 would provide long-term effectiveness and permanence because both alternatives would maintain protection of human health and the environment once RAOs were met and PRGs were attained. Alternative 3 is preferred with respect to this criterion because it would offer long-term effectiveness more quickly, as the *in-situ* remediation treatability studies already have substantially reduced contamination and significantly expedited the cleanup time.

Reduction of Toxicity, Mobility or Volume through Treatment

Alternative 1 would not reduce the toxicity, mobility or volume of contaminants in groundwater through treatment.

For Alternative 2, pumping for plume containment would reduce the mobility of contaminants in groundwater and ensure that no new areas become contaminated. The treatment system of Alternative 2 would reduce the toxicity of contaminants. However, under Alternative 2 the volume of contaminated groundwater would not be expected to be reduced except after a very long time. As demonstrated by the treatability studies, Alternative 3, through the *in-situ* remediation treatment by injections of CPS and EVO, was very successful in substantially reducing the toxicity, mobility and volume of contaminants in groundwater in a much shorter time frame.

Short-Term Effectiveness

Alternative 1 would not pose potential short-term risk or hazard to the community, the workers, or the environment because no actions would occur. However, this alternative does not mitigate potential exposure pathways or meet the RAOs and PRGs for OU1.

Alternatives 2 and 3 are effective in the short-term. Alternatives 2 and 3 would have minimal potential risks or hazards associated with implementing the alternatives, which would be reduced using administrative and engineering control, health and safety measures, and proper personal protective equipment. Alternative 3, which more aggressively treats the contamination via the *in-situ* injections, is expected to achieve RAOs more quickly than the pump-and-treat remedy in Alternative 2, which, as stated previously is no longer efficiently reducing groundwater concentrations. Based on current modeling, Alternative 3 is estimated to achieve the RAOs and PRGs in approximately 50 to 200 years, compared to 440-660 years for Alternative 2. Thus, Alternative 3 will achieve the RAOs and PRGs three to eight times faster.

Implementability
All three alternatives are implementable. Alternative 1 would require no resources or effort to implement. Alternatives 2 and 3 require resources and effort. The pump-and-treat system of Alternative 2 operated for almost 25 years, so it already has been demonstrated to be implementable. The *in-situ* remediation of Alternative 3 was demonstrated to be implementable with the injections of the treatability studies conducted from 2010 to 2014.

Further, for Alternative 2, pump-and-treat requires extensive energy for operation and produces a significant amount of waste sludge to be landfill off-site, whereas Alternative 3 has significantly lower energy demands with very little waste generated as a result.

Cost

A table of the estimated capital, annual O&M, and present worth costs for each alternative is presented below.

Alternative	Capital Cost	Annual O&M Cost	Present Worth
1	$0	$0	$0
2	$1,600,000	$850,000	$27,050,000
3	$8,800,00	$490,000	$9,125,000

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.*

THE NINE SUPERFUND EVALUATION CRITERIA

1. **Overall Protection of Human Health and the Environment** evaluates whether an alternative eliminates, reduces, or controls threats to public health risk assessment is an analysis of the potential adverse health and the environment through institutional controls, engineering controls, or treatment.

2. ***Compliance with Applicable or Relevant and Appropriate Requirements (ARAR)*** evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

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

4. ***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 contaminant present.

5. ***Short-term Effectiveness*** considers the length needed to implement an alternative and the risks the alternative poses to workers, the community, and the environment during construction.

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

7. ***Cost*** includes estimated capital and annual operation and maintenance costs, as well as present value cost. Present value 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 t0 -30 percent.

8. ***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.

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

State Acceptance
The State of New Jersey concurs with the preferred alternative.

Community Acceptance
Community acceptance of the preferred alternative will be addressed in the ROD following review of the public comments received on the Proposed Plan.

PREFERRED ALTERNATIVE

EPA's preferred alternative is Alternative 3, *In-Situ* Remediation, Monitored Natural Attenuation, Institutional Controls, Long-Term Monitoring and Five-Year Reviews. The estimated present-worth cost of the preferred alternative is $9,125,000. The components of the preferred alternative are as follows:

- Injecting calcuim polysulfide (CPS) into the high concentrated target portions of the aquifer to reduce chromium concentrations.

- Injecting emulsified vegetable oil (EVO) into the high concentrated target portions of the aquifer to reduce VOCs concentrations (TCE).

- Implementing long-term monitoring of groundwater to monitor the degradation of TCE and Cr(VI) and the reduction of the VOC and chromium plumes and to monitor MNA parameters and evaluate the ongoing effectiveness of the treatments. Secondary contaminants beryllium, boron and vanadium present a noncancer health hazard that will be addressed by MNA and long-term monitoring.

- Establishing institutional controls in the form of CEA/WRA to restrict the groundwater use and prohibit activities that could result in human exposure to chromium and VOCs in groundwater.

- Reviewing site conditions at least once every five years, as required by CERCLA, until the RAOs and PRGs are met.

The preferred alternative satisfies the two threshold criteria and achieves the best combination of the five balancing criteria of the comparative analysis. This alternative is preferred because it will achieve the RAOs and PRGs in the shortest amount of time. It provides *in-situ* treatment of the contaminants in groundwater, mainly chromium and TCE that constitute potential risk and hazard drivers at the site. Monitoring will provide the data to ensure that the RAOs and PRGs are achieved. The EPA and NJDEP expect the preferred alternative to satisfy the following statutory requirements of CERCLA Section 121(b): 1) be protective of human health and the environment; 2) comply with ARARs; 3) be cost effective; 4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) satisfy the preference for treatment as a principal element. EPA will assess the modifying criteria of community acceptance in the Record of Decision Amendment following the close of the public comment period.

FOR FURTHER INFORMATION

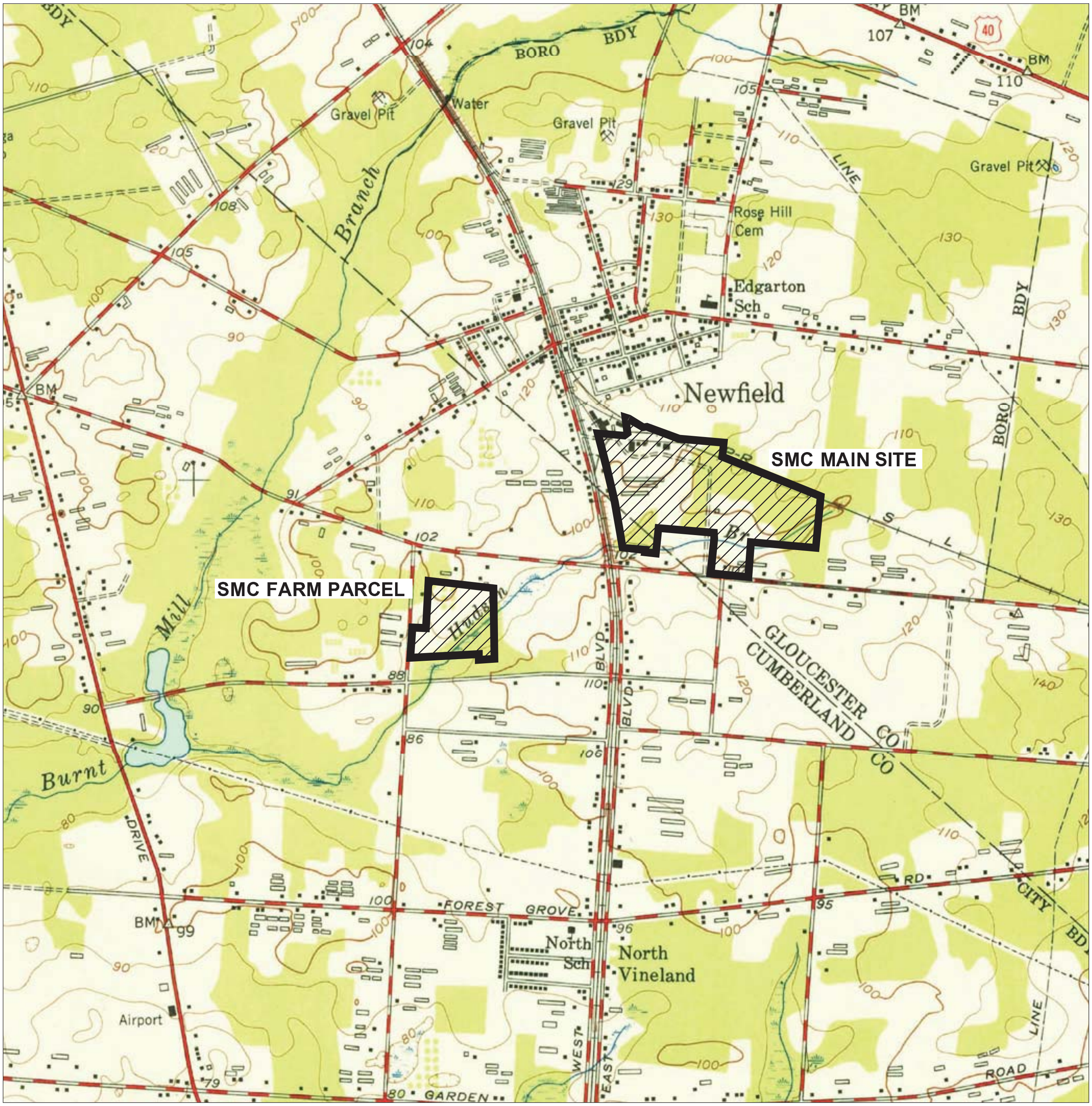
The administrative record file, which contains copies of the Proposed Plan and supporting documentation is available at the following locations:

Newfield Public Library
115 Catawba Avenue
Newfield, New Jersey 08344
(856) 697-0415
Hours: Mon-Thu 10:00 AM-7:00 PM, Fri 10:00 AM-5:00 PM, Sat 10:00 AM-1:00 PM

EPA Region 2, Superfund Records Center
290 Broadway, 18th Floor
New York, New York10007-1866
(212) 637-4308
Hours: Mon – Fri, 9:00 AM-5:00 PM

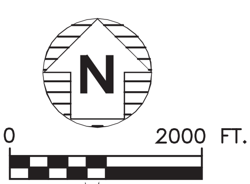
In addition, select documents from the administrative record are available on-line at:

http://www.epa.gov/region2/superfund/npl/shieldalloy/



SOURCE: NEWFIELD, N.J. QUADRANGLE, 1953, PHOTOREVISED 1994,
7.5 MINUTE SERIES (USGS TOPOGRAPHIC MAP)

SITE PROPERTY BOUNDARY



APPROXIMATE SCALE

QUADRANGLE LOCATION

TRC ENVIRONMENTAL CORP.
1601 Market Street, Suite 2555
Philadelphia, PA 19103

SITE LOCATION MAP

SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

JOB NO.: 112434.00OU2.003050

PZ/DD	DATE: MAY 2015	FIGURE: 1

PLOT DATA
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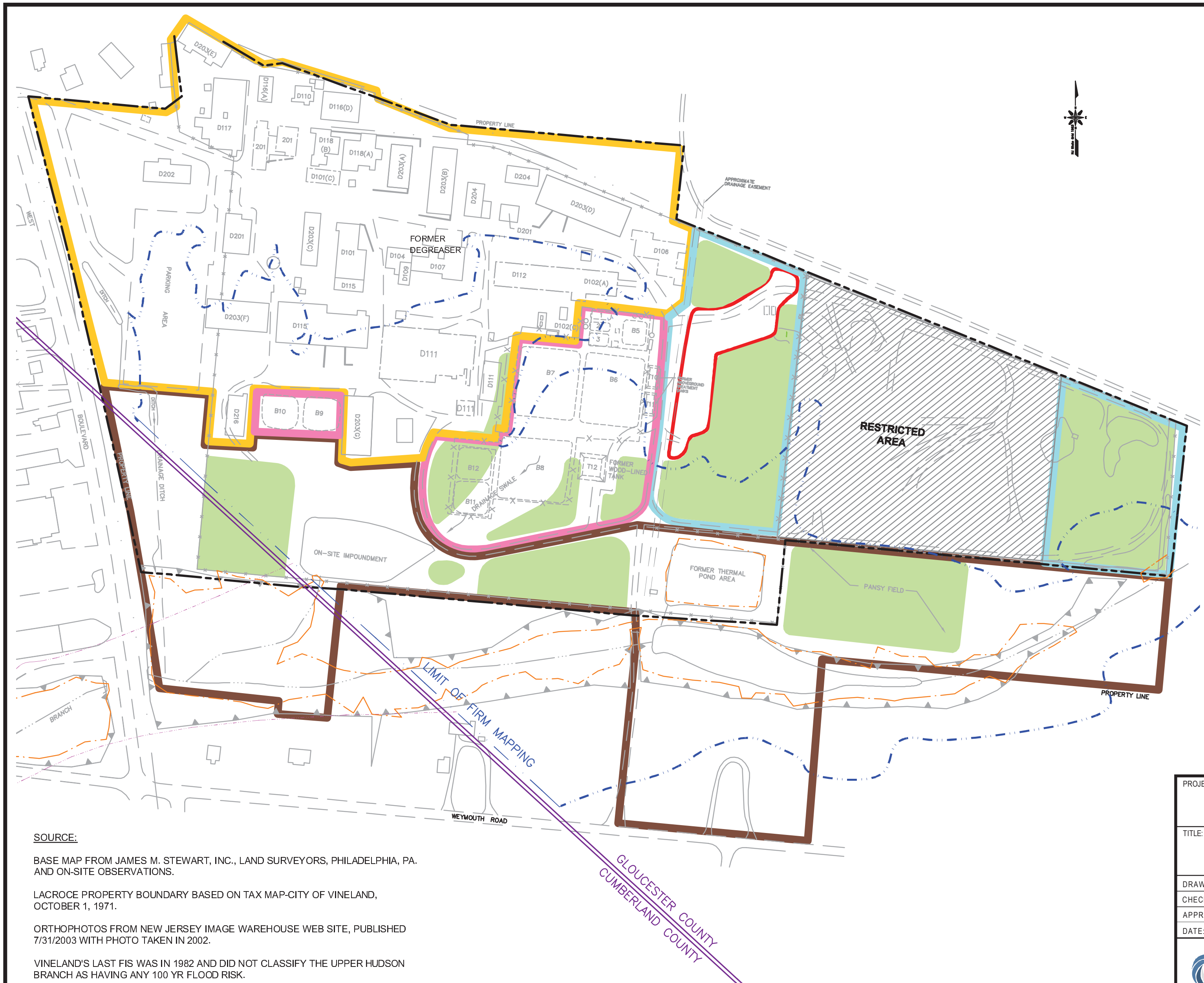
Operator Name: STEHLE, DIANAH
Drawing Plot Scale: 1" = 1'
Dwg Size: 0.64 Mb
Plot Date: May 13, 2015
Plot Time: 1:13 PM
Attached Xrefs:
Attached Images:
Layout: FIG01 Site Location



LEGEND

- NATURAL RESOURCE RESTORATION PLANTING AREAS (NOTE: THESE AREAS WERE CAPPED UNDER REGULATORY LEGAL AGREEMENTS WITH 1-2' OF CLEAN SOIL AND VEGETATION, IN 1999 AND 2001. DATA SHOWN IS BELOW THE CAP).
- RESTRICTED AREA
- EASTERN STORAGE AREAS
- FORMER LAGOONS AREA
- FORMER PRODUCTION AREA
- DELINEATED WETLAND
- 100 YR FLOODPLAIN*
- ESTIMATED FLOOD PLAIN OF THE HUDSON BRANCH
- PROPERTY LINE
- WETLAND LIMITS
- DEMOLISHED BUILDING FOOTPRINT
- ITEMS REMOVED/CLOSED
- SOUTHERN AREA
- UNCAPPED AREA

* BASED ON 2010 FIS IN NEWFIELD NEW JERSEY. VINELAND'S LAST FIS WAS IN 1982 AND DID NOT CLASSIFY THE UPPER HUDSON BRANCH AS HAVING ANY 100 YR FLOOD RISK.

SOURCE:

BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA. AND ON-SITE OBSERVATIONS.

LACROCE PROPERTY BOUNDARY BASED ON TAX MAP-CITY OF VINELAND, OCTOBER 1, 1971.

ORTHOPHOTOS FROM NEW JERSEY IMAGE WAREHOUSE WEB SITE, PUBLISHED 7/31/2003 WITH PHOTO TAKEN IN 2002.

VINELAND'S LAST FIS WAS IN 1982 AND DID NOT CLASSIFY THE UPPER HUDSON BRANCH AS HAVING ANY 100 YR FLOOD RISK.

PROJECT: SHIELDALLOY METALLURGICAL CORP. 35 SOUTH WEST BLVD. NEWFIELD, NEW JERSEY			
TITLE: SITE PLAN			
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CHECKED BY: DD	AS INDICATED	FILE NO. 112434.0000.02.dwg	
APPROVED BY: -	DATE PRINTED:	FIGURE 2	
DATE: MAY 2015			

TRC
1601 Market Street
Suite 2555
Philadelphia, PA
Phone: 215.563.2122

PLOT DATA
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Attached Images:
Layout: FIG02 Site Plan

APPENDIX V-b

PUBLIC NOTICE

THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

INVITES PUBLIC COMMENT ON THE PROPOSED AMENDMENT TO THE GROUNDWATER REMEDY FOR THE SHIELDALLOY METALLURIGICAL SUPERFUND SITE

The U.S. Environmental Protection Agency (EPA) and the New Jersey Department of Environmental Protection (NJDEP) will hold a public meeting on August 12, 2015 at 7:00 p.m., at the Newfield Borough Hall, 18 Catawba Avenue, Newfield, New Jersey to discuss the findings of the remedial investigation and feasibility study (RI/FS) and the Proposed Plan for operable unit one (chemical contamination detected in groundwater) at the Shieldalloy Metallurgical Superfund site.

EPA is issuing the Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environ¬mental Response, Compensation, and Liability Act of 1980, as amended, and Section 300.430(¬f) of the National Oil and Hazardous Substances Pollution Contingency Plan.

The primary objectives of this action are to prevent exposure due to ground-water ingestion and minimize any potential future health and environmental impacts. The main features of this proposed remedy amendment include in-situ remediation, monitored natural attenuation, groundwater monitoring and institutional controls.
The remedy described in this Proposed Plan is the preferred remedy for the Site. Changes to the preferred remedy or a change from the preferred remedy to another remedy may be made if public comments or additional data indicate that such a change will result in a more appropriate remedial action. The final decision regarding the selected remedy will be made after EPA has taken into consideration all public comments. EPA is soliciting public comment on all of the alternatives considered in the detailed analysis of the RI/FS report because EPA and NJDEP may select a remedy other than the preferred remedy.

The administrative record file, which contains the information upon which the selection of the response action will be based, is available at the following location:

Newfield Public Library
115 Catawba Avenue
Newfield, New Jersey 08344
(856) 697-0415

Responses to the comments received at the public meeting and in writing during the public comment period, which runs from July 30, 2015 to August 28, 2015, will be documented in the Responsiveness Summary section of the Record of Decision Amendment, the document which formalizes the selection of the remedy. All written comments should be addressed to:

Sherrel Henry
Remedial Project Manager
U.S. Environmental Protection Agency
290 Broadway, 20th Floor
New York, NY 10007-1866
E-mail: henry.sherrel@epa.gov

The proposed plan and other site documents are available electronically at www.epa.gov/region2/superfund/npl/shieldalloy/
in addition, if you have any other questions pertaining to this site please contact:

Wanda Ayala
Community Involvement Coordinator
Public Affairs Division
U.S. Environmental Protection Agency
290 Broadway, 27th Floor
New York, NY 10007-1866
(212) 637-3676
E-mail: ayala.wanda@epa.gov

($62.48)

APPENDIX V-c

PUBLIC MEETING SIGN-IN SHEETS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

ShieldAlloy Superfund Site

PRAP – OU1/Public Meeting

7 to 9 pm, Wednesday, August 12, 2015

SIGN IN SHEET

Newfield Borough Hall
Newfield, NJ

First Name: John
Last Name: Nessel
Suffix: P

Address: Number and Street
Apartment/Unit

(b) (6) [redacted]

☐ I PREFER TO GET INFORMATION VIA EMAIL

Email Address

First Name: JOHN & AnneMarie
Last Name: GEORGE
Suffix

Address: Number and Street
Apartment/Unit

(b) (6) [redacted]

☐ I PREFER TO GET INFORMATION VIA EMAIL

Email Address

First Name: JOHN
Last Name: MAZZEI
Suffix

(b) (6) [redacted]

☐ I PREFER TO GET INFORMATION VIA EMAIL

(b) (6) [redacted]

First Name: Donald
Last Name: Sullivan
Suffix

(b) (6) [redacted]

☐ I PREFER TO GET INFORMATION VIA EMAIL

Email Address

First Name: Linda
Last Name: Perle
Suffix

(b) (6) [redacted]

☐ I PREFER TO GET INFORMATION VIA EMAIL

Email Address

ShieldAlloy Superfund Site

PRAP – OU1/Public Meeting

7 to 9 pm, Wednesday, August 12, 2015

SIGN IN SHEET

Newfield Borough Hall
Newfield, NJ

First Name	Last Name	Suffix
John & Carole	Paladino	

☐ I PREFER TO GET INFORMATION VIA EMAIL

Address: Number and Street — Apartment/Unit

(b) (6) [redacted]

Email Address

(b) (6) [redacted]

First Name	Last Name	Suffix
Rachel	Zaccaria	

☐ I PREFER TO GET INFORMATION VIA EMAIL

(b) (6) [redacted]

(b) (6) [redacted]

First Name	Last Name	Suffix
Steven W. Smith		

☐ I PREFER TO GET INFORMATION VIA EMAIL

(b) (6) [redacted]

Email Address

First Name	Last Name	Suffix
Christine	Scarpa	

☐ I PREFER TO GET INFORMATION VIA EMAIL

(b) (6) [redacted]

Email Address

First Name	Last Name	Suffix
Joseph	Romeo	

☐ I PREFER TO GET INFORMATION VIA EMAIL

(b) (6) [redacted]

Email Address

The Information you provide here may be subject to disclosure under the Freedom of Information Act.

ShieldAlloy Superfund Site

PRAP – OU1/Public Meeting

7 to 9 pm, Wednesday, August 12, 2015

SIGN IN SHEET

Newfield Borough Hall
Newfield, NJ

First Name: Mario | Last Name: Ruiz-Mesa | Suffix:

☑ I PREFER TO GET INFORMATION VIA EMAIL

(b) (6) [redacted]

Email Address: (b) (6) [redacted]

First Name: Jonathan | Last Name: Atwood (Sen. Jeff Van Drew) | Suffix:

☐ I PREFER TO GET INFORMATION VIA EMAIL

Address: Number and Street: 219 N. Main St. Suite B | Apartment/Unit:

City: Millville | State: NJ | Zip code: 08332

Email Address: senvandrew @ njleg.org

First Name: T. | Last Name: Ragone | Suffix:

☑ I PREFER TO GET INFORMATION VIA EMAIL

(b) (6) [redacted]

Email Address: (b) (6) [redacted]

First Name: Joseph | Last Name: Smith | Suffix:

☐ I PREFER TO GET INFORMATION VIA EMAIL

(b) (6) [redacted]

Email Address: (b) (6) [redacted]

First Name: Rick | Last Name: Tonetta | Suffix:

☑ I PREFER TO GET INFORMATION VIA EMAIL

Address: Number and Street: 640 E Wood St | Apartment/Unit:

City: Vineland | State: NJ | Zip code: 08360

Email Address: RTonetta @ VinelandCity.org

The Information you provide here may be subject to disclosure under the Freedom of Information Act.

ShieldAlloy Superfund Site

PRAP – OU1/Public Meeting

7 to 9 pm, Wednesday, August 12, 2015

SIGN IN SHEET

Newfield Borough Hall
Newfield, NJ

First Name: Lee
Last Name: Burke
Suffix: Mr.

- [x] I PREFER TO GET INFORMATION VIA EMAIL

Address: Number and Street
Apartment/Unit
(b) (6) [redacted]

Email Address

First Name: Susan Mavilla
Last Name
Suffix

- [ ] I PREFER TO GET INFORMATION VIA EMAIL

(b) (6) [redacted]

Email Address

First Name: Stuart
Last Name: Lieberman Esq
Suffix

- [ ] I PREFER TO GET INFORMATION VIA EMAIL

Address: Number and Street: Lieberman & Blecher
Apartment/Unit
City: 10 Jefferson Plaza Princeton
State: NJ
Zip code: 08540

Email Address: SL @ liebermanblecher.com

First Name: Zoltan
Last Name: Szabo
Suffix

- [x] I PREFER TO GET INFORMATION VIA EMAIL

Address: Number and Street: 305 Yale
Apartment/Unit
City: Stratford
State: NJ
Zip code: 08084

Email Address: zszabo @ usgs.gov

First Name
Last Name
Suffix

- [ ] I PREFER TO GET INFORMATION VIA EMAIL

Address: Number and Street
Apartment/Unit
City
State
Zip code

Email Address
@

The Information you provide here may be subject to disclosure under the Freedom of Information Act.

APPENDIX V-d

PUBLIC MEETING TRANSCRIPT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II

---x

SHIELDALLOY METALLURIGICAL CORP. SUPERFUND SITE

PUBLIC MEETING

---x

NEW BOROUGH HALL
18 CATAWVA AVENUE
NEWFIELD, NEW JERSEY

August, 12, 2015
7:00 p.m.

A P P E A R A N C E S:

WANDA ALYALA,

EPA Community Involvement Coordinator

Donna GAFFIGAN

DEP Case Manager

SHERREL HENRY,

EPA Remedial Project Manager

MICHAEL SIVAK,

Acting Branch Chief/Risk Assessor

MS. AYALA: Good evening, everyone. I'd like to welcome you to our meeting. My name is Wanda Ayala, and I am the Community Coordinator for the Shieldalloy Superfund Site. Tonight we are hear to talk about the record of decision amendment for the proposed remedial action plan for Operable Unit 1.chemical contamination in the ground water.

The theme of subject of the rag/slag pile is subjected of the NJCP and will not be discussed tonight. I would ask that everyone put their cellphones on vibrate, please, I would like to acknowledge Mayor Sullivan of Newfield who is with us tonight and any other elected official, please, standup and state your name.

Councilwoman Sagaris.

MS. AYALA: Here tonight we also have with us from the EPA is Sherrel Henry EPA Remedial Project Manager. We also, have Michael Sivak Acting Branch Chief/Risk Assessor of the Superfund program.

Also, we. Have Donna Gaffigan from the New Jersey DEP.

Again, my name is Wanda Ayala I am EPA Community Involvement Coordinator. We also, have Jacqueline who is our stenographer. We are required under the New Jersey Superfund to have the meeting recorded. We will start the meeting with a slide presentation. With that I will hand it over to Sherrel.

MRS. HENRY: Good evening, it is good to be here tonight. I recognize some faces from last year from operable Unit-2. Operable Unit-2 consisted of contamination in surface soil, surface water and sediments. And that was a remedy that was selected last year.

So why are we here tonight? We are here tonight based on new information collected at the SMC site. EPA is proposing to amend a 1996 discussion to change the selected remedy addressing nonoperable groundwater which is Operable Unit-1. EPA is proposing this fundamental change from extraction and treatment of contaminated. Groundwater better known as pump-and-treat, and we are proposing to change that to injection of treatment reagent to stimulate in-situ chemical and biological degradation.

So basically, we are saying right now we have pump-and-treat, and we are proposing to change the. Remedy, and I'm here to propose the reasons why we overrode that discussion.

Before I get into that I'm going to give you some background information. The facility is located at 35 South West Boulevard in the Borough of Newfield. Between 1965 and 2007 SMC utilized the facility to manufacture speciality metals. The site was closed in 2007 and the site was used for administrative purposes and buildings at the site were rented for warehousing.

Another part of the site are the farm parcels. The farm parcels manufacturing activities were never conducted at the farm parcels, but it is important because it was used for pump-and-treat.

It was bought so that it could facilitate the pump-and-treat system. There is actually a pumping well located at that location, and how did the contamination get into the groundwater?

Well at the site while it was in operation there was unlined lagoons located at the site. So when the contaminated water entered the lagoons it went into the groundwater and that is how it became contaminated with Chromium, TCE and perchlorate.

Perchlorate -- there is another operable unit for this site which consists of the study. Perchlorate in all mediums. That is in all surface soils, sediments, groundwater and surface water, and that will be the final operable unit for this site.

So these unlined lagoons that were contaminated were remediated between 1995 and 1998 and the contaminated soils were removed and sampling was done to make sure the contamination was removed. To give you a brief site history. Chromium contamination was detected in 1970 in municipal and private water.

Wells by DEC and site investigations

started back in 1972 and detected Chromium as the primary contamination and Trichloroethene (TCE) as secondary contamination of concern.

TCE was used as a decreasing at the site. So that after the contamination was detected DEC directed SMC (Shieldalloy Metallurgical Corporation) to install a pump-and-treat system at the site to treat the contamination.

During the 1990s various studies were done at the site and they were conducted by DEC. Based on all of these studies that was done, DEC selected a record of discission for operable Unit-1 which is groundwater and why we are here tonight, and that remedy was pump-and-treat the water and treatment above ground.

In 2010 EPA became the lead for the site. We took over enforcement leads. Then negotiated an administrative order with the PRP's to investigate the site. I'll give you an overview of what the site looks like. I know you all know where it is. I know this picture -- I want you -- there are three areas that I will be referring to throughout my presentation. One is the car wash, the Vineland car wash. That is important because pumping wells are located there. That is the farm parcel that I talked about, and there are also pumping wells located there as well.

We are here tonight because of certain key studies to show that the system that was selected in the 1996 (ROD) that it is not working as well as the intended was.

The first, one I will talk about is the Optimization Study. So these various investigations were and conducted. The first one, I will talk about is the Optimization Study. This Optimization Study was performed to evaluate the efficiency of the pump-and-treat system in the 1996 rod. The study included various data collected monthly for over 20 years.

Groundwater was collected from the site for 20 years. You can imagine the amount of data that is available for the public groundwater at that site, and these various studies were from five pumping wells located, like, I mention in the picture. There is two at the facility, two at the car wash and one at the farm parcel.

Basically, the study was to determine the ability of the pump-and-treat system to meet the remedial action objectives. These are the goals of the remediation. Are they doing what the intention of what that remedy was for.

So what we do, we have to review data from that just to make sure everything is working the way it should. And the data review focused on Chromium as the primary contaminant, and TCE as a secondary contaminant.

So the result of this study indicated that pump-and-treat had reached the point where it was no longer reducing

contamination to a certain level. It had leveled off.

When it first started, the removal was very large. The numbers were not going below a 1,000(mg/l) it had leveled off. It was unable to get below that number. It also found that the pump-and-treat was very costly, ineffective and used a lot of energy.

An example, the treatment system that was used for the metal, electrochemical precipitation unit, used energy that 125 homes would use everyday, 365 days per year. So a recommendation was made that we investigate in-situ technologies.

The rod that we are trying to change was written in 1996. Since then there are a lot of new information out there, and new remedies, and technologies. So it recommended that we take a look at the in-situ technology.

The other study that I'll talk about is OU-1 Supplemental Remedial Investigation. We call them supplemental because it is being done after the record of decision was completed.

This basically, we knew that there was TCE in the groundwater, but what we did not know is how far it extended to the site. It was above guidelines, but how far did it go? So this study was to, basically, to delineate the extent of the contamination plume.

It focused on the TCE because we had an idea before the start where exactly where the peripheral boundaries where. So after the (ROD) was signed there was a lot of studies that were performed. Supplemental ora that was conducted.

In 2002, 2006, 2009 supplemental investigations were conducted with oversight by New Jersey of Protection. I'll refer to it as the DEP. The studies that was done with the oversight of EPA was conducted in 2010 and that is the information I am going to focus on.

So this involved the instillation of permanent wells to see what was in th ground well. We took the samples and found out exactly what was in the groundwater. So the results of this study which was performed in 2010 and that was prior to us doing any work at the site.

It found that the Chromium plume was very large. It was 26 hundred feet long, extending from the facility that you see, in the picture to the farm parcel. This was about a half a mile, and that this plume was actually contained at the farm parcel, and it extended 110 feet below ground.

To get an idea about what this looks like. I'll show you -- I dont know how well you can see that? It starts at the facility past the car wash and extends to the farm parcel. The darker areas are the higher consternation of the Chromium, which is about 1,000(mg/l).

The results for the remedial investigation or RA was a TCE plume it showed that in the shallow zone it was contained on site. It was 100 feet long by 500 feet wide, and it was in the shallow zone below ground. We refer to that as the shallow zone, and the source area was in located at the facility.

For the deeper zones that is 70 to 130 feet below ground. We found that the plume was unusually wide, it extended from the facility. Actually, a building where the TCU was used. It extended from that building to past the farm parcel.

MR. LIEBERMAN: Is this a mixed plume

or just TCU?

MRS. GAFFIGAN: The groundwater is safe. I am just focusing on the TCE, like, the Chromium first and this is the TCE plume. If you take, whatever, samples you have of TCE and you plot where it is going based on the concentration.

THE PUBLIC: Maybe we should go back to the slide before and show the colors. They are all different chemicals.

MRS. HENRY: It is not. It is all Chromium. The different color represents different concentration. The darker areas are a 1,000(mg/l) and this green area is 500(mg/L), 500 to a 1000. And this area, this area right here is 100 to 500. So this is all the Chromium plume.

Let me show you what the TCU looks like in the shallow zone. As you can see in the shallow zone from the building that used TCU as a place to decrease, it started from there and it is pretty much in the shallow zone. IT IS just outside the boundaries of the facility. The darker areas again, the TCU levels are lower. The darker areas represent 100(mg/l). This area right here is 50 to 100, 10 to 50 and 1 to 10.

MR. LIEBERMAN: One quick question. While I understood the numbers, they do not represent to me what are the acceptable limits?

MRS. HENRY: I apologize for Chromium the acceptable limit is 70.

MR. LIEBERMAN: And we are at a 1000?

MRS. HENRY: That is average concentration.

Mr. SIVAK: But the data that we are showing up here is from 2010. We will show you the levels that are more reflective of more recent conditions, but this is in 2010. In 2010 we were conducting these limits that were evaluated in the existing technologies.

MR. LIEBERMAN: So 70 is acceptable for --

MRS. HENRY: 70 is the guideline. I'm going to get into that later. I apologize.

MR. SIVAK: 70 is for Chromium, but for TCE it is 1. The state MCL is 1.

MRS. HENRY: So this what the plume,

the TCU plume looked like in the shallow zone, and in the deeper zone, usually because the aquifer is sandy you see a long narrow plume, but what we see in the deeper zones is that it is very very wide, unusually wide. That leads us to believe there is other non SMC sources in the area that is contributing to the area in the deep zone.

I know that, and I'll digress just a little bit. I know that there is concerns about Burnt Mill Pond everyone here realizes.

That it is a natural resource that is very valuable to the community.

So what we did. We are aware of the concerns from the community from the meeting we had last year. What we saw last year and what we saw in the press. So what EPA did was to focus on wells near Burnt Mill Pond. Just to evaluate if there was a problem in the groundwater to Burnt Mill Pond, and we offer the following slides.

So the three wells that we focused on were ZP-1, ZP-3 and ZP-2. So the EPA they would look at the results of contamination, of TC contamination in these wells. Because like I mentioned before the Chromium contamination was contained at the farm parcel, which is a half mile up from Burnt Mill Pond.

So we focused on TC data that we collected, and what we found -- so from those three wells that I showed you, near the pond it showed volatile organic compounds. Specifically TC, Tetris

Chloride, Ethene and PC which is Petrus Chloride.

THE PUBLIC: You found PC in there not TC?

MRS. GAFFIGAN: I'm getting to that. We found PC, but TC is a breakdown product of PC.

MR. LIEBERMAN: That's right not the other way around.

MRS. HENRY: That is what I am saying. So we found PC, and where ever you find PC you will find TC. So PC was also detected. It was also detected in other wells southwest of the SMC sites.

Like, I was saying before, PC was never used at the SMC facility. It was never found in the soils or in the groundwater, but we are finding the down gradients south and west of the site. TC was also found in two to three wells at depth. At 30 to 35 hundred feet below grade, which is much deeper then Burnt Mill Pond.

Like I said, let say, that Burn Mill Pond stops here. The groundwater was found deeper then Burnt Mill Pond. In addition, to that the shallow zone contamination there is a layer of groundwater, beneath the pond, and also covers contamination that is in the deeper zone. So what that does is protects any contamination that may be in the deep zone, and we know that is where the PC contamination is. It prevents it from getting into Burnt Mill Pond.

You guys may not remember, but operable Unit-2 is where we studied the stream. No VOC's were found in the stream leading to Burnt Mill Pond. No VOC's were detected, and TC and PC from the deep zone we know it does not flow to Burnt Mill Pond.

MR. LIEBERMAN: How do you know that?

MS. AYALA: Sir, if you could not be so disruptive. It is hard for the court reporter. You will have the opportunity to talk or speak at the end, please.

MRS. HENRY: So we thought this would be helpful because we knew there was concern that maybe the groundwater would be impacted at Burnt Mill Pond. So the next key study was done. That gave us information to suggest a change to the remedy. The main study was the in-situ studies. The goal of this study was to prove that this technology could reduce the contamination mass.

There was an area that were very high. So the goal of this remedy was to reduce that mass to a comfortable concentration. So that natural processes could be utilized. They used a more advance in-situ in the ground injections. It allowed technology to reach a point so that the natural processes can takeover.

The results of that investigation was conducted between 2011 and 2014 and, basically, with the injections. You are injecting a reagent into the ground to treat the contamination. We looked at different reagents. The one that was found to be appropriate for treating Chromium was Calcium Polyphosphate, which I am going to refer to as PCS, basically, what happens when you inject this reagent into the groundwater it mixes with the groundwater and -- it is a reducing environment meaning there is no oxygen.

Because it is a reducing environment Hexavalent Chromium which is our Chrom-6 was reduced to Chrom-3, which is Trivalent Chromium. It is a harmless gas, whereas, Hexavalent Chromium that is one that is not good. We also found emulsified vegetable oil or EVO which was a good amendment or reagent to treat TC.

Basically, what happens with EVO it contains nutrients that fosters the natural bugs that are in the ground called microbes. The EVO provide a carbon source that the bug, they actually eat, they mix with the groundwater and eat the TC. When they digest this, I know it sounds weird, they produce a little amount of water and carbon dioxide and ethane and a small amount of water. We found this was a good amendment to treat TC.

We also collected and monitored natural attenuation parameters. I'll will get into that a little bit later and what that is. So this technology we knew that it definitely worked. There was information that said that in-situ worked, and that the reagent that we choose to treat the contaminates would work. We were really amazed at the results that we got in a really short period of time.

Total Chromium and total Chromium includes; Hexavalent Chromium and Trivalent Chromium so that is why we call it total Chromium. It declined to over 4,000(mg/l) to 140(mg/l) and Hexavalent Chromium declined from approximately 2,000(mg/l) to 13(mg/l) that is over a 97 percent reduction in the mass.

Like I said, we new that it worked, but we did not realize that it would work so well. This is information is from the well on the facility. Let me give you an idea of what this look like in the figure. You will recall that pump-and-treat had leveled off at 1,000(mg/l) and here we are getting it down to 140 and to 130 and that is amazing. So to give you an idea of how drastic this change is I show you this diagram.

I know that this is kind of technical. So what I want you to focus on is this red area. This figure was from the facility in 2011. This was prior to the injection. This red area -- notice how large this is? And those concentrations are above 10,000(mg/l). So this is the area we are trying to get rid of. The red area and the yellow area is 5,000 so that the natural processes could takeover.

The next picture will show after the injection. This is what we saw. The mass of the plume is much smaller, and you are seeing no reds or no yellows. So in that short period of time the levels were decreasing significantly. Like I said, no reds or yellows and this was really amazing.

So that was the result for Chromium. TC and TC injections were performed at the facility because that was the source area, and if you get rid of the source then natural processes will take care of the rest. In the source area the highest concentration that we found was 207.

You know, once we did the EVO injections in essence the levels were non-detect. Essentially zero. So the in-situ actually treated the source area for TC in the shallow zone which was located on the property. So the goal -- what were trying to do with the in-situ we were trying to get rid of the most contaminated area of the plume.

Once you do that, natural processes, and I will talk about natural attenuation process next. Natural attenuation relies on natural processes to decrease or attenuate the size of the plume, but in order for that to work you can't have a very high concentration.

So the institute took care of the high concentration so that the MNA would be effective. Like, natural attenuation you have to monitor. It is a very important to monitor. Just to ensure that the natural attenuation processes are still active.

In order for the bugs to take care of the contamination you have to have the right conditions a reduce in Chromium in the environments. Low oxygen at all sites. There are natural attenuation processes going on in the groundwater, but for it to be called a remedy it has to be active, and you have to monitor to make sure those levels are declining. So monitoring is very important.

The investigation for MNA, basically, we investigate the groundwater aquifer to make sure these conditions were ideal for the bugs to -- for active contamination to be reduced. Let me recap. So institute took care of the high concentration area, so that natural processes are able to be performed.

So risks at the sight. There were several metals and VOC's found at the site that were detected above the guideline values. You saw the levels of the TCE, the goal is 1 and for Chromium it is 70 and we found levels above those guidelines for various metals such as; Chromium, Beryllium, Boron and Vanadium.

As far as the risk if someone drinks the groundwater it would present a risk. But the groundwater that is effected by the plume -- no one is drinking it. Everyone is drinking from public wells. As far as ecological receptors there were no pathways that were identified.

Critters could actually get to the groundwater. There is no pathways for them to get to the water. So there is no ecological risk. So once you have an alternative, you have to decide what are the objectives. What are you trying to accomplish with your remedy.

So that is how you come up with remedial action objective. And these objectives were the same ones that were selected in the 1996 (ROD), record of decision. Basically, it is to prevent exposure to the groundwater from someone drinking the groundwater from the contamination that is associated with SMC property. And it is also to prevent migration. This is very important because you don't want the contamination spreading.

So you have to monitor to make sure it is not migrating, down grading, that could potentially effect other wells, and the third one was to remediate the groundwater contamination that was coming from the SMC facility to achieve guidance values, and these guidelines that we are talking about are called premamillary remediation goals. And these remediation goals were developed to meet the remedial action objectives.

For total Chromium it is 70. There is no number for Hexavalent Chromium. So we use 70 for Chromium for TCE it is 1. We use the most stringent for either State or Federal guidelines. TC is 1 because that is the New Jersey standard.

I know I have been talking about micrograms per liter. To get an idea of what that is, that would be if you took a pinch of salt and you put it into ten tons of potato chips. Just to give you a perspective of what 1(mg/l) is.

So that is the guideline for TCE. So after the remediation is done and you set your goals, a feasibility study is done, but for this case because it is a broad -- this is an amendment. We are changing one remedy to another. There was a remedy selected, but we are changing it.

So we did a focus study and what that does -- you are basically looking at the remedy that was selected and you are comparing it to the remedy that you are proposing to change it to. Then you have a proposed plan which is what we are here to talk about tonight. There are in essence two options. Alternative-1 is you have no further action, but you have to look at that. In essence we are comparing Alternative-2 to Alternative-3. Alternative-2 is a pump-and-treat system. It is an Alternative that was selected in 1996, and the cost of that was estimated to be over 27 million. Alternative-3 which is in-situ remediation is estimated at a little over 9 million dollars.

And there are common elements between Alternative-2 and 3. These are institutional controls. Both of the remedies called for institutional controls, and in this case there was specific institutional controls.

Classified exception areas which is a CEA and a well restriction. This would prevent someone from digging a well or coming into contact with the groundwater. There is also long term monitoring. Long term monitoring is very important. It is to ensure that the remedy is doing what it is supposed to do. You have to monitor to make sure it is getting better and not getting worse.

Then we have five year reviews. You can look at the five year review as a checkup point. We selected the remedy and the remedy was supposed to work a certain way. So at the five year mark according to the guidance, we take a look at the remedy. What numbers are we seeing? Is it going down. Is it shrinking or is it getting bigger? Are the levels decreasing? So at the five year review point this is what we do. It is like a checkup point for the remedy. So I am going to go into a little bit more details of exactly what the remedies are.

So Alternative-2 was selected as the 1996 ROD and specifically it called for five extraction wells. The water is captured by these wells and brought above ground and it goes through different treatment chains. And for TC there was an air stripper put in place that treated the recovered water from the wells.

For metals like Chromium there was electrochemical precipitation treatment units, and this Optimization Study was done. It was so energy extensive. It was modified in 2011 to a ion exchange unit. Which used less energy.

This system was used to remove the Chromium contamination. After it goes to the treatment chain, the recovered water is discharged to a surface body, the Hudson.

It is brought to the Hudson branch. This remedy also called for monitoring.

Like I said, initially they were monitoring monthly for over 20 years. Then it was changed to semi-annual about two years ago. There was a lot of data out there for us to study.

Alternative-3 -- much of this Alternative was conducted during the treatability studies between 2011 and 2014. The purpose of that portion of the remediation -- of this remediation technology was to get rid of the very very high levels of contaminants. So that the natural processes could be used.

The Chromium and from the pictures that I showed you the Chromium plume was reduced significantly. The Chromium and TC the TC plume went down to zero and the by product Chromium was significantly reduced, and that was done in a short period of time.

The pump-and-treat system was used for over 20 years. In this short period of time we saw significant changes. It was really amazing. I want to point out that even though the injections were conducted. The last injection was done in 2014. The reagents are still in the groundwater. They are mixing and active treatment is still ongoing.

It is estimated that the benefits of the shallow and the deep zone -- that this active remediation could go on anywhere from 5 to 35 years. So the reagents are in the ground and they move slowly with the groundwater, and as they move they are cleaning up the groundwater in a shorter period of time then we expect. Maybe not at those great levels, but it is an active remediation. The other component of this remedy is monitored natural attenuation.

We found that the aquifer is rich and it is able -- the emanate processes are on going. All the right mix is under the ground and it is active. That is an important part. You take care of high concentration and then let emanate do the rest along with ongoing treatment. Overtime you will see that the mass levels will decrease and overtime it will get to the remedial outcome objectives and the PRG's.

Phase 2 Alternatives were compared to each other. The EPA has nine criteria's. Our threshold criteria, meaning that EPA will never select a criteria that does not meet these two criteria's. All of this answers the question, will it protect you? Will it protect the plants? You know if you are on the site or near the site will you be protected and in compliance with -- it is called the Applicable or Relevant and Appropriate Requirement (ARARs).

Does it meet the state or federal guidelines? The next five criteria's are what we call Primary Balancing Criteria. This is where the trade off -- it is a trade off. So that you can choose the best criteria for that site. So Long-Term Effectiveness. Will the effects of the cleanup plan last or could the cleanup cause future risk. For Reduction of toxicity it says using the treatment, does the alternative reduce the harmful effects? Or does it spread the contamination or does the amount of contamination decrease?

Short-Term Effectiveness -- how soon will you see adequate reduction? Could the cleanup cause Long-Term or Short-Term hazards towards the population or the environment? You can probably see it in that chart with the cancer's.

Implementability (sic) can it be implemented or the needed equipment, are the chemicals available? And at what cost? What is the total cost? EPA must find a plan that gives necessary protection for reasonable cost. The last two alternatives are called Modifying Criteria's because there is input from the state and the community.

You could change or modify the suggestive alternative. Does the state agree with the EPA's remedy selection -- and in this case -- DEP concurs with the change and remedy that is proposed. Community acceptance -- that will not be assessed until after the common period, and until the common period is complete and that is August 30th. Sorry July 30th to August 28th.

So after comparing the two areas. We

know that pump-and-treat has been working and it is very very effective. When we first started the levels dropped from about 30,000 and it came to a 1,000. So it did work and it definitely contained the plume. You can see what in-situ did after such a short period of time.

EPA is proposing to change the remedy to OU-3 which is injecting the CPS to treat Chromium in the high concentration areas. And injecting EVO into the high concentration areas on site to treat TCE, and implementing long-term monitoring just to make sure that the ongoing process is in place -- that the natural attenuation -- that the plume size is shrinking and that chemicals are being decreased.

And there is also secondary contamination found at the site. Secondary metals. And it is expected that these metals will be treated by long-term monitoring, and emanate and natural attenuation for these metals. And the very important part of this remedy is establishing institution of controls. In the forms of CEA/WRA. Which is a classified restriction area and well restriction area. And this is basically to restrict groundwater use. So that no one will drink the water in the plume area.

It will prohibit activity that could result in human activity to groundwater while in the plume. This restriction will make sure that does not happen. There will be a five year review. Like I said, it is a checkup point to make sure that remedial action objectives are being met. That the levels are actual decreasing. You have to make sure that it is actually contained and that the plume is -- you want to make sure it is not getting bigger. If it is contained then eventually it will shrink.

The basis is that it does meet the threshold criteria. It protects the overall human health and the environment. It will also meet the state and federal guidelines. We have used the most advance technology available. It was very very effective in a short period of time.

The levels of contamination has

dropped significantly and the expectation is that it will continue. There was a rapid reduction in the plume volume. You saw the picture that I showed you. All the red areas were gone. They were all gone in a short period of time. We knew that it would work, but we did not know it would be this effective.

The reagents that we put in the ground, we actual did, it was to make the underground more conclusive to the natural processes to occur. So that is why we changed.

With pump-and-treat the levels were not moving in the past 10 years. They were at a 1,000, with the pump and wells and we did not see any movement. The guidelines for Chromium is 70 and it was leveling off at 1,000 for 10 years. So we knew we needed to do something. So we did the treatment with a study. It was very effective so we are proposing a change to operable Unit-3. Which is in-situ injections.

So the next step is EPA will sign a record of decision amendment. It is an amendment because we are changing an existing remedy. We are not selecting a remedy for the first time. We are changing the remedy, called record of decision amendment.

After the ROD is signed we will negotiate with the responsible parties and the responsible parties will draw up a remedial design and implement a remedial action and implement the remediation. The public comment period is open July 30th and it closes August 28th and written comments can be addressed to me or you can e-mail me. All verbal and written comments will be taken. So this concludes the formal presentation part of the meeting.

THE PUBLIC: Will that be available tomorrow on the internet? The slide presentation?

MS. Ayala: Yes. I'm going to ask for a five minute break. I'm going to ask that, whatever, your presenting, your questions or comments please state your name for the court reporter.

MR. LIEBERMAN: My name is Stewart

LIEBERMAN, and I'm an environmental attorney for the City of Vineland. Do you want me to go by the mic?

MS. AYALA: No.

MR. LIEBERMAN: First of all, thank you very much for your courtesy and the beautiful way you presented that. I have a few questions for the City of Vineland. First of all, when you were doing the bench study in order to determine the effectiveness of the in-situ treatment were you pumping and treating at the same time?

MRS. HENRY: Yes.

MR. LIEBERMAN: What was being done in order to give a credit to the pump-and-treat when you assessed the viability of the in-situ treatments since you will not be pumping and treating when you do in-situ treatments? When you do in-situ treatments you will not be pumping right?

MRS. HENRY: Correct.

MR. LIEBERMAN: What did you do in analyzing the effectiveness of in-situ treatment to give a credit to the fact that you will not be pumping and treating? Did you pump and treat during the bench study?

MRS. HENRY: Bench scale are not done in the ground. It is what you do in the lab. So it was pumping, but we were not doing anything to the ground. It was in the lab. Once we started the active injections the pump-and-treat system was turned off.

MR. LIEBERMAN: You did turn it off? It was not on or off during any of it, or just during the beginning of it?

MR. SIVAK: Let's take a step back. You are using the term bench scale study. For us a bench sale study is done in the lab. When we pulled this material out of the ground and we and we had to figure out what were the best amendments to add.

MR. LIEBERMAN: Yes.

MR. SIVAK: To break this material down. By the way -- why don't you pull up the lab with the Acetone on it so we can talk about the efficiency of the pump-and-treat system.

Because I think that is where he is going with this question. So we were still pumping and treating that is the remedy of record. While we were pumping and treating we were running these laboratory studies to try to figure out the best amendment to add to help breakdown the Chromium, and to help breakdown the TCE. Once we figured out that we wanted to try CPS for the Chrom, and the EVO for the TCE, we then shut down the pump-and-treat and we moved out into the field to try to start pilot studies.

I think that is what you are talking about. We were actually in the field running this study. This three year study. Were we pumping and treating and the answer to that is no.

MR. LIEBERMAN: During none of it or during its inception? At what point did you recommence pumping after the injection? How much time had past?

MRS. HENRY: The pump-and-treat system is not pumping right now.

MR. LIEBERMAN: You never turned it back on after the injections?

MRS. HENRY: No. The results were so incredible in the high concentration areas. No, we did not turn it on. The reagents that are in the ground -- if you turn on the pump-and-treat it is going to take the EVO and the CPS out of the groundwater and then there is no ongoing treatment.

MR. LIEBERMAN: It would not make sense.

MRS. HENRY: Right, it would not make sense.

MR. LIEBERMAN: Another question. The purpose of the study is to meet the RAO's, right? In other words if I don't speak your language, right, the EPA language. It my understanding the purpose is to meet the PRG's and RAO's goals?

MRS. HENRY: Preliminary Remediation Goals.

MR. LIEBERMAN: Tell me how long do you think it is going to take? Because Item number 3 is at best -- when are we going to meet an acceptable level for the PRG's or the ROA's by your standard? When do you think that is going to be?

MR. SIVAK: We have three different

areas that we are treating. The Chromium which is limited to the shallow area. It is contained by the farm parcels. So there is a boundary to it. It is pretty shallow. The goal that we are trying to meet is 70(mg/l) of total Chromium. Right now we have a reduction of in the 2000's or, whatever. It is down to about 140 in total. We have to get down to 70.

We think based on the information that we have now, and the most recent injection that we did and the most recent sampling that we did, those concentrations modeling them out into the future it is going to be about 40 to 50 years.

MR. LIEBERMAN: Fifty to one hundred years.

MR. SIVAK: For the Chromium.

MR. LIEBERMAN: Just for the Chromium?

MR. SIVAK: That modeling will be updated because what we have learned is that as the CPS sits in the ground it is continuing to reduce these concentrations. So we will continue to go out and collect groundwater --

MR. LIEBERMAN: Or it might not. We will find out in five years.

MR. SIVAK: Don't forget we had it in the ground for about three or four years already. It continues to reduce the concentration.

MR. LIEBERMAN: But so did pump-and-treat for quite a while. So the point is we are going to have to incrementally find out; is that correct?

MR. SIVAK: Correct. We are going to keep monitoring it.

MR. LIEBERMAN: I just want you to know. I don't know how the good people here feel, but on behalf of the City of Vineland we are not at all pleased. Or do we find it to be any source of benefit or encouragement that the regiment that you choose will take 50 to 200 years based on your own studies to meet acceptable levels.

MRS. HENRY: You see the pump-and-treat will take 400 to 600 years.

MR. LIEBERMAN: And I want to address that in terms of pump-and-treat. Your pump-and-treat has five wells over a half mile plume, correct?

MRS. HENRY: Yes.

MR. LIEBERMAN: Did you consider instead of abandoning the pump-and-treat -- did you consider installing different wells?

MR. SIVAK: No. The Optimization Study performed on this site several years ago -- the Optimization Study had several recommendations. One of them is to evaluate what additional wells or the placement of wells would make an impact on what we were doing.

Part of that, and we also looked at other methodologies and other studies, that existed since the time the original remedy was selected. So we looked at all of that as we were responding to the results of the Optimization Study.

MR. LIEBERMAN: Right.

MR. SIVAK: Based on that when this remedy was initially selected pump-and-treat was a very common technology. In the 30 years since we were selecting groundwater remedies for EPA we learned that groundwater pump-and-treat by themselves don't typically result in achievement of RAO's.

MR. LIEBERMAN: Say that again slowly. Pump-and-treat remedies -- what were the next three words?

MR. SIVAK: By themselves.

MR. LIEBERMAN: Correct. By themselves. So you need to look at other technologies?

MR. SIVAK: Correct. So you need to look at a variety of technologies. So the Optimization Study suggested that we look at other studies or technologies -- we thought was a very good selection. That is why we switched to these studies -- these bench scale studies -- to the potential alternatives of these injections of these amendments into the ground.

What we learned that as these materials are in the ground they are continuing to actively reduce concentrations. Continuing to pump-and-treat the ground water while this is in there, it reduces the efficiency of this material in the groundwater.

It makes it inappropriate to inject it in the first place. If we are going to pump it right back out and not give it any retention time while it is down there. So our strategy, right now, is proposing to move toward a technology that we had tremendous success with. We have gotten a much greater kick start on our groundwater after having been toted out here. I asked Sherrel to put this slide up here.

These were the groundwater concentrations and for a number of years these pump-and-treat were quite successful, and beginning in '95 we started to see a very low decrease in the concentration overtime.

MR. LIEBERMAN: When you did your --

MR. SIVAK: I'm sorry let me finish, please.

MR. LIEBERMAN: I know it is just taking such a longtime. I want to make sure I get my questions in.

MR. SIVAK: Oh, you will get your questions in. I am trying to answer your question. So that maybe it will answer some other questions that maybe you won't have to ask that.

MR. LIEBERMAN: I understand.

MR. SIVAK: I think what we are trying to do here is we are trying to say that we were really not getting the kind of response that we wanted to, in order to meet our remedial action objectives, and that is what I think we are trying to do now.

We've run this approach by our groundwater experts both within our region, and we've run it by our folks in Washington D.C. who look at groundwater strategies all around the country. They agreed this is the right approach to take for this study.

MR. LIEBERMAN: Who told you that five wells was sufficient for a half a mile stretch? When did somebody tell you that five wells would be adequate for half a mile long plume?

MR. SIVAK: I think it is important -- no go ahead --

MRS. HENRY: I was going to say that you could put in -- say you put in ten wells. What is going to happen is you are going to be pumping a lot of clean water and you may still get the same result.

Pumping that much does cost a lot of money -- and you are pumping and treating clean water. This injection you took it right to the source where the high concentrations were. We put the amendments in the ground and treated it right there. If you pump you are pumping clean water to be able to get to get to the areas that --

MR. LIEBERMAN: -- but you did not have to do that though, because when you pump you can install the wells -- in other words the five wells I take it were not installed when the plume was not fully delineated.

In other words the five wells were installed before you found out you had a five mile plume; is that correct?

MRS. HENRY: Correct.

MR. LIEBERMAN: So once you found out that you had a half of mile of plume -- what you could have considered and I just want to know if you did -- was installing further wells down stream or down gradient so that you can keep track of the plume and treat it. I want to know did you ever consider doing that?

MRS. HENRY: If you delineate the plume that is what you would want to do. It is not practical to treat --

MR. LIEBERMAN: But it is done all the time isn't it? In other words, in New Jersey and I have done a lot of TC cleanups in New Jersey, and we do them the old fashion way -- we do some pump-and-treats and at the end we do some minor treatments in order to finish up.

MRS. HENRY: So we have been pumping for over 20 years and that is, basically, what we are doing. We are doing that.

MR. LIEBERMAN: Can I ask you a question?

MRS. HENRY: Yes.

MR. LIEBERMAN: If you say you are doing it how did you not gain hydogeological (sic) control of the plume, so that if was able to go half a mile? How did you allow that to happen?

MRS. HENRY: The plume is -- go

ahead.

MR. SIVAK: I think that we showed information that suggested there might be other sources contributing to that.

MR. LIEBERMAN: I know that you think that, but have you identified or have you done a stretch of public records to identify any other possible sources?

MRS. HENRY: Yes.

MR. LIEBERMAN: Well, who do you think they are?

MR. SIVAK: We are still under investigation for a lot of these. We are not at liberty to say who they are.

MR. LIEBERMAN: Well, PC either comes from dry cleaner's or it is a solvent that is used in lieu of TC. Have you determined -- have you done -- you said it did not come from this facility. Have you done --

MRS. HENRY: No, no we used TC at the facility. What I am saying is PCE was never used at the facility and we are finding PC.

MR. LIEBERMAN: How do you know that?

MRS. HENRY: Because when we take samples -- we are not just testing for

Chromium and TCE we are testing for all VOC's and all metals, and we found PC -- we never found it at the site facility. We are finding it off site.

MR. LIEBERMAN: One last question for you then I will sit down so that others can ask questions also, and that is this -- by pumping you were able to obtain so measure of control of the plume so that even though it was allowed to spread half a mile you were at least able to stop it from progressing past that by some measure of hydogeological control through the pumping; isn't that correct?

MRS. HENRY: YES.

MR. LIEBERMAN: When you stopped the pumping you are going to lose that control -- in other word, the zone of influence from those pumps keeps the plume -- because as you pump and pump and pump you have a zone of influence that goes around each well, and it stops the plume from migrating.

If you turn that off and you lose that ability, what is going to happen is that part of the control is going to disappear. What do you have that you know is going to have the same benefit?

MRS. HENRY: What we did it is called modeling -- we took out the highest areas of concentration. We have done modeling to show that what is called sentinel wells -- compliance wells down gradient of the plume and modeling showed based on the concentration that we have now, that those levels will never reach the compliance well. It would be contained. It won't --

MR. SIVAK: Getting rid of all the hot spots of the plume -- getting rid of the high concentration in the source area. We don't have anything that is that hot spot moving through the plume. On the fringe of the plume -- on that tail end that you are concerned is going to keep migrating.

MR. LIEBERMAN: Yes.

MR. SIVAK: That is going to degrade over time. We have natural attenuation conditions that exist that is going to degrade that tail end of the plume over time if you have nothing feeding it. So the plume is what we call in a steady state. We believe we are in a pretty good steady of state.

MR. LIEBERMAN: I have no further questions for you. Thank you very much.

DONNA GAFFIGAN: New Jersey DEP. When you did the pilot test didn't you inject the CPS to treat the Chrom on site, also at the car wash and at the farm parcel?

MRS. HENRY: Yes, we did. Thank you Donna.

DONNA GAFFIGAN: So that would have treated along the length of the public --

MR. SIVAK: -- for the Chromium.

MRS. HENRY: -- thank you Donna.

MR. LIEBERMAN: -- we think you should keep pumping. The answer is we think you should keep pump-and-treat and that you should do more of that. Get these numbers way done and then finish with this stuff.

Instead of doing this -- wait 200 years. You are nice people -- you are good people, but it is ridiculous to expect a community -- I am 58 years old. I am never going to see that.

I mean it is ridiculous. That is not

what the environmental protection agency should be doing for the public. It should be making the PRP's do a cleanup that is viable, and that you do not have to wait centuries for a cleanup. That is not what the environmental protection agency should be doing.

While you are nice people and brave for coming here. I noticed your slide did not say anything about 50 to 200 years. You had everything else in those slides, but the one thing you did not put in there and there is a reason for that and that is because someone like me --

MR. SIVAK: We can put the slide up. We can absolutely can put it up here.

MR. LIEBERMAN: Of course you can, but you did not have it up. You are going to put it up because I said it.

MR. SIVAK: I mean, we can put it up there, but you would have to look at the length of time to achieve the remedial action objective.

MR. LIEBERMAN: You pumped inadequately. You only have five wells for over half a mile and DP would never let you do that in a million years. It is completely inadequate.

MRS. HENRY: That was a DEP remedy.

DONNA GAFFIGAN: That was a DEP remedy. The pumping wells worked for the length of the plume as it was delineated in 1995. The Chrom has not gone past --

MR. LIEBERMAN: And you are the lead agency? Not DEP.

DONNA GAFFIGAN: At the time.

MR. LIEBERMAN: And if DP stuck with it and we did not go through an LSC program and we had a case manager here, they would have said you have to put in more wells and get better control. That is all I am saying.

DONNA GAFFIGAN: This is a Superfund site so it is not in the LSC.

MR. LIEBERMAN: I know that. I understand that.

MR. SIVAK: We don't know what would have happened.

MR. LIEBERMAN: I do know what would have happened. I have been practicing in

New Jersey -- I have been doing it for over 30 years. I can tell you that no DEP case manager -- none, would accepted five wells for a plume that is a half a mile, and then you come in here and put your arms up and say it is not working.

Of course it is not working, it is woefully inadequate, it was not engineered properly. The problem is that it was engineered at a time when you did not delineate the horizontal extent of the plume. I don't know how far it is -- and instead of saying let's look for another remedy you could have used the remedy that works which is pumping and treating, and you should have done a much more vigorous job of it.

Instead -- and by the way this stuff that you are using what is it? What product are you using for the TC?

MRS. HENRY: Vegetable oil.

MR. LIEBERMAN: What is the product? It is a brand? What is the product that you are using?

MR. SIVAK: I don't know.

MR. LIEBERMAN: Have you had success with that? There are about 50 vendors, at least, with this stuff. They all go out and they market there bugs. They call them bugs or, whatever, it is. How much success have you had using this particular vendor in the field?

MRS. HENRY: We showed you the results. It was very successful.

MR. LIEBERMAN: On a bench study?

MR. SIVAK: No, in the field.

MR. LIEBERMAN: Not in a real life environment.

MR. SIVAK. The results that we showed. The decrease in concentrations. What we presented are from the site.

MR. LIEBERMAN: And it is so good that after 50 years we might get to the levels. It is ridiculous and everyone in this room knows it. It is ridiculous. You cannot say that is success.

So anyway I am going to stop talking. There are other people that want too. That is Vineland position in case you are wondering. Thank you.

LORETTA WILLIAMS: I would like to ask where was this used before? Was there any facility that is close to the materials that Shieldalloy worked with? Was there other companies that used this particular process?

MR. HENRY: Are you talking about thein-situ or the EVO?

LORETTA WILLIAMS: The one that you are proposing?

MR. SIVAK: So there is a couple of parts to your question. The first is are there other sites where we used in-situ treatments? And we do in-situ treatments on a number of sites, in our region.

LORRETA WILLIAMS: Like where? There is one near Kings Bay Navel Submarine Base, but there were other methods used and it didn't -- and it is going to take decades to clean.

MR. SIVAK: So we can treat contamination right where it is in the ground or we can extract it and we call them exits or above ground pump-and-treats systems. Where we are pumping it out of the groundwater and treating it.

Historically, EPA has always selected external pump-and-treat for groundwater. What we found that after a period of time it was just not that effective as we would like them to be, and it is very difficult to reach you remedial action objectives or your remediation goals using solely pump-and-treat technology. That is exactly what happened here as Sherrel said.

LORETTA WILLIAMS: Could you use both?

MR. SIVAK: Well--

LORRETA WILLIAMS: Could you use pump-and-treat and use this too?

MR. SIVAK: Well, one of the points --

MR. SIVAK: Well, one of the points we are trying to make is once we inject these materials into the ground the longer they are there we have found them to be effective in continuing to actively degrade these materials.

Both the Hexavalents Chromium to reduce that to the Trivalent and to drop it out of the solution and allow it to reach our remedial action objective. For the Chromium and the emulsified vegetable oil that we are injecting for the TCE.

We found that to be very successful while it is down there as well. So we think not pumping and once we put this material into the ground is a better situation. Because it is a longer retention time for the material to be in the groundwater and move with the contamination and it has worked its way through and it is continuing to degrade this material.

LORRETA WILLIAMS: That is why it is going to take 50 years, right? We already went through 30 with the pump-and-treat --

MR. SIVAK: So why don't you put the slides up with using just the pump-and-treat? So what we found is that those estimates -- those predicted model values are based off of data once we -- like our first round of data that we collected -- once we did the first injection.

LORRETA WILLIAMS: So 80 to 100 years?

MR. SIVAK: Right.

LORRETA WILLIAMS: The heat zone 100 and the other zone 80.

MR. SIVAK: So if you look at the in-situ which is what we are proposing we are saying the TC will be cleaned up in between 30 and 40 years. If we do the pump-and-treat it is going to be between 80 and 100 years.

So we think this is a better timeframe for remediation, and the same thing with the Chromium we are projecting about 80 to 100 years versus 400 to 700 years for over here.

LORRETA WILLIAMS: How do you arrive -- why can't you use both?

MR. SIVAK: Because once you are going to put this material into the ground and then pump it out and treat it you are taking it back out of the ground.

LORRETA WILLIAMS: Why not pump it out and take it to an off site? Like a hazardous waste facility. Would that not make sense?

MR. SIVAK: Because it is still going

to take that length of time to pump it out of the ground.

DONNA GAFFIGAN: The question is being answered. Let's be respectful.

MR. SIVAK: To simply say that adding more wells will reduce the pump-and-treat significantly is a little -- I don't know if that is the true answer to the story.

LORRETA WILLIAMS: There is not enough wells to begin with. Maybe this attorney is correct.

MR. SIVAK: And putting in wells at the five locations -- the wells where they are right now is the area with the highest concentration. Where we believe putting in those wells and extracting the water we are getting the best bang for our buck.

If we were to put wells into other areas, downward gradient that we recently delineated, those wells are much lower at that tail end. If we are going to put a well in there and extract that groundwater at that tail end we are going to be pulling a lot of clean groundwater out of there. We are wasting a lot of energy, we are wasting a lot of resources, and we are creating a lot of waste.

We are trying to balance at being efficient, being energy saving, and not producing a lot of waste while we do this.

LORRETA WILLIAMS: But pumping it out of the ground and shipping it off to an off site --

MR. SIVAK: Again, pumping it out of the ground is not as simple -- it is not like we are putting a straw in and we are sucking it out. It is like you have a big bath tub and you only put in one little straw, you have to be careful where you put the straw to suck it out because the contamination is not universal, it is spread throughout.

There are areas where it is higher and there are area where it is lower. So you have to be very careful where you are extracting it. We think the wells we have in place right now are doing a good job of focusing on the areas of high concentration material. Simply to add more wells in areas that are not quite as heavily contaminated, we are not going to get -- adding another well we are not going to get an additional measure of reduction in concentration.

It is going to be a smaller reduction. So we believe that the in-situ remedy is the most effective way to move forward in helping us to achieve our goals, and we are going to be remodeling these values.

LORRETA WILLIAMS: So 50 for a shadow zone, and 200 years for a deep zone?

MR. SIVAK: Yes, but again as we get more information -- ever time we go out and collect groundwater data we get new Chromium concentrations, and updated TCE concentrations.

We are rerunning these models and we believe that these times are going to go down because we think the concentrations are going to be decreasing, perhaps more quickly then we thought and hopefully more quickly then we think. We think that will result in quicker cleanup time.

LORRETA WILLIAMS: Another thing, there is institutional controls that we can't even use that ground -- the Shieldalloy's are out of here. They are operating in another country, and that property can never be used.

MR. SIVAK: Well, the property can be used. The restrictions -- the IC'S -- the institutional controls we are talking about, they are on the groundwater. So what that is doing and it is a very common practice in New Jersey, in New York and other area around the country where we have contaminated groundwater -- it takes a long time to cleanup. It is not an easy fix.

No matter where you are or what you are dealing with. It is not a quick cleanup at all.

LORRETA WILLIAMS: There is a second part of this too. That is we will have institutional controls if they don't properly clean it up, but we are not suppose to talk about that tonight, but they cannot use that property, Shieldalloy's property.

They can't use that. Not even for commercial use. Because you can't put employees there. No company is going to put a business there and then 20 years down the line and people start getting cancer. They just won't do that. There is two parts to this. Institutional controls are going to be on both.

MR. SIVAK: So there will be institutional controls on the soil for the Shieldalloy's facility -- you were here last year talking about --

LORRETA WILLIAMS: Couldn't the soil be moved to an off site -- like at the last meeting when -- there was a fourth alternative, everybody in that room was more in favor of that then the one you choose.

And that would have exuviated the soil and the sediments, and it would have been exuviated and moved to a facility off site. Instead you choose the one that would keep the sediments here.

MR. SIVAK: No. What we are doing with that remedy is, the sediments that are going to rest in the Hudson Branch. They are going to be exuviated and sent off site. Those are going to go away.

LORRETA WILLIAMS: But the soil --

MR. SIVAK: With the soil -- the only risk with the soil is from inhalation of the medium of dust in the soil through construction activities, and through exuviating those soils. The medium is in the deeper soil.

Normal activity from industrial or commercial activities -- workers who would be at that facility handling typical loading, off loading, working in warehouses, on that facility -- anyone with those types of activities would have no unacceptable health risk from the materials from the soil at the Shieldalloy facility.

LORRETA WILLIAMS: Would the EPA amend this alternative? So that the soil and the sediments would be moved off site?

MR. SIVAK: Right, now, we would have no reason to reopen that remedy for the soils, because sediments are being sent off site. The sediments are being sent off site.

They are being shipped away if they pose an unacceptable ecological risk, but the only unacceptable risk that EPA found in the onsite soils were from deeper soils. They were not even at the surface. They were like at a 6. They were deep. They were not at the surface.

There was Vanadium in those soils. We found if those soils get entrained in the air and people breath them in over a long period of time, i.e. by construction activities. So if they are excavating it, they are introducing the dust into the environment, and then there is a potential for unacceptable health risk from that perspective.

We believed it was better for everybody to leave those soils in place. They were not migrating to the ground. They are not at risk to anybody because nobody is in contact with them, because they are at a deeper level.

So we believed it was a better remedy for everybody to simply leave them in place rather then dig them up.

LORRETA WILLIAMS: It was cheaper for Shieldalloy.

LINDA PALADINO: It is my

understanding that there is no remedy. Based on your presentation tonight there is no remedy known to EPA to remediate this problem that would take less then 50 years; is that correct? There is no technology? No remedy, notwithstanding what you show us tonight? There are no other choices that would take less then 50 years?

MR. SIVAK: We did a focus study. We did not look at every alternative that was out there. When we were looking for alternatives to the pump-and-treat, because the pump-and-treat was not responding the way we wanted it to.

We looked at literature. We looked at what technologies existed that were very effective at treating both Chromium and TCE. They are two very different kinds of chemicals. As you can see we are using two different kinds of technologies to address them. One is the polysulfate injections and one of them is emulsified vegetable oil.

So there is two different technologies that we came up with based on literature and based on success rates.

There are other sites that have this type of contaminates and these types of geology conditions. It is the geochemistry of the area that is helping us -- helping us to be so successful.

So when we looked at the technologies that were there we came up with some other studies. We looked at our bench scale study efforts, but when we went out and did these pilot studies, we got such a great response. We got such a great reduction in a very short period of time.

We focused all of our efforts on optimizing these two particular types of geologies.

LINDA PALADINO: I understand that. It is pretty impressive to reduce it to that level in that short period of time, but I think my question is -- have you used something else at any other site that would yield a better result in less time then 50 years?

I mean, I know you picked this and I understand why, but was there something else available out there that you choose not to go with?

Mrs. Henry: This is the newer technology and we know that it is efficient. So that is why we choose to go with it. I don't know if there is --

MR. SIVAK: I don't know if there is, and I am not the person who evaluated these technologies at that level. But we can certainly go back and look see.

LINDA PALADINO: It just seems that any entity that you go to in the United States you have to get in there right from the get go and say, no matter what we do, you are looking at 50 to 200 years for us to fix this. I just find your premise a little unsettling. Going in to solve the problem.

My other question would be if you discovered a new site that had a Chromium level at 140, a brand new site that you had not done anything to yet what would be your plan of remediation?

MRS. HENRY: Let's say it is CPS, it worked so well at this site and the aquifers were the same we would definitely use the CPS.

MR. SIVAK: So that the goal that we are doing with the Chromium -- so Chromium exist in a couple of different forms, and we talked about that for a little bit.

We talked about the Hexachrome. We talked about the Trichrome. HexaChromium is very nasty stuff. EPA identifies it as an oral carcinogen. It is an inhalation carcinogen. It is very nasty stuff. Trichrome everybody needs it in their bodies to live. Okay. It is an essential dietary nutrient.

LINDA PALADINO: Yet to much sugar can kill you.

MR. SIVAK: You are right. It is a dietary nutrient. Your body has a way of regulating it. How much it needs and how much it does not need. Just the form of it is a really big issue. So when we have Hexachrome in groundwater which is what we have we try to do a couple of things.

The first thing, is we try to change it to the Trichrome form. Okay. Again, Hexachrome bad and Trichrome not to bad. So our goal is to try to convert all of the

Hexachrome to Trichrome.

The second thing we try to do is the Trichrome can be dropped out of solution. It binds to little finds that are in the groundwater. It does not stay in the dissolved phase very often. It is a lot easier to manipulate and drop it out of solution. So that allows us to achieve our remedial action objective of 70(mg/l) that we talked about.

That is what we are trying to do with the groundwater. So when we have other Hexachrome sites that is the philosophy that we try to take. We try to convert the Hexachrome to Trichrome, and we try to drop the Trichrome out of solution. That is what we are doing here, and what we found is the way to make that happen is to add the CPS.

For some reason the CPS has been successful at a lot of other sites, but for some reason the geochemistry here really promotes this to happen at a much more effective way then we thought was possible. Does that make sense?

LINDA PALADINO: It does. It is kind

of like an analogy we have a tumor in the ground and you just gave it chemotherapy is there reaction from what you put in the ground as being harmful?

MR. SIVAK: We have not seen other sites where this has been injected. We are not injecting insane amounts of it like what has been above and beyond what has been done elsewhere.

What we are doing is kind of what is in scale with what has been done elsewhere. We have not seen any negative effect to the aquifers from the addition to this at all. Because we are monitoring for this because clearly we don't want any of that to happen. So that was a great question.

LINDA PALADINO: My last question would be you have a benchmark study to get this down to 70 for the Chromium. You are going to monitor in five years; is that correct?

MR. SIVAK: No.

LINDA PALADINO: I said ongoing monitor --

MRS. HENRY: Ongoing monitoring at

the five year time and that is when we will do a review, and a report will be generated, but we have ongoing monitoring semiannual.

MR. SIVAK: So the Superfund law requires at a minimum of five years we do a formal report on the performance of the remedy and the protectiveness of the remedy. We are monitoring those remedies for those two things, but at five years we are required by law to submit a formal report.

LINDA PALADINO: Okay. Do you have some kind of benchmark for that five year mark? In other words, if it is 139 are we okay? You know, it is 139 it went down. Do you have some kind of benchmark that in five years if it is not doing what it is supposed to be doing, what would be your plan of action then?

I guess you can't tell us because you would have to do some kind of study. Where are your benchmarks as this goes on? Do you just say here is our benchmark now don't worry about it for 50 years.

MR. SIVAK: One thing that Sherrel talked about earlier. We are going to collect all the data at that five year period. We are going to show the trend analysis. We saw the trend analysis for the TC and it was really good for several years.

It was an overall downward trend for a really longtime, and then it kind of reached a point where we were not seeing the reduction that we were before, and we call that an acetonic level. It is geology term or something. It starts to level off. We are not seeing the response that we would expect to see, as it had been before.

Our geologist that we have on staff are looking at that all the time, and when we start to see those trends. A not decrease in concentrations then we start thinking if it continues like this for maybe three or four monitoring events, then we start to think do we need to do something else.

LINDA PALADINO: So you don't have a goal for this?

MR. SIVAK: There is not trigger that says we have to start something else immediately. It is an ongoing professional judgement type of evaluation. Go ahead Sherrel. I'm sorry.

MRS. HENRY. No. That is fine.

MAYOR SULLIVAN: I think there was one part of her question that was not answered. Is there any other Superfund sites that have the same types of chemicals and they treated it and it worked? Over a course of time you have over a hundred sites -- is there anything similar to Shieldalloy metals?

MR. SIVAK: For Chromium -- we don't have a whole lot of Chromium sites in New Jersey. I know there is Puchack Well Field. We have a couple, but I don't know off the top of my head what we injected into all of them. That is not what I prepared for today, but I can follow up with you.

MAYOR SULLIVAN: In the whole country?

MR. SIVAK: I don't know I would have to go back and look. I don't know sites that are not in our region very well. I mean there are several hundred sites around the country. We can go back and see. So your concern is mostly with the Chromium, and our institute injections?

LORRETA WILLIAMS: All metals. Like other alloyed metals in the United States. Not just Shieldalloy, because that is what we are trying to cleanup is the metals.

MR. SIVAK: We can follow up with you on that after the meeting ends. Our formal response will be in the response summary, but we can follow up with you personally to let you know what we find out.

MAYOR SULLIVAN: Will we know something way before these five years if it is working?

MR. HENRY: Yes, because we are monitoring twice a year.

JOHN NESSEL: My name if John Nessel and I have lived in Newfield for a longtime. Just a couple of questions. Number one, if you can't identify, you said there was some additional stuff done through dry cleaning operation. You said it was done with the study.

MRS. HENRY: I said it was commonly used. I said there was other non SMC sources, but I did not specifically mentioned any specific entity.

JOHN NESSEL: But they are showing up in the groundwater studies?

MRS. HENRY: Yes, PC.

JOHN NESSEL: Well, we know what they are, but if you don't know where they are coming from how can you treat the ground effectively to get rid of them? Don't you have to find the site where it started and cleanup the site so it does not leach into the ground?

MR. SIVAK: Okay. So a couple of things. We started our TC injections up at the source area. Remember when Sherrel had that map up here that showed there was a building that handled decreasing and the materials needed to decrease.

We started our injections -- our emulsified vegetable oil injections. Those were the hottest spots, and that is where we started it. Prior to us doing this, when we started this supplemental remediation investigation to more clearly delineate the plume further down then we had originally looked, that is where we stated to see some of the perks -- the dry cleaning solvent.

We are not finding it on the facility itself. So we are looking at other possible sources of the perk. We are not doing that as part of this investigation. It is a separate entity. We have started having conversations about that right now. That does not stop us from having the obligation or requirement to address the TC up here at the facility itself.

So that is what we are doing. We are trying to address the contamination up here, and we have been very successful. We are basically getting non detects in our wells that are up here, but the wells down here we are still seeing a little bit of stuff, but up here where we done these injections we have been very very successful.

We think as the material moves through here, and we now have clean water moving through here. This is going to be cleaned up in a relatively short period of time.

So we are doing a couple of things.

We are continuing to attack the PCE, because that is our site source contamination, and we have the responsibility to respond to at Shieldalloy Metallurgical Site, and we are looking at what might be the source of some of this perk that is happening down here. Does that answer your question?

JOHN NESSEL: When we did this a while ago I told you where the dry cleaning place was, and you are still looking into it. Why have we not gone out to that site to see if, in fact, that is where the contamination is coming from? Why have we not done that? I don't mean any disrespect. It is just the way of the world, why?

MR. SIVAK: I can't talk about enforcement or other investigation that have been going on other properties. I don't know the information that has been done on that. That is something --

JOHN NESSEL: Excuse me. So you don't know if there was an investigation conducted or not?

MR. SIVAK: I know there is some work that is being done, but I don't know the extent of all of those efforts. I can try to find out some information out for you, but I am not sure what we are at liberty to talk about, right now, or what we can share. I can certainly follow up with you on that information.

JOHN NESSEL: I can tell you. I worked for the United States Parcel Service for some years, but they were in existence there on the corner of the Boulevard and East Avenue -- no Weymouth Road -- and there were times -- not times -- all the time they would take tractor -- triple trailers and park them and decrease them and wash the grease right into that river.

Why are we not going after that site? See if that is where the problem is or if it is contributing. I don't get it. I talk to people before after the meeting.

My other question is for the officials here for the borough of Newfield are we doing anything in conjunction with the city of Vineland to help get this situation under control? What are we doing? I just talked to Mr. -- I forget what his name is, but I am glad he came. I spoke with him and he said they have not heard from Newfield yet.

So I would like to know -- and I know our Mayor is here, and I hate to put him on the spot, but when are we going to put our feet together with the City of Vineland and push this thing towards the better interest of the borough of Newfield residents? When are we going to do that.

MAYOR SULLIVAN: As far as I know our officials has shared information with the City of Vineland. I will definitely follow up on that.

JOHN NESSEL: I hate to put you on the spot, but it seems we need to do that. It cannot be one town then another town. We have got to get together and help everybody in this area. I mean the cancer rate in this area is unbelievable and it is getting worse. We need to do something here and take care of this nonsense. Thank you very much for your time.

JOHN MAZZEY: Thank you for your presentation. I think I heard someone say that sediments from the Hudson Branch are being exuviated out and removed.

MRS. HENRY: That was last year. Last time we had a meeting. That was a remedy that was selected for operable Unit-2 and we are going to exuviate sediments from the Hudson Branch.

JOHN MASSEY: My follow up question is I live adjacent to Burnt Mill Pond. I have been there since 1973. I think I also heard you say that the surface water of the pond is not contaminated; is that correct? You have done testing of it?

MRS. HENRY: Yes, for operable Unit-2.

JOHN MASSEY: Okay. Did you test the sediment of it in Burnt Mill Pond?

MRS. HENRY: Yes, we did.

JOHN MASSEY: Are you saying that is not contaminated?

MRS. HENRY: Correct. It does not present a risk.

MR. SIVAK: We submitted those results when we were here last year.

JOHN MASSEY: My question then is if

the city decides to dredge Burnt Mill Pond there will be no issue to deposit that sediment?

MR. SIVAK: They would have to contact whatever facility --

JOHN MASSEY: True, but in terms of EPA and DEP there would be no issue of where the sediment is deposited?

MR. SIVAK: We have found --

JOHN MASSEY: Because it is not contaminated, correct?

MR. SIVAK: Correct. We have not found any contamination from any of our samples from Burnt Mill Pond.

JOHN MASSEY: And you are going to put that in your report?

MR. SIVAK: It is on the record that is why we have a court reporter.

JOHN MASSEY: I would like to thank you for that comment. I did not realize the contamination of the Hudson Branch --

JOHN SULLIVAN: I don't know if there is contamination or not. I worked there and witnesses what happened. Whether it is part of the contamination process or whatever. I am just telling you I saw -- I saw it myself for what it is worth.

JOHN PALADINO: But the lake or the pond it is contaminated -- Burnt Mill?

MRS. HENRY: The deep groundwater.

MR. SIVAK: Groundwater is not impacting the lake -- the pond at all. Our studies have showed that the deeper groundwater is contaminated with some volatiles. There is a shallow layer of groundwater that is not contaminated, and then there is the pond bottom.

So any discharge to the pond would be from the shallow groundwater if there is any. We have not found any contamination in there. Does that make sense?

JOHN PALADINO: Yes, it make sense, but how deep is that water?

MR. SIVAK: The deeper shallow or the contaminate?

JOHN PALADINO: The contaminate.

MRS. HENRY: 35 to 100 feet below.

JOHN PALADINO: But the contamination came from Shieldalloy?

MR. SIVAK: And possibly other sites.

Or sources.

JOHN MASSEY: Just to follow up. There is a city pumping station probably 300 yards from my house, along Delsea Drive -- we are about a half mile from that plume. So you mean to tell me that well is not contaminated? It is more then 6 feet or 100 feet.

MR. SIVAK: Is it a public supply well?

JOHN MASSEY: Yes.

DONNA GAFFIGAN: The public supply well I don't have --

JOHN MASSEY: It is closed. It has been closed since winter.

DONNA GAFFIGAN: Right, and they have begun to use it again. They will have to test it before they distribute it. I don't think there are contamination in it. I will check for you.

JOHN MASSEY: I did not get any letters saying that has been reopened. It was supposed to reopen in May.

DONNA GAFFIGAN: Would someone from our safe drinking water know? They said in the summer it was used as supplemental water. Maybe we have not needed supplemental water to use that well. I think that is well number 10?

JOHN MASSEY: I am not sure.

DONNA GAFFIGAN: There is another well that they are using as supplemental water. I could follow up.

SUSAN MAVILLA: I have lived here for over 30 years. I have one comment. The comment I have to say is the EPA along with the Vineland and Newfield residents that they don't know of a comparable case in the country of a situation that we are dealing with. I think that is disgraceful that you don't have an answer for us on that. I don't mean to be disrespectful because you guys have put on a wonderful presentation for someone like us who does not understand science or engineering. The explanations were wonderful.

I do have a question. The other question is we are here for you guys to give us a presentation of a change that is going to go on, but from my understanding the change has already been made. You have already been doing this procedure for the last four years. So what I am trying to understand if we are here for public comment, and EPA has already made the change. Am I missing something.

MR. SIVAK: No. When we started the pilot study. The remedy of record is groundwater pump-and-teat. The groundwater pump-and-treat was not working the way we wanted it to work.

So we had recommendations from hydro-geologist that thought we should look at some other alternatives and technologies to deal with these contaminates. So we went out and looked at some other studies. We looked at other sites that use these materials -- I just don't know the names of them.

I know there are other Chromium sites in New Jersey. I know there is Puchack. I have information back at my office, but that is not why we are here tonight. I apologize for that.

So we had very good success with this

stuff in the lab then -- which is part of our process we have to pilot it in the field. We set up a field study. Anytime you do an injection into the ground. You have to inject it, then you have to wait. If you want that material to disperse, and you want to see what effect if has on the contamination.

So after we had that happen we had pretty good results. You don't do another injection because you don't know if it is a rebound, and are those contaminations going to pop back up once this material dissipates, or are the concentration going to stay low.

So we waited and did another round of injections. Then we were prepared to come out and say this is what we are prepared to do. We think this is a much better and efficient way to deal with the contamination out here. What do you guys think about it?

It turns out those few initial round of injections that we piloted were so successful that it dropped the level to a point we never expected. So we are a little bit further along then we expected. It is a very good thing. It eliminates the need to say we got some reduction, but we want to keep trying it because we think it will be better in the future. What do you guys think -- it kind of takes that process away.

On the other hand we are at much, much lower levels then we expected. We think that is a very good thing. So that is my answer to you. You are right the process -- we should have come to you when there was other technologies or alternatives. When there was still questions out there. Fortunately or unfortunately we are much further ahead then when we first came to you.

LEE T: You have five wells in this 21 mile stretch. Now, are these monitoring wells or extracting wells? Now according to your statement if you put in more wells you would be pumping clean water.

MR. SIVAK: Right. The challenge is where do we place these wells so we minimize pumping clean water and maximize pumping contaminated water.

LEE T: Well, you are wrong. The longer it takes to pump this out don't it have more time to leech into the groundwater?

MR. SIVAK: There is always that possibility. We think the plume is at a steady state right, now.

LEE T: How do you know that?

MR. SIVAK: These essential wells at the very far end of the plume and now that we addressed the highest levels of contamination at the source area we are not seeing the plume really expand.

LEE T: You have monitoring wells and pumping wells?

MRS. HENRY: We have hundred of monitoring wells.

LEE T: So that is how you know that it is not spreading?

MRS. HENRY: Exactly and the levels are going down, yes.

LEE T: All right. The only other thing that bothered me a little bit is when you said this is the best bang for our buck. Basically, what it is coming down to is dollars. We are sitting here with this water and you are worrying about the buck.

MR. SIVAK: No. Maybe that was a poor choice of words. I apologize about that. I did not mean to be flip-it. The point I was trying to make is we are getting the biggest result in the quickest most efficient way with the technologies we are proposing.

MRS. HENRY: He meant the reduction.

LEE T: When you draw out are you bringing in fresh water intrusion to help bring that out?

MR. SIVAK: That is our concern. When we are extracting the more monitoring wells we install, especially in the further end of the plume -- the concentrations are much lower. We are pumping large amounts of water, and we have low levels of contaminations.

So we are bringing a lot of fresh water with that. It is still going through our treatment process. Whatever, we pump out has to go through that treatment process. You always want to optimize where you are extracting that water. I think that was the point the solicitor was trying to make.

That we should have reevaluate where the extraction wells were and we feel those extraction well were located in appropriate places and we are still not getting the reduction in concentration that we had hoped for.

LEE T: But I think more wells would get it out there faster. You would probably be using your fresh water to get it out there.

MR. SIVAK: Right, but that is not particularly efficient.

LEE T: But it is healthier?

MR. SIVAK: I am sorry. I don't follow.

LEE T: Out of the ground is faster and healthier.

MR. SIVAK: That part is correct.

LEE T: Then why don't you put in more wells?

MR. SIVAK: Because the number of wells we need to achieve that would be a significant effort, and you are bringing -- that water that you are bringing out you are pulling amendments that were added that do such a wonderful job of reducing these concentrations.

So if we get rid of that and we are just pumping out the water it is that amount of water that we have to draw out to treat that lower amount of contamination is -- we are using a lot of resources, a lot of carbon, and a lot of the ion exchange resident. Creating a lot amount of waste by pumping and treating all of this water.

Much of it is very low level, and can be treated by monitored natural attenuation and by injections of these amendments.

LEE T: I appreciate you coming out my wife is pulling me by my shirt.

MS. AYALA: Remember the public comment is open until August 28th. You can also ask for an extension.

LEE T: Do you know exactly what it is and what the label is?

MR. SIVAK: I mean we have that information. We know what the products are.

It is emulsified vegetable oil.

LEE T: Whether it is Wesson? I am sorry I should not have said that, but really it has to be labeled with something.

MR. SIVAK: I am sorry. We don't have that information with us. That particular brand of emulsified vegetable oil. It is in our reports.

LEE T. Thank you for coming out.

JOHN PALADINO: After five sites you injected the vegetable oil?

MRS. HENRY: No, just one site. Vegetable oil was injected in the source area. On one site. In a different location at the facility.

JOHN PALADINO: Only once?

MRS. HENRY: We did it once --

JOHN PALADINO: Now, you study it?

MRS. HENRY: We did it in 2011 and got the results in 2012, and results were non detect. So in 2012, 2013 we are still zero for the TC.

JOHN PALADINO: But the pumps are -- so essentially you are not doing anything now?

MR. SIVAK: What we are doing is we are allowing the EVO to work its way through the system and it provides nutrients it is providing this enhanced environment for these microbes that exists naturally in the geology in the aquifer and grade this material and eat it up.

JOHN PALADINO: But then again you only did it one time.

MRS. HENRY: And it worked.

JOHN PALADINO: How many gallons did you use?

MRS. HENRY: We used a lot, but I don't have that readily available. You can get it at the repository located in the library. I can get that information out of the reports for you.

JOHN NESSEL: Who is paying for this cleanup and this oil? Shieldalloy or the tax payer?

MR. SIVAK: The responsible parties for the site.

JOHN NESSEl: And that is who?

MR. SIVAK: SMC.

MRS. HENRY: But for operable Unit-2

TRC is paying for the study. Is It privately funded.

JOHN NESSEL: It is not tax payer money?

MR. SIVAK: No, no.

JOHN NESSEL: And the numbers you are getting are from who? I remember the last time we did this at the school you were supplying us with numbers to tell us how good it was going.

MRS. HENRY: We are overseeing it. Anything they do we are overseeing it. DEP is also looking at it. They have to make sure that they follow guidelines. We check all of the data to make sure that is done.

MR. SIVAK: We identify the protocols that need to be followed, and they go and do it.

JOHN NESSEL: I said this in '84. I said what about the water and they said, well you are not drinking it. The water that is entering the atmosphere from irrigation. They said it is not an issue, not an issue. Now, it is an issue.

There is still farming going on

there. They are still doing irrigation, well are we sure that is not in the target site.

MRS. HENRY: I am not sure where they are irrigating.

JOHN NESSEL: How far away from the contamination site are people allowed to water?

MRS. HENRY: There has got be some institutional controls in the entire plume. If it is in the plume you cannot use the water.

TERRY: I think, the product sounds really great, and your presentation sort of defies logic for people who are not scientist. With all of the knowledge and acronyms. Natural attenuation has not worked. In 1970 they thought throw it into a holding pool and let the water sit and that did not work.

Then the next steps was the wells, the pump-and-treat and that did not work. The counselor's point was well taken if it is not aggressive, and attacked in that way. The natural attenuation does not work. You have not done enough you have not hit enough areas.

Why don't you hit more areas? You admit you were surprised that the plume was so horizontal, and we saw that illustration of that. Is there something -- in the geology of the area that is more receptive to that kind of treatment. You stopped it at 26 hundred feet, but it continues to spread 110 feet deep. So all of these kinds of things that are just raised by looking at your presentation -- you no don't give confidence to the citizens -- that shall go unnamed.

Can it be any more efficient in the long run that will have any type of continual ability then before. I am just making a comment.

MRS. HENRY: After what we did it delineated how wide it is, and how deep it is to make sure the levels are decreasing.

TERRY: You are charged with that.

MRS. HENRY: Exactly.

TERRY: Considering that you are 50 years into it, and class action suits and all of it. The institutional controls that is such an un-trust worthy situation. The liability on that. It is so un-trust worthy. Relying on you to do that is difficult at times.

We don't want to be adversaries we need you. More wells or more vegetable oil or whatever it is. We think you are tying to strike a deal with Shieldalloy and pay less.

MR. SIVAK: Can I respond to something you said about natural attenuation. You were so clear and so honest with your comments. Things that you said I think we take for granted because we know this stuff so well. To hear comments about natural attenuation -- I think some of the earlier comment by the solicitor kind of touched upon that. They understand natural attenuation and don't feel we are doing enough.

TERRY: It is obvious not letting it go. Even in the end the earth has a natural ability -- with this kind of heavy duty chemicals. There is a tipping point.

MR. SIVAK: Exactly. So in the last 15 years/ish EPA has gotten much more robust with the kind of conditions that need to be in place for natural attenuation to occur for different types of contaminates. Not all contaminates are the same. Here we are talking about two very different types of metals.

The Hexachromium and we are talking about a Chlorinate Volatile which is the TCE. We also have another group called B-text components. B-text components and these chemicals are both volatile, but they are both very different. The chlorines that are on the TCE, the Vinyl Chlorides behave and act very differently and react very differently in the subsurface then these petroleum type of contaminates.

So what the EPA has done is they looked at a lot of different environmental conditions that would be more successful at promoting natural attenuation for these different types of contaminates. What Sherrle was talking about as part of focus feasibility study is supplemental investigation. We really did investigate the condition that existed here that would allow for natural attenuation and the monitor part is very active part of this remedy.

There is a lot of things that have to take place in order for natural attenuation to even be considered by the EPA one of them is you cut off the source. We talked about the unlined lagoons back in the operational days we believed they did a phenomenal job at cleaning up the lagoons of all that contaminated soil by capping that material.

We believe strongly that there are no more sources of contamination to the groundwater at the site itself. Another thing we looked at is not continuing to expand if it continues to expand then you have nothing to monitor. It just seems that you monitor for decreases on the fringe end. Okay. We have identified the plumes we know that each plume goes much longer then we though it was.

Maybe one reason for that is there could be other sources. It is not just all

Shieldalloy there are some other sources that are done there, but regardless we are not seeing -- we have these wells -- we cut off the pump-and-treat years ago. We stopped that.

The plume we are continuing to expand as the groundwater moves through and rebounds and starts to go in its natural pattern, it will pull that contamination along with it. That contamination will continue to migrate, and we are not seeing that in the essential wells.

We believe that the plume is kind of static. It is not expanding. In fact we believe it is shrinking. We cut off the source. We know these natural things exist down there. We know they are doing some good jobs to chew up this material and break it down into harmless degradation products. The injections of these EVO's -- it is okay to be skeptical about that, but surprisingly it is very effective.

TERRY: I am not at all skeptical. Again, it is the amount of effort put into it. Yes, monitoring is one thing, but being more aggressive about it.

MR. SIVAK: And as part of the monitoring we start to see that it may make sense to schedule another injection, and plan for that, and we will go back the remedy allows for that to happen. It allows for additional injections of EVO or the CPS.

If we believe that is necessary to promote the dissolution of this material, but in a more efficient manner.

TERRY: So you are only working on the site at the end of the plume? How many points and you would do this treatment?

MR. SIVAK: We would have to evaluated that. As we talked the Chromium injections were done at the site at the car wash and at the farm parcel. So we had three different arrays of injection points, throughout that plume and it has been very successful at reducing those concentrations.

We are still going to monitor that, if we start to determine if we need another round of injections -- maybe we don't need anymore at this source area up here because those concentrations are really low, but further down in what remains of the plume we may need a little kick start to help those natural degradations processes. Until those natural attenuations process happen, again, we will consider that.

ELIZABETH: I worked at Shieldalloy I was secretary there for 11 years. I left in 1969 and in 2006 I was in very serious car accident. When I was in the hospital a thyroid doctor told me and my husband that I had a nodule there and it was going to turn into cancer. So I asked a lot of questions. He said did you ever work around asbestosis or metal? It was like ding, ding, ding. I still think that Shieldalloy was responsible for that. I really do. I worked there for 11 years. I feel good, but I am on thyroid medication. I live about four or five miles from here and I feel sorry for you people, I really do. (Inaudible.)

Do those results go directly to the township of Newfield or Vineland? Do the results get published? Can we make it that they go to the governing bodies that protect our town?

MRS. HENRY: Yes. We can definitely do that. We put them in the repository at the library so you can see those results, and the results are on our web site. The five year review will be on there.

We understand your position and we think it is not quick enough.

JOHN PALADINO: It is about lack of trust, from you and from EPA. That is all I can tell you.

MR. SIVAK: I thank you for saying that it is not an easy thing to say.

JOHN PALADINO: The people of Newfield knew there was a problem.

JOHN SMITH: When you were talking earlier why wait if it is so successful? Why wait, however, long to do another injection.

MR. SIVAK: Well, part of the reason is we have to wait to see -- we just did an injection and we have to wait for the material to migrate out. To see where it is going? Where are we getting our biggest increases. If we are simply going to move our injection points 100 feet down and inject ever 6 months we are not going to see how effective that is.

We could overwhelm the system. Certain microbes can -- there is a balance we need to achieve and monitor.

JOHN SMITH: I know you don't dump the whole bottle of detergent into the washing machine. It is so large and I am not saying do it all, but maybe in thirds. Maybe cutting down 50 years to 30. I know the family like the Roberts family. It is a heck of a lot better than fifty. It is three generations. It is her family, then her kids, then the grandchildren.

MS. AYALA: Anymore comments? With that I would like to thank you all for coming out. Public comment period is August 28th. If you have questions or comments you can address them to Sherrel. Again, my name if Wanda Ayala and I would like to thank you.

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(Meeting concluded at 11:00 p.m.)

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C E R T I F I C A T E

COMMONWEALTH OF PENNSYLVANIA:
COUNTY OF PHILADELPHIA:

I, Jacqueline Gibson, a Shorthand (Stenotype)Reporter and Notary Public in and for the County and State, do hereby certify that the foregoing transcription of the 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 matter, nor in any way interested in the result or outcome thereof.

IN WITNESS WHEREOF, I have hereunto set my hand this 20th day of August, 2015.

____

Jacqueline Gibson

APPENDIX V-e

WRITTEN COMMENTS

VINELAND
New Jersey
Discover The Difference

DEPARTMENT OF LAW
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August 11, 2015

VIA OVERNIGHT AND ELECTRONIC MAIL
Sherrel Henry, Remedial Project Manager
U.S. Environmental Protection Agency
290 Broadway, 20th Floor
New York, NY 10007
E-mail: henry.sherrel@epa.gov

RE: Shieldalloy Metallurgical Corporation Superfund Site
Gloucester/Cumberland Counties, New Jersey

Dear Ms. Henry:

This letter is submitted in anticipation of an August 12, 2015 meeting at Newfield Borough Hall, which the Environmental Protection Agency ("EPA") has indicated, by way of a July 2015 Superfund Proposed Plan, will pertain to EPA's effort to amend the 1996 Record of Decision ("ROD") for Operable Unit 1 ("OU-1") at the above-referenced Site (the "Site"). EPA proposes to provide an Amended Remedy for OU-1.[1]

The purpose of this correspondence is to raise grave concerns that the City of Vineland (the "City") has about the amended remedy for OU-1, as the Preferred Alternative proposed by EPA does not appear to adequately protect the health and safety of the City's residents, or to protect the natural environment surrounding important public resources including Burnt Mill Pond. As you know, the City has previously raised similar issues with regard to EPA actions for OU-2, and maintains such concerns.[2]

I. Background

The City of Vineland owns and maintains an important natural resource known as Burnt Mill Pond. The Pond and surrounding parkland, which are State of New Jersey Green Acres parklands, are actively used for various recreational activities including fishing, boating (with access through

1 You indicate in the Proposed Plan that the Plan is related to non-perchlorate groundwater contamination at the Site. OU-1 is the relevant designation for this concern. It appears that this Plan in no way relates to OU-2 or OU-3.

2 The City's environmental counsel sent EPA a letter raising significant issues with OU-2 in late 2014.

boat ramps along the Pond), and walking (along the walking trail that surrounds the Pond). The City of Vineland is a community that prides itself on its natural resources, of which Burnt Mill Pond and the surrounding park property are significant and valued examples. However, the City is also keenly aware that Burnt Mill Pond lies directly downstream from the main Shieldalloy Site in Newfield, New Jersey. The City therefore closely monitors EPA's actions at the Site given its active interest in protecting the health and safety of its residents and visitors, including but not limited to visitors to the Pond.

II. The City of Vineland Has Concerns Regarding EPA's July 2015 Proposed Plan for OU-1

The current selected remedy for OU-1 was selected by EPA—in concurrence with the New Jersey Department of Environmental Protection ("DEP")—in a Record of Decision ("ROD") dated September 24, 1996. That remedy is currently in use and includes a groundwater pump-and-treat system with extraction, above-ground treatment, and on-site discharge of treated water. However, in the wake of a Remedial Optimization Study performed in 2010, which apparently revealed certain inefficiencies in the then-existing remediation, in July 2015, EPA proposed an amendment to the ROD. The July 2015 Proposed Plan includes three Remediation Alternatives including: (1) No Action; (2) Continued Pump-and-Treat; and (3) *In Situ* remediation. EPA states in the Proposed Plan that EPA has a Preferred Alternative of Alternative 3, which consists of "*In Situ* Remediation, Monitored Natural Attenuation, Institutional Controls, Long Term Monitoring and Five-Year Reviews."

Unfortunately, it is clear upon the City's review (in consultation with its attorneys) that Alternative 3 fails to address important public concerns. Notably, the Proposed Plan appears to rest upon the basic information provided in the September 1996 ROD, which was issued nearly twenty years ago. Reliance on such a document may be misplaced given the changing uses of the areas within all of the OUs, in the Hudson Branch and beyond, during that time. For instance, as the City informed EPA in late 2014, Burnt Mill Pond is now actively utilized by local residents as parkland.3

In its amendment to the older plan, EPA also appears to rely on a 1995 human health risk assessment and the 2015 OU-1 Risk Update to determine and assess the site-related human health risks for reasonable maximum exposure. The second of four steps in calculating risk is called the "exposure assessment." This analysis aims to assess "the different

3 As noted in that letter by the City's environmental counsel the Agency's use of the "recreational trespasser" scenario did not adequately reflect the current and anticipated uses of the area.

exposure pathways through which people might be exposed to the contaminants." However, what this analysis seems to forego is any exposure that may come via migration of a contaminant from the site. Seemingly, if this analysis were included the preferred alternative analysis may be weighted differently. Notably, the second of three Remedial Action Objectives is to "Prevent migration of groundwater contamination." As you know, groundwater migration remains a concern for all areas downgradient of the Shieldalloy Site.

It also appears that EPA's Proposed Plan does not provide for elimination of unreasonable risks to human health and safety within a reasonable timeframe. While it is true that EPA has stated Alternative 3 would protect human health and the environment, and be more cost-effective and efficient in achieving acceptable standards, the Agency has also stated that the amended proposal would not achieve an acceptable contamination level for 50-200 years. Even with this method's more aggressive and timely results (as compared to Alternatives 1 and 2), it would be less effective than Alternative 2 at preventing migration of contaminants.

Nowhere in EPA's Proposed Plan is it in any way discussed that the most effective alternative may include a combination of the current pump-and-treat system and the EPA's preferred *in situ* remediation methods. Not only would this eliminate certain vulnerabilities created by the choice of one method over the other, but such a combination is commonplace in environmental remediation. It has also shown to be highly effective when used. Further, as it appears never to have been considered by EPA that a possible alternative may include some form of excavation for effective access to contaminated groundwater, the City requests that EPA consider doing so as a supplement to its use of pump-and-treat and *in situ* methods.

III. The City Maintains Concerns Regarding EPA's September 2015 Record of Decision for OU-2.

The City still has concerns related to the recently issued ROD for OU-2. The Plan does not appear to adequately address a remedial action for Burnt Mill Pond, as opposed to its discussion of the Hudson Branch, which is more extensive. For more detail, I refer you to the letter of the city's environmental counsel, Stuart J. Lieberman, Esq., of August 21, 2014.

IV. Conclusion.

The City of Vineland bears responsibility for all persons who live, work, and recreate in the City. It therefore seeks to make sure that the

City remains free of harmful environmental contamination, including the cancer-causing contaminants linked to the Newfield Shieldalloy Site. The

City requests that the State and Federal governments act reasonably in response to the City's concerns so that human health and safety can be protected and this important resource can be restored.

EPA and NJDEP's past management of the Site and its surrounds indicate those agencies do not fully contemplate the importance of these resources to the City's population. As previously indicated, the City continues to anticipate that it will spend approximately $1,000,000.00 to repair the on-site dam at Burnt Mill Pond utilizing taxpayer funds. Therefore, it would appear to be an ideal time to further investigate and address any existing contamination in and below the Pond. Vinelands' failure to meet certain requirements of the original grant of the Pond (i.e., that it be maintained as a usable park) could threaten to expose the City to a reverter to the grantor.

The City looks forward to working with EPA to ensure that the environment, as well as the health and safety of its residents, is protected. We also thank you for considering these comments in anticipation of the August 12, 2015 meeting.

Very truly yours,

RICHARD P. TONETTA, ESQUIRE
Solicitor, City of Vineland

cc: Administrator Gina McCarthy (*via U.S. first class mail*)
Judith Enck, Regional Administrator, EPA Region 2 (*via U.S. first class mail*)
Bob Martin, NJDEP Commissioner (*via U.S. first class mail*)

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August 28, 2015

Via Email/Federal Express

Ms. Sherrel Henry
Remedial Project Manager
Emergency and Remedial Response Division
US Environmental Protection Agency, Region 2
290 Broadway, 20th Floor
New York, NY 10007-1866

Re: TRC Environmental Corporation Comments to USEPA's OU1 Proposed Remedial Plan for the Shieldalloy Metallurgical Corporation Superfund Site

Dear Ms. Henry:

TRC Environmental Corporation ("TRC") welcomes the opportunity to submit these comments to the July 2015 Proposed Remedial Plan ("Proposed Plan") of the U.S. Environmental Protection Agency ("EPA" or "Agency") for Operable Unit 1 ("OU1") at the Shieldalloy Metallurgical Corporation ("SMC") Superfund Site in Newfield, New Jersey (the "Site"). As the party preparing the Remedial Investigations/Focused Feasibility Study ("RI/FFS"), as well as the Pilot Studies, for the Site, TRC has a comprehensive and highly informed understanding of Site conditions and the OU1 remedial alternatives which were considered by EPA, culminating in the Agency's selection of Alternative 3 as the preferred alternative.

TRC has carefully evaluated the Proposed Plan and the rationale set forth in it for EPA's selection of the proposed "Preferred Alternative" (Alternative 3), which consists of In Situ Remediation (including Monitored Natural Attenuation [MNA]) of OU1 to achieve the Preliminary Remediation Goals ("PRGs").

For the reasons addressed in these comments, selection of remedial Alternative 3 is consistent with the National Contingency Plan ("NCP") under the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA" or "Superfund"); it is also consistent with EPA policy and precedent throughout Region 2 and across the country, and, as discussed in detail in the FS and below, Alternative 3 is the alternative which best satisfies the Threshold and Balancing Criteria that EPA is required to weigh under the NCP.[1]

[1] It is our further understanding, as represented by EPA at the August 12, 2015 Public Meeting, that the Preferred Alternative has also already received State Acceptance which satisfies one of the Balancing Criteria under CERCLA. (Transcript at p. 31)

I. SUMMARY

Selection of Alternative 3 is consistent with the NCP and EPA Superfund policy and precedent, for at least the following reasons:

A. Alternative 3 best meets the requirements of the NCP remedy selection criteria that must be weighed and balanced as a whole to identify a final remedy for the Site;

B. Alternative 3 meets the threshold criteria

C. Alternative 3 best meets the five balancing criteria, and is the most effective remedy at reducing contaminant levels and does so more quickly and efficiently than Alternative 2 Pump and Treat (P&T);

D. Alternative 3 is a "greener" remedial alternative when compared to Alternative 2 (P&T);

E. Certain public sentiment raised at the August 12th Public Meeting, wishing that *both* Alternative 3 *and* Alternative 2 (P&T) be performed simultaneously, cannot work as a fundamental matter of implementability because the P&T remedy will actually be injurious to the more effective Alternative 3 remedy (e.g., the operation of the P&T system would actually remove the beneficial treatment reagents that are presently treating groundwater). Similarly, based upon several questions/comments made by citizens at the Meeting, it was apparent that various members of the public did not fully understand that the active injection component associated with Alternative 3 has already been successfully implemented. Therefore, the Responsiveness Summary/ROD should clarify for the public that the in situ injection program has already been performed during the small and large scale pilot program in an effort to aggressively remove the contaminant mass in a way that the pump and treat system could not. It should be similarly clarified that the remaining $490,000 to be spent is attributable to MNA-related costs.

F. The State of New Jersey has accepted Alternative 3.

For any and all of these reasons, EPA is correct in selecting Alternative 3 as the Preferred Alternative for OU1 and the final amended Record of Decision remedy for the Site.

II. DISCUSSION

A. Alternative 3 Best Beets the Requirements of the NCP Remedy Selection Criteria that Must Be Weighed and Balanced as a Whole to Identify a Final Remedy for the Site

As EPA is aware, the NCP dictates an analysis of remedial alternatives under consideration that "consists of an assessment of individual alternatives against each of nine evaluation criteria and *a comparative analysis that focuses upon the relative performance of each alternative against those criteria*." 40 C.F.R. § 300.430(e)(9)(ii) (emphasis supplied). These nine criteria are:

(i) two "threshold" criteria (overall protection of human health and the environment, and compliance with Applicable or Relevant and Appropriate Requirements "ARARs") which each alternative must be evaluated against in order to be eligible for selection;

(ii) five primary "balancing" criteria (long-term effectiveness and permanence; reduction of toxicity, mobility, or volume; short-term effectiveness; implementability; and cost); and

(iii)two "modifying" criteria (state and community acceptance) that are to be considered in final selection of the remedy. These criteria are considered after the public comment period.

TRC reserves the right to offer further comment, after the comment period, relative to these two criteria.

Id. at § 300.430(f)(1)(i).

All the above criteria "are used to select a remedy." *Id*. See also *id*. at § 300.430(f)(ii). EPA is required to select the "*most appropriate* remedial action" for a site by "identify[ing] the alternative that *best meets the requirements in* § 300.430(f)(1)(i)," i.e., that "best" meets the nine remedy selection criteria taken as a whole. *Id*. at § 300.430(f)(1)(ii), (f)(2) (emphasis supplied).

The administrative record for the Site, the RI/FS approved by the Agency, and EPA's own Proposed Plan demonstrate clearly that Alternative 3 represents the alternative that provides the best balance among the NCP remedy selection criteria as a whole and, therefore, should be selected as the final OU1 remedy for the Site.

B. Alternative 3 Satisfies the NCP's Threshold Criteria

EPA's Proposed Plan itself demonstrates that Alternative 3 satisfies the first two Threshold Criteria of the NCP. In that regard, the Proposed Plan states the following:

(i) *Overall Protection of Human Health and the Environment*: "Alternatives 2 and 3 employ active technologies to address the groundwater contamination". Proposed Plan, at 11. Further, "Alternative 3 would protect human health and the environment through *in-situ* remediation, MNA and institutional controls."

Clearly, Alternative 3 satisfies this criterion. Additionally, and as described in further detail below, given that Alternative 3 is far more effective at removing contaminants in a much shorter timeframe when compared to Alternative 2, Alternative 3 is more protective of human health and the environment than Alternative 2.

(ii) *Compliance with ARARs*: "Alternatives 2 and 3 would comply with chemical-specific ARARs." Proposed Plan at 12.

Alternative 3 clearly satisfies this criterion.

C. Alternative 3 Best Meets the Five Balancing Criteria, and is the Most Effective Remedy at Reducing Contaminant Levels and Does so More Quickly and Efficiently than Alternative 2 Pump and Treat (P&T)

Alternative 3 is also superior to Alternative 2 under the NCP's five balancing criteria. In this regard the Proposed Plan provides as follows:

(i) *Long-Term Effectiveness and Permanence*: "Alternatives 2 and 3 would provide long-term effectiveness and permanence because both alternatives would maintain protection of human health and the environment once RAOs were met and PRGs were attained. **Alternative 3 is preferred with respect to this criterion because it would offer long-term effectiveness more quickly, as the *in-situ* remediation treatability studies already have substantially reduced contamination and significantly expedited the cleanup time.**" Proposed Plan at 12. (Emphasis Added)

At the public meeting, the EPA confirmed and reinforced this point by referring to the in situ approach, Alternative 3 results as "amazing " (Transcript at pp. 19, 28); "very effective" (Transcript at pp. 30, 34); "incredible" (Transcript at p. 38); "great" (Transcript at p. 68); "more effective" (Transcript at p. 71); "very successful" (Transcript at p. 78); "much better and efficient' (Transcript at p. 88); successful (Transcript at p. 88); and "phenomenal" (Transcript at p. 101).

Thus, Alternative 3 clearly satisfies and is preferable to Alternative 2 with respect to this criterion.

(ii) *Reduction of Toxicity, Mobility, or Volume Through Treatment*: "As demonstrated by the treatability studies, Alternative 3, through the *in-situ* remediation treatment by injections of CPS and EVO, was very successful in substantially reducing the toxicity, mobility and volume of contaminants in groundwater in a much shorter time frame." Proposed Plan, at 12.

In stark contrast, Alternative 2, P&T, is no longer effective at significantly reducing either the volume or toxicity of the contaminant plume. At the public hearing, the EPA said "With pump-and-treat …it was leveling off at 1,000 [ug/l] for 10 years. So we knew we needed to do something." (Transcript at p. 34).

TRC further notes that these asymptotes were within the radius of the pumping wells. Outside of that radius, concentrations had barely decreased at all over 20 years (and were as high as 40,000 ug/l, until the Alternative 3 in situ work was performed and greatly reduced the concentrations by >95%). More pumping wells would simply have achieved the same limiting asymptotic condition over a broader area.

Because the in situ work changes the valence state of the chromium, to a form that is extremely conducive to MNA mechanisms, Alternative 3 also achieves a reduction in the mobility of contaminants. The selected remedy (the combination of active remediation attributable to the injections coupled with MNA processes) will effectively contain the plume. The EPA stated at the Public Meeting that "We think the plume is at a steady state right, now." (Transcript at p. 90). Because the footprint of the plume has been greatly decreased by the injections, Alternative 3 has achieved major volume reduction. Over 20 years of operation, P&T has achieved essentially no reduction in plume volume. .

In light of the foregoing, Alternative 3 is far superior to Alternative 2 with respect to this criterion.

(iii) *Short Term Effectiveness:* Alternatives 2 and 3 both have some measure of effectiveness in the short-term. "Alternatives 2 and 3 would have minimal potential risks or hazards associated with implementing the alternatives, which would be reduced by using administrative and engineering controls, health and safety measures, and proper personal protective equipment. **Alternative 3, which more aggressively treats the contamination via the *in-situ* injections, is expected to achieve RAOs more quickly than the pump-and-treat remedy in Alternative 2, which, as stated previously is**

no longer efficiently reducing groundwater concentrations. Based on current modeling, Alternative 3 is estimated to achieve the RAOs and PRGs in approximately 50 to 200 years, compared to 440-660 years for Alternative 2. Thus, Alternative 3 will achieve the RAOs and PRGs three to eight times faster." Proposed Plan, at 12. (Emphasis Added)

As such, Alternative 3 is superior to Alternative 2 with respect to this criterion.

(iv) *Implementability*: "The pump-and-treat system of Alternative 2 operated for almost 25 years, so it already has been demonstrated to be implementable. The *in-situ* remediation of Alternative 3 was demonstrated to be implementable with the injections during the treatability studies conducted from 2010 to 2014. Further, for Alternative 2, pump-and-treat system requires extensive energy for operation and produces a significant amount of waste sludge to be landfill off-site, whereas Alternative 3 has significantly lower energy demands with very little waste generated as a result." Proposed Plan at 13.

Additionally, while Alternative 2 can be implemented, its efficacy has proven to be limited. The 2010 OU1 Optimization Study, included in the Administrative Record, outlined the history of EPA's review and improvement of P&Ts, and outlined suggested site-specific improvements. The OU1 Optimization Study indicates that EPA, via the Office of Solid Waste and Emergency Response (OSWER) has been performing P&T Optimization Studies since at least 2000 as part of the *Superfund Reforms Strategy* (OSWER 9200.0-33; July 7, 2000). Furthermore, the USEPA directed effort towards greening P&T systems in December of 2009 by issuing "Green Remediation Best Management Practices (BMPs): Pump and Treat Technologies". In this document, the USEPA advocates that technologies such as in situ be considered and that MNA also be considered to address the diffuse portion of the plume. OSWER and the Superfund program use the Remediation System Evaluation (RSE) process, a tool developed by the U.S. Army Corps of Engineers (USACOE). The RSE process is meant to provide an appraisal of the remediation. USACOE says "*In some cases, decision documents were cast long ago and such issues as technical impracticability and risk-based clean-up were not considered.*"

With the backdrop and experience both from a technical and regulatory perspective on the remedy, and upon reviewing 20 years of extensive data collection, the OU1 Optimization Study, concluded that "...the pace of cleanup associated with P&T is slow (and getting slower), and that...the current treatment system is highly energy intensive." At the OU1 public hearing, EPA summed this up by saying "The numbers were not going below a 1,000(mg/l) it had leveled off. It was unable to get below that number." (Transcript at p. 8)

The EPA also indicated at the Public Meeting that "EPA...learned that groundwater pump-and-treat by themselves don't typically result in achievement of RAO's." (Transcript at p. 42)

In short, P&T has outlived its useful life and represents the wrong technology for this Site. The unsupported assertion (either factually or technically) by certain members of the public that EPA should direct the installation of a broader P&T system is simply misplaced as that technology has already proven to be ineffective at further reducing contaminant levels. A larger P&T system would simply achieve similar asymptotes, with much greater energy use, and much more wasted water, for a lot more money.

EPA said at the public hearing "We've run this approach [Alternative 3] by our groundwater experts both within our region, and we've run it by our folks in Washington D.C. who look at groundwater strategies all around the country. They agreed this is the right approach to take." (Transcript at p. 45).

Therefore, Alternatives 3 is superior to Alternative 2 with respect to this criterion.

(v) *Cost*: The Proposed Plan indicates that the present value of Alternative 2 is $27M while the present value of Alternative 3 is $9M. Proposed Plan at 13.

Therefore, any reasonable evaluation of both the EPA-approved FS, the discussion in the Proposed Plan, and the application of the Balancing Criteria under the NCP can only yield the conclusion that Alternative 3 must be selected as the ROD Remedy for OU1.

D. Alternative 3 is a "Greener" Remedial Alternative When Compared to Alternative 2

The Proposed Plan does not mention the issue of sustainable (or green) remediation; however, EPA Region 2 places significant emphasis on its "Clean & Green" remediation policy, which was established in March 2009 to ensure consideration of environmental impacts of remediation activities by seeking to employ sustainable practices.[2] The objectives of that

[2] See also *Superfund Green Remediation Strategy*, EPA, OSWER and Office of Superfund Remediation and Technology Innovation, September 2010 (calling for incorporation of green remediation factors as part of remedy evaluations starting in fiscal year 2010 and including pursuit of ways to reduce use of energy and minimize GHG emissions). Notably, EPA has concluded that "[g]reen remediation aligns with goals and processes outlined in CERCLA . . . as well as the NCP . . . ," including "remedy selection considerations such as 'the nine criteria' to

policy applies to all Superfund cleanups and which Region 2 has referred to as the "touchstone" for its remedial actions.

However, the OU1 FS appropriately ranked the alternatives relative to "green remediation" and found that Alternative 3 represents the most sustainable green remedial alternative. Thus, in addition to being the remedy that best achieves and complies with the requirements of the NCP, the selection of Alternative 3 also best comports with EPA's green remediation objectives.

E. Certain public sentiment wishing that ***both*** Alternative 3 (In Situ) *and* Alternative 2 (P&T) be implemented are contrary to the concept of the alternatives; these two alternatives are inconsistent with each other and are mutually exclusive

At the Public Meating, certain members of the public expressed an interest in implementing both Alternative 3 (In Situ) and Alternative 2 (P&T). As a threshold matter, EPA is precluded from considering the application of Alternative 2 because to do so would require the Agency to ignore the extreme cost and inefficiency of that remedy which renders the application of Alternative 2 inconsistent with the NCP.

Both CERCLA and the NCP require that remedial actions be "cost-effective." See 42 U.S.C. § 9621(a) (EPA "*shall* select remedial actions . . . which provide for cost-effective response" (emphasis supplied)); *id.* at § 9621(b)(1) (same); 40 C.F.R. § 300.430(f)(1)(ii)(D) ("Each remedial action selected *shall* be cost-effective . . . ." (emphasis supplied)); *The Role of Cost in the Superfund Remedy Selection Process*, OSWER Directive 9200.3-23FS, September 1996 ("*The Role of Cost Guidance*"), at 5 ("CERCLA and the NCP *require* that *every* remedy selected *must* be cost-effective" (emphasis in original)). Alternative 3 is cost effective and satisfies this requirement. Because Alternative 2 clearly is not cost-effective, its selection would be unlawful.

The NCP mandates that any final remedy be "cost-effective" is independent of the requirement that the costs of remedial alternatives be considered and weighed. In light of this "cost-effectiveness" mandate, "costs that are grossly excessive compared to the overall effectiveness of alternatives may be considered as one of several factors used to eliminate alternatives. *Alternatives providing effectiveness and implementability similar to that of another alternative by employing a similar method of treatment or engineering control, but at greater cost, may be eliminated*" at the stage that alternatives are developed and screened. 40 C.F.R. § 300.430(e)(7)(iii). See *id.* at § 300.430(e)(1).

EPA must ensure that the remedial action selected is "cost-effective." Cost-effectiveness is determined by (i) first determining the overall effectiveness of the remedy (by evaluating

evaluate alternatives." *Id.* at 3. As such, green remediation principles are an important aspect of the problem to be considered by EPA in selecting a final remedy.

long-term effectiveness and permanence, reduction of toxicity, mobility or volume through treatment, and short-term effectiveness), and (ii) then comparing overall effectiveness to cost to ensure that the remedy is cost-effective. A remedy is cost-effective if its costs are proportional to its overall effectiveness. See 40 C.F.R. § 300.430(f)(1)(ii)(D).

As discussed above, EPA's Proposed Plan concludes that both Alternative 2 and 3 are protective of human health and the environment and are consistent with ARARs. However, the short-term effectiveness of Alternative 2 is less favorable than that of Alternative 3. The long-term effectiveness of Alternatives 2 and 3 are equally disparate as Alternative 2 would require hundreds of years to achieve the PRGs while Alternative 3 would meet these objectives more quickly. Perhaps even more compelling is the fact that Alternative 2 has already been proven not to work at further reducing contaminant levels regardless of the cost (which is extreme) since it does not provide any commensurate benefit.

Accordingly, it is impossible for Alternative 2 to be considered cost-effective because it is three times more costly than Alternative 3 without providing greater overall effectiveness (i.e., its costs are not proportional to its overall benefits or effectiveness).[3] For EPA to conclude otherwise would run counter to the evidence before the Agency in the administrative record and therefore would be arbitrary and capricious.[4] Moreover, because Alternative 2 is significantly more costly, EPA would have to provide an exceptionally strong basis to support selection of Alternative 2 over, or in addition to, Alternative 3, which it will be unable to do. See 40 C.F.R. § 300.430(e)(7)(iii).

In addition to the costliness of Alternative 2, **these two remedies are mutually exclusive; they cannot both be implemented.** Because the in situ work has placed the essential additives throughout the aquifer, and because those additives are continuing to improve aquifer conditions, and are expected to do so for an additional 5 to 30 years (depending on location), it is essential to keep those additives in place. Pumping (via Alternative 2) would actually remove the helpful additives, and counteract the substantial cleanup treatment and accelerated contaminant removal that has already occurred. The P&T was found by the EPA to be technologically dated and unable to reduce contaminant levels at an acceptable rate. Reactivating the P&T would slow the cleanup process down and preclude the effectiveness of the more significant groundwater treatment afforded by Alternative 3.

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[3] See 40 C.F.R. § 300.430(f)(4) (requiring an assessment of "the best balance of tradeoffs"); *Pub. Citizen, Inc. v. Mineta*, 340 F.3d 39, 55-61 (2d Cir. 2003) (failure of agency to weigh costs and benefits of alternatives, factor in relative advantages and disadvantages of each, and explain why costs were worth the benefits constituted arbitrary and capricious action).

[4] See *State Farm*; *Islander E. Pipeline Co. v. Conn. Dept. of Envtl. Prot.*, 482 F.3d 79, 95-105 (2d Cir. 2006) ("*Islander E. Pipeline Co.*") (failure to adequately examine the relevant record evidence and articulate a rational connection between the facts in the record and the bases for an agency's decision is arbitrary and capricious).

Finally, based upon several questions/comments made by citizens at the Hearing, it was apparent that certain commenters did not fully understand that the active injection component associated with Alternative 3 has already been successfully completed. Therefore, the ROD should clarify that the in situ injection program has already been implemented pursuant to the small and large scale pilot program in an effort to aggressively remove the contaminant mass in a way that the pump and treat system simply could not, and that the remaining $490 thousand to be spent is attributable to MNA-related costs.

In short, the goal of any remedy is to achieve cleanup in a reasonable time. Alternative 3 best achieves the cleanup goals in the fastest time available through existing technology. A hybrid approach utilizing elements of the two alternatives is simply not viable which is why no hybrid alternative was presented or considered in the FS.

F. New Jersey Has Accepted Alternative 3

The eighth of the nine EPA criteria, namely, State Acceptance, also favors Alternative 3. At the public hearing, the EPA stated that "DEP concurs with the change and remedy that is proposed" (Transcript at p. 31).

The ninth criterion, Public Acceptance, occurs after the comment period ends.

CONCLUSION

For the reasons cited above, the selection of Alternative 3 as EPA's Preferred Alternative is consistent with CERCLA and the NCP, supported by the administrative record, and is consistent with relevant and applicable CERCLA remediation guidance and precedent. The administrative record, including the FS for the Site, clearly demonstrates that Alternative 3 is the remedial alternative that provides the best balance of the nine remedy selection criteria.

TRC requests that EPA give careful consideration to these comments and include these comments in the administrative record for the Site. Any questions that EPA may have regarding these comments, and any request for further information, may be directed to the undersigned.

Respectfully submitted,

TRC ENVIRONMENTAL CORP.

Marc Faecher
Senior Vice President

cc: Michael Sivak, Section Chief – New Jersey Remediation Division, EPA Region 2
Patrick J. Hansen, P.E., Vice President TRC
(Both of the above via Email only)