INTERIM RECORD OF DECISION
OPERABLE UNIT 2
BEDROCK GROUNDWATER
& OFFICE AREA SOIL

SPECTRON, INC. SUPERFUND SITE
ELKTON, CECIL COUNTY, MARYLAND

UNITED STATES ENVIRONMENTAL
PROTECTION AGENCY

REGION 3
PHILADELPHIA, PENNSYLVANIA
September 2012

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LIST OF ACRONYMS

AR	Administrative Record
ARARs	Applicable or Relevant and Appropriate Requirements
ATSDR	Agency for Toxic Substances and Disease Registry
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	Contaminant of Concern
CSM	Conceptual Site Model
DNAPL	Dense Non-Aqueous Phase Liquid
EPA	United States Environmental Protection Agency
ERAGS	Ecological Risk Assessment Guidance for Superfund
ESL	Ecological Screening Level
FS	Feasibility Study
FFS	Focused Feasibility Study
GAC	Granular Activated Carbon
gpm	Gallons per Minute
HHRA	Human Health Risk Assessment
HI	Hazard Index
ICs	Institutional Controls
LNAPL	Light Non-Aqueous Phase Liquid
MCL	Maximum Contaminant Level
MDE	Maryland Department of the Environment
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ND	Non-Detect
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
OU	Operable Unit
O&M	Operation and Maintenance
PCE	Tetrachloroethylene
ppb	Parts Per Billion
ppm	Parts per Million
PDI	Pre-Design Investigation
RA	Remedial Action
RAO	Remedial Action Objective
RBC	Risk Based Concentration
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SI/GWTS	Stream Isolation and Groundwater Treatment System
SLERA	Screening Level Ecological Risk Assessment
SVOC	Semi-Volatile Organic Compound
TCE	Trichloroethylene
TS	Treatability Study
µg/L	Micrograms per Liter
VI	Vapor Intrusion
VOC	Volatile Organic Compound

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PART I – THE DECLARATION

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I. THE DECLARATION

A. Site Name and Location

The Spectron, Inc. Superfund Site (the Site) is located approximately 6 miles north of the Town of Elkton, Cecil County, Maryland and consists of a 5 acre property historically operated as a paper mill and solvent recovery facility. The National Superfund Database Identification Number is MDD000218008. This action addresses Operable Unit 2 (OU-2), Bedrock Groundwater and Office Area Soil. A Site Location Map is included as Figure 1 and the Site Layout is included as Figure 2.

B. Statement of Basis and Purpose

The Bedrock Groundwater portion of OU-2 is further defined as the Source Area and the Dissolved VOC Plume, as shown on Figure 3. This Interim Record of Decision (ROD) presents EPA's Selected Remedy for the Bedrock Groundwater Source Area and Office Area Soil and is an interim action for OU-2. The final remedy for OU-2, addressing the Bedrock Groundwater Dissolved VOC Plume will be selected in a future ROD. Operable Unit 1 (OU-1), Soil and Overburden Groundwater, was addressed separately in a September 16, 2004 Record of Decision (ROD) and March 29, 2012 ROD Amendment.

The selected remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 U.S.C. § 9601 et seq, as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300, as amended.

This decision document is based on the Administrative Record for the Site, which was developed in accordance with Section 113 (k) of CERCLA (42 U.S.C. § 9613(k)). This Administrative Record file is available for review online at http://www.epa.gov/arweb, at the U.S. Environmental Protection Agency Region III Records Center in Philadelphia, Pennsylvania, and at the Cecil County Library in Elkton, Maryland. The Administrative Record Index (Appendix A) identifies each document contained in the Administrative Record upon which the selection of the remedy is based.

The State of Maryland concurs with the Selected Remedy (Appendix B).

C. Assessment of the Site

The response action selected in this Interim ROD is necessary to protect human health and the environment from actual or threatened releases of hazardous substances.

D. Description of the Selected Remedy

The Selected Remedy in this Interim ROD will address the OU-2 Bedrock Groundwater Source Area and Office Area Soil. The OU-2 Bedrock Groundwater Dissolved VOC Plume will be addressed in a future ROD. As indicated above, OU-1, Soil and Overburden Groundwater has been addressed separately, however, the Office Area on the northeastern side of Little Elk Creek contains contaminated soil that was not addressed under OU-1.

The goal of the Selected Remedy is to restore contaminated bedrock groundwater in the Bedrock Groundwater Source Area to its beneficial use, where practicable. Where groundwater restoration in the Bedrock Groundwater Source Area is impracticable, the Selected Remedy will prevent exposure to Dense Non-Aqueous

Phase Liquid (DNAPL) and contaminated bedrock groundwater, reduce bedrock groundwater contaminant concentrations, and prevent DNAPL from acting as a continuous source for bedrock groundwater contamination. The Selected Remedy will also ensure continued operation of the existing Stream Isolation and Groundwater Treatment System (SI/GWTS) (Figure 4) and reduce risk associated with contaminated Office Area soils. EPA's Selected Remedies for the Bedrock Groundwater Source Area and Office Area Soil consist of Alternative BGW-3 – Groundwater Extraction and Treatment and Alternative OAS-2 – Excavation of Soil, Placement Under OU-1 Asphalt (or Equivalent) Cap, respectively, as described in the following sections.

D.1 Bedrock Groundwater Source Area

Alternative BGW-3 – Groundwater Extraction and Treatment consists of the following components:

1. Pre-Design Investigation (PDI) to delineate the SI/GWTS capture zone and dense non-aqueous phase liquid (DNAPL) extent;

2. Continued operation and maintenance of the SI/GWTS (including modifications/upgrades necessary to treat extracted bedrock groundwater);

3. DNAPL collection/extraction and offsite treatment/disposal;

4. Groundwater extraction and treatment using the existing GWTS;

5. Groundwater monitoring;

6. Surface water monitoring;

7. Monitored Natural Attenuation (MNA) Evaluation;

8. Residential well monitoring, temporary water, and wellhead treatment;

9. Vapor intrusion monitoring and mitigation;

10. Land and groundwater use restrictions.

The Selected Remedy for the Bedrock Groundwater Source Area also includes a Technical Impracticability (TI) Waiver of groundwater Applicable or Relevant and Appropriate Requirements (ARARs) for a portion of the Bedrock Groundwater Source Area due primarily to the presence of DNAPL in deep bedrock and the low permeability of the geologic formation. Additionally, the Waste Management Area (WMA) designation set forth in the 2004 OU-1 ROD will also apply to the Selected Remedy due to waste remaining in place in the Plant Area at the former Spectron property. Both the TI Waiver and WMA are described in additional detail in Part I, Section E., Statutory Determinations, and Part II, Section I.1, Common Elements of Each Remedial Component, Section J., Comparative Analysis of Alternatives, and Section M.2., Compliance with Applicable or Relevant and Appropriate Requirements.

D.1.1 Bedrock Groundwater Source Area Performance Standards

Implement Alternative BGW-3 – Groundwater Extraction and Treatment in accordance with the performance standards in Sections D.1.1.1 through D.1.1.10 below.

D.1.1.1 Pre-Design Investigation

Conduct a PDI consisting of the following components:

1. Groundwater capture zone investigation for the existing SI/GWTS (Figure 4);
2. Delineation of DNAPL extent;
3. Groundwater contaminant trend analysis.

D.1.1.2 Continued Operation of the Stream Isolation and Groundwater Treatment System (SI/GWTS)

Continue operation and maintenance of the SI/GWTS in accordance with the following performance standards established in the 2004 OU-1 ROD (Section 11.2.1) until federal Maximum Contaminant Levels (MCLs), non-zero Maximum Contaminant Level Goals (MCLGs) and Maryland Department of the Environment (MDE) Groundwater Cleanup Standards (GWCS) for Site COCs (Table 1) are achieved throughout the Bedrock Groundwater Source Area, with the exception of the WMA (Figure 5) and Technical Impracticability Zone (TI Zone) (Figures 6 through 10):

1. Effluent discharged from the existing SI/GWTS resulting from treated groundwater and DNAPL shall meet the substantive requirements of the National Pollution Discharge Elimination System (NPDES) program and the Maryland discharge limitations and monitoring requirements and shall contain less than 100 µg/L of total VOCs.
2. Air emissions from the existing SI/GWTS resulting from treated groundwater shall meet the substantive requirements of Maryland general air emissions standards, Maryland regulations governing toxic air pollutants, and federal air emissions standards for process vents. In addition, emissions shall result in a cumulative excess carcinogenic risk of less than or equal to 10^{-6} and a cumulative excess non-carcinogenic Hazard Index (HI) of less than or equal to 1. The EPA guidance document, Control of Air Emissions from Superfund Air Strippers at Superfund Groundwater Sites (OSWER Directive 9355.0-28, June 15, 1989) shall also be considered in determining the need for air emission controls;
3. A capacity evaluation shall be conducted every two (2) years to determine if expansion of the existing GWTS is necessary to prevent untreated groundwater from bypassing the system;
4. SI/GWTS components shall be maintained, and replaced as necessary, to minimize downtime and maximize system performance;
5. Monitoring reports shall be submitted to EPA at a frequency sufficient to determine if the SI/GWTS is in compliance with the performance standards 1 through 4 specified above;
6. Onsite handling and offsite disposal of hazardous substances from operation of the SI/GWTS shall be conducted in accordance with MDE and EPA regulations. Offsite disposal of hazardous substances shall be in accordance with CERCLA (42 U.S.C. § 9621 (d)(3)) and the NCP (40 C.F.R. § 300.440);
7. An emergency notification plan shall be developed to alert EPA and MDE of system shutdown or failure;
8. Surface water in Little Elk Creek shall meet the numerical performance standards established in 2004 OU-1 ROD, listed on Table 2[1];
9. The SI/GWTS shall be operated in a manner to prevent flotation of the stream liner system;
10. The vegetative cover, including the stream bank and riparian habitat, shall be maintained in the vicinity of the SI/GWTS and along Little Elk Creek to provide stream bank stabilization and habitat cover. An evaluation of the condition of the vegetative cover shall be conducted every two (2) years;
11. The SI/GWTS shall be maintained in a manner that fish can travel up to the dam.

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1 - EPA Region III BTAG Freshwater Screening Benchmarks shall also be used to evaluate the water quality in Little Elk Creek; however, the benchmarks are not considered performance standards for the purposes of this Interim ROD.

D.1.1.3 DNAPL Collection

Collect DNAPL that accumulates in any existing borehole or any future borehole using passive and/or active methodology:

1. Collected DNAPL shall be treated and disposed of offsite at a permitted waste disposal facility in accordance with CERCLA (42 U.S.C. § 9621 (d)(3)) and the NCP (40 C.F.R. § 300.440).

D.1.1.4 Groundwater Extraction and Treatment

Extract and treat the Bedrock Groundwater Source Area within the Groundwater Extraction Areas depicted on Figure 11. The Groundwater Extraction Areas may be modified based on the results of the PDI/Remedial Design and/or data collected during operation of the groundwater extraction and treatment system:

1. Extracted groundwater shall be treated using the existing SI/GWTS and discharged to Little Elk Creek and/or reinjected per Item 2, below. Effluent and air emissions from the existing SI/GWTS shall continue to meet performance standards established in the 2004 OU-1 ROD (Section 11.2.1) and described herein. The SI/GWTS shall be evaluated during the PDI/Remedial Design to determine if upgrades are necessary to treat the extracted groundwater to meet the SI/GWTS performance standards;
2. Treated groundwater shall be reinjected into the bedrock to enhance groundwater flow gradients if determined to be appropriate for groundwater extraction and treatment and the bedrock is determined to be sufficiently permeable. Reinjection shall not adversely impact the capture/containment of the SI/GWTS and/or extraction and treatment system or cause unintended contaminant migration;
3. Extraction and treatment of groundwater shall continue until MCLs, non-Zero MCLGs and MDE GWCS for Site COCs (Table 1) are achieved throughout the Bedrock Groundwater Source Area, with the exception of the WMA (Figure 5) and the TI Zone (Figures 6 through 10).

D.1.1.5 Groundwater Monitoring

Perform groundwater monitoring within the Bedrock Groundwater Source Area to meet the following objectives:

1. Monitor containment and capture of SI/GWTS and Groundwater Extraction and Treatment system;
2. Confirm the delineation of DNAPL;
3. Evaluate VOC concentration trends over time;
4. Evaluate Bedrock Groundwater Source Area contaminant plume stability (i.e., the Bedrock Groundwater Source Area contaminant plume shall not expand or migrate);
5. Verify that MCLs, non-Zero MCLGs and MDE GWCS for Site COCs (Table 1) are achieved throughout the Bedrock Groundwater Source Area, with the exception of the WMA (Figure 5) and TI Zone (Figures 6 through 10);
6. Confirm that once the numerical performance standards for Site COCs specified in Table 1 are achieved, exposure to groundwater would result in a cumulative excess carcinogenic risk of less than or equal to 10^{-4} and a cumulative excess non-carcinogenic HI of less than or equal to 1, throughout the Bedrock Groundwater Source Area, with the exception of the WMA (Figure 5) and TI Zone (Figures 6 through 10).

D.1.1.6 Surface Water Monitoring

Perform surface water monitoring to monitor water quality in Little Elk Creek:

1. In accordance with performance standard 8 for the Continued Operation of the SI/GWTS component of the remedy, surface water in Little Elk Creek shall be monitored to confirm that the numerical performance standards established in the 2004 OU-1 ROD are being achieved (Table 2);

D.1.1.7 Monitored Natural Attenuation Evaluation

Perform groundwater monitoring within the Bedrock Groundwater Dissolved VOC Plume (Figure 13) to meet the following objectives:

1. Demonstrate and document whether natural attenuation is occurring in the Bedrock Groundwater Dissolved VOC Plume sufficiently to achieve MCLs, non-Zero MCLGs and MDE GWCS for Site COCs (Table 1) in a reasonable timeframe compared to a more active remedy;
2. Detect changes in environmental conditions (e.g., hydrogeologic, geochemical, microbiological, or other changes) that may reduce the efficacy of any of the natural attenuation processes;
3. Identify any potentially toxic and/or mobile transformation products;
4. Determine whether the Bedrock Groundwater Dissolved VOC Plume is expanding (either downgradient, laterally or vertically);
5. Demonstrate the efficacy of institutional controls and groundwater and residential monitoring requirements.

D.1.1.8 Residential Well Monitoring and Treatment

Conduct residential well sampling and provide wellhead treatment[2]:

1. Perform periodic monitoring of the residences located within the Well Pumping Restriction Area (Figure 12) on a routine basis[3] for all Site COCs (Table 1);
2. Perform periodic monitoring of any future residential or commercial well installed within the Well Pumping Restriction Area (Figure 12) on a routine basis for all Site COCs (Table 1);
3. If residential well water quality exceeds MCLs, non-zero MCLGs, or MDE GWCS for any Site COCs (Table 1), a temporary water supply shall be provided followed by the installation of a wellhead treatment system;
4. Existing and future wellhead treatment systems shall be operated and maintained such that drinking water at the tap (after treatment) meets MCLs, non-zero MCLGs and MDE GWCS for Site COCs (Table 1);
5. Wellhead treatment shall continue until groundwater throughout the Well Pumping Restriction Area (Figure 12) meets MCLs, non-zero MCLGs and MDE GWCS for Site COCs (Table 1).

D.1.1.9 Vapor Intrusion Monitoring and Mitigation

Conduct vapor intrusion sampling at existing occupied structures[4] within the Well Pumping Restriction Area (Figure 12) during each Five Year Review and at any new occupied structures when constructed within the Well Pumping Restriction Area[5]:

1. Vapor intrusion sampling shall consist of sub-slab, indoor air, and outdoor air sampling at each location, where practicable, in accordance with current EPA guidance;
2. Vapor intrusion mitigation shall be conducted if sub-slab[6], indoor air, and/or outdoor air sampling results indicate that actual or potential migration of Site-related compounds from contaminated

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2 - Residential well monitoring and wellhead treatment are subject to homeowner access approval.
3 - Monitoring frequency shall be determined during Remedial Design and may be subject to change based on Site activities. EPA anticipates that more frequent residential monitoring shall occur during drilling activities at the Site to ensure that such activities do not impact residential wells in the short term.
4 - The term occupied structure shall refer to any residence, commercial, or industrial building that may be occupied for 8 or more hours on a routine basis. A detached garage or storage building shall not be considered an occupied structure.
5 - Vapor intrusion sampling and mitigation are subject to homeowner access approval.
6 - In order to evaluate the potential risk posed to human health by sub-slab soil vapor, an attenuation factor shall be applied to the sub-slab soil vapor data to represent the extent to which sub-slab soil vapor is expected to enter the indoor air of a structure. For the purposes of this Interim ROD, and in accordance with current EPA guidance, an attenuation factor of 0.1 shall be utilized.

groundwater to indoor air would result in a cumulative excess carcinogenic risk of greater than or equal to 10^{-4} and/or a cumulative excess non-carcinogenic HI of greater than 1;

3. Vapor intrusion mitigation shall continue until:
    a) Groundwater within the Well Pumping Restriction Area (Figure 12) meets MCLs, non-Zero MCLGs and MDE GWCS for Site COCs (Table 1); and,
    b) Sub-slab, indoor air, and/or outdoor air sampling results indicate that actual or potential migration of Site-related compounds from contaminated groundwater to indoor air would result in a cumulative excess carcinogenic risk of less than or equal to 10^{-6} and a cumulative excess non-carcinogenic HI of less than or equal to 1.

D.1.1.10 Land and Groundwater Use Restrictions

Implement institutional controls within OU-2 in conjunction with institutional controls required by the 2004 OU-1 ROD. A Land Use Control Assurance Plan (LUCAP) shall be prepared to develop and document the mechanisms for implementing the institutional controls for both OU-1 and OU-2. The institutional controls shall achieve the following restrictions:

1. Use and/or contact with groundwater, via ingestion, dermal contact or vapor inhalation, within the Office Area shall be prohibited;
2. Activities within the Well Pumping Restriction Area (Figure 12), without EPA approval, that would impact the groundwater extraction and treatment system, including installation of new residential/commercial/industrial water supply wells and/or significant increases in pumping rates of existing water supply wells, shall be prohibited;
3. Vapor intrusion sampling shall be conducted at any future occupied structure at the Plant Area and Office Area;
    a) Vapor intrusion sampling shall consist of sub-slab, indoor air, and outdoor air sampling at each location, where practicable, in accordance with current EPA guidance[7];
4. Activities within the Office Area that would adversely impact the SI/GWTS or groundwater extraction and treatment system, such as excavation or construction, without prior EPA approval, shall be prohibited.

D.2 Office Area Soil

Alternative OAS-2 – Excavation of Soil, Placement Under OU-1 Asphalt (or Equivalent) Cap consists of the following components:

1. Excavation and consolidation of contaminated soil under the OU-1 asphalt (or equivalent) cap;

2. Confirmatory sampling and analysis;

3. Backfill of excavation using clean fill;

4. Land and groundwater use restrictions.

D.2.1 Office Area Soil Performance Standards

Implement Alternative OAS-2 – Excavation of Soil, Placement Under OU-1 Asphalt (or Equivalent) Cap in accordance with the performance standards in Sections D.2.1.1 and D.2.1.2 below.

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7 - The Office Area and Plant Area shall be subject to the vapor intrusion sampling, data evaluation, and mitigation requirements specified in Part I, Section D.1.1.9 and Part II, Section L.2.2.9 of this Interim ROD.

D.2.1.1 Excavation of Soil, Placement Under OU-1 Asphalt (or Equivalent) Cap

Conduct soil remediation at the Office Area at the Site, consisting of the following elements:

1. Excavate all soil that exceeds the soil cleanup standards presented in Table 1[8] as shown on Figure 15;
2. Collect and analyze[9] soil samples from the perimeter, sidewalls, and bottom of the excavation to confirm that all soil exceeding the cleanup standards in Table 1 has been removed;
    a. Any additional soil exceeding the cleanup standards presented in Table 1 identified during sampling shall also be excavated;
3. Place excavated soil under the OU-1 asphalt (or equivalent) cap, when constructed;
    a. Soil shall be managed in accordance with the portions of 40 C.F.R. § 264 determined to be ARARs and listed in Table 5.
4. Backfill the excavation with clean fill and revegetate.
    a. Clean fill shall meet the EPA Region 3 Ecologically Protective Backfill Values presented in Table 3.

D.2.1.2 Land and Groundwater Use Restrictions

Implement institutional controls within the Office Area in accordance with institutional controls required by the 2004 OU-1 ROD. A Land Use Control Plan (LUCAP) shall be prepared to develop and document the mechanisms for implementing the institutional controls. The institutional controls shall achieve the following restrictions:

1. Use and/or contact with groundwater, via ingestion, dermal contact or vapor inhalation, within the Office Area shall be prohibited;
2. Activities within the Office Area that would adversely impact the SI/GWTS or groundwater extraction and treatment system, such as excavation or construction, without prior EPA approval, shall be prohibited.

E. Statutory Determinations

Based on the information currently available, EPA has determined that the Selected Remedy for the Bedrock Groundwater Source Area and Office Area Soil is protective of human health and the environment, is cost effective, and utilizes permanent solutions for treatment of principal threat waste (DNAPL). The Selected Remedy for Office Area Soil will also comply with ARARs. The Selected Remedy for the Bedrock Groundwater Source Area will comply with all ARARs with the exception of following, which are waived in accordance with CERCLA (42 U.S.C. § 9621 (d)(4)(C)) and the NCP (40 C.F.R. § 300.430(f)(1)(ii)(C)(3)):

- Federal Maximum Contaminant Levels (MCLs) required by the Safe Drinking Water Act, 42 U.S.C § 300g-l and set forth in 40 C.F.R. § 141.61 (applicable requirement);
- Federal non-zero Maximum Contaminant Level Goals (MCLGs) established by the Safe Drinking Water Act, 42 U.S.C § 300g-l and set forth in 40 C.F.R § 141.50-51 (relevant and appropriate requirement);
- Maryland Department of the Environment (MDE) Groundwater Cleanup Standards (GWCSs) set forth in the *MDE Cleanup Standards for Soil and Groundwater Interim Final Guidance Version 2.1* (relevant and appropriate requirement).

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8 - The soil cleanup standards presented in Table 1 for protection of human health are also protective of the environment; therefore, additional ecological risk-based cleanup goals are not specified.
9 - Field screening of soil using an x-ray fluorescence (XRF) device (or similar) shall be permitted, however, confirmation sampling shall also require laboratory analysis of soil samples.

These ARARs will be waived within the TI Zone depicted on Figure 6 through 10 for the compounds listed on Table 4. Additionally, groundwater will not be remediated to groundwater ARARs within the WMA at the Site, per the 2004 OU-1 ROD.

The TI Waiver is based on the technical impracticability of meeting groundwater ARARs from an engineering perspective due to the presence of DNAPL in bedrock at depths of up to 360 feet bgs, the low permeability and limited fracturing of Site bedrock, and the presence of uncontaminated residential wells in the vicinity of DNAPL.

Due to insufficient data, a remedy was not selected for the Bedrock Groundwater Dissolved VOC Plume, therefore, compliance with ARARs for the Bedrock Groundwater Dissolved VOC Plume was not considered in this Interim ROD. The Selected Remedy for the Bedrock Groundwater Source Area will achieve groundwater ARARs throughout the Bedrock Groundwater Source Area, with the exception of the WMA and TI Zone. Once groundwater ARARs are achieved, in accordance with the NCP (40 C.F.R. § 300.430(e)(2)(i)(D)), a risk assessment shall be performed for any residual Site COCs to confirm that exposure to groundwater within the Bedrock Groundwater Source Area, with the exception of the WMA and TI Zone, would result in a cumulative excess carcinogenic of less than or equal to 10^{-4} and a non-carcinogenic HI of less than or equal to 1.

ARARs for the Selected Remedy are presented in Table 5.

A statutory Five Year Review will be conducted within five years after initiation of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment. Five Year Reviews will be conducted at least every five years after the date of the initiation of the remedial action and continue until hazardous substances are no longer present above levels that allow for unlimited use and unrestricted exposure.

F. ROD Certification Checklist

The following information is included in the Decision Summary (Part II) of this Interim ROD, while additional information can be found in the Administrative Record file for the Site:

- Chemicals of concern (COCs), their respective concentrations, and cleanup levels (Table 1);
- Baseline risk represented by the COCs;
- How source materials constituting principal threats are addressed;
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and ROD;
- Potential land and groundwater use that will be available at the Site as a result of the Selected Remedy;
- Estimated capital, annual O&M, and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected; and
- Key factors that led to selecting the remedy.

G. Authorizing Signature

This Interim ROD selects the remedy for the OU-2 Bedrock Groundwater Source Area and Office Area Soil at the Spectron, Inc. Superfund Site, and is based on the Administrative Record for the Site. The remedy for the OU-2 Bedrock Groundwater Dissolved VOC Plume will be selected in a future ROD. EPA selected this remedy with the concurrence of the Maryland Department of the Environment (MDE). The Director of the Hazardous Site Cleanup Division (HSCD) for EPA Region III has approved and signed this Interim ROD.

Approved by: Date:

September 26, 2012

Ronald J. Borsellino, Director
Hazardous Site Cleanup Division

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PART II- THE DECISION SUMMARY

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II. THE DECISION SUMMARY

A. Site Name, Location and Description

The Spectron, Inc. Superfund Site (the Site) (CERCLIS Identification No. MDD000218008) is located approximately six miles north of the Town of Elkton, Cecil County, Maryland in a stream valley formed by Little Elk Creek, which flows through the Site from north to south. The Site consists of the former Spectron, Inc. property, comprised of approximately 5 acres, and the groundwater contaminant plume extending to the south-southeast of the property. Residential, wooded, and agricultural properties surround the Site. The Site Location is shown on Figure 1 and the Site Layout is shown on Figure 2.

The former Spectron, Inc. property was historically operated as a solvent recovery facility resulting in contaminated Soil and Overburden Groundwater, designated as Operable Unit 1 (OU-1), and Bedrock Groundwater and Office Area Soil, designated as Operable Unit 2 (OU-2). The Bedrock Groundwater portion of OU-2 is further defined as the Source Area and the Dissolved Volatile Organic Compound (VOC) Plume. This Interim Record of Decision (ROD) addresses the OU-2 Bedrock Groundwater Source Area and Office Area Soil only. Due to insufficient data, the remedy for the Bedrock Groundwater Dissolved VOC Plume will be selected in a future ROD. The approximate extent of the Bedrock Groundwater Source Area and Dissolved VOC Plume are shown on Figure 3.

OU-1, Soil and Overburden Groundwater was addressed separately in a September 16, 2004 ROD and March 29, 2012 ROD Amendment.

EPA is the lead Agency for the Site and the Maryland Department of the Environment (MDE) is the support Agency. The cleanup is being financed by a Potentially Responsible Party Group (PRP Group) [10].

B. Site History and Enforcement Activities

This section of the Interim ROD provides the history of the Site and a discussion of EPA and MDE investigations and response activities. The "Proposed Rule" proposing the Site to the National Priorities List (NPL) was published in the *Federal Register* on October 14, 1992. The "Final Rule" adding the Site to the NPL was published in the *Federal Register* on May 31, 1994.

B.1. History of Activities Leading to Contamination

The Site operated as a paper mill until it was destroyed by fire in 1954. The mill buildings, except for the former Power House building, were subsequently razed. Spectron, Inc. operated a solvent recycling facility at the Site from 1962 to 1988 and reportedly handled more than one million gallons of liquids per year when in operation. Operations at the Site ceased in 1988.

Liquid materials processed at the facility included VOCs that are denser than water, such as chlorofluorocarbons, halogenated ethenes and ethanes, and chlorobenzenes as well as VOCs that are less dense than water, such as alkanes and aromatic hydrocarbons. Many of these compounds have a low solubility in water and tend to remain as non-aqueous phase liquids (NAPLs) when released to the environment. VOCs with densities greater than water may sink through the saturated zone until a physical or hydraulic barrier is reached.

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10 - Approximately 1,000 Potentially Responsible Parties (PRPs) have been identified for the Site, consisting of parties that historically sent hazardous materials to the Spectron, Inc. facility for recycling. Various subsets of PRPs have entered into agreements with EPA to perform portions of the cleanup at the Site, as discussed herein. However, for the purposes of this Interim ROD, the PRPs will be referred to as "the PRP Group" and no distinction will be made to differentiate the various subsets.

Both light and dense NAPLs (LNAPLs and DNAPLs, respectively) were released while the solvent recycling operation was active, resulting in contaminated groundwater and DNAPL seeps along the western bank of Little Elk Creek. Waste sludge containing solvents like trichloroethylene (TCE) and tetrachloroethylene (PCE) was placed into an unlined open air lagoon adjacent to Little Elk Creek. The waste sludge then migrated into the Creek through shallow groundwater or by being washed out of the lagoon during storm events. When the Site was abandoned by the owner in 1988, more than 500,000 gallons of solvents and other liquids were left onsite in tanks and drums.

Soil and overburden material, overburden groundwater, and bedrock groundwater are impacted at the Site as a result of the historic solvent recycling operation. However, residential wells surrounding the Site have been sampled on a regular basis since the 1990's, and Site-related contaminants have not historically been detected in these wells at concentrations exceeding federal Maximum Contaminant Levels (MCLs).

B.2. History of Previous Environmental Investigations and Response Actions

Multiple permit violations and orders were issued against Spectron, Inc. during its operation. In September 1982, EPA and the predecessor to MDE, the Maryland Department of Health and Mental Hygiene, Office of Environmental Programs, ordered the property owner to remove the upper six inches of contaminated soil and to add an asphalt cover throughout the Site. Concrete perimeter dikes were then constructed around the process and storage areas and the remaining portion of the property was paved with asphalt. This work also included the removal of "Hot Spots" such as the former lagoon. However, subsequent data collection at the Site data indicated that contamination in the shallow soils remained following this action.

In 1983, 42 well points were reportedly installed by the property owner along the western bank of the stream in an attempt to remediate solvents in the shallow groundwater and cut off seepage of VOCs to the stream. Design documents indicate that the well points were to be 10 to 20 ft deep, with an expected total groundwater yield of 20 to 30 gallons per minute (gpm). Extracted water was to be treated by an air stripper, with carbon treatment of the vapor phase, and reinjected through a series of wells reportedly installed on the northwest side of the property. However, the exact locations of these remediation system components and the effectiveness of the system, if installed, are unknown.

In 1988, the Site was abandoned by the owner with more than 500,000 gallons of solvents and other liquids reportedly remaining onsite in tanks and drums. EPA initiated a removal action in June 1989 to remove the hazardous materials from the property and secure the Site. Pursuant to an August 1989 Administrative Order on Consent, the PRP Group completed the removal action in 1990 to mitigate potential hazards of fire, explosion, or exposure to these materials. A second AOC was entered into by the PRP Group in October 1991 to control seeps of contaminated ground water that were leaking out of the shallow soil along the bank of Little Elk Creek and posed a potential public health and ecological threat.

On October 14, 1992, the Site was proposed to the NPL, which is a listing of the most serious uncontrolled or abandoned hazardous waste sites requiring long term remedial action. The Site was formally added to the NPL on May 31, 1994, making it eligible for Federal cleanup funds.

On September 30, 1996, MDE, in cooperation with the Agency for Toxic Substances and Disease Registry (ASTDR), issued a Preliminary Public Health Assessment Report for the Site. The report found that in the 1960's and early 1970's, area residences may have been exposed to airborne contaminants. However, sampling conducted in 1995 and 1996 for that report indicated that there was no current public health hazard from air exposures near the Site. The report recommended a sampling program for local residential wells near the Site, and further recommended treatment of residential wells where contamination was detected. These recommendations have been followed by the PRP Group. VOCs were historically detected in several residential wells at concentrations below federal MCLs. Wellhead treatment systems were installed at those residences and are currently maintained by the PRP Group.

In May 1996, an AOC was issued by EPA requiring the PRP Group to conduct a Remedial Investigation and Feasibility Study (RI/FS) at the Site. The RI/FS for OU-1 was completed in March 2003. The RI for OU-2 was completed in October 2010 and the FS was completed in June 2012. The RI/FS Reports for OU-2 help form the basis for the Selected Remedy and are discussed in detail in Part II, Section E.3, Nature and Extent of Contamination and Conceptual Site Model.

Pursuant to the October 1991 AOC discussed above, in April 1998, EPA and MDE approved the design for the installation of a Stream Isolation/Groundwater Collection and Treatment System (SI/GWTS) to prevent contaminated groundwater seeps from the Spectron property from discharging into Little Elk Creek (Figure 4). In the fall of 1998, the PRP Group began construction on the system, consisting generally of the following components:

- Excavation of the creek bed;
- Installation of a passive drain system;
- Installation of an impermeable membrane liner to provide a barrier between the creek and contaminated seeps/ground water.

Construction within the creek bed was completed in 1999. The creek was restored by planting native trees and plants along the banks and in the creek bed itself. Approximately 2,000 cubic yards of affected stream sediments were excavated from Little Elk Creek as part of the SI/GWTS construction. Unused materials were stockpiled beneath a covered area (the Drum Storage Building) in the northern portion of the facility.

The SI/GWTS began operation in March 2000. The stream liner system consists of three sections of underdrains (slotted PVC pipes) beneath a flexible, impermeable membrane that is installed beneath the Little Elk Creek streambed. These components are kept in place by rock-filled gabion baskets and mats. The underdrains intercept VOC-bearing groundwater from the overburden and bedrock before it can discharge to the stream. The upstream and downstream ends of each of the three stream liner sections are anchored by a concrete cutoff wall. Each section of underdrain is piped by gravity to one of three collection sumps; water in each sump is then pumped to the GWTS. The water level in each sump is held constant, so that sump effluent flows vary over time.

The groundwater treatment system removes VOCs from the stream liner effluent. Water from each collection sump is treated using an oil/water separator to remove potential NAPL, batch-processed through two powdered activated carbon treatment (PACT) reactors, mixed with molasses and phosphoric acid to stimulate the biological treatment and sent through an aeration blower to provide oxygen to further promote biological growth.

The treated effluent water is discharged back to Little Elk Creek and is monitored for pH and routinely sampled and analyzed for VOCs. The SI/GWTS can handle up to 50 gpm but typically processes between 30 to 45 gpm, depending on flow in the sumps. Approximately 29,000 lbs of VOCs have been captured and treated by the SI/GWTS, as of December 2011. Because of the improvements in stream water quality due to the SI/GWTS, previous restrictions on the use of the stream for swimming and fishing have been removed.

In March 2003, the United States District Court for the District of Maryland (District Court of Maryland) finalized a settlement which required *de minimis* parties to pay $5.3 million toward the cleanup of the Site. The *de minimis* settlement included approximately 500 parties who historically had sent relatively small amounts of hazardous material to the Site. *De minimis* settlements enable smaller waste contributors to help pay cleanup costs in advance and, in exchange, releases them from future financial obligations at Superfund sites.

EPA issued the Proposed Plan for OU-1 on June 20, 2003 and held a public comment period from that date until August 20, 2003. A public meeting to present the Proposed Plan was held on June 26, 2003. Following consideration of comments, the ROD for OU-1 was signed by EPA on September 16, 2004. Subsequent to the issuance of the ROD for OU-1, EPA and the PRP Group entered into an AOC for Remedial Design of the OU-1 remedy in July 2006. Additionally, in January 2007, EPA and the PRP Group executed a Consent Decree (CD), which was entered by the District Court of Maryland, requiring the PRP Group to perform both the OU-1 and OU-2 remedies at the Site.

In accordance with the requirements of both of the aforementioned agreements, a Pre-Design Investigation (PDI), including a Treatability Study and Focused Feasibility Study (FFS), was conducted and served as the basis for a modification to the OU-1 remedy. A Proposed Plan for the remedy modification was issued by EPA on October 14, 2011 and a public comment period was held from that date until December 19, 2011. A public meeting to present the Proposed Plan was held on November 8, 2011. Following consideration of comments from the public, a ROD Amendment to modify the 2004 OU-1 ROD was issued on March 29, 2012.

The final amended remedy for OU-1 consists of the following components:

1. Continued operation and maintenance of the existing Stream Isolation and Groundwater Treatment System (SI/GWTS);

2. Demolition to grade of all structures in the Plant Area;

3. Placement of onsite debris piles under the asphalt (or equivalent) cap;

4. Grading of the Plant Area;

5. Installation of an asphalt (or equivalent) cap;

6. In-situ thermal treatment of principal threat waste;

7. Monitoring to ensure the effectiveness of the remedy;

8. Land and groundwater use restrictions.

Demolition of onsite structures is anticipated to occur in the Fall of 2012 and Remedial Design for the remaining components of the OU-1 remedy is currently underway.

C. Community Participation

Community Involvement activities conducted at the Site to date consist of the following:

- November 1998 – Open house to answer questions regarding the SI/GWTS;
- September 1999 – Event to commemorate the completion of the SI/GWTS;
- June 2003 – Public meeting to present the Proposed Remedial Action Plan (Proposed Plan) for the initial OU-1 ROD;
- October 2007 – Information session to discuss OU-1 remedial design activities;

- November 2011 – Public meeting to present the Proposed Plan for the OU-1 ROD Amendment;
- July 2012 – Public meeting to present the Proposed Plan for the OU-2 ROD.

Fact Sheets and/or public notices were distributed in June 1996, May 1997, February, June and November 1998, September 1999, May 2000, June 2003, September 2007, October 2011, and July 2012.

During the Proposed Plan process for the OU-2 remedy selection, EPA hosted a public meeting to engage the local community, and distributed a fact sheet to update the community on EPA's activities. These community participation activities meet the public participation requirements in CERCLA (42 U.S.C. § 9617) and the NCP (40 C.F.R. § 300.430 (f)(3)).

In addition to historic documents already contained in the OU-1, OU-2, and Site-Wide Administrative Records, the RI Report, FS Report, associated work plans and interim reports, and OU-2 Proposed Plan for the Site were made available to the public in July 2012. These documents can be found in the Administrative Record file located in the EPA Region III Office, the Cecil County Library in Elkton, Maryland and online at www.epa.gov/arweb. The notice of the availability of these documents was published in the Cecil Whig on July 9, 2012. The public comment period was held from July 9, 2012 to August 7, 2012.

A fact sheet detailing the Proposed Plan was mailed to local citizens on July 9, 2012. The public meeting was held on July 18, 2012, to present the Proposed Plan to the community and solicit their comments. At this meeting, representatives from EPA answered questions about the Site and the remedial alternatives. EPA's responses to comments received during this period are included in the Responsiveness Summary, which is included as Part III of this Interim ROD.

D. Scope and Role of Operable Unit

EPA has organized the work at the Site into two Operable Units (OUs).

- Operable Unit 1: Soil and Overburden Groundwater
- Operable Unit 2: Bedrock Groundwater and Office Area Soil

EPA selected a remedy for OU-1 in a ROD signed on September 16, 2004 and modified the remedy for OU-1 in a ROD Amendment signed on March 29, 2012.

The Bedrock Groundwater portion of OU-2 is further defined as the Source Area and the Dissolved VOC Plume. Currently, insufficient data exists to select a remedy for the Bedrock Groundwater Dissolved VOC Plume. Therefore, this Interim ROD selects a remedy for the Bedrock Groundwater Source Area and Office Area Soil only. The remedy for the Bedrock Groundwater Dissolved VOC Plume will be selected in a future ROD following the collection of additional data. The future ROD is expected to be the final action for OU-2.

This remedy selected by this Interim ROD addresses the Bedrock Groundwater Source Area and Office Area Soil, as follows:

D.1 Bedrock Groundwater Source Area

The remedy selected by this Interim ROD will prevent current and potential future exposure to DNAPL and contaminated bedrock groundwater that would result in unacceptable risk to human health, minimize the potential to mobilize residual or trapped DNAPL, treat DNAPL to the maximum extent practicable to minimize the source of groundwater contamination, ensure continued operation of the SI/GWTS, and restore bedrock groundwater within the Bedrock Groundwater Source Area outside of the WMA and TI Zone to meet groundwater cleanup standards. The remedy also addresses potential future vapor intrusion resulting from the Bedrock Groundwater Source Area. The remedy will be readily implementable, will be complimentary to the OU-1 remedy in reducing DNAPL mass at the Site, and will be complementary to the final remedy selected for OU-2, addressing the Bedrock Groundwater Dissolved VOC Plume.

D.2 Office Area Soil

The remedy selected by this Interim ROD for Office Area Soil is expected to be the final action for Office Area Soil. The remedy will prevent current and potential future exposure to contaminated soil that would result in unacceptable risk to human health and the environment. The remedy will be readily implementable and will not adversely impact other components of the OU-1 or OU-2 remedies.

E. Site Characteristics

This section of the Interim ROD provides an overview of the Site's geology and hydrogeology, the sampling strategy used during Site investigations, and the nature and extent of contamination. Additional information regarding the nature and extent of contamination can be found in the Administrative Record.

E.1. Overview of the Site

The Site is located approximately six miles north of Elkton, Maryland, and is situated in a stream valley formed by Little Elk Creek. Included in the Site are the former Spectron, Inc. property and the groundwater contaminant plume extending to the east and southeast of the property. Soil and overburden material, overburden groundwater, and bedrock groundwater on the former Spectron, Inc. property and bedrock groundwater to the southeast of the property are impacted as a result of the historic operation of the property as a solvent recycling/recovery facility. The Site is bordered by residential properties to the east and south and by wooded areas to the north and west. Little Elk Creek flows through the Site from north to south. Please refer to Figure 1 for a Site Location Map.

Operable Unit 1 (OU-1) consists of soil and overburden material and overburden groundwater impacted by chlorinated and non-chlorinated VOCs. OU-1 generally encompasses the Plant Area portion of the former Spectron, Inc. property and adjacent areas to the northwest and southeast on the western side of Little Elk Creek. Contaminated soil and overburden material and contaminated overburden groundwater has not historically been identified outside of the Plant Area portion of OU-1.

Operable Unit 2 (OU-2) consists of bedrock groundwater impacted by chlorinated and non-chlorinated VOCs and soil in the Office Area impacted by metals. The impact to bedrock groundwater extends below the Plant Area, below Little Elk Creek to the north of the Plant Area, and to the south-southeast of the Plant Area, off of the Spectron property, generally along bedrock foliation planes. Impacted soil in the Office Area is located to the north of the Plant Area, across Little Elk Creek.

Figure 2 presents the Site Layout showing the extent of the OU-2 study area and Figure 3 shows the approximate extent of bedrock groundwater contamination.

E.2. Geology and Hydrogeology

E.2.1 Overburden Composition

The overburden on the Spectron property is comprised of both fill material and native soil. Fill material on the Spectron property consists of sandy soil containing rubble and demolition debris. Beneath the fill is brown fine sand and silty sand (native soil). On the Spectron property, the overburden ranges from less than three feet to more than 20 feet thick. The overburden beyond the Spectron property typically ranges from approximately 10 to 18 feet thick, but may be up to 30 or 40 feet thick on hillsides bordering the stream valley. Near Little Elk Creek, the overburden contains more weathered bedrock and quartz fragments. Gravel, sand, silt, and clay of the Potomac Formation outcrops on the ridge top west of the Site. This high-permeability formation represents a potentially significant groundwater recharge area for the Site.

E.2.2 Bedrock Composition

Bedrock at the Site consists of hard, fractured, gneiss. Two bedrock formations are recognized: beneath the former Spectron property and west of Little Elk Creek, bedrock is classified as the James Run Formation; east of Little Elk Creek, a formation known as the Gneiss at Rolling Mill is present. These formations are similar in that they both contain a weak but pervasive foliation, differing slightly in mineral content. The gneiss may contain inclusions of darker-colored rock and large biotite lenses, and the quartz-rich bedrock also contains frequent large inclusions and veins of quartz. These mineralogically distinct zones usually exhibit a higher degree of fracturing.

E.2.3 Bedrock Fracture Characteristics

With the exception of the relatively shallow interval (less than 100 to 150 feet below ground surface (bgs)), bedrock at the Site is relatively poorly fractured, with some intervals of 10 to 20 feet or more without visible fractures. Where biotite lenses or quartz veins create an additional plane of weakness in the rock, the fracture frequency in these sections is much higher. Fractures become less frequent in the deeper bedrock (more than 250 to 300 feet bgs) due to increasing lithostatic pressure with depth. This feature is an important part of the Conceptual Site Model (CSM) discussed later in this document.

Larger fractures are present over the entire range of monitoring well depths and were not associated with particular depth intervals. Larger fractures were, however, frequently associated with quartz veins and biotite zones that appear to be preferential zones for fracturing. Fractures that developed along bedrock foliation thus likely have a greater extent and aperture because this plane of weakness in the rock is common across the Site and has a relatively consistent orientation. Smaller, more-frequent fractures identified directly from inspection of rock cores are not typically associated with quartz or biotite zones, and are likely more irregular than the larger fractures because they do not closely follow the foliation.

E.2.4 Bedrock Structure Characteristics

There are several sets of related fractures in the bedrock, and some of these sets correlate with linear Site features such as stream segments or lineaments. Linear features that do not correspond to bedrock fracture orientations are not likely related. The average strike of foliation-plane fractures is approximately N90°E and the average dip of these fractures is approximately 27° to the south. Foliation plane fractures are approximately twice as common as fractures with different orientations; therefore, it is likely that bedrock groundwater flows primarily along foliation-plane fractures. Steeply-dipping fractures may intersect two or more shallow-dipping, foliation-plane fractures, thereby magnifying their potential influence on groundwater flow.

Data suggest that some of the straight segments of Little Elk Creek may be related to the surface expression of steeply-dipping bedrock fractures. This may significantly influence groundwater flow in the bedrock, because steeply-dipping fractures that occur below stream segments may also intersect several water-bearing fractures at depth and provide a conduit for upward flow of bedrock groundwater.

Several conductive zones are present in the bedrock to the south of the Spectron property. These conductive zones are interpreted as water-bearing zones in weathered bedrock or near-vertical fractures. No evidence of a non-conductive mass (such as a quartz body) was indicated in this area; however, non-conductive zones identified in shallow and deeper bedrock were interpreted as blocks of relatively unfractured and non-water bearing bedrock bounded by sets of foliation-plane fractures and vertical fractures. Two such areas were identified between upland areas on either side of Little Elk Creek. One of these zones could be a potential barrier to groundwater flow to the south and likely limits DNAPL migration in this direction. Groundwater elevation and contaminant concentration data support this finding.

E.2.5 Hydrogeology

The Site is located in a stream valley between two topographic highs (ridges) to the east and west. The topographic relief between ridge tops, approximately 200 ft, is a significant component of regional hydrogeologic conditions and creates a mechanism to drive natural groundwater flow from recharge zones in upland areas toward discharge zones in the stream valley. Groundwater flow in the area follows the typical pattern in stream valleys, with flow from topographic highs toward the stream and upward from deeper bedrock. Groundwater is encountered in the overburden at depths ranging from approximately 2 to 10 feet bgs.

The crystalline bedrock has essentially no primary permeability and transmits fluids only through secondary permeability (fractures). Thus, virtually all groundwater flow in bedrock at the Site is along, and controlled by, interconnected bedrock fractures. Groundwater yield from these fractures depends on effective fracture aperture and degree of interconnection with other water-bearing fractures. In general, shallower fractures in Site bedrock have larger apertures than deeper fractures, due to increasing lithostatic pressure with depth and have groundwater yields ranging from less than 0.1 gpm to more than 10 gpm. Shallow fractures (less than approximately 100 feet bgs) usually have the highest groundwater yield owing to their relatively larger apertures. Most groundwater is developed from fractures in the upper 100 ft of bedrock. Deeper fractures (below approximately 300 feet bgs) typically have a very low yield (<0.1 gpm). However, if steeply-dipping fractures are present, they can draw additional groundwater from shallow-dipping fractures that they intersect.

Fractures that are not aligned with foliation planes typically have groundwater yields that are lower than yields from primary fractures, regardless of their dip angles. Since these fractures did not develop along the main plane of bedrock weakness, they are likely not as extensive as foliation-plane fractures. The primary water-bearing fractures at the Site are roughly parallel to bedrock foliation. Steeply dipping fractures, where present, cross-cut the shallow-dipping foliation-plane fractures and potentially provide hydraulic connections between the foliation-plane fractures. In general, hydraulically-significant fracture interconnections are not present in Site bedrock, except along certain orientations and at relatively small distances. In a few instances, hydraulic connections over greater distances were observed (depending on fracture orientation with respect to bedrock structure).

Groundwater elevations are relatively stable and consistent. Groundwater elevations in wells at higher topographic elevation or greater distance from Little Elk Creek are higher than wells that are closer to Little Elk Creek or at a lower topographic elevation. Stream elevations in Little Elk Creek are consistently lower than groundwater elevations on either side of the stream channel, and confirm that regional groundwater discharges to the stream.

Most of the water-bearing fractures identified in monitoring well boreholes are associated with foliation planes in the bedrock, which dip at a shallow angle to the south-southeast. This implies that foliation-plane fractures exert the most control over groundwater flow in the bedrock. A second set of steeply-dipping, water-bearing fractures aligned with regional deformation patterns may also be significant to groundwater flow. As noted above, fracture yields generally diminish with depth (especially below 150 ft bgs) and are minimal in the deep bedrock (> 300 ft). Because of these conditions, deeper fractures are likely to be much less important relative to contaminant migration. However, higher-angle fractures connected to shallow-dipping, water-bearing fractures can have higher than expected yields and may exert local control over vertical groundwater flow.

E.3. Nature and Extent of Contamination and Conceptual Site Model

E.3.1 Initial Investigations (1991-2001)

Multiple investigations related to OU-2 were conducted after operations at the Spectron property ceased in 1988, as summarized below. Investigations between 1991 and 1996 were conducted as discrete projects, and investigations between 1997 and 2001 were conducted using a phased, iterative approach so that the results of one phase could be used to guide the investigative work of each subsequent phase. The initial investigations are not formally considered part of the Remedial Investigation (RI) for OU-2; however, data from these investigations was used both to characterize the Site as well as help plan the formal RI.

Interim Remedial Investigation (1991-1992)

The Interim Remedial Investigation (IRI) evaluated the feasibility of designing a groundwater extraction and treatment system to mitigate discharges of contaminants to Little Elk Creek. However, the IRI identified the potential presence of DNAPL beneath the Spectron property and stream, indicating that the proposed extraction and treatment system would likely not be effective.

Residential Well Sampling (1991-1992)

Residential drinking water supply wells in the vicinity of the Spectron property were sampled by EPA, MDE, and the PRP Group. Site-related VOCs were not detected in the residential wells.

Focused Remedial Investigation (1993-1994)

The Focused Remedial Investigation (FRI) evaluated the potential presence of DNAPL in the subsurface at the former Spectron property and defined the sources of VOC impact to the adjacent Little Elk Creek via installation and sampling of two angled wells (AW-1 and AW-2) and three vertical wells (VW-1, VW-2, and VW-3), as shown on Figure 2. A draft FRI Report was submitted to EPA and MDE in May 1994 but was never finalized. The FRI Report contained the following findings:

- Overburden consists of up to 20 ft of unconsolidated fill material and natural sediments;
- Bedrock consists of extremely hard, massive gneiss, with the upper 50 ft fractured and weathered, creating a moderately-transmissive zone. Below 50 ft, the bedrock was found to contain fewer fractures and was much less transmissive;
- Groundwater in the overburden and the upper bedrock zone flows toward Little Elk Creek. Groundwater flow in the deeper bedrock could not be well-defined;
- Potential DNAPL was identified at the sediment/bedrock interface, based on elevated VOC concentrations, near the central portion of the Spectron property in both accumulated (free product) and

residual form. Free product was observed in the two angled wells (AW-1 and AW-2), VW-2, and a piezometer (PZ-19) installed in the streambed. Residual DNAPL was observed in one soil boring at the northern end of the Site, near the location of a former lagoon;

- The preferential DNAPL migration pathway in the bedrock appeared to follow the primary fractures, which dip at a low angle to the southeast;
- Three pathways for VOC mass loading to the stream were defined: discharge of contaminated overburden groundwater, discharge of contaminated bedrock groundwater, and VOC dissolution directly from DNAPL present at or near the stream bottom.

Office Area RI (1996-1997, 2003)

RI activities specifically directed toward the former Office Area were performed in 1996 by Advanced Geoservices Corporation (AGC) and in 1997 by Environmental Resources Management (ERM), on behalf of the PRP Group. Tetra Tech EM, Inc. (Tetra Tech) also performed additional Office Area RI activities in 2003, on behalf of EPA.

The Office Area RI indicated that VOCs and pesticides were either not detected or were detected below EPA Regional Screening Levels (RSLs) for soil and shallow groundwater and/or MDE Residential Soil Cleanup Standards (RSCS) for soil in this area. Benzo(a)pyrene and several metals (antimony, arsenic, chromium, iron, lead, manganese, and mercury) were detected in soil above one or more of these criteria but did not result in an unacceptable risk to human health or the environment. The metals concentrations were compared to MDE Anticipated Typical Concentrations (ATCs) for central Maryland. With the exception of lead, the concentrations were similar to naturally-occurring levels in soil and may be unrelated to historic Site operations.

A subsequent Office Area Investigation was conducted in 2007 and is discussed under Part II, Section E.3.2, Remedial Investigation (2001-2009) below.

RI/FS Work Plan Addendum (1999-2001)

Additional RI work, described in a November 1999 RI/FS Work Plan Addendum, included installation of two angled wells (AW-3 and AW-3S) and one vertical well (VW-4) between February and August 2000. Another angled well (AW-4) was attempted, but this well was installed as a vertical well (designated VW-5) due to drilling difficulties. Monitoring intervals in these wells were selected based on borehole geophysics and video logging, and multi-level sampling systems were installed in AW-3 and VW-5.

The findings from these activities were summarized in the February 6, 2001 Supplemental Bedrock RI Data Package Report. The primary conclusion of the report was that two distinct groups of VOCs were present in bedrock groundwater to the south of the Spectron property; the Parent VOC group, consisting predominantly of methylene chloride, PCE, TCE, 1,1,1-Trichloroethane (1,1,1-TCA), and 1,2-dichloroethane (1,2-DCA), and the Breakdown VOC group, consisting predominantly of vinyl chloride, cis-1,2-dichloroethene (cis-DCE), 1,1-DCA, 1,1-DCE, chloroethane, and chloroethene. The presence of the Breakdown VOC group was interpreted as indicative of the breakdown of VOCs by naturally occurring microorganisms. Additionally, the presence of the Parent VOC group in deep bedrock was interpreted as evidence that the VOC plume from onsite DNAPL migrated downward along the primary bedrock fracture plane. This key finding was used extensively in later RI phases to plan locations and drilling depths for additional bedrock monitoring wells.

E.3.2 Remedial Investigation (2001-2009)

Activities that comprised the RI for OU-2 were performed in accordance with a total of six (6) RI/FS Work Plan Addenda between 2001 and 2009. The RI consisted of the following tasks:

- Monitoring well installation;
- Monitoring well abandonment and replacement;
- Groundwater sampling and analysis;
- Groundwater elevation monitoring;
- AW-1 DNAPL evaluation;
- DNAPL sampling and analysis;
- Passive diffusion bag (PDB) groundwater sampling and analysis;
- Stream piezometer installation, sampling, and analysis;
- Surface water and sediment sampling and analysis;
- Office Area sampling;
- Surface geophysical surveys;
- Bedrock structural data analysis;
- Public water supply well survey;
- Vapor intrusion investigation.

The primary purpose of the OU-2 RI was to collect the data necessary to adequately characterize bedrock groundwater so that effective remedial alternatives could be developed and evaluated. Data was also collected to provide information about overburden and bedrock groundwater interaction, as it related to potential remedial alternatives for OU-1 at the Site. The findings of the OU-2 RI are summarized below:

Hydrogeology

- Bedrock at the Site is relatively poorly fractured, except for the relatively shallow interval (less than 100 to 150 feet bgs), with some intervals of 10 to 20 feet or more without visible fractures. Logging data from the monitoring well boreholes indicate that fractures become less frequent in the deeper bedrock (more than 250 to 300 ft bgs) due to increasing pressure with depth;
- Water-bearing fractures identified in monitoring well boreholes are primarily associated with foliation planes in the bedrock, which dip at a shallow angle to the south/southeast and control groundwater flow in the bedrock. A second set of steeply-dipping, water-bearing fractures aligned with regional deformation patterns may also be significant to groundwater flow to the east toward Little Elk Creek;
- The surface geophysical investigation south of the Spectron property indicated the presence of several conductive zones in the bedrock. No evidence of a non-conductive mass (such as a quartz body) was indicated in the survey area. However, non-conductive zones identified in shallow and deeper bedrock were interpreted as blocks of relatively unfractured and non-water bearing bedrock bounded by sets of fractures;
- Water level elevations are relatively stable and consistent. Groundwater elevations in wells at higher topographic elevation or greater distance from Little Elk Creek are higher than wells that are closer to Little Elk Creek or at a lower topographic elevation;
- Stream elevations in Little Elk Creek are consistently lower than groundwater elevations on either side of the stream channel and confirm that regional groundwater discharges to the creek.

Residential Wells

- Residential water supply wells identified within one mile of the Site are not likely to affect hydraulic gradients or groundwater flow directions in the bedrock near the Site. Additionally, no continuously-operating or larger industrial supply wells were identified within one mile of the Site;

- A comprehensive residential well sampling event was conducted in July 2008. Sampling results indicated that 1,1-DCA was detected in one of the 32 residential wells that were sampled at a concentration below the EPA regional Screening Level (RSL) of 2.4 µg/L. However, 1,1-DCA was detected in the sample collected between the influent from the supply well and effluent from a carbon treatment system only and was not detected in the treatment system influent or effluent samples at this residence. Therefore, the detection of 1,1-DCA may have been due to laboratory error;
- Residential wells effectively surround the Site. A total of 8 wells are located within the extent of or within 150 feet of the Bedrock Groundwater Source Area and/or Dissolved VOC Plume. Currently, data indicates that the residential wells are not impacted by Site-related VOCs. However, due to the location of the wells within the extent of or in close proximity to the Bedrock Groundwater Source Area and/or Dissolved VOC plume, these wells have the potential to become impacted in the future. The location of the properties where residential wells may potentially become impacted in the future is displayed on Figure 12, defined as the Well Pumping Restriction Area.

DNAPL Delineation

- The presence of DNAPL in bedrock was confirmed or is considered probable at two locations; in the vicinity of angled well AW-1 (at a relatively shallow depth) and in the vicinity of well VW-9D (more than 300 ft deep). These two areas are included in the Bedrock Groundwater Source Area that extends southward from the Spectron property, Office Area, and adjacent stream within a relatively narrow band of southward-dipping bedrock fractures (Figure 3);
- Laboratory analysis of DNAPL samples collected at the Site indicates that the VOC source material at the Site consists primarily of, but is not limited to, the following compounds: Methylene chloride, 1,2-dichloroethane (1,2-DCA), 1,1-dichloroethane (1,1-DCA), trichloroethylene (TCE), 4-methyl-2-pentanone, 1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (cis-1,2-DCE), 1,1,1-trichloroethane (TCA), chlorobenzene, tetrachloroethylene (PCE), 1,2 and 1,4-dichlorobenzene, and 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113).

Office Area Investigation

- Soil sampling of the Office Area, conducted in 2007, indicated the presence of metals and SVOCs exceeding EPA RSLs or MDE Residential Soil Cleanup Standards (RSCS). The metals concentrations were compared to MDE Anticipated Typical Concentrations (ATCs) for central Maryland. With the exception of arsenic and lead, the concentrations were similar to naturally-occurring levels in soil and may be unrelated to historical Site operations. The maximum detected concentrations of arsenic and lead were 31.6 mg/kg and 1460 mg/kg, respectively, presenting an unacceptable risk to human health and the environment;
- Sub-slab vapor sampling inside the former Office Area building indicated low concentrations of various VOCs. PCE exceeded EPA RSLs for indoor air (using a 0.1 attenuation factor) in three samples and 1,1,2-TCA exceeded EPA RSLs in one sample;
- Soil vapor sampling to the north of the former Office Area building indicated VOC concentrations of aromatic and chlorinated VOCs exceeding EPA RSLs for indoor air (using a 0.1 attenuation factor). These samples were located in the vicinity of a former septic tank or leach field identified during geophysical surveys in this area;
- The sub-slab and soil vapor sampling indicated that there was a potential for vapor intrusion to occur at unacceptable levels in a future building constructed within the Office Area.
- The former Office Area building was demolished in September 2010.

Vapor Intrusion Investigation

- Sub-slab and indoor air sampling at the residential and non-residential properties near the Spectron property indicated low concentrations of several VOCs. Low concentrations of several VOCs were also detected in the ambient air samples. Multiple VOCs in the sub-slab samples (using a 0.1 attenuation factor) and in indoor air exceeded EPA RSLs. However, the VOCs detected in the indoor air samples were not detected in the sub-slab samples at the same locations, indicating that the VOC concentrations were not Site-related and were likely due to household sources.
- The sub-slab and indoor air sampling indicated that the current vapor intrusion pathway was not considered complete for any Site-related constituents at these properties. However, as indicated above, sampling conducted at the Office Area indicated that vapor intrusion may occur at unacceptable levels in a building constructed at this location in the future. The Office Area lies within the extent of the Bedrock Groundwater Source Area and Dissolved VOC Plume. A total of 8 residences lie within the extent of or within 150 feet of the Bedrock Groundwater Source Area and/or the Dissolved VOC Plume. Therefore, due to the potential vapor intrusion risks identified at the Office Area and similar proximity of residences to the Bedrock Groundwater Source Area and Dissolved VOC Plume, vapor intrusion may be a concern at these residences in the future. The residential properties at which vapor intrusion may present a potential future risk are displayed on Figure 12, defined as the Well Pumping Restriction Area.
- A vapor intrusion investigation was not performed in the Plant Area at the former Spectron property due to institutional controls required by Section 11.2.5 of the 2004 OU-1 ROD that prohibit any "activity or property use within the Plant Area that could compromise the integrity of the cap, including construction of below-grade foundations or footers, borings, well installation, or placement of heavy equipment, trailers or other similar activities." Based on this restriction, EPA does not anticipate the construction of any buildings in the Plant Area on the former Spectron property at which vapor intrusion would be a potential concern. However, the remedy described herein also includes subsequent land use restrictions to further address potential vapor intrusion concerns.

Groundwater Characterization

- Groundwater sampling results indicate that groundwater concentrations range from greater than 100,000 µg/L of total VOCs in groundwater samples closest to DNAPL to non-detect in groundwater samples from six wells and three sampling zones in a Westbay multi-level monitoring system located to the south of the Spectron property (VW-16);
- Intrinsic degradation of VOCs has been observed in the bedrock groundwater, via chemical and/or biological processes as indicated by the presence of ethene and other VOC biodegradation byproducts in groundwater samples from bedrock monitoring wells.

Surface Water and Sediment

- Surface water sampling results indicate that VOCs, including 1,4-dioxane, were not detected in any of the surface water samples;
- Three VOCs (2-butanone, acetone, and toluene) were detected in the sediment samples. Only toluene was detected at more than trace concentrations and was only detected in samples collected upstream from the Spectron property. Therefore, although toluene is a Site-related contaminant, because toluene was only detected in upstream samples, the toluene detected in the sediment is unlikely to be from the Site. In addition, none of the primary VOCs typically associated with Site DNAPL (e.g., PCE, TCE, 1,1,1-TCA, methylene chloride) were detected in any sediment samples;
- Sampling results indicate that dissolved VOCs in bedrock groundwater potentially discharging to Little Elk Creek have no measurable impact on surface water and stream sediment quality.

E.3.3 Conceptual Site Model

Based on the findings of the Previous Investigations and Remedial Investigation described above, the following Conceptual Site Model (CSM) was developed:

1. Groundwater flow in Site bedrock occurs along fractures, because the bedrock (granitic gneiss) has no primary porosity. Where the rock is not fractured, there is little or no groundwater flow. The shallow bedrock is more fractured than deeper bedrock and has the highest groundwater yield. Fractures in deeper bedrock have increasingly smaller apertures and groundwater yields due to the effect of lithostatic pressure;

2. The most frequent fractures, and those with the largest openings (apertures), are commonly aligned with foliation in the bedrock. These foliation-plane fractures strike approximately east-west and dip to the south at a relatively shallow angle (an average of 27°). Groundwater in the bedrock thus moves primarily along foliation-plane fractures. Steeply dipping fractures may connect two or more foliation-plane fractures, locally increasing groundwater yields in nearby wells;

3. The intermediate/deep bedrock is very poorly-fractured and has much lower groundwater yield compared to shallower bedrock. These low-yield zones may be bounded by fractures or fracture zones in a few areas which may in turn align with sections of Little Elk Creek allowing hydraulic communication across the stream and between shallow and deeper bedrock;

4. Site hydrogeology is typical of a stream-valley flow system. Groundwater flow in Site bedrock is from topographic highs and upward from deeper bedrock to Little Elk Creek. Groundwater recharge occurs along the ridges east and west of the Site. Groundwater discharge to Little Elk Creek is expected to occur primarily through discrete point sources associated with open fractures, instead of more diffuse or continuous seepage zones;

5. Groundwater flow in Site bedrock occurs along complex pathways that are controlled by the orientation, transmissivity and interconnection of fractures. On a local scale, this may result in hydraulic heads that deviate markedly from those predicted by data contouring, which is forced to overlook the existence and effect of individual fracture connections. Fracture interconnections in the bedrock typically do not extend more than 75 to 100 feet laterally or vertically, except in discrete zones of more-extensively fractured bedrock;

6. The extent of the Bedrock Groundwater Source Area is shown on Figure 3. Source material for VOCs detected in bedrock groundwater exists as immobile DNAPL in the overburden and shallow bedrock beneath the Spectron property and in bedrock beneath the Office Area (including the intervening Little Elk Creek). DNAPL source material also exists along bedrock fractures in a narrow, elongated zone extending south of the Spectron property toward the VW-9 well cluster. Some of the DNAPL material, particularly where it is in very small fractures or geologic media of limited transmissivity, may be in a residual state (i.e., immovable even if hydraulic gradients or groundwater flow is increased by artificial means);

7. DNAPL was released at several defined areas at the Spectron property (primarily former Process Areas F, G, and H, as shown on Figure 2) and migrated downward through the overburden until reaching a physical or hydraulic barrier. DNAPL then accumulated until it reached a critical thickness and entered fractures in the bedrock, or flowed laterally until seeping out of the stream bank. Once in the bedrock, DNAPL migrated downward along fracture planes by gravity. Downward migration occurred relatively quickly, counter to groundwater flow directions, and ceased when another physical or hydraulic barrier

was encountered or the DNAPL mass was depleted by loss of residual material during migration. DNAPL in the bedrock is currently immobile unless acted upon by artificial means.

8. DNAPL material in the Bedrock Groundwater Source Area is the source of the Bedrock Groundwater Dissolved VOC Plume at the Site (Figure 3). Dissolution of DNAPL material accounts for the observed suite of VOCs in bedrock groundwater. Detection of the more soluble and/or recalcitrant VOCs indicates that they originated from Site-related DNAPL material.

9. The highest groundwater VOC concentrations are observed in proximity to DNAPL source material in the bedrock and persist in bedrock fractures with the lowest groundwater flow (low-permeability or blind fractures). In fractures with more groundwater flow, VOC concentrations can be diluted by several orders of magnitude between the source material and discharge locations.

10. The SI/GWTS in Little Elk Creek is the receptor for VOCs in bedrock groundwater. Hydraulic and analytical data consistently show that dissolved VOCs are transported in bedrock groundwater, along water-bearing fractures, from the Bedrock Groundwater Source Area toward eventual discharge to the SI/GWTS in Little Elk Creek.

F. Current and Future Potential Land Use and Water Use

Land use in the vicinity of the Site is primarily residential and agricultural. Despite historical industrial use of the Site, the Spectron property is currently zoned for residential use, according to the zoning board of Cecil County, Maryland. The properties immediately adjacent to the Spectron property are currently used for residential purposes or are zoned for residential use if undeveloped. However, due to the soil contamination and building rubble below the Plant Area, along with the presence of the GWTS building, EPA has determined that the Site cannot reasonably be expected to return to residential use. Instead, potential uses include a community park or access ramp to Little Elk Creek, development of the Site for commercial/light industrial use, or as a county utility vehicle maintenance/parking facility. Public water is not currently or reasonably anticipated to be available in the vicinity of the Site and any future development would need to rely on groundwater as a water source. Such use would be subject to the restrictions imposed by the institutional controls component of the 2004 OU-1 ROD and by this Interim ROD.

The Site was purchased by the PRP Group from the former owner/operator in December 2011. Currently, the SI/GWTS treatment building, the historic power house structure, and an open-air pavilion are located on the Plant Area portion of the Site. The power house and pavilion will be demolished as a component of the OU-1 remedy selected in the 2004 OU-1 ROD. The former office building located in the Office Area portion of the Site was demolished in September 2010. The Plant Area is fenced and generally accessible only to authorized personnel.

G. Summary of Site Risks

This section summarizes the results of the risk assessments that were performed during the RI. These baseline risk assessments (before any cleanup) provide the basis for taking a response action and indicate the exposure pathway(s) that need to be addressed by the remedial action. For more detailed human health and ecological risk information, please refer to the November 2009 OU-2 Human Health Risk Assessment (HHRA) and August 2007 OU-2 Screening-Level Ecological Risk Assessment (SLERA) available in the Administrative Record for the Site. Human health risk summary tables from the HHRA are included as Appendix C.

HOW IS HUMAN HEALTH RISK CALCULATED?

A Superfund human health risk assessment estimates the baseline risk. The baseline risk is an estimate of the likelihood of developing cancer or non-cancer health effects if no cleanup action were taken at a site. To estimate baseline risk at a Superfund site, EPA undertakes a four-step process:

Step 1: Analyze Contamination
Step 2: Estimate Exposure
Step 3: Assess Potential Health Dangers
Step 4: Characterize Site Risk

In Step 1, EPA looks at the concentrations of contaminants found at a site as well as past scientific studies on the effects these contaminants have had on people (or animals, when human studies are unavailable). Comparison between site-specific concentrations and concentrations reported in past studies helps EPA to determine which concentrations are most likely to pose the greatest threat to human health.

In Step 2, EPA considers the different ways that people might be exposed to contaminants identified in Step 1, the concentrations that people might be exposed to, and the potential frequency and duration of exposure. Using this information, EPA calculates a "reasonable maximum exposure" scenario, which portrays the highest level of exposure that could reasonably be expected to occur.

In Step 3, EPA uses the information from Step 2 combined with information on the toxicity of each chemical to assess potential risks. EPA considers two types of risk: cancer and non-cancer risk. The likelihood of any kind of cancer resulting from a Superfund site is generally expressed as an upper bound probability; for example, a "1 in 10,000 chance." In other words, for every 10,000 people that could be exposed, one extra cancer may occur as a result of exposure to site contaminants. An extra cancer case means that one more person could get cancer than would normally be expected to from all other causes. For non-cancer health effects, EPA calculates a "hazard index." The key concept here is that a "threshold level" (measured as a Hazard Index (HI) of less than 1) exists below which non-cancer health effects are no longer predicted.

In Step 4, EPA determines whether site risks are great enough to cause health problems for people at or near the Superfund site. The results of the three previous steps are combined, evaluated, and summarized. EPA adds up the potential risks from the individual contaminants and exposure pathways and calculates a total site risk. Generally, cancer risks between 10^{-4} and 10^{-6}, and a non-cancer hazard index of 1 or less are considered acceptable for EPA Superfund sites.

G.1 Human Health Risk Assessment

The HHRA was conducted to characterize and quantify the current and potential future human health risks that would occur if no remedial action were taken to address contaminated media at the Site. The HHRA identifies the potential exposure pathways in which people may be exposed to Site contaminants, the toxicity of the contaminants present, and the potential for carcinogenic and non-carcinogenic effects to occur from exposure to the contaminants. EPA has set a target risk range of 10^{-4} to 10^{-6} for a lifetime excess carcinogenic risk. For non-carcinogenic contaminants, EPA sets a target of a HI of no greater than 1. Site-related contaminants of concern (Site COCs) identified for OU-2 are presented in Table 1.

Receptor populations evaluated in the HHRA included current/future adult residents, current/future child residents, child swimmers, adult anglers, and potential future construction workers. No Site COCs were identified in either surface water or sediment in Little Elk Creek, primarily due to the installation of the SI/GWTS. Of the exposure scenarios considered, the following contained both a complete exposure pathway and Site COCs:

- Potential current exposure by adult and child resident to Site COCs in bedrock groundwater used as residential well water;
- Potential future exposure by adult and child resident to Site COCs in bedrock groundwater used as residential well water;
- Potential future exposure by adult and child resident and construction worker to Site COCs in Office Area soils.

Carcinogenic risks and non-carcinogenic hazards were found to be at or in exceedance of regulatory thresholds (carcinogenic risk of 10^{-4}, non-carcinogenic HI of 1) for the following:

- Potential future exposure by adult resident to Site COCs in bedrock groundwater (ingestion, dermal contact, and inhalation of vapors):
    - Carcinogenic risk of 1×10^{-1};
    - Non-carcinogenic HI of 800.
- Potential future exposure by child resident to COCs in bedrock groundwater (ingestion and dermal contact):
    - Carcinogenic risk of 7×10^{-2};
    - Non-carcinogenic HI of 2,000.
- Potential future exposure by adult resident to COCs in Office Area Soil (ingestion and dermal contact):
    - Carcinogenic risk of 1×10^{-4}.
- Potential future exposure by child resident to COCs in Office Area Soil (ingestion and dermal contact):
    - Non-carcinogenic HI of 3.

G.2 Ecological Risk Assessment

The SLERA was conducted to determine whether Site COCs posed an unacceptable risk to ecological receptors. The SLERA described the ecology of the Site and surrounding environs within a 0.5-mile radius, identified Site COCs for ecological receptors, and identified complete exposure pathways for ecological receptors. Based on these data, the SLERA identified appropriate measurement and assessment endpoints, evaluated exposures to representative Site receptors, and presented screening-level risk calculations. The SLERA also evaluated the need for further ERA activities at the Site. A summary of the results of the SLERA is presented below.

Because the majority of the property is currently paved and will be covered with an asphalt (or equivalent) cap as a component of the 2012 OU-1 ROD Amendment and, as such, prevents direct contact by ecological receptors, exposures to impacted surface and subsurface soils were not evaluated. Likewise, direct contact with potentially affected groundwater was not evaluated in the SLERA because ecological receptors inhabiting the study area are not likely to contact groundwater directly. The potential ecological risks posed by surface water and sediment in Little Elk Creek, however, were evaluated.

Site COCs were identified by screening surface water and sediment against the USEPA Region 3 Biological Technical Assistance Group (BTAG) screening values. Three downstream constituents exceeded the BTAG screening values (iron, manganese, and nickel); however, the concentrations of these metals were all less than the maximum upstream concentration, indicating that these exceedances are likely not the result of Site-related activities.

Food-chain calculations were conducted for the muskrat, mink, and belted kingfisher to evaluate potential ecological risk to higher trophic-level receptors. These food-chain models quantitatively evaluated incidental ingestion of surface water and sediment and ingestion of affected food items. In this screening evaluation, hazard quotients were calculated using highly conservative predictive modeling for estimating Site COC intake and literature-derived toxicological criteria. The food-chain modeling indicated that the hazard quotient for several constituents was greater than one; however, the upstream concentrations of these constituents were greater than the concentrations observed at and downstream of the Site. Consequently, because the risk estimates were driven primarily by contributions from upstream sources, coupled with the fact that very conservative assumptions were used in the derivation of these risk estimates, no further evaluation of ecological risk at the Site was required.

Additional soil samples were collected from the Office Area after the SLERA was conducted in August 2007. The sampling indicated the presence of arsenic and lead at concentrations exceeding Ecological Soil Screening Levels (Eco-SSLs) for terrestrial plants (lead and arsenic) and avian and mammalian wildlife (lead only). These Eco-SSL exceedances were considered when determining soil cleanup goals to ensure protection of the environment in addition to protection of human health.

G.3 Basis for Remedial Action

In summary, the HHRA and SLERA for OU-2 demonstrated the presence of unacceptable risks to human health and the environment. EPA determined that remedial actions are necessary to reduce the risks to within or below EPA's acceptable risk range. Therefore, it is EPA's determination that implementation of the Selected Remedy identified in this Interim ROD is necessary to protect human health and the environment from actual or threatened releases of hazardous substances.

H. Remedial Action Objectives (RAOs)

To protect human health and the environment from current and potential future risk, the following Remedial Action Objectives (RAOs) were developed to address the OU-2 Bedrock Groundwater Source Area and Office Area Soil:

1. Prevent current or future exposure (ingestion, direct contact, and/or vapor inhalation including vapor intrusion) to DNAPL and contaminated bedrock groundwater which would result in unacceptable risk to human health;

2. Prevent current or future direct contact with contaminated soils which would result in unacceptable risk to human health and the environment;

3. Prevent the mobilization of residual or trapped DNAPL;

4. Prevent the migration and expansion of, and reduce the extent of, contaminated bedrock groundwater;

5. Treat principal threat waste (DNAPL) in bedrock groundwater, to the maximum extent practicable, to minimize the continuing source of contamination to bedrock groundwater;

6. Restore contaminated bedrock groundwater to beneficial use, where practicable, defined as meeting the following criteria:
    a. Federal Maximum Contaminant Levels (MCLs) or non-zero MCL Goals (MCLGs), Maryland Department of the Environment (MDE) Groundwater Cleanup Standards (GWCS) and
    b. Reduction of cumulative excess carcinogenic risk to less than or equal to 1 in 10,000 (i.e. 10^{-4}) and cumulative excess non-carcinogenic risk to a HI of less than or equal 1;

7. Ensure continued operation and maintenance of the previously constructed SI/GWTS, so that Federal Ambient Water Quality Criteria (AWQC) for consumption of fish and drinking water are not exceeded within Little Elk Creek, immediately downstream of the Site.

The action in this Interim ROD will reduce the excess carcinogenic risk from exposure to contaminated soil and contaminated bedrock groundwater and DNAPL in the Bedrock Groundwater Source Area to within EPA's acceptable risk range of 10^{-4} to 10^{-6} and reduce excess non-carcinogenic risk to a HI of less than or equal to 1 through a combination of treatment, containment, and institutional controls.

I. Description of Alternatives

CERCLA (42 U.S.C. § 9621) requires that any remedial action to address contamination at a Superfund site be protective of human health and the environment, cost effective, in compliance with regulatory and statutory provisions that are Applicable or Relevant and Appropriate Requirements (ARARs), and compliant with the NCP, to the extent practicable.

I.1. Common Elements of Each Remedial Component

Each of the Remedial Alternatives, including Alternative BGW-1: No Action, would include the following common elements:

Five Year Reviews

Five Year Reviews are required at all Superfund sites where waste is left in place; therefore, Five Year Reviews will be required for the Site due to the continued presence of waste in the Plant Area at the Site. In the case of the Spectron Site, Five Year Reviews will be conducted every five years from the start of onsite construction of the Remedial Action.

Technical Impracticability Waiver

Due to the presence of DNAPL at depths up to 360 feet bgs and the low permeability and limited interconnectivity of fractures in bedrock, EPA has determined that it is technically impracticable from an engineering perspective to restore bedrock groundwater in the vicinity of DNAPL to beneficial use using existing technologies. Therefore, a Technical Impracticability Waiver (TI Waiver) shall apply to groundwater ARARs for the portion of the Site in which DNAPL is present for select compounds.

This area, designated as the Technical Impracticability Zone (TI Zone), is located below Little Elk Creek to the northeast of the former Spectron property and to the south-southeast of the former Spectron property, as shown on Figure 6 in plan view. Figures 7 through 9 show the limits of the TI Zone in cross-section to the south-southeast of the former Spectron property. Adjacent to the property, the TI Zone extends from the water table (approximately 20 feet below ground surface (bgs)) to 140 (bgs). The TI Zone in this area dips to the south-southeast along foliation-plane fractures in the bedrock and reaches a depth of approximately 240 to 360 feet bgs at a distance of approximately 450 feet from the property boundary. The TI Zone is shallow near the former Spectron property boundary due to the presence of DNAPL in shallow fractures. Away from the former Spectron property, DNAPL is encountered at increasing depths due to flow along the foliation-plane fractures and shallow bedrock contains only low concentrations of Site-related contaminants.

Figure 10 shows the limits of the TI Zone in cross-section to the northeast of the former Spectron property below Little Elk Creek. The TI Zone in this area extends from the bottom of the creek bed to a depth of approximately 100 feet bgs due primarily to the presence of DNAPL in angled wells extending below the creek.

The groundwater ARARs being waived consist of federal MCLs, which are considered applicable requirements, and federal non-zero MCLGs and MDE GWCSs, which are considered relevant and appropriate requirements.

The list of compounds and associated groundwater ARARs for which the TI Waiver shall apply is presented in Table 4. The compounds listed in Table 4 do not include all Site COCs listed in Table 1. Instead, compounds for which the TI Waiver shall apply include compounds that were detected in DNAPL, are present in bedrock groundwater at elevated concentrations indicative of the nearby presence of DNAPL, and are resistant to dissolution and/or degradation. Site COCs in Table 1 that are not included in Table 4 are expected to meet groundwater ARARs within the TI Zone.

Although EPA has determined that it is technically impracticable to restore bedrock groundwater to meet groundwater ARARs within the TI Zone, as an alternative remediation strategy to ensure protection of human health within the TI Zone, the RAOs and Remedial Alternatives were designed to:

- Treat DNAPL to the maximum extent practicable;
- Contain DNAPL and associated dissolved VOCs where treatment is impracticable;
- Prevent potential exposure to DNAPL and contaminated groundwater through monitoring and institutional controls;
- Restore bedrock groundwater outside the TI Zone to meet groundwater ARARs.

Each of the components of the Remedial Alternatives was designed to be consistent with the TI Zone alternative remediation strategy. The technical impracticability of treating DNAPL and bedrock groundwater to meet groundwater ARARs within the TI Zone is discussed in additional detail in Part II, Section J. Comparative Analysis of Alternatives.

Waste Management Area

The 2004 OU-1 ROD designated the Plant Area on the Spectron Property as a Waste Management Area (WMA) because waste would be left in place as a component of the OU-1 remedy (Figure 5). The WMA designation will also apply to the OU-2 remedy. The waste consists of residual waste and debris piles from the former onsite lagoon, contaminated creek sediments from construction of the SI/GWTS, structural debris and historic building foundations, abandoned drainage pipes, and an abandoned mill race. Based on this designation, groundwater ARARs consisting of federal MCLs, non-zero MCLGs, and MDE GWCS for all Site COCs (Table 1) will be met at the boundary of the WMA rather than within the WMA. The WMA is discussed in additional detail in Part II, Section J. Comparative Analysis of Alternatives.

Groundwater Plume Areas

Bedrock Groundwater consists of the Source Area and the Dissolved VOC Plume, as shown on Figure 3. As previously discussed, the Remedial Alternatives presented in this Interim ROD address the Bedrock Groundwater Source Area only. Additional data will be collected to select a remedy for the Bedrock Groundwater Dissolved VOC Plume. For the purpose of evaluating Remedial Alternatives, the Bedrock Groundwater Source Area and Dissolved VOC Plume were further subdivided based on hydrogeologic conditions, DNAPL and dissolved VOC distribution, and potential receptors, as shown on Figure 13:

Bedrock Groundwater Source Area

- Source Area WMA;
  - Potential DNAPL and dissolved VOC plume below the WMA;
- Source Area A;
  - Potential and Confirmed/Probable DNAPL and dissolved VOC plume below Little Elk Creek, the Office Area, and east/northeast of Little Elk Creek;
- Source Area B;
  - Sub Area B-1 – Shallow Potential and Confirmed/Probable DNAPL and dissolved VOC plume to the southeast of the Spectron Property;
  - Sub Area B-2 – Deep Potential and Confirmed/Probable DNAPL to the southeast of the Spectron Property;

Bedrock Groundwater Dissolved VOC Plume

- Dissolved VOC Plume C;
  - Dissolved VOC plume to the northwest of the Spectron Property emanating from/adjacent to Bedrock Groundwater Source Areas WMA and A;
- Dissolved VOC Plume D;
  - Dissolved VOC plume to the southeast of the Spectron Property emanating from Bedrock Groundwater Source Area B.

Although the Remedial Alternatives address the Bedrock Groundwater Source Area and Dissolved VOC Plume subdivisions in different manners, the designation of the subdivisions are consistent for all Remedial Alternatives. Additional discussion of potential remedial technologies that were eliminated based on Site characteristics is available in the OU-2 FS.

I.2. Remedial Alternatives

I.2.1 Bedrock Groundwater Source Area

The following Remedial Alternatives were evaluated to address the Bedrock Groundwater Source Area and are numbered to correspond with the alternatives presented in the OU-2 FS:

- Alternative BGW-1: No Action
- Alternative BGW-2: SI/GWTS
- Alternative BGW-3: Groundwater Extraction and Treatment

Alternative BGW-1: No Action

Estimated Cost: $0
Estimated Annual Cost: $0
Estimated Present Worth Cost: $0
Estimated Time to Completion: hundreds of years

This alternative is developed and retained as a baseline scenario to which the other alternatives may be compared. Under this alternative, EPA would take no action at the Site to address Bedrock Groundwater.

Alternative BGW-2: SI/GWTS

Estimated Capital Cost: $1,676,648
Estimated Annual Cost: $6,267,379
Estimated Present Worth: $7,944,028
Estimated Time to Completion: 60 years

Alternative BGW-2 consists of a Pre-Design Investigation (PDI) to delineate the capture zone of the existing SI/GWTS and the extent of DNAPL adjacent to Little Elk Creek, continued operation of the existing SI/GWTS, DNAPL collection, groundwater and surface water monitoring, a Monitored Natural Attenuation (MNA) evaluation, residential monitoring, and institutional controls restricting land and groundwater use.

Pre-Design Investigation

The PDI will consist of three components: a groundwater capture zone analysis for the SI/GWTS, installation of additional DNAPL delineation wells, and comprehensive sampling of bedrock monitoring wells.

The existing SI/GWTS utilizes a passive drain system to capture contaminated groundwater seeps that formerly discharged to Little Elk Creek. The capture zone analysis will be conducted to better define what portion of the bedrock aquifer discharges to the SI/GWTS. Additional bedrock monitoring wells or piezometers will be installed on the Spectron property, the Office Area, and adjacent properties so that groundwater concentrations, potential DNAPL zones, and potentiometric surfaces can be monitored to establish the direction of groundwater flow relative to the SI/GWTS. Additionally, tracer testing may be conducted based on initial results of the capture zone analysis.

Additional bedrock monitoring wells will also be installed in three areas of the Site to delineate the potential extent of DNAPL, as shown on Figure 14[11]. The areas are located along the western boundary of the Spectron property and the northeastern side of Little Elk Creek. Based on conditions observed during drilling and the results of initial testing, the wells may be installed to monitor multiple levels within each borehole. Construction and location details will be selected based on consultation with EPA and MDE.

Finally, multiple comprehensive sampling events will be conducted from all completed bedrock groundwater monitoring wells at the Site. The sampling will be conducted to assess potential contaminant concentration trends and further evaluate contaminant plume stability and migration.

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11 - Monitoring wells were installed in two of the DNAPL delineation areas during the development of the OU-2 FS in mid-2011 in accordance with the requirements listed herein and in consultation with EPA and MDE. Completed well locations and potential future well locations are shown on Figure 14.

Continued Operation of SI/GWTS

Continued operation of the SI/GWTS was required by the 2004 OU-1 ROD and 2012 OU-1 ROD Amendment to address contaminated groundwater that discharges to the SI/GWTS from the overburden within the Plant Area at the former Spectron property (defined as OU-1). Continued operation of the SI/GWTS would also be a component of Alternative BGW-2 to address contaminated groundwater that discharges to the SI/GWTS from bedrock within the Plant Area and from bedrock to the north, northeast, and southwest of the former Spectron property, including both the Bedrock Groundwater Source Area and Dissolved VOC Plume.

Portions of both the Bedrock Groundwater Source Area and Dissolved VOC Plume discharge to the SI/GWTS, as shown on Figure 3 and therefore both areas would be treated by the SI/GWTS. The SI/GWTS would continue to operate to treat bedrock groundwater should the overburden groundwater no longer contain contaminants at levels of concern following the implementation of the OU-1 remedy.

The SI/GWTS would continue to operate as described in Part II, Section B.2 History of Previous Environmental Investigations and Response Actions, in accordance with the performance standards established in Section 11.2.1 of the 2004 OU-1 ROD and as specified herein.

Based on the current condition of the SI/GWTS, replacements and/or upgrades to the system will be necessary in the future, including flow equalization tanks, and possible liner replacement.

Continued operation of the SI/GWTS will primarily address Bedrock Groundwater Source Areas WMA, A, and Sub-Area B-1 by containing and treating contaminated bedrock groundwater resulting from the dissolution of DNAPL. The SI/GWTS also addresses a portion of the Bedrock Groundwater Dissolved VOC Plume directly adjacent to the Bedrock Groundwater Source Area. DNAPL and contaminated bedrock groundwater within Bedrock Groundwater Source Area Sub-Area B-2 are naturally contained by Site geology and will be monitored as described below. The SI/GWTS provides containment and reduces contaminant mass within the Bedrock Groundwater Source Area and is a component of the alternative remediation strategy for addressing the TI Zone.

DNAPL Collection/Extraction

DNAPL historically accumulated in three bedrock monitoring wells within the Bedrock Groundwater Source Area; AW-1, AW-2, and VW-9DD. DNAPL continues to accumulate in AW-1 at an approximate rate of 1 gallon per month; however, DNAPL no longer accumulates in AW-2 or VW-9DD. DNAPL will continue to be collected from AW-1 and from any future borehole in which it is observed. Additionally, potential enhancements to DNAPL recovery will be evaluated during Remedial Design, such as widening the AW-1 borehole or utilizing multi-phase extraction (MPE). Collected DNAPL will be disposed of offsite at a permitted hazardous waste disposal facility in accordance with CERCLA and the NCP.

DNAPL collection/extraction can potentially reduce contaminant mass within Bedrock Groundwater Source Areas WMA, A, and Sub Area B-1, if DNAPL is encountered in borings installed in these areas, consistent with the alternative remediation strategy for the TI Zone.

Groundwater and Surface Water Monitoring

Groundwater and surface water monitoring will be implemented to monitor the performance of the SI/GWTS, confirm the delineation of DNAPL areas, evaluate contaminant concentration trends, and monitor the water quality in Little Elk Creek. Groundwater monitoring will also assess the natural dissolution of DNAPL contaminant mass over time and evaluate the natural containment of DNAPL by the Site geology.

This monitoring is also a component of the alternative remediation strategy for the TI Zone. The monitoring area will include the Bedrock Groundwater Source Areas WMA, A, and B. The Bedrock Groundwater Dissolved VOC Plumes C and D will be monitored as a component of the MNA Evaluation as described below. Surface water monitoring will be consistent with the monitoring required by the 2004 OU-1 ROD and generally monitor upstream, downstream, and GWTS effluent contaminant concentrations. Sampling will be required until groundwater is restored to meet groundwater ARARs outside of the TI Zone and WMA.

Monitored Natural Attenuation Evaluation

Currently available data indicates that natural attenuation processes within Bedrock Groundwater Dissolved VOC Plumes C and D may be reducing contaminant concentrations. However, as previously discussed, insufficient data currently exists to determine if natural attenuation processes would be able to sufficiently reduce contaminant concentrations within these areas to meet groundwater ARARs. Therefore, an MNA Evaluation will be conducted to further assess the feasibility of MNA within Bedrock Groundwater Dissolved VOC Plumes C and D to meet groundwater ARARs. The Dissolved VOC Plume is shown on Figure 3 and subdivisions of the area, Dissolved VOC Plumes C and D, are shown on Figure 13.

In general, natural attenuation processes include advection/dispersion, sorption/retardation, dilution, volatilization, biodegradation, and abiotic degradation/transformation. Evaluation of MNA processes during the OU-2 RI indicated that Site conditions are conducive to MNA and presented the following evidence that natural attenuation processes were occurring:

- Reduction in VOC concentrations over time within Bedrock Groundwater Dissolved VOC Plume D in well clusters VW-4/VW-5S/VW-5I and VW-7S/7D adjacent to Little Elk Creek, downstream of the former Spectron property and in well VW-17, downgradient of the former Spectron property;
- Ethene and other VOC daughter products are present in groundwater samples collected from bedrock monitoring wells, indicative of biodegradation;
- Elevated methane concentrations are present in VW-17, indicating that methylene chloride degradation is occurring due to methylotrophic bacteria and a nitrate-reducing environment;
- Evaluation of overburden groundwater and the OU-1 Treatability Study results demonstrated that the requisite microorganisms are present at the Site for the biodegradation of chlorinated ethenes (e.g., PCE, TCE) and ethanes (e.g., 1,1,1-TCA);
- Advection and dilution are occurring as groundwater containing dissolved VOCs mixes with uncontaminated bedrock groundwater at the intersections of hydraulically-interconnected fractures that are outside the VOC plume, resulting in contaminant dilution along the natural groundwater flow path.

However, a rigorous time-series groundwater sampling program has not been conducted for Bedrock Groundwater Dissolved VOC Plumes C and D. Therefore, additional evaluation of MNA is required to determine its feasibility for implementation.

Under the MNA Evaluation, Bedrock Groundwater Dissolved VOC Plumes C and D would be monitored for the continued degradation of VOCs by natural processes. The evaluation of MNA would be conducted to confirm that attenuation would occur within the anticipated remedial timeframes of the other remedial components. These processes should continue to gradually reduce VOC concentration in groundwater over time thereby restoring the aquifer in Bedrock Groundwater Dissolved VOC Plumes C and D to achieve groundwater ARARs. This additional data over time would be collected during the PDI/Remedial Design. If MNA is determined to be occurring, long term monitoring would be required to more adequately confirm the VOC plume extent stability and establish VOC and geochemical trends. Other diagnostic tools will be considered during Remedial Design to distinguish between VOC transport and biological/abiotic degradation processes such as carbon stable isotope analysis.

Routine groundwater monitoring of VOCs and MNA indicator parameters will be conducted to demonstrate that natural conditions are decreasing VOC concentrations via physical, chemical, and biological processes and that the Bedrock Groundwater Dissolved VOC Plume is not migrating or expanding. During Remedial Design, the MNA parameters, monitoring wells and frequency will be specified, which typically begins with frequent monitoring that is extended with time, and the sufficiency of the current monitoring well network will also be evaluated. The design will consider the use of microbiological, carbon isotope monitoring and other testing to better evaluate and quantify degradation/transformation processes and rates throughout OU-2, including the Bedrock Groundwater Source Area and Dissolved VOC Plume. The goal of the MNA Evaluation will be to conclusively determine that destruction of VOCs by natural processes is occurring and the final monitoring program will be designed accordingly.

Residential Well Monitoring and Mitigation

Residential monitoring will consist of both residential well and vapor intrusion sampling[12]. Residential well sampling will continue to be conducted in accordance with the current residential well monitoring program being performed by the PRP Group. Samples will be collected from the residential wells located within the extent of or within 150 feet of the Bedrock Groundwater Source Area and/or Dissolved VOC Plume on a routine basis. The residential properties meeting these criteria are defined as the Well Pumping Restriction Area, as shown on Figure 12. If any new residential wells are installed within the Well Pumping Restriction Area those wells will also be included in the routine monitoring program. Currently, three residential wells have wellhead treatment systems installed. Maintenance of these treatment systems will continue to be conducted on an as-needed basis.

Due to the proximity of the residential wells in the Well Pumping Restriction Area to the known extent of the Bedrock Groundwater Source Area and Dissolved VOC Plume, the potential exists that the residential wells may become impacted by Site COCs in the future. If Site COCs are detected in residential well water exceeding groundwater ARARs, a temporary water supply will be provided to the resident until a wellhead treatment system is installed, consisting generally of carbon filtration and ultraviolet disinfection. Monitoring of the well and maintenance of the wellhead treatment system will be conducted following installation.

Residential well monitoring and mitigation will continue until the groundwater within the Well Pumping Restriction Area achieves groundwater ARARs.

Residential monitoring and potential mitigation is consistent with the alternative remediation strategy for the TI Zone by preventing and/or addressing future exposure to Site-related contaminants.

Vapor Intrusion Monitoring and Mitigation

The vapor intrusion investigation conducted during the OU-2 RI indicated that vapor intrusion was not currently occurring at occupied structures located within the extent of the Bedrock Groundwater Source Area and Dissolved VOC Plume at the Site. However, the vapor intrusion investigation conducted at the Office Area indicated that vapor intrusion would present an unacceptable risk to human health if a building was constructed at that location. The Office Area is located approximately 50 feet from currently occupied residences and within the extent of the Bedrock Groundwater Source Area and Dissolved VOC Plume. Therefore, due to the

12 - Residential well monitoring, wellhead treatment, vapor intrusion sampling, and vapor intrusion mitigation are subject to homeowner access approval.

proximity of the Office Area to currently occupied structures, location of occupied structures within the extent of or within close proximity to the Bedrock Groundwater Source Area and/or Dissolved VOC Plume, and uncertainty involved in the construction of new buildings within or in close proximity to the Bedrock Groundwater Source Area and Dissolved VOC Plume, vapor intrusion may present a future risk exceeding EPA's acceptable risk range at both currently occupied structures and potential new structures.

The residential properties at which vapor intrusion may present a future risk according to the above criteria are defined as the Well Pumping Restriction Area, as shown on Figure 12. If any new occupied structures are constructed within the Well Pumping Restriction Area, including at the former Spectron property or Office Area, a vapor intrusion investigation will be conducted in accordance with current EPA guidance, generally consisting of sub-slab, indoor air, and outdoor air sampling. Occupied structures are defined as residences, commercial buildings, or industrial facilities that are occupied for 8 or more hours per day on a routine basis. Additionally, vapor intrusion sampling will be conducted at the time of each Five Year Review for the Site at all previously sampled residences. If, during future vapor intrusion sampling, data indicates that actual or potential migration of Site COCs from contaminated groundwater to indoor air would result in a cumulative excess carcinogenic risk of greater than or equal to 10^{-4} or a cumulative excess non-carcinogenic HI of greater than 1, vapor intrusion mitigation would be conducted.

It is anticipated that mitigation will generally consist of the installation of a sub-slab depressurization system to relieve pressure beneath the building foundation and prevent vapors from migrating into the structure. However, additional measures such as the installation of vapor barriers, ventilation systems, sump mitigation systems or any other technique necessary to prevent vapors from accumulating at unacceptable levels may also be considered. Additional vapor intrusion sampling will be conducted following the installation of the system to confirm its effectiveness.

Mitigation will continue until the groundwater within the Well Pumping Restriction Area achieves groundwater ARARs and sub-slab, indoor air, and outdoor air sampling data indicates that actual or potential migration of Site COCs from contaminated groundwater to indoor air would result in a cumulative excess carcinogenic risk of less than or equal to 10^{-6} and a cumulative excess non-carcinogenic risk of less than or equal to a Hazard Index of 1.

Vapor intrusion monitoring and potential mitigation is consistent with the alternative remediation strategy for the TI Zone by preventing and/or addressing future exposure to Site-related contaminants.

Institutional Controls

Land use restrictions and institutional controls will be documented in a Land Use Control Assurance Plan (LUCAP). The LUCAP, which was also a requirement of the 2004 OU-1 ROD, will include controls for both OU-1 and OU-2, including the Office Area. Institutional controls required by the 2004 OU-1 ROD generally limited land and groundwater use that could adversely impact the OU-1 remedy or result in unacceptable risk to human health within the Plant Area at the former Spectron property (Figure 5). OU-1 institutional controls also limited activities within the Well Pumping Restriction Area (Figure 12) that could adversely impact the OU-1 remedy.

The institutional controls for OU-2 would be implemented in conjunction with the OU-1 institutional controls and expand the scope of those controls. OU-2 institutional controls would expand the OU-1 institutional controls by also limiting land and groundwater use in the Office Area that could adversely impact the OU-1 or OU-2 remedy or result in unacceptable risk to human health. The OU-2 institutional controls would also include requirements that vapor intrusion investigation (and potential mitigation) be performed on any occupied structure constructed in the future at the Plant Area or Office Area.

Alternative BGW-3: Groundwater Extraction and Treatment

Estimated Capital Cost: $2,671,341
Estimated Annual Cost: $7,095,145
Estimated Present Worth: $9,766,486
Estimated Time to Completion: 30 years

Alternative BGW-3 is similar to Alternative BGW-2 and includes the following common elements, as described above:

- PDI to delineate the SI/GWTS capture zone and DNAPL extent;
- Continued operation and maintenance of the SI/GWTS (including modifications/upgrades necessary to treat extracted bedrock groundwater);
- DNAPL collection/extraction and offsite treatment/disposal;
- Groundwater extraction and treatment using the existing GWTS;
- Groundwater monitoring;
- Surface water monitoring;
- MNA evaluation;
- Residential well monitoring and wellhead treatment;
- Vapor intrusion monitoring and mitigation;
- Land and groundwater use restrictions.

However, Alternative BGW-3 also includes extraction and treatment of contaminated groundwater, and potentially DNAPL, using bedrock extraction wells, as described below, as well as additional institutional controls to protect the integrity of the system.

Groundwater Extraction and Treatment

Groundwater extraction and treatment would consist of groundwater extraction from bedrock wells to remove and treat VOC mass/DNAPL, hydraulically capture and contain contaminated Bedrock Groundwater, and enhance the dissolution of DNAPL in bedrock. Contaminated groundwater and any entrained DNAPL will be treated by the GWTS prior to discharge to Little Elk Creek and/or reinjection into the bedrock. As discussed in additional detail in Part II, Section K, Principal Threat Waste, DNAPL is considered a principal threat waste.

Groundwater extraction wells would be installed and operated in Bedrock Groundwater Source Areas WMA, A, and Sub Area B-1 as shown on Figure 11. Final extraction well locations and quantity will be determined during the PDI and/or Remedial Design. These areas were selected for groundwater extraction and treatment due to the presence of DNAPL and/or elevated VOCs at relatively shallow depths within the bedrock. Shallow bedrock at the Site has a greater groundwater yield than deeper bedrock, and bedrock fractures encountered at depths less than about 50 to 100 feet bgs typically have the highest groundwater yield. Groundwater extraction within these areas will therefore focus on the removal and treatment of VOC mass/DNAPL from the Bedrock Groundwater Source Area at the Site.

The deep bedrock within Bedrock Groundwater Source Area Sub Area B-2 also contains DNAPL and elevated VOC concentrations. However, deep bedrock has very low permeability and pumping cannot be sustained in most wells within Bedrock Groundwater Source Area Sub Area B-2. Therefore, groundwater extraction and treatment is not feasible in that area. However, shallow bedrock groundwater in Bedrock Groundwater Source Area Sub Area B-2 is not impacted by VOCs, indicating that the low permeability of the bedrock within this area is naturally containing contaminant migration. Groundwater monitoring discussed previously in this Interim ROD will be conducted to monitor Bedrock Groundwater Source Area Sub Area B-2.

The placement of groundwater extraction wells within the Bedrock Groundwater Source Area on the Spectron Property or adjacent properties would be designed to capture/contain contaminated bedrock groundwater that is not within the capture zone of the existing SI/GWTS. The capture zone of the existing SI/GWTS and pumping rates and areas of influence of potential extraction wells would be evaluated during the PDI. Additionally, a detailed analysis would be conducted to determine if potential modifications or upgrades to the existing GWTS would be required to treat the extracted groundwater.

Groundwater extraction will also increase groundwater flux through DNAPL within the overall Bedrock Groundwater capture zone. This increased flux will dissolve DNAPL more quickly, resulting in a faster reduction of DNAPL mass. DNAPL may also be extracted directly in this manner, if entrained in extracted bedrock groundwater. Potential injection of treated groundwater to further increase groundwater flux through DNAPL at the boundaries of the groundwater extraction area (Figure 11) will be evaluated during Remedial Design.

Groundwater extraction and treatment from Bedrock Groundwater Source Areas WMA, A, and Sub Area B-1 is consistent with the alternative remediation strategy for the TI Zone by containing and capturing contaminated bedrock groundwater emanating from the TI Zone and WMA. Groundwater extraction from Bedrock Groundwater Source Areas WMA and Sub Area B-1 will reduce the contaminant mass flux to Bedrock Groundwater Dissolved VOC Plume D. Additionally, groundwater extraction from Bedrock Groundwater Source Areas WMA and A will reduce contaminant mass flux to Bedrock Groundwater Dissolved VOC Plume C. It is anticipated that the reduction in contaminant mass flux to Bedrock Groundwater Dissolved VOC Plumes C and D will allow groundwater ARARs to be met within these areas, potentially via MNA. The MNA evaluation component of the remedy will determine if MNA is capable of reducing contaminant concentrations within these areas, outside of the TI Zone, to meet groundwater ARARs. Groundwater extraction within the portion of Bedrock Groundwater Source Area A located outside of the TI Zone will reduce contaminant mass such that groundwater ARARs can also be met within that area.

Based on currently available data, the total pumping rate for the extraction wells is anticipated to be approximately 5 to 10 gpm. Currently, it is anticipated that the GWTS can manage the additional volume and VOC loading from the proposed network of extraction wells assuming similar influent characteristics. However, modifications and/or upgrades to the GWTS will be made if the current system is determined to be insufficient during Remedial Design.

Groundwater extraction will continue for approximately 30 years based on the presence of DNAPL in the vicinity of extraction well locations, to provide containment of the VOCs in groundwater from Bedrock Groundwater Source Areas WMA, A and Sub-Area B-1, and restore bedrock groundwater to meet groundwater ARARs outside the TI Zone and WMA.

Groundwater extraction and treatment will treat principal threat waste (DNAPL) to the maximum extent practicable, thereby reducing the continued source of groundwater contamination, while also minimizing potential exposure to contaminated groundwater, consistent with the alternative remediation strategy for the TI Zone.

Institutional Controls

As indicated under Alternative BGW-2, the OU-1 ROD requires institutional controls within the Well Pumping Restriction Area (Figure 12) to limit activities that could adversely impact the OU-1 remedy. Due to the potential location of extraction wells and associated piping on private property under Alternative BGW-3, this alternative would also include institutional controls within the Well Pumping Restriction Area to limit activities that could potentially impact the groundwater extraction well system.

I.2.2 Office Area

The following Remedial Alternatives were evaluated to address Office Area Soil and are numbered to correspond with the alternatives presented in the OU-2 FS:

- Alternative OAS-1: No Action
- Alternative OAS-2: Excavation of Soil, Placement Under OU-1 Asphalt (or Equivalent) Cap
- Alternative OAS-3: Excavation of Soil, Offsite Disposal

Alternative OAS-1: No Action

Estimated Present Worth Cost: $0
Estimated Time to Completion: N/A

This alternative is developed and retained as a baseline scenario to which the other alternatives may be compared. Under this alternative EPA would take no action at the Site to address contaminated Office Area soils.

Alternative OAS-2: Excavation of Soil, Placement Under OU-1 Asphalt (or Equivalent) Cap

Estimated Present Worth: $49,500
Estimated Time to Completion: <1 year

Alternative OAS-2 consists of excavation of contaminated Office Area soils and consolidation under the asphalt (or equivalent) cap to be installed at the former Spectron facility under the 2011 OU-1 ROD Amendment. This alternative will mitigate potential human health and ecological risks associated with elevated lead and arsenic concentrations in Office Area soils (Figure 15).

Soil Remediation

Soil will be excavated from the area depicted on Figure 15 and stockpiled at the former Spectron facility under the former drum storage building until construction of the OU-1 asphalt (or equivalent) cap commences. The soil will be placed under the cap with existing stockpiled soil and debris when the cap is constructed. The excavation will be backfilled with clean fill and vegetated. The clean fill will meet the EPA Biological Technical Assistance Group (BTAG) Region 3 Ecologically Protective Backfill Values presented in Table 3.

Confirmatory Sampling and Analysis

Soil samples will be collected from the perimeter, sidewalls, and bottom of the excavation to confirm that all soil containing contaminants at concentrations exceeding the soil cleanup standards listed in Table 1 has been removed. Based on the results of the confirmation sampling, any additional soil containing contaminants at concentrations exceeding the soil cleanup standards listed in Table 1 will also be excavated. Soil screening using field techniques may be used to help define the extent of the excavation, however, laboratory analysis of soil samples will be required to confirm the final boundaries of the excavation.

Institutional Controls

Institutional controls that would be implemented in the Office Area are described in detail under the Bedrock Groundwater Source Area Remedial Alternatives.

Alternative OAS-3: Excavation of Soil, Offsite Disposal

Estimated Present Worth: $60,400
Estimated Time to Completion: <1 year

Alternative OAS-3 is identical to Alternative OAS-2 except that excavated soil will be disposed offsite at a permitted waste disposal facility. Following excavation, soil will be characterized in accordance with facility requirements and transported offsite for disposal in accordance with EPA and MDE regulations.

I.3. Expected Outcomes of the Selected Remedy

The Selected Remedy presented herein will prevent current and potential future exposure to DNAPL, contaminated bedrock groundwater and resultant vapors, and contaminated soil through a combination of containment, treatment, and institutional controls. Through the use of treatment technologies, this remedy will permanently reduce the toxicity, mobility, and volume of contaminants in Site media and treat principal threat waste (DNAPL) to the maximum extent practicable.

J. Comparative Analysis of Alternatives

The alternatives discussed above were compared with the nine criteria set forth in the NCP (40 C.F.R § 300.430(e)(9)(iii)) in order to select a remedy for the Site. These nine criteria are categorized according to three groups: threshold criteria; primary balancing criteria; and modifying criteria. These evaluation criteria relate directly to the requirements of CERCLA (42 U.S.C § 9621), which determine the overall feasibility and acceptability of the remedy.

Threshold criteria must be satisfied in order for a remedy to be eligible for selection. Primary balancing criteria are used to weigh major trade-offs among remedies. State and community acceptance are modifying criteria formally taken into consideration after public comment is received on the Proposed Plan. A summary of each of the criteria is presented below, followed by a summary of the relative performance of the alternatives with respect to each of the nine criteria. These summaries provide the basis for determining which alternative provides the “best balance” of trade-offs with respect to the nine criteria. Additional comparative analysis of the alternatives can be found in the OU-2 FS.

Threshold Criteria:

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

2. Compliance with ARARs 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.

Primary Balancing Criteria:

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 contamination present.

5. Short-term Effectiveness considers the risks that might be posed to the community during implementation of the alternative; the potential impacts on workers during the remedial action and the effectiveness and reliability of protective measures; potential environmental impacts of the remedial action; and the length of time until protection is achieved.

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

Modifying Criteria:

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

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

DETAILED ANALYSIS OF THE REMEDIAL ALTERNATIVES

1. Overall Protection of Human Health and the Environment

Bedrock Groundwater Source Area

Alternative BGW-1 provides protection of human health in a limited portion of the Bedrock Groundwater Source Area by natural containment of DNAPL and contaminated bedrock groundwater. Protection of human health is provided under Alternative BGW-2 by continued operation of the SI/GWTS in conjunction with residential well and vapor intrusion monitoring, DNAPL collection, and institutional controls restricting groundwater use. Alternative BGW-3 provides protection of human health in the same manner as Alternative BGW-2 by treating/removing DNAPL and contaminated bedrock groundwater thereby reducing potential future risk and contaminant migration. However, Alternative BGW-3 provides treatment/removal of a greater volume of DNAPL and contaminated bedrock groundwater. Additionally, Alternative BGW-3 treats/removes DNAPL and contaminated bedrock groundwater that could potentially discharge to Little Elk Creek, if the stream liner portion of the SI/GWTS should fail or be damaged.

Office Area

Alternative OAS-1 would not provide protection of human health or the environment. Alternatives OAS-2 and OAS-3 would provide protection of human health and the environment by the excavation and disposal of contaminated soils.

2. Compliance with ARARs

Bedrock Groundwater Source Area

The 2004 OU-1 ROD designated the Plant Area as a Waste Management Area (WMA) because waste would be left in place as a component of the OU-1 remedy (Figure 5). The WMA designation will also apply to the OU-2 remedy selected herein. The waste consists of residual waste and debris piles from the former onsite lagoon, contaminated creek sediments from construction of the SI/GWTS, structural debris and historic building foundations, abandoned drainage pipes, and an abandoned mill race. Based on this designation, in accordance with the preamble of the NCP (55 FR 8753), chemical-specific ARARs for groundwater, such as MCLs, non-zero MCLGs, or MDE GWCS, need to be met at the boundary of the WMA rather than within the WMA.

In accordance with CERCLA (42 U.S.C. § 9621 (d)(4)(C)) and the NCP (40 C.F.R. § 300.430(f)(1)(ii)(C)(3)), EPA has determined that achieving groundwater cleanup ARARs throughout the groundwater contaminant plume will be technically impracticable from an engineering perspective. Therefore, a TI Waiver shall apply to a portion of the of the groundwater contaminant plume, known as the TI Zone.

The TI Zone is located below Little Elk Creek to the northeast of the former Spectron property and to the south-southeast of the former Spectron property, as shown on Figure 6. Figures 7 through 9 show the limits of the TI Zone in cross-section to the south-southeast of the former Spectron property. Adjacent to the property, the TI Zone extends from the water table (approximately 20 feet below ground surface (bgs)) to 140 (bgs). The TI Zone in this area dips to the south-southeast along foliation-plane fractures in the bedrock and reaches a depth of approximately 240 to 360 feet bgs at a distance of approximately 450 feet from the property boundary. The TI Zone is shallow near the former Spectron property boundary due to the presence of DNAPL in shallow fractures. Away from the former Spectron property, DNAPL is encountered at increasing depths due flow along the foliation-plane fractures and shallow bedrock contains only low concentrations of Site-related contaminants.

Figure 10 shows the limits of the TI Zone to the northeast of the former Spectron property below Little Elk Creek. The TI Zone in this area extends from the bottom of the creek bed to a depth of approximately 100 feet bgs due primarily to presence of DNAPL in angled wells extending below the creek.

The TI Waiver shall apply to the following groundwater ARARs:

- Federal Maximum Contaminant Levels (MCLs) established by the Safe Drinking Water Act, 42 U.S.C § 300g-l and set forth in 40 C.F.R. § 141.61;
- Federal non-zero Maximum Contaminant Level Goals (MCLGs) established by the Safe Drinking Water Act, 42 U.S.C § 300g-l and set forth in 40 C.F.R. § 141.50-51;
- Maryland Department of the Environment (MDE) Groundwater Cleanup Standards (GWCSs) set forth in the *MDE Cleanup Standards for Soil and Groundwater Interim Final Guidance Version 2.1*.

These groundwater ARARs will not be met within the TI Zone but will be required to be met within the remainder of the groundwater contaminant plume outside of the TI Zone and WMA. MCLs are considered applicable requirements and non-zero MCLGs and MDE GWCSs are considered relevant and appropriate requirements.

The list of compounds and associated groundwater ARARs for which the TI Waiver shall apply is presented in Table 4. The compounds listed in Table 4 do not include all Site COCs listed in Table 1. Instead, compounds for which the TI Waiver shall apply include compounds that were detected in DNAPL, are present in bedrock groundwater at elevated concentrations indicative of the nearby presence of DNAPL, and are resistant to dissolution and/or degradation. Site COCs in Table 1 that are not included in Table 4 are expected to meet groundwater ARARs within the TI Zone and WMA.

The TI Waiver is necessary at this Site due to the following factors:

- DNAPL is present at the Site in bedrock at depths up to 360 feet bgs;
- Extraction or complete hydraulic containment of DNAPL is not feasible due to very low permeability of the bedrock and decreased number and interconnectivity of fractures with depth;
- Aggressive pumping or injection of in situ treatment amendments may potentially mobilize DNAPL and impact residential wells that are currently unaffected.

The alternative remediation strategy within the TI Zone and WMA would consist of a combination of monitoring and institutional controls under Alternative BGW-2 to provide protection of human health and the environment. Under Alternative BGW-3, a combination of limited treatment and containment, where possible, monitoring, and institutional controls will be employed within the TI Zone and WMA and contaminated bedrock groundwater plume to ensure protection of human health and the environment.

Bedrock Groundwater consists of the Source Area and the Dissolved VOC Plume. Remedial Alternatives BGW-2 and BGW-3 are considered interim remedies because only the Bedrock Groundwater Source Area is addressed. Both alternatives require that an MNA Evaluation be conducted within the Bedrock Groundwater Dissolved VOC Plume to determine if MNA would be effective in reducing VOC concentrations within this area to meet groundwater ARARs. Therefore, the ability of the Remedial Alternatives to meet groundwater ARARs within the Bedrock Groundwater Dissolved VOC Plume outside of the WMA and TI Zone is not evaluated in this Interim ROD and shall be addressed in a future decision document when sufficient data is collected. Both Alternatives BGW-2 and BGW-3 would be capable of meeting groundwater ARARs in the Bedrock Groundwater Source Area outside of the WMA and TI Zone.

Additional ARARs relating to continued operation of the SI/GWTS, such as federal and Maryland air emissions regulations, surface water quality regulations, and hazardous waste management regulations would continue to be met under all Remedial Alternatives. A list of ARARs for the interim OU-2 remedy is included in Table 5.

Office Area

Alternative OAS-1 would provide no protection of human health and the environment and would not achieve compliance with ARARs. Alternatives OAS-2 and OAS-3 would comply with the chemical, location, and action-specific ARARs presented in Table 5.

3. *Long Term Effectiveness and Permanence*

Bedrock Groundwater Source Area

Alternative BGW-1 does not address current or potential future risk from groundwater or provide long-term monitoring or institutional controls.

Alternative BGW-2 would provide limited reduction of risk in the long-term via treatment of DNAPL and contaminated groundwater by the SI/GWTS. Alternative BGW-3 would provide increased risk reduction in the long-term via the SI/GWTS and additional extraction and treatment of DNAPL and contaminated groundwater. Both BGW-2 and BGW-3 ensure permanence of the remedy through treatment, monitoring, and institutional controls.

Office Area

Alternative OAS-1 would not provide long-term reduction of risk. Alternatives OAS-2 and OAS-3 would both provide long-term risk reduction through excavation and disposal of contaminated soil and institutional controls limiting future land and groundwater use.

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

Bedrock Groundwater Source Area

Alternative BGW-1 does not provide treatment of DNAPL or contaminated bedrock groundwater. Limited natural attenuation may occur at the downgradient edge of the contaminant plume, however, the volume of contaminated bedrock groundwater may increase as DNAPL is dissolved.

Both Alternatives BGW-2 and BGW-3 provide treatment of DNAPL, which is considered a principal threat waste. Alternative BGW-2 would reduce toxicity, mobility, and volume through treatment of DNAPL and bedrock groundwater via the SI/GWTS. Reduction in DNAPL mass would also occur as DNAPL is dissolved and the resultant contaminated bedrock groundwater is captured by the SI/GWTS. Alternative BGW-3 would reduce toxicity, mobility, and volume through treatment in the same manner as Alternative BGW-2, however, treatment would be enhanced further by the extraction and treatment of DNAPL and contaminated bedrock groundwater. Furthermore, the addition of the extraction well network to the SI/GWTS would increase the overall capture zone of contaminated bedrock groundwater in the Bedrock Groundwater Source Area, further enhancing treatment and reducing contaminant mass.

Office Area

Alternative OAS-1 would not provide any treatment of contaminated soil. Alternative OAS-2 would also not provide treatment of contaminated material, however, the mobility of contaminants would be reduced by consolidation of the excavated material beneath the low-permeability asphalt (or equivalent cap) required by the OU-1 ROD Amendment. Alternative OAS-3 would provide the greatest reduction in toxicity, mobility, and volume of contaminated soil at the Site via excavation and offsite disposal, however, soil would also not be treated by this remedial alternative.

5. Short-term Effectiveness

<u>Bedrock Groundwater Source Area</u>

Alternative BGW-1 would not provide protection of human health or the environment in the short term or attain RAOs.

Alternative BGW-2 would provide short-term reduction of risk to human health and the environment primarily by continued operation of the SI/GWTS. Short-term risks to the community would be minimal during construction and would primarily be related to delineation well installation. RAOs would be attained in a timely manner, with the exception of reducing DNAPL volume, which may extend to 60 years or more.

Alternative BGW-3 would provide short term risk reduction in the same manner as Alternative BGW-2, however, additional reduction in DNAPL mass is expected under Alternative BGW-3 due to DNAPL and contaminated bedrock groundwater extraction and treatment. Additional short-term risk to the community may be greater under Alternative BGW-3 due to the increased number and location of extraction and monitoring wells compared to Alternative BGW-2. However, Alternative BGW-3 is expected to meet groundwater ARARs in the Bedrock Groundwater Source Area outside of the TI Zone and WMA in a shorter time frame, as described below. Additional air emissions may occur as a result of the increased volume of contaminated groundwater treated by the SI/GWTS, however such emissions would be subject to the state and federal air emissions ARARs established for the SI/GWTS in the 2004 OU-1 ROD.

The following time frames were estimated to attain the RAO of meeting groundwater ARARs in the Bedrock Groundwater Source Area outside the TI Zone and WMA:

- BGW-1: hundreds of years
- BGW-2: 60 years
- BGW-3: 30 years

<u>Office Area</u>

Alternative OAS-1 would not provide protection of human health or the environment in the short term or attain RAOs. Both Alternatives OAS-2 and OAS-3 could be implemented quickly. Alternative OAS-2 would require additional management of contaminated soil onsite compared to Alternative OAS-3. However, Alternative OAS-3 would also require offsite transportation and offsite management of contaminated soil and consequently would not enhance the short-term effectiveness of the remedy.

6. Implementability

<u>Bedrock Groundwater Source Area</u>

Alternative BGW-1 would be easily implemented because no action would be taken. However, because no action would be taken, the alternative does not meet threshold or balancing criteria or address RAOs.

Both Alternatives BGW-2 and BGW-3 include a Pre-Design Investigation (PDI) to evaluate the capture zone of the SI/GWTS and further characterize DNAPL extent and contaminated groundwater. The results of the PDI could potentially impact the implementability of both Remedial Alternatives. However, based on current information, Alternative BGW-2 appears to be most readily implementable because it relies primarily on the continued operation of the existing SI/GWTS. Alternative BGW-3 would include installation of additional extraction wells, potentially obtaining access to adjacent properties, and conveyance of extracted groundwater from extraction wells to the GWTS that would complicate implementation of the remedy.

Office Area

Alternative OAS-1 could not be implemented because it does not meet threshold or balancing criteria or address RAOs. Both Alternatives OAS-2 and OAS-3 would be readily implementable; however, offsite disposal of contaminated soil under Alternative OAS-3 is less complicated than storage, grading, and consolidation of the soil under the asphalt (or equivalent) cap under Alternative OAS-2.

Following the issuance of the OU-2 Proposed Plan, the PRP Group indicated that the excavated Office Area Soil could be used as fill for grading the Plant Area prior to the placement of the OU-1 asphalt (or equivalent) cap. Using the contaminated Office Area Soil as fill would allow the OU-1 asphalt (or equivalent) cap to be implemented more readily and reduce the amount of clean fill that would be required from an offsite source.

7. Cost

Bedrock Groundwater Source Area

The present worth costs of Alternatives BGW-1 through BGW-3 are summarized as follows:

Alternative	Capital Cost	Present Worth of O&M/Periodic Costs	Total Cost
BGW-1	$0	$0	$0
BGW-2	$1,680,000	$6,270,000	$7,950,000
BGW-3	$2,670,000	$7,090,000	$9,760,000

The 30 year present worth estimate was calculated using a five (5) percent discount rate to remain consistent with the five (5) percent discount rate utilized in the 2004 OU-1 ROD and 2012 OU-1 ROD Amendment. Costs for long-term monitoring and Five Year Reviews are included in the annual Operations and Maintenance (O&M) costs above. Alternatives BGW-2 and BGW-3 also include costs for a full replacement of the liner system component of the SI/GWTS.

Alternative BGW-1 assumes no action will be taken at the Site, and therefore has no cost. Alternatives BGW-2 and BGW-3 are identical except for additional groundwater extraction and treatment under Alternative BGW-3, accounting for the increased cost.

Office Area

The present worth costs of Alternatives OAS-1 through OAS-3 are summarized as follows:

Alternative	Total Cost
OAS-1	$0
OAS-2	$49,500
OAS-3	$60,400

Alternative OAS-1 assumes no actions will be taken at the Site, and therefore has no cost. Alternatives OAS-2 and OAS-3 are identical except that contaminated soil would be disposed offsite under Alternative OAS-3 rather than consolidated onsite under Alternative OAS-2, accounting for the increased cost.

8. State Acceptance

The Maryland Department of the Environment (MDE) concurs with EPA's Selected Remedy for the Site; a concurrence letter was received by EPA on September 19, 2012 (Appendix B).

9. Community Acceptance

EPA conducted a public meeting for the Proposed Plan on July 18, 2012. EPA's Preferred Alternative was well received by those in attendance. Questions and concerns that were raised during the public meeting along with EPA's responses are provided in Section III of this Interim ROD, the Responsiveness Summary. Additional comments that were submitted to EPA during the comment period are also addressed in the Responsiveness Summary.

K. Principal Threat Waste

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a Site wherever practicable (40 C.F.R. § 300.430(a)(1)(iii)(A)). The principal threat concept is applied to the characterization of source materials at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination, for example, to groundwater. Principal threat wastes are those source materials considered to be highly toxic or highly mobile, which would present a significant risk to human health or the environment should exposure occur.

For OU-2, DNAPL, whether in residual or free-flowing form, is considered principal threat waste because it acts as a reservoir for continued groundwater contamination. Treatment of DNAPL to the maximum extent practicable is therefore a component of the OU-2 remedy.

L. Selected Remedy: Description and Performance Standards

Based on consideration of the CERCLA requirements and analysis of alternatives using the nine evaluation criteria, including public comments, EPA's Selected Remedy is as follows:

- Bedrock Groundwater Source Area – BGW-3 – Groundwater Extraction and Treatment
- Office Area Soil – OAS-2 – Excavation of Soil, Placement Under OU-1 Asphalt (or Equivalent) Cap

As previously discussed, Bedrock Groundwater is further defined as the Source Area and Dissolved VOC Plume. The Selected Remedy presented herein addresses the Bedrock Groundwater Source Area only and does not address the Bedrock Groundwater Dissolved VOC Plume. Instead, the Selected Remedy includes additional data collection to facilitate the selection of a remedy for the Bedrock Groundwater Dissolved VOC Plume in a future ROD.

L.1. Summary of the Rationale for Selected Remedy

L.1.1 Bedrock Groundwater Source Area

Remedial Alternative BGW-3 – Groundwater Extraction and Treatment will meet the RAOs of preventing current or potential future exposure to DNAPL and contaminated bedrock groundwater that would result in unacceptable risk to human health, minimize the potential to mobilize residual or trapped DNAPL, treat DNAPL to the maximum extent practicable to minimize the source of groundwater contamination, ensure continued operation of the SI/GWTS, and restore bedrock groundwater in the Bedrock Groundwater Source Area outside of the WMA and TI Zone to meet groundwater ARARs. The remedy is readily implementable and will be complementary to the OU-1 remedy in reducing DNAPL mass at the Site. Alternative BGW-3 also has the following advantages compared to the remaining remedial alternatives evaluated herein:

- Greater potential treatment of principal threat waste (DNAPL) over a shorter time frame;
- Enhanced capture and containment of DNAPL and contaminated bedrock groundwater;
- Similar cost.

Based on the factors presented above, EPA's Selected Remedy to address the Bedrock Groundwater Source Area is BGW-3 – Groundwater Extraction and Treatment.

L.1.2 Office Area Soil

Remedial Alternative OAS-2 – Excavation of Soil, Placement Under OU-1 Asphalt (or Equivalent) Cap will meet the RAO of preventing current or future direct contact with contaminated soils which would result in an unacceptable risk to human health or the environment. Additionally, Alternative OAS-2 has the following advantages compared to the other remedial alternatives evaluated herein:

- Excavated soil will be used as fill for grading the Plant Area and reduce the amount of clean fill required from offsite sources;
- Less transportation and management of contaminated soil offsite;
- Similar cost.

Based on the factors presented above, EPA's Selected Remedy to address Office Area Soil is OAS-2 – Excavation of Soil, Placement Under OU-1 Asphalt (or Equivalent) Cap.

L.2. Description of the Selected Remedy

Below is a detailed description of EPA's Selected Remedy; Alternative BGW-3 – Groundwater Extraction and Treatment and Alternative OAS-2 – Excavation of Soil, Placement Under OU-1 Asphalt (or Equivalent) Cap. A conceptual layout of Alternative BGW-3 is shown on Figure 11 and the approximate extent of the Office Area Soil excavation is shown on Figure 15.

L.2.1 Bedrock Groundwater Source Area – Alternative BGW-3 – Groundwater Extraction and Treatment

Alternative BGW-3 – Groundwater Extraction and Treatment consists of the following components:

1. PDI to delineate the SI/GWTS capture zone and dense non-aqueous phase liquid (DNAPL) extent;
2. Continued operation and maintenance of the SI/GWTS (including modifications/upgrades necessary to treat extracted bedrock groundwater);
3. DNAPL collection/extraction and offsite treatment/disposal;
4. Groundwater extraction and treatment using the existing GWTS;
5. Groundwater monitoring;
6. Surface water monitoring;
7. MNA Evaluation;
8. Residential well monitoring, temporary water, and wellhead treatment;
9. Vapor intrusion monitoring and mitigation;
10. Land and groundwater use restrictions.

The Selected Remedy for the Bedrock Groundwater Source Area also includes a Technical Impracticability (TI) Waiver of groundwater Applicable or Relevant and Appropriate Requirements (ARARs) for a portion of the Bedrock Groundwater Source Area due primarily to the presence of DNAPL in deep bedrock and the low permeability of the geologic formation. Additionally, the Waste Management Area (WMA) designation set forth in the 2004 OU-1 ROD will also apply to the Selected Remedy due to waste remaining in place in the Plant Area at the former Spectron property. Both the TI Waiver and WMA are described in additional detail in Part I, Section E., Statutory Determinations, and Part II, Section I.1, Common Elements of Each Remedial Component, Section J., Comparative Analysis of Alternatives, and Section M.2., Compliance with Applicable or Relevant and Appropriate Requirements.

L.2.2 Bedrock Groundwater Source Area Performance Standards

Implement Alternative BGW-3 – Groundwater Extraction and Treatment in accordance with the performance standards in Sections L.2.2.1 through L.2.2.10 below.

L.2.2.1 Pre-Design Investigation

Conduct a PDI consisting of the following components:
1. Groundwater capture zone investigation for the existing SI/GWTS (Figure 4);
2. Delineation of DNAPL extent;
3. Groundwater contaminant trend analysis.

L.2.2.2 Continued Operation of the Stream Isolation and Groundwater Treatment System (SI/GWTS)

Continue operation and maintenance of the SI/GWTS in accordance with the following performance standards established in the 2004 OU-1 ROD (Section 11.2.1) until federal MCLs, non-zero MCLGs and MDE GWCSs for Site COCs (Table 1) are achieved throughout the Bedrock Groundwater Source Area, with the exception of the WMA (Figure 5) and TI Zone (Figures 6 through 10):

1. Effluent discharged from the existing SI/GWTS resulting from treated groundwater and DNAPL shall meet the substantive requirements of the NPDES program and the Maryland discharge limitations and monitoring requirements and shall contain less than 100 µg/L of total VOCs.
2. Air emissions from the existing SI/GWTS resulting from treated groundwater shall meet the substantive requirements of Maryland general air emissions standards, Maryland regulations governing toxic air pollutants, and federal air emissions standards for process vents. In addition, emissions shall result in a cumulative excess carcinogenic risk of less than or equal to 10^{-6} and a cumulative excess non-carcinogenic HI of less than or equal to 1. The EPA guidance document, Control of Air Emissions from Superfund Air Strippers at Superfund Groundwater Sites (OSWER Directive 9355.0-28, June 15, 1989) shall also be considered in determining the need for air emission controls;
3. A capacity evaluation shall be conducted every two (2) years to determine if expansion of the existing GWTS is necessary to prevent untreated groundwater from bypassing the system;
4. SI/GWTS components shall be maintained, and replaced as necessary, to minimize downtime and maximize system performance;
5. Monitoring reports shall be submitted to EPA at a frequency sufficient to determine if the SI/GWTS is in compliance with the performance standards 1 through 4 specified above;
6. Onsite handling and offsite disposal of hazardous substances from operation of the SI/GWTS shall be conducted in accordance with MDE and EPA regulations. Offsite disposal of hazardous substances shall be in accordance with CERCLA (42 U.S.C. § 9621 (d)(3)) and the NCP (40 C.F.R. § 300.440);
7. An emergency notification plan shall be developed to alert EPA and MDE of system shutdown or failure;
8. Surface water in Little Elk Creek shall meet the numerical performance standards established in 2004 OU-1 ROD, listed on Table 2[13];
9. The SI/GWTS shall be operated in a manner to prevent flotation of the stream liner system;
10. The vegetative cover, including the stream bank and riparian habitat, shall be maintained in the vicinity of the SI/GWTS and along Little Elk Creek to provide stream bank stabilization and habitat cover. An evaluation of the condition of the vegetative cover shall be conducted every two (2) years;
11. The SI/GWTS shall be maintained in a manner that fish can travel up to the dam.

L.2.2.3 DNAPL Collection

Collect DNAPL that accumulates in any existing borehole or any future borehole using passive and/or active methodology:

1. Collected DNAPL shall be treated and disposed of offsite at a permitted waste disposal facility in accordance with CERCLA (42 U.S.C. § 9621 (d)(3)) and the NCP (40 C.F.R. § 300.440).

13 - EPA Region III BTAG Freshwater Screening Benchmarks shall also be used to evaluate the water quality in Little Elk Creek, however, the benchmarks are not considered performance standards for the purposes of this Interim ROD.

L.2.2.4 Groundwater Extraction and Treatment

Extract and treat the Bedrock Groundwater Source Area within the Groundwater Extraction Areas depicted on Figure 11. The Groundwater Extraction Areas may be modified based on the results of the PDI/Remedial Design and/or data collected during operation of the groundwater extraction and treatment system:

1. Extracted groundwater shall be treated using the existing SI/GWTS and discharged to Little Elk Creek and/or reinjected per Item 2, below . Effluent and air emissions from the existing SI/GWTS shall continue to meet performance standards established in the 2004 OU-1 ROD (Section 11.2.1) and described herein. The SI/GWTS shall be evaluated during the PDI/Remedial Design to determine if upgrades are necessary to treat the extracted groundwater to meet the SI/GWTS performance standards;
2. Treated groundwater shall be reinjected into the bedrock to enhance groundwater flow gradients if determined to be appropriate for groundwater extraction and treatment and the bedrock is determined to be sufficiently permeable. Reinjection shall not adversely impact the capture/containment of the SI/GWTS and/or extraction and treatment system or cause unintended contaminant migration;
3. Extraction and treatment of groundwater shall continue until MCLs, non-Zero MCLGs and MDE GWCS for Site COCs (Table 1) are achieved throughout the Bedrock Groundwater Source Area, with the exception of the WMA (Figure 5) and the TI Zone (Figures 6 through 10).

L.2.2.5 Groundwater Monitoring

Perform groundwater monitoring within the Bedrock Groundwater Source Area to meet the following objectives:

1. Monitor containment and capture of SI/GWTS and Groundwater Extraction and Treatment system;
2. Confirm the delineation of DNAPL;
3. Evaluate VOC concentration trends over time;
4. Evaluate Bedrock Groundwater Source Area contaminant plume stability (i.e., the Bedrock Groundwater Source Area contaminant plume shall not expand or migrate);
5. Verify that MCLs, non-Zero MCLGs and MDE GWCS for Site COCs (Table 1) are achieved throughout the Bedrock Groundwater Source Area, with the exception of the WMA (Figure 5) and TI Zone (Figures 6 through 10);
6. Confirm that once the numerical performance standards for Site COCs specified in Table 1 are achieved, exposure to groundwater would result in a cumulative excess carcinogenic risk of less than or equal to 10^{-4} and a cumulative excess non-carcinogenic HI of less than or equal to 1, throughout the Bedrock Groundwater Source Area, with the exception of the WMA (Figure 5) and TI Zone (Figures 6 through 10).

L.2.2.6 Surface Water Monitoring

Perform surface water monitoring to monitor water quality in Little Elk Creek:

1. In accordance with performance standard 8 for the Continued Operation of the SI/GWTS component of the remedy, surface water in Little Elk Creek shall be monitored to confirm that the numerical performance standards established in the 2004 OU-1 ROD are being achieved (Table 2);

L.2.2.7 Monitored Natural Attenuation Evaluation

Perform groundwater monitoring within the Bedrock Groundwater Dissolved VOC Plume to meet the following objectives:

1. Demonstrate and document whether natural attenuation is occurring in the Bedrock Groundwater Dissolved VOC Plume sufficiently to achieve MCLs, non-Zero MCLGs and MDE GWCS for Site COCs (Table 1) in a reasonable timeframe compared to a more active remedy;

2. Detect changes in environmental conditions (e.g., hydrogeologic, geochemical, microbiological, or other changes) that may reduce the efficacy of any of the natural attenuation processes;
3. Identify any potentially toxic and/or mobile transformation products;
4. Determine whether the Bedrock Groundwater Dissolved VOC Plume is expanding (either downgradient, laterally or vertically);
5. Demonstrate the efficacy of institutional controls and groundwater and residential monitoring requirements.

L.2.2.8 Residential Well Monitoring and Treatment

Conduct residential well sampling and provide wellhead treatment[14]:

1. Perform periodic monitoring of the residences located within the Well Pumping Restriction Area (Figure 12) on a routine basis[15] for all Site COCs (Table 1);
2. Perform periodic monitoring of any future residential or commercial well installed within the Well Pumping Restriction Area (Figure 12) on a routine basis for all Site COCs (Table 1);
3. If residential well water quality exceeds MCLs, non-zero MCLGs, or MDE GWCS for any Site COCs (Table 1), a temporary water supply shall be provided followed by the installation of a wellhead treatment system;
4. Existing and future wellhead treatment systems shall be operated and maintained such that drinking water at the tap (after treatment) meets MCLs, non-zero MCLGs and MDE GWCS for Site COCs (Table 1);
5. Wellhead treatment shall continue until groundwater throughout the Well Pumping Restriction Area (Figure 12) meets MCLs, non-zero MCLGs and MDE GWCS for Site COCs (Table 1).

L.2.2.9 Vapor Intrusion Monitoring and Mitigation

Conduct vapor intrusion sampling at existing occupied structures[16] within the Well Pumping Restriction Area (Figure 12) during each Five Year Review and at any new occupied structures when constructed within the Well Pumping Restriction Area[17]:

1. Vapor intrusion sampling shall consist of sub-slab, indoor air, and outdoor air sampling at each location, where practicable, in accordance with current EPA guidance;
2. Vapor intrusion mitigation shall be conducted if sub-slab[18], indoor air, and/or outdoor air sampling results indicate that actual or potential migration of Site-related compounds from contaminated groundwater to indoor air would result in a cumulative excess carcinogenic risk of greater than or equal to 10^{-4} and/or a cumulative excess non-carcinogenic HI of greater than 1;
3. Vapor intrusion mitigation shall continue until:
    a) Groundwater within the Well Pumping Restriction Area (Figure 12) meets MCLs, non-Zero MCLGs and MDE GWCS for Site COCs (Table 1); and,
    b) Sub-slab, indoor air, and/or outdoor air sampling results indicate that actual or potential migration of Site-related compounds from contaminated groundwater to indoor air would result

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14 - Residential well monitoring and wellhead treatment are subject to homeowner access approval.

15 - Monitoring frequency shall be determined during Remedial Design and may be subject to change based on Site activities. EPA anticipates that more frequent residential monitoring shall occur during drilling activities at the Site to ensure that such activities do not impact residential wells in the short term.

16 - The term occupied structure shall refer to any residence, commercial, or industrial building that may be occupied for 8 or more hours on a routine basis. A detached garage or storage building shall not be considered an occupied structure.

17 - Vapor intrusion sampling and mitigation are subject to homeowner access approval.

18 - In order to evaluate the potential risk posed to human health by sub-slab soil vapor, an attenuation factor shall be applied to the sub-slab soil vapor data to represent the extent to which sub-slab soil vapor is expected to enter the indoor air of a structure. For the purposes of this Interim ROD, and in accordance with current EPA guidance, an attenuation factor of 0.1 shall be utilized.

in a cumulative excess carcinogenic risk of less than or equal to 10^{-6} and a cumulative excess non-carcinogenic HI of less than or equal to 1.

L.2.2.10 Land and Groundwater Use Restrictions

Implement institutional controls within OU-2 in conjunction with institutional controls required by the 2004 OU-1 ROD. A LUCAP shall be prepared to develop and document the mechanisms for implementing the institutional controls for both OU-1 and OU-2. The institutional controls shall achieve the following restrictions:

1. Use and/or contact with groundwater, via ingestion, dermal contact or vapor inhalation, within the Office Area shall be prohibited;
2. Activities within the Well Pumping Restriction Area (Figure 12), without EPA approval, that would impact the groundwater extraction and treatment system, including installation of new residential/commercial/industrial water supply wells and/or significant increases in pumping rates of existing water supply wells, shall be prohibited;
3. Vapor intrusion sampling shall be conducted at any future occupied structure at the Plant Area and Office Area;
    a. Vapor intrusion sampling shall consist of sub-slab, indoor air, and outdoor air sampling at each location, where practicable, in accordance with current EPA guidance[19];
4. Activities within the Office Area that would adversely impact the SI/GWTS or groundwater extraction and treatment system, such as excavation or construction, without prior EPA approval, shall be prohibited.

L.2.3 Design Considerations

Groundwater extraction will generally consist of hydraulic testing, treatability testing to determine if modifications to the SI/GWTS are necessary, installation of extraction wells, installation of piping to convey extracted water to the SI/GWTS, and O&M related to system and well operation. Final well locations, construction details, and pumping rates will be based on the findings of the PDI/Remedial Design.

EPA has determined that a TI Waiver is appropriate for this Site because it is technically impracticable from an engineering perspective to meet groundwater ARARs within a portion of the Bedrock Groundwater Source Area. As such, the Selected Remedy will not remediate groundwater to groundwater ARARs, such as MCLs, non-zero MCLGs, MDE GWCS, within the TI Zone, (Figures 6 through 10) for the Site COCs presented in Table 4. Additionally, groundwater will not be remediated to groundwater ARARs within the WMA at the Site, per the 2004 OU-1 ROD.

Contaminated groundwater in the Bedrock Groundwater Source Area outside of the TI Zone and WMA will be restored to meet groundwater ARARs using a combination of continued operation of the SI/GWTS and groundwater extraction and treatment.

The ability of MNA to meet groundwater ARARs within the Bedrock Groundwater Dissolved VOC Plume will be assessed via an MNA Evaluation. The extraction and treatment system shall be designed to capture and contain contaminated groundwater resulting from DNAPL dissolution that is not currently captured and contained by the SI/GWTS, to the extent practicable, as determined by the PDI capture zone investigation.

19 - The Office Area and Plant Area shall be subject to the vapor intrusion sampling, data evaluation, and mitigation requirements specified in Part I, Section D.1.1.9 and Part II, Section L.2.2.9 of this Interim ROD.

Continued groundwater, surface water, residential well, and vapor intrusion monitoring will verify that complete exposure pathways do not exist for Site-related contaminants and evaluate the capture and containment of the SI/GWTS and extraction and treatment system. The groundwater, surface water, residential well, and vapor intrusion monitoring programs may be refined during Remedial Design and during the construction phase of the Remedial Action as additional data is gathered related to groundwater at the Site. Additional groundwater monitoring will be conducted during the MNA Evaluation discussed above and may include additional monitoring well installation. MNA monitoring parameters and locations will be established during Remedial Design.

Wellhead treatment will generally consist of the installation of a carbon treatment and ultraviolet disinfection system. Vapor intrusion mitigation will generally consist of the installation of a sub-slab depressurization system, passive sub slab venting, or crawl space depressurization. Wellhead and vapor intrusion treatment methodology will be determined based on location-specific conditions and will be subject to EPA approval.

Institutional controls consistent with those required by the 2004 OU-1 ROD will restrict land use and require monitoring and mitigation to prevent potential future exposure to Site COCs. Institutional controls will be documented in and/or implemented by a LUCAP and will likely consist of deed restrictions, environmental covenants, and township ordinances. Final selection of land use controls will be subject to EPA approval.

The feasibility of reinjecting treated groundwater upgradient of the groundwater extraction areas to enhance groundwater flow gradients will be evaluated during Remedial Design. Reinjection will be considered appropriate for the remedy if the capture and containment of the SI/GWTS and/or extraction and treatment system are not adversely impacted, if the injected water will not cause unintended contaminant migration, and if the bedrock exhibits sufficient yield to accept the injected water.

L.2.4 Alternative OAS-2 – Excavation of Soil, Placement Under OU-1 Asphalt (or Equivalent) Cap

Alternative OAS-2 – Excavation of Soil, Placement Under OU-1 Asphalt (or Equivalent) Cap consists of the following components:

1. Excavation and consolidation of contaminated soil under the OU-1 asphalt (or equivalent) cap, when constructed;

2. Confirmatory sampling and analysis;

3. Backfill of excavation using clean fill;

4. Land and groundwater use restrictions.

L.2.5 Office Area Soil Performance Standards

Implement Alternative OAS-2 – Excavation of Soil, Placement Under OU-1 Asphalt (or Equivalent) Cap in accordance with the performance standards in Sections L.2.5.1 and L.2.5.2 below.

L.2.5.1 Excavation of Soil, Placement Under OU-1 Asphalt (or Equivalent) Cap

Conduct soil remediation at the Office Area at the Site, consisting of the following elements:

1. Excavate all soil that exceeds the soil cleanup standards presented in Table 1[20] as shown on Figure 15;
2. Collect and analyze[21] soil samples from the perimeter, sidewalls, and bottom of the excavation to confirm that all soil exceeding the cleanup standards in Table 1 has been removed;
    a. Any additional soil exceeding the cleanup standards presented in Table 1 identified during sampling shall also be excavated.
3. Place excavated soil under the OU-1 asphalt (or equivalent) cap, when constructed;
    a. Soil shall be managed in accordance with the portions of 40 C.F.R. § 264 determined to be ARARs and listed in Table 5.
4. Backfill the excavation with clean fill and revegetate.
    a. Clean fill shall meet the EPA Region 3 Ecologically Protective Backfill Values presented in Table 3.

L.2.5.2 Land and Groundwater Use Restrictions

Implement institutional controls within the Office Area in accordance with institutional controls required by the 2004 OU-1 ROD. A LUCAP shall be prepared to develop and document the mechanisms for implementing the institutional controls. The institutional controls shall achieve the following restrictions:

1. Use and/or contact with groundwater, via ingestion, dermal contact or vapor inhalation, within the Office Area shall be prohibited;
2. Activities within the Office Area that would adversely impact the SI/GWTS or groundwater extraction and treatment system, such as excavation or construction, without prior EPA approval, shall be prohibited.

L.2.6 Design Considerations

Soil sampling conducted during the PDI will be completed using direct push technology to refine the area of known soil contamination identified in the RI and to document post-excavation activities. Excavated soil may be staged at the Site within the former drum storage building prior to or during construction of the OU-1 asphalt (or equivalent) cap.

L.3 Cost Estimate for the Selected Remedy

Appendix D includes details of the estimated costs to construct and implement the Selected Remedy. The estimated cost for Alternative BGW-3 – Groundwater Extraction and Treatment is $9,760,000 and the estimated cost for Alternative OAS-2 – Excavation of Soil, Placement Under OU-1 Asphalt (or Equivalent) Cap is $49,500. The information in this cost estimate is based upon the best available information regarding the anticipated scope of the Remedial Action.

Some changes to the cost estimates are expected to occur during implementation of the remedy. Major changes shall be documented in the form of a memorandum to the file, an ESD, or a ROD Amendment, as appropriate. This cost estimate is expected to be within +50 to -30 percent of the actual project cost.

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20 - The soil cleanup standards presented in Table 1 for protection of human health are also protective of the environment; therefore, additional ecological risk-based cleanup goals are not specified.

21 - Field screening of soil using an x-ray fluorescence (XRF) device (or similar) shall be permitted, however, confirmation sampling shall also require laboratory analysis of soil samples.

L.4 Expected Outcomes of the Selected Remedy

This section presents the expected outcomes of the Selected Remedy in terms of land and groundwater use and risk reduction achieved as a result of the response action.

Due to the establishment of the TI Zone and WMA designation, a portion of the Bedrock Groundwater Source Area is not expected to be restored to beneficial reuse. However, the Bedrock Groundwater Source Area outside of the TI Zone and WMA will be restored to beneficial reuse by the Selected Remedy. Additionally, continued operation of the SI/GWTS and extraction and treatment of groundwater from the Bedrock Groundwater Source Area will treat principal threat waste (DNAPL) to reduce the source of groundwater contamination and prevent the groundwater contaminant plume from expanding. Institutional controls will prohibit the use of groundwater at the former Spectron property and within the Office Area and will limit the expansion of groundwater use within the Well Pumping Restriction Area. Institutional controls will also limit the reuse of the Office Area by prohibiting activities that could adversely impact the SI/GWTS or groundwater extraction and treatment system. Residential wells in the vicinity of the Site are not currently impacted by Site COCs and are expected to continue to be used for water supply purposes.

Due to the limitations and restrictions imposed by the TI Zone, WMA, and institutional controls, the former Spectron property and Office Area cannot reasonably be expected to return to residential use and any redevelopment would be subject to the restrictions described above. Potential uses could include, among others, a community park or access ramp to Little Elk Creek, development of the Site for commercial/light industrial use, county utility vehicle maintenance/parking, or as a solar power generation facility. The potential future uses of the Site are consistent with both OU-1 and OU-2 institutional controls.

M. Statutory Determinations

Under CERCLA (42 U.S.C. § 9621) and the NCP (40 C.F.R. § 300.430(f)(5)(ii)), EPA must select remedies that are protective of human health and the environment, comply with ARARs, are cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery to the maximum extent possible. There is also a preference for remedies that use treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as a principal element. The following sections discuss how the remedy modification meets these statutory requirements.

M.1. Protection of Human Health and the Environment

Based on the information currently available, EPA has determined that the Selected Remedy for the Bedrock Groundwater Source Area and Office Area Soil is protective of human health and the environment, is cost effective, and utilizes permanent solutions for treatment of principal threat waste (DNAPL).

M.2. Compliance with Applicable or Relevant and Appropriate Requirements

The NCP (40 C.F.R. § 300.430(f)(5)(ii)(B) and (C)) requires that a ROD describe Federal and State ARARs that the remedy modification will attain or provide a justification for any waivers. Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, or contaminant; remedial action; location; or other circumstance at a CERCLA site. Relevant and appropriate requirements, while not legally applicable to circumstances at a particular CERCLA site, address problems or situations similar to those encountered at the site such that their use is considered relevant and appropriate.

The Selected Remedy for Office Area Soil will comply with ARARs. The Selected Remedy for the Bedrock Groundwater Source Area will comply with all ARARs with the exception of following, which are waived in accordance with CERCLA (42 U.S.C. § 9621 (d)(4)(C)) and the NCP (40 C.F.R. § 300.430(f)(1)(ii)(C)(3)):

- Federal MCLs required by the Safe Drinking Water Act, 42 U.S.C § 300g-l and set forth in 40 C.F.R. § 141.61 (applicable requirement);
- Federal non-zero MCLGs established by the Safe Drinking Water Act, 42 U.S.C § 300g-l and set forth in 40 C.F.R § 141.50-51 (relevant and appropriate requirement);
- MDE GWCSs set forth in the *MDE Cleanup Standards for Soil and Groundwater Interim Final Guidance Version 2.1* (relevant and appropriate requirement).

These ARARs will be waived within the TI Zone depicted on Figure 6 through 10 for the compounds listed on Table 4. Additionally, groundwater will not be remediated to groundwater ARARs within the WMA at the Site, per the 2004 OU-1 ROD.

The TI Waiver is based on the technical impracticability of meeting groundwater ARARs from an engineering perspective due to the presence of DNAPL in bedrock at depths of up to 360 feet bgs, the low permeability and limited fracturing of Site bedrock, and the presence of uncontaminated residential wells in the vicinity of DNAPL.

Due to insufficient data, a remedy was not selected for the Bedrock Groundwater Dissolved VOC Plume, therefore, compliance with ARARs for the Bedrock Groundwater Dissolved VOC Plume was not considered in this Interim ROD. The Selected Remedy for the Bedrock Groundwater Source Area will achieve groundwater ARARs throughout the Bedrock Groundwater Source Area, with the exception of the WMA and TI Zone. Once groundwater ARARs are achieved, in accordance with the NCP (40 C.F.R. § 300.430(e)(2)(i)(D)), a risk assessment shall be performed for any residual Site COCs to confirm that exposure to groundwater within the Bedrock Groundwater Source Area, with the exception of the WMA and TI Zone, would result in a cumulative excess carcinogenic of less than or equal to 10^{-4} and a non-carcinogenic HI of less than or equal to 1.

M.3. Cost Effectiveness

Cost effectiveness is determined by evaluating the remedy’s long-term effectiveness and permanence; reduction in toxicity, mobility, or volume through treatment; and short-term effectiveness. If the overall cost of the remedy is proportional to its overall effectiveness, then it is considered to be cost effective. The Selected Remedy satisfies the criteria listed above because it offers a permanent solution through the treatment of contaminants in bedrock groundwater and onsite capping of contaminants in soil, and at a similar cost as the other protective remedies that were evaluated. Therefore, the Selected Remedy is cost effective.

M.4. Utilization of Permanent Solutions to the Maximum Extent Practicable

EPA has determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment are practicable at the Site. When compared to the other protective alternatives that were evaluated, EPA has determined that the Selected Remedy provides the best balance of tradeoffs in terms of the five balancing criteria, as well as the preference for treatment as a principal element. The remedy modification also has State and community acceptance.

The Selected Remedy will meet the statutory preference for treatment as a principal element by addressing principle threat waste (DNAPL) and contaminated bedrock groundwater via extraction and treatment and continued operation of the SI/GWTS within the Bedrock Groundwater Source Area.

M.5. Five Year Review Requirements

CERCLA (42 U.S.C. § 9621 (c)) and the NCP (40 C.F.R. § 300.430(f)(4)(ii) provide the statutory and legal bases for conducting Five Year Reviews. The Selected Remedy will result in hazardous substances remaining onsite above levels that allow for unlimited use and unrestricted exposure. Therefore, a statutory review will be conducted within five years after initiation of the Remedial Action to ensure the remedy is, or will be, protective of human health and the environment.

N. Documentation of Significant Changes from the Preferred Alternative of the Proposed Plan

The Proposed Plan was released for public comment on July 9, 2012. The public comment period for the Proposed Plan was held from July 9, 2012, to August 7, 2012. EPA held a public meeting on July 18, 2012, to present the Preferred Alternative in the Proposed Plan. EPA has reviewed and responded to verbal and written comments submitted during the public comment period in Part III of this ROD Amendment, the Responsiveness Summary.

Based on comments submitted by the PRP Group during the public comment period and subsequent discussions between EPA and the PRP Group in response to those comments, the Selected Remedy for Office Area Soil is Alternative OAS-2 – Excavation of Soil, Placement Under OU-1 Asphalt (or Equivalent) Cap, rather than Alternative OAS-3 Excavation of Soil, Offsite Disposal, which was presented as the Preferred Alternative in the Proposed Plan. The change was made primarily because the soil from the excavation can be used for grading purposes beneath the OU-1 asphalt (or equivalent) cap. Additionally, use of contaminated soil onsite is consistent with the remedy selected in the 2004 OU-1 ROD which determined that consolidation of contaminated soil onsite beneath the cap is preferable to offsite disposal. Consolidation of contaminated soil onsite eliminates the risk of mismanagement of the soil offsite by a third party. Soil sampling methodology in the Selected Remedy was also modified slightly from the Proposed Plan. The comments and responses that facilitated the modifications are included in Part III, Section B., Stakeholder Comments.

O. State Role

MDE, on behalf of the State of Maryland, has reviewed the Remedial Alternatives presented in this ROD and has indicated its concurrence with the Selected Remedy. MDE has also reviewed the list of ARARs to determine if the Selected Remedy is in compliance with appropriate State environmental laws and regulations. Correspondence with MDE regarding the Selected Remedy is included as Appendix B.

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PART III- THE RESPONSIVENESS SUMMARY

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III. RESPONSIVENESS SUMMARY

This section summarizes the questions and comments received during the public comment period for the Spectron, Inc. Superfund Site. The Proposed Plan was released for public comment on July 9, 2012. The public comment period was from July 9, 2012 to August 7, 2012. A public meeting was held at the Cherry Hill Middle School in Elkton, MD on the evening of July 18, 2012.

A. Questions Raised During the July 18, 2012 Public Meeting

Question 1: A citizen asked if the streambed in Little Elk Creek was excavated before the impermeable membrane component of the SI/GWTS was installed.

EPA Response: Yes. The streambed was excavated down to the bedrock surface prior to installation of the impermeable membrane. Excavated sediments are currently staged onsite and will be placed below the asphalt (or equivalent) cap to be installed over the Plant Area as a component of the OU-1 remedy (Figure 5).

Question 2: A citizen indicated that they believe dumping of waste down wells on the Site property occurred when Spectron, Inc. was in operation.

EPA Response: EPA has historically heard anecdotal evidence of dumping of waste down former onsite wells. However, the existence and location of the wells or evidence of dumping into wells has never been confirmed. The impact to soil and overburden groundwater and bedrock groundwater is believed to be a result of the historic storage of waste solvents in an unlined lagoon and spills and releases that historically occurred at the Site when Spectron, Inc. was in operation prior to the Site being paved.

Question 3: A citizen asked if the parking lot had been excavated.

EPA Response: Yes. In September 1982, EPA and the predecessor to MDE, the Maryland Department of Health and Mental Hygiene, Office of Environmental Programs, ordered the former property owner to remove the upper six inches of contaminated soil and install an asphalt cover. The former unlined lagoon was also excavated at that time.

Question 4: A citizen asked if the well servicing an apartment complex near the Site was impacted.

EPA Response: No. None of the residential wells in the vicinity of the Site are impacted by Site-related contaminants at concentrations exceeding federal drinking water standards (MCLs). Residential well monitoring has been conducted by the PRP Group under EPA oversight since 1995. Historically, some wells contained Site-related contaminants below MCLs. However, since the SI/GWTS was completed in 2000, Site-related contaminants are typically not detected in residential wells.

Despite the lack of current impact to residential wells, due to the proximity of residential wells to highly contaminated areas of bedrock groundwater, the potential for residential wells to become impacted in the future does still exist. Continued residential well monitoring as well as requirements for providing temporary water and installing wellhead treatment systems should residential wells become impacted are included as components of the Selected Remedy for OU-2.

Question 5: A citizen asked if the former Spectron property would be reused in the future.

EPA Response: Yes. Due to the presence of highly contaminated soil and groundwater at the former Spectron property, redevelopment of the Site for residential or commercial purposes is very unlikely. However, the Site may be used as a community park, access ramp to Little Elk Creek, as a maintenance or storage area for municipal vehicles, or other uses consistent with the land and groundwater uses prescribed herein. Additionally, the PRP Group is currently evaluating the feasibility of installing a solar panel array at the Site to provide power to the SI/GWTS and groundwater extraction and treatment system. Institutional controls will be implemented at the former Spectron property to ensure that reuse of the property will not impact the OU-1 or OU-2 remedies or result in unacceptable risk to human health or the environment.

Question 6: A citizen asked if the Office Area would be reused in the future.

EPA Response: Yes, reuse is possible. Potential redevelopment of the Office Area would be consistent with the potential redevelopment of the former Spectron property and would be subject to similar institutional controls, as described above.

Question 7: A citizen asked if swimming and fishing are restricted in Little Elk Creek.

EPA Response: No. The swimming and fishing advisory in Little Elk Creek is no longer in effect. As a result of the installation of the SI/GWTS, the water in Little Elk Creek currently meets state and federal water quality criteria.

B. Stakeholder Comments

The following comments were submitted by the PRP Group in letters dated August 7 and August 21, 2012. The comments refer to sections and page numbers in the July 2012 Interim Proposed Plan. No other comments were received from stakeholders.

B.1 August 7, 2012 Comments

Comment 1: Section IV, Human Health Risk Assessment (p. 18), Table 1: This section identifies contaminants of concern (COCs) for OU-2, which are summarized in the referenced Table 1. As noted in the Technical Impracticability Evaluation Report (Appendix A of the OU-2 Feasibility Study Report), Table 1 should also include 1,4-dichlorobenzene and 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113).

EPA Response: The Site COCs for OU-2 were selected based on the identification of contaminants as risk drivers for future residents exposed to groundwater as potable water in the November 24, 2009 Human Health Risk Assessment (HHRA) (Section 8.6, pages 44 and 45). Neither 1,4-dichlorobenzene nor CFC-113 were identified as risk drivers by the HHRA and, consequently, neither contaminant is considered a Site COC for OU-2.

EPA recognizes that both 1,4-dichlorobenzene and CFC-113 (as well as multiple other contaminants) are present in bedrock groundwater at concentrations exceeding groundwater ARARs and/or RSLs. However, it is anticipated that reducing Site COCs to concentrations below the performance standards specified in Table 1 will also reduce the concentrations of contaminants that are not considered Site COCs to below groundwater ARARs and/or RSLs. As indicated in the Groundwater Monitoring performance standard (Part I, Section D.1.1.5, Item 6 and Part II, Section L.2.2.5, Item 6), a risk assessment shall be performed once groundwater ARARs specified in Table 1 are achieved for Site COCs to confirm that the cumulative excess carcinogenic and non-carcinogenic risks presented by all remaining contaminants are within EPA's acceptable risk ranges.

Comment 2: Section VI, Technical Impracticability Waiver (p. 23), Table 2: Table 2 lists the compounds and associated groundwater ARARs for which the TI Waiver is being proposed. This table should also include 1,4-dichlorobenzene and 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113), as noted in the TI Evaluation Report Section 3.1 (page 14 of that document).

EPA Response: As indicated above in the response to Comment 1, neither 1,4-dichlorobenzene nor CFC-113 were identified as Site COCs and as a result no groundwater ARARs were selected as performance standards for 1,4-dichlorobenzene or CFC-113. Therefore, it is not necessary to waive groundwater ARARs for those contaminants.

Comment 3: Section VI, Residential Well Monitoring and Mitigation, p. 29: The available data do not support a conclusion that residential wells where COCs are absent may become impacted in the future. Residential well water supplies have been sampled and analyzed for Site COCs since 1995. The historical and on-going residential well sampling programs and results for the Site are described in the RI Report. The groundwater sampling results for 32 residential wells that effectively surround the Spectron property consistently demonstrate the absence of Site-related COCs or Site-related COCs at concentrations above drinking water MCLs.

EPA Response: EPA recognizes that historically residential wells have not been impacted by Site COCs and that the potential for residential wells to become impacted by Site COCs in the future is very low based on available long-term monitoring data. However, due to the proximity of residential wells to highly contaminated areas of bedrock groundwater, the potential for residential wells to become impacted in the future does still exist. Additionally, the Preferred Alternative in the Proposed Plan and Selected Remedy in this Interim ROD include extraction and treatment of contaminated bedrock groundwater. Although the groundwater extraction and treatment component of the remedy will be designed such that potential impacts to residential wells are minimized, drilling wells and extracting groundwater may increase the potential for impacts to occur.

Based on these factors, EPA believes that continued residential monitoring and provisions for treatment of impacted residential wells are appropriate to ensure the protection of human health. The residential well monitoring program may be reevaluated in the future once the groundwater extraction and treatment system is operational and functional to determine if modifications or reductions to the monitoring program are appropriate based on available data.

Comment 4: Section VIII, Pre-Design Investigation, p. 44: For clarification, the PRP Group notes that the groundwater capture zone investigation for the SI/GWTS will encompass both OU-1 (soil/overburden groundwater) and OU-2 (bedrock) and will be conducted as an integrated pre-design investigation. The sequencing and timing of the capture zone investigation will be evaluated during remedial design in terms of OU-1 and OU-2 elements.

EPA Response: EPA acknowledges the comment.

Comment 5: Section VIII, Continued Operation of the SI/GWTS:

- p. 44: Under Performance Standard number 3, it is anticipated that frequent (every 2 years) capacity evaluations for the GWTS will not be necessary in the future, and the PRP Group proposes that the frequency of future capacity evaluations be reviewed during the First Five Year Review.
- p. 45: Under Performance Standard number 9, it is noted that the SI/GWTS will continue to be operated to prevent liner floatation to the extent practicable, but that an acceptable degree of liner float, consistent with the SI/GWTS design specifications, may occur infrequently due to unexpected maintenance issues and/or abnormal hydraulic conditions.

- p. 45: With respect to Performance Standard number 11 and fish migration to the dam, the SI/GWTS will continue to be operated consistent with its design and the last 12 years of successful operation.

EPA Response: The performance standards for the SI/GWTS in the OU-2 ROD were specifically designed to be consistent with the performance standards for the SI/GWTS in the 2004 OU-1 ROD to avoid having disparate performance standards for the same system. With respect to the first part of the comment, EPA recognizes that the capacity evaluation frequency may be modified in the future due to changing Site conditions (i.e. in situ thermal treatment under OU-1) and/or changing effluent conditions (i.e. groundwater extraction and treatment under OU-2). With respect to the second comment, EPA acknowledges that liner float in some circumstances may be unavoidable, however the expectation remains that instances of liner float be minimized or eliminated, if practicable. Finally, with respect to the third portion of the comment, EPA agrees that the SI/GWTS has been operated in accordance with the performance standard regarding fish migration established in the 2004 OU-1 ROD and expects such operation to continue in the future.

Comment 6: Section VIII, Groundwater Extraction and Treatment, p. 45: Under item number 2, it is requested that the first sentence be revised to "Treated groundwater **may** be reinjected into the bedrock…" This change is consistent with the OU-2 FS Report and the remainder of this sentence and is to indicate that reinjection is an option if beneficial to the remedy but is not a requirement.

EPA Response: EPA recognizes that reinjection of treated bedrock groundwater is not a strict requirement of the OU-2 remedy and will only be conducted if determined to be beneficial to the overall remedy and if the bedrock is sufficiently permeable to accept the treated water. Additionally, as worded in the Interim Proposed Plan, the performance standard correctly reflects this conditional requirement. Therefore, the performance standard in the Interim ROD will be as follows:

"Treated groundwater shall be reinjected into the bedrock to enhance groundwater flow gradients if determined to be appropriate for groundwater extraction and treatment and the bedrock is determined to be sufficiently permeable. Reinjection shall not adversely impact the capture/containment of the SI/GWTS and/or extraction and treatment system or cause unintended contaminant migration."

Comment 7: Section VIII, Office Area – Alternative OAS-3 – Excavation and Off-Site Disposal, pp. 51-52: The PRP Group recognizes that EPA has selected the OAS-3 alternative for Office Area soil proposed by the Group to include off-site disposal of excavated soil. Based on preliminary design discussions, the PRP Group requests that EPA allow a further evaluation of off-site disposal and disposal of soil under the Spectron property cap during design, and therefore the alternative be revised to allow for this flexibility, pending EPA approval of the OU-2 Remedial Design.

EPA Response: EPA must select a final disposal location for contaminated soil in the Interim ROD and cannot provide the type of flexibility requested. In response to discussions with EPA regarding this comment, the PRP Group submitted a letter dated August 21, 2012, as described below.

B.2 August 21, 2012 Comments

The following comment was received directly from Advanced GeoServices Corporation, a contractor for the PRP Group.

Comment 1: Advanced GeoServices, on behalf of the Galaxy/Spectron Remedial Group, LLC., submits this request to implement Option OAS-2 (Excavation of Soil, Placement under Low Permeability

Cap (OU-1 Cap)) in lieu of Option OAS-3 (Excavation and Off-Site Disposal) for the Office Area Soils at the Spectron Inc. Superfund Site in Elkton, Maryland. Placement of excavated soils beneath the OU-1 Cap is preferred to off-site disposal as it would reduce the amount of imported materials necessary for creation of the cap subgrade, and would allow for consistency of management of excavated soils (i.e., all excavated and stockpiled soils - future and current - would be placed beneath the cap).

The following activities are proposed to be conducted and are consistent with the Feasibility Study for Operable Unit 2 dated June 2012 and the Interim Proposed Plan for Record of Decision for Operable Unit 2 dated July 2012, with the exception that soil samples will be collected postexcavation in lieu of prior to excavation.

- Mark excavation limits shown on Feasibility Study Figure 2-4;
- Install silt fence between the excavation area and creek;
- Conduct excavation from 0 to 2 feet;
- Collect six post-excavation soil samples from 0 to 2 ft. depth at the excavation perimeter for analysis for arsenic and lead. Analyze on a real-time basis in accordance with EPA Method 6200 with a multi-element x-ray fluorescence (XRF) device. Results will be compared to Interim Proposed Plan Table 1 (arsenic and lead);
- Place excavated soils beneath the OU-1 cap;
- Backfill with clean fill and 4 inches of topsoil meeting the EPA backfill standards in Interim Record of Decision Table 3 with the exception of mercury. Mercury would be screened against 0.1 mg/kg (USEPA Region 4 Ecological Screening Level); and,
- Hydroseed.

EPA Response: Based on the additional information provided by the PRP Group, EPA concurs that due to the anticipated need for fill material onsite during grading of the Plant Area under OU-1, consistency with soil management practices under the 2004 OU-1 ROD, and the elimination of the potential for mismanagement of contaminated soil offsite by a third party, Alternative OAS-2 – Excavation of Soil, Placement Under OU-1 Asphalt (or Equivalent) Cap is the preferred Remedial Alternative for addressing Office Area Soil. EPA also concurs with the PRP Group’s proposal to collect soil samples after excavation rather than prior to excavation because the soil will no longer require characterization for offsite disposal. However, EPA does not concur with the post-excavation soil confirmation sampling methodology. Soil analysis utilizing XRF in accordance with EPA Method 6200 is insufficient for post-excavation soil confirmation sampling. Laboratory analysis of post-excavation soil confirmation samples will be required to determine if all impacted soil has been excavated.

Due to these changes, the Selected Remedy in this Interim ROD differs from the Preferred Alternative described in the OU-2 Interim Proposed Plan as described in Part II, Section N., Documentation of Significant Changes from the Preferred Alternative of the Proposed Plan. Under the Selected Remedy, contaminated Office Area soil will be consolidated onsite beneath the OU-1 asphalt (or equivalent) cap, rather than disposed of offsite, as proposed under the Preferred Alternative in the Proposed Plan.

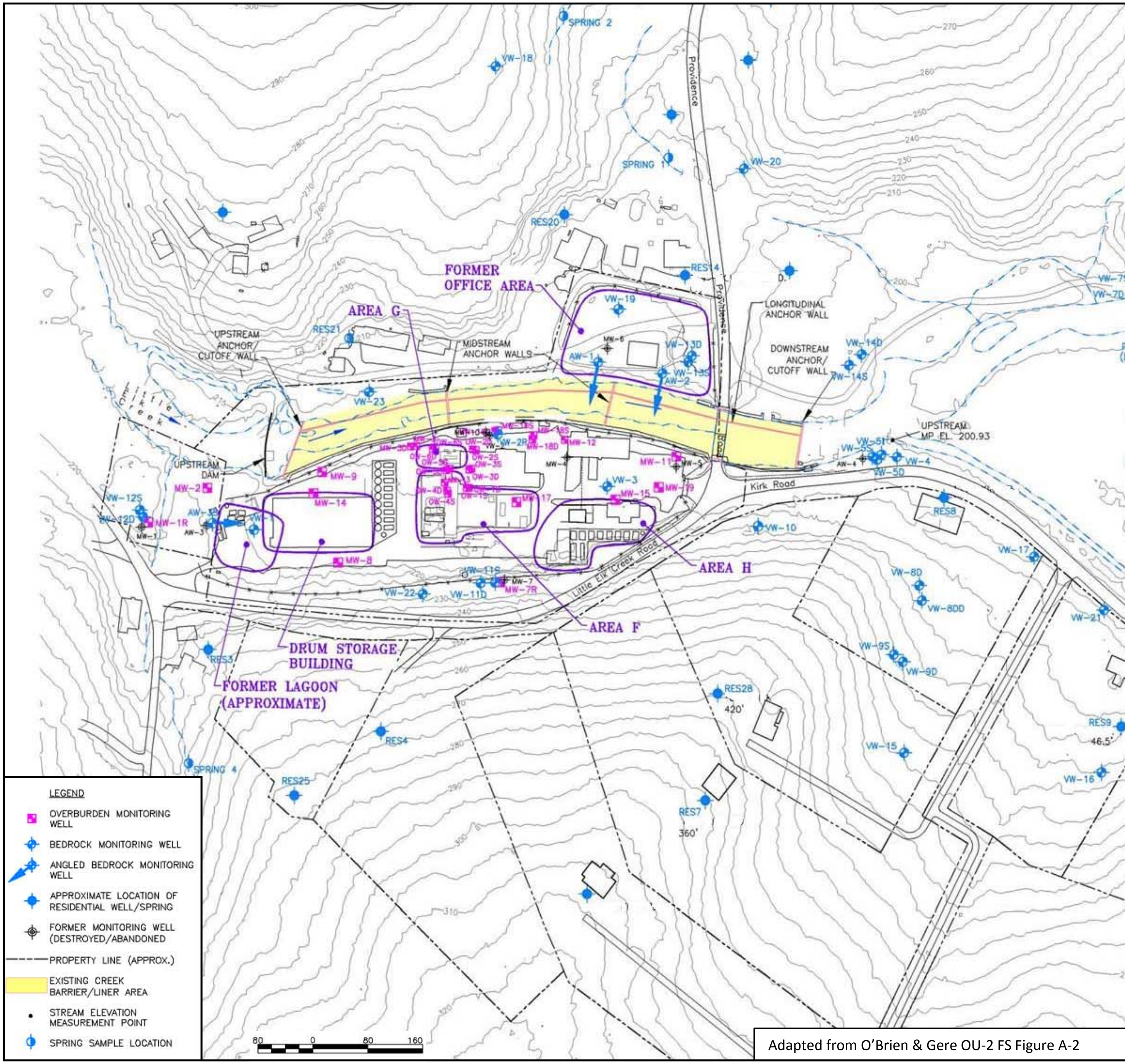
Figures

Spectron, Inc.
Superfund Site

Figure 1
Site Location Map

US EPA
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103

United States
Environmental Protection
Agency



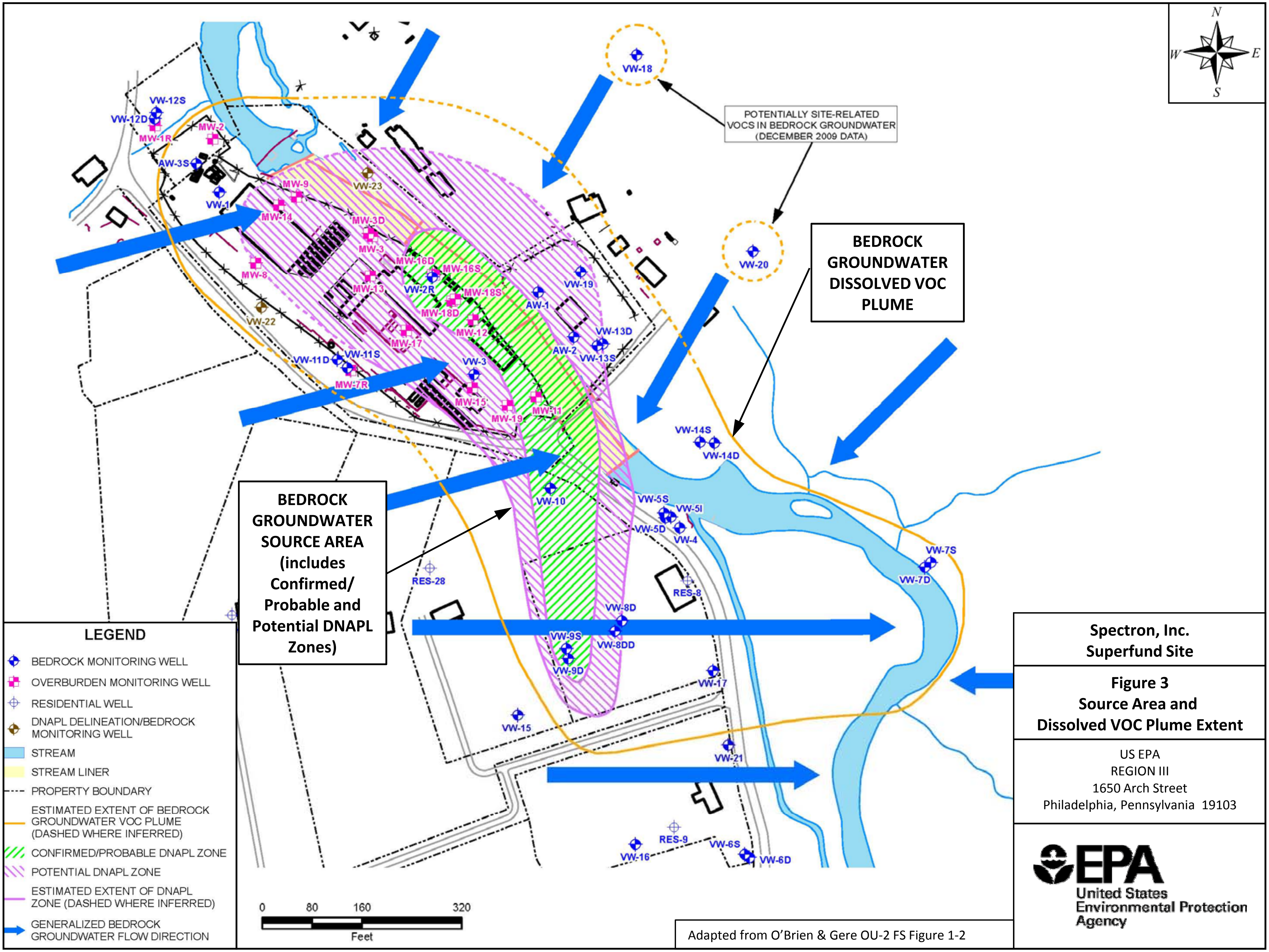
Adapted from O'Brien & Gere OU-2 FS Figure A-2

Spectron, Inc.
Superfund Site

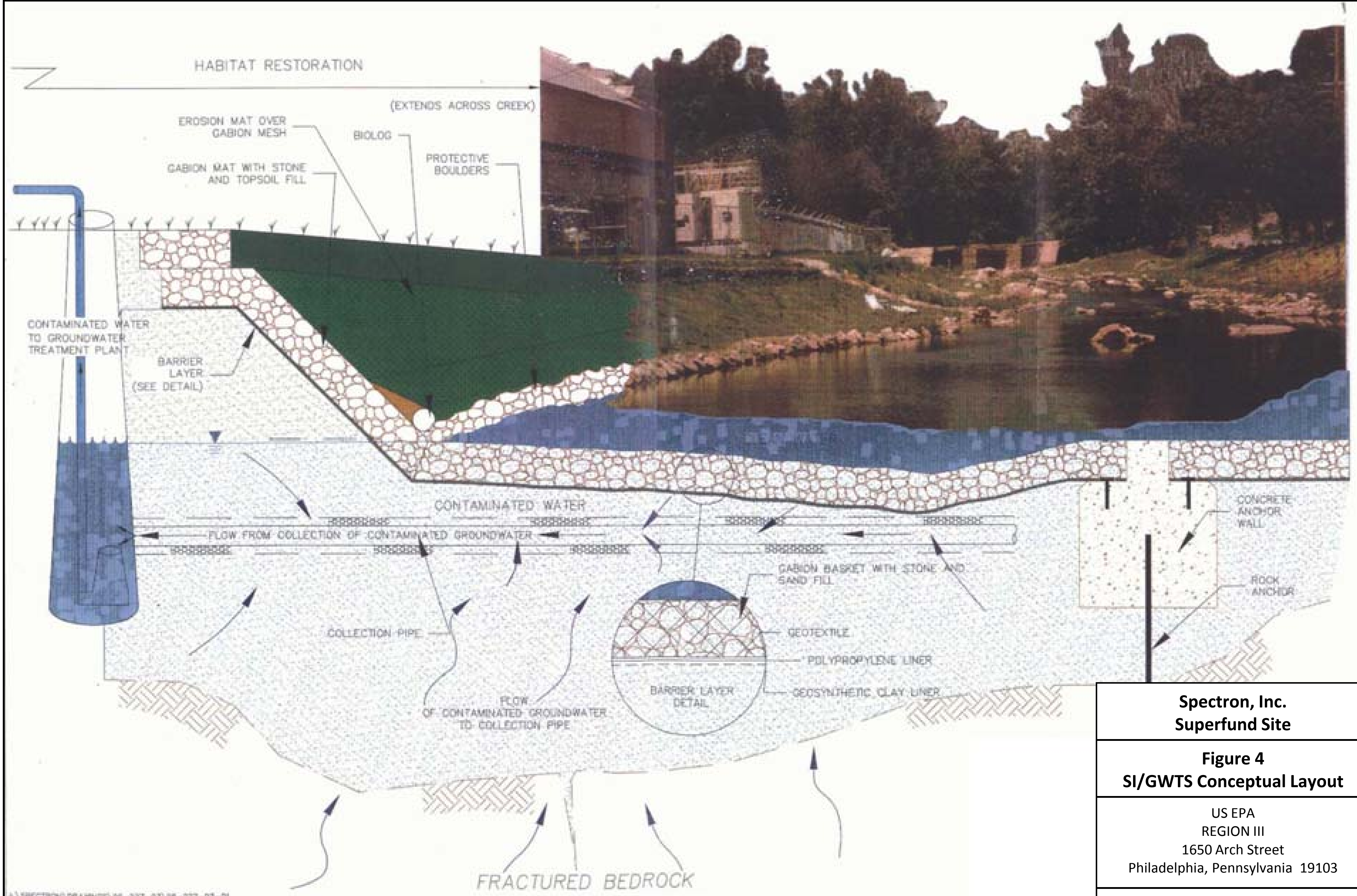
Figure 2
Site Layout

US EPA
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103

EPA United States Environmental Protection Agency



N
E
S
W
POTENTIALLY SITE-RELATED VOCS IN BEDROCK GROUNDWATER (DECEMBER 2009 DATA)
BEDROCK GROUNDWATER DISSOLVED VOC PLUME
BEDROCK GROUNDWATER SOURCE AREA (includes Confirmed/ Probable and Potential DNAPL Zones)
VW-18
VW-20
VW-12S
VW-12D
MW-1R
MW-2
AW-3S
VW-1
MW-9
VW-23
MW-14
MW-3D
MW-3
MW-8
MW-16D
MW-16S
VW-2R
MW-13
MW-18S
MW-18D
VW-19
AW-1
VW-22
MW-17
MW-12
VW-13D
AW-2
VW-13S
VW-11D
VW-11S
MW-7R
VW-3
MW-15
MW-19
MW-11
VW-14S
VW-14D
VW-10
VW-5S
VW-5I
VW-5D
VW-4
VW-7S
VW-7D
RES-28
RES-8
VW-8D
VW-9S
VW-8DD
VW-9D
VW-17
VW-15
VW-21
RES-9
VW-16
VW-6S
VW-6D
LEGEND
BEDROCK MONITORING WELL
OVERBURDEN MONITORING WELL
RESIDENTIAL WELL
DNAPL DELINEATION/BEDROCK MONITORING WELL
STREAM
STREAM LINER
PROPERTY BOUNDARY
ESTIMATED EXTENT OF BEDROCK GROUNDWATER VOC PLUME (DASHED WHERE INFERRED)
CONFIRMED/PROBABLE DNAPL ZONE
POTENTIAL DNAPL ZONE
ESTIMATED EXTENT OF DNAPL ZONE (DASHED WHERE INFERRED)
GENERALIZED BEDROCK GROUNDWATER FLOW DIRECTION
0 80 160 320
Feet
Adapted from O'Brien & Gere OU-2 FS Figure 1-2
Spectron, Inc. Superfund Site
Figure 3
Source Area and Dissolved VOC Plume Extent
US EPA
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103
EPA
United States Environmental Protection Agency

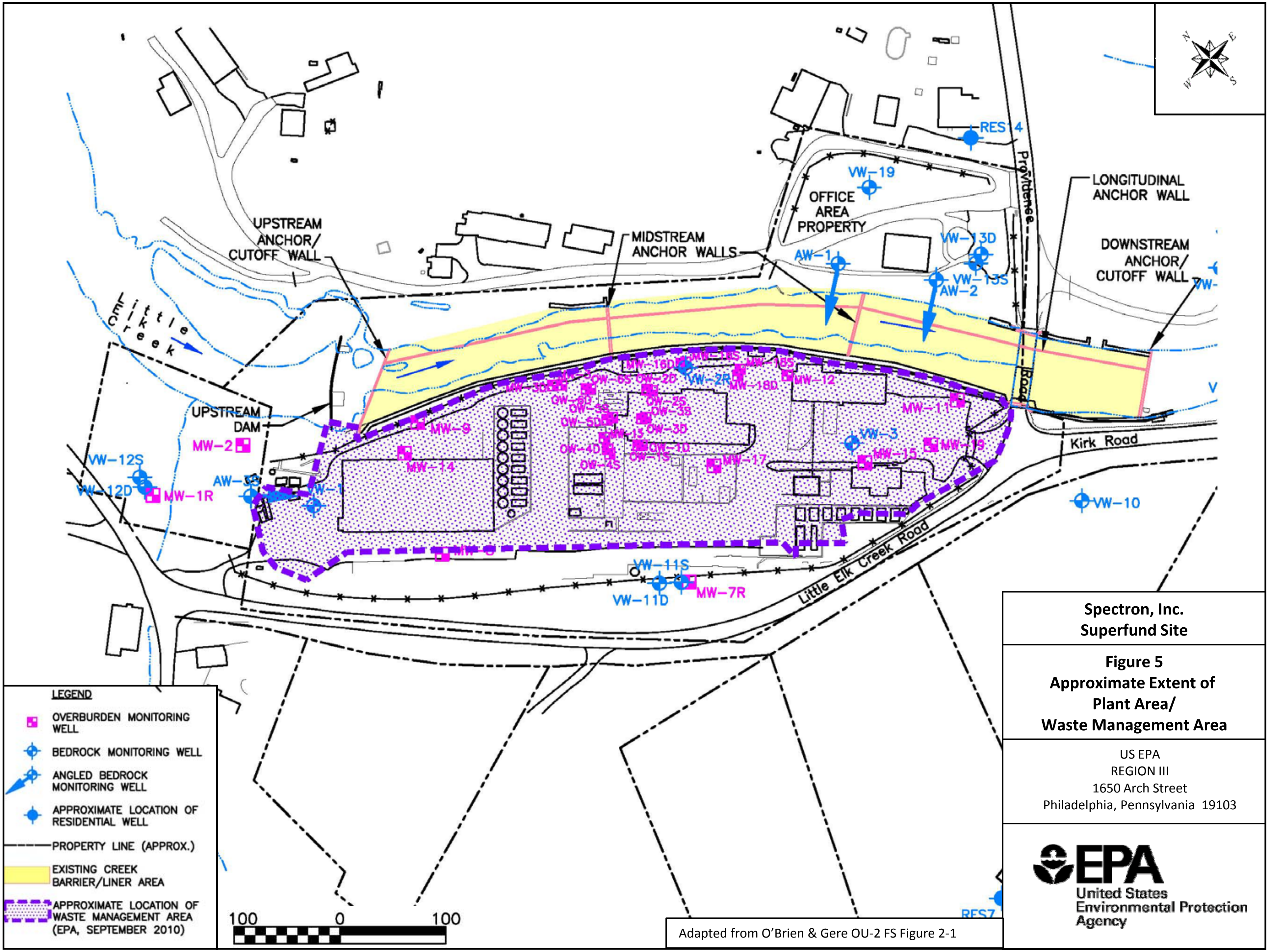


Spectron, Inc.
Superfund Site

Figure 4
SI/GWTS Conceptual Layout

US EPA
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103

United States Environmental Protection Agency



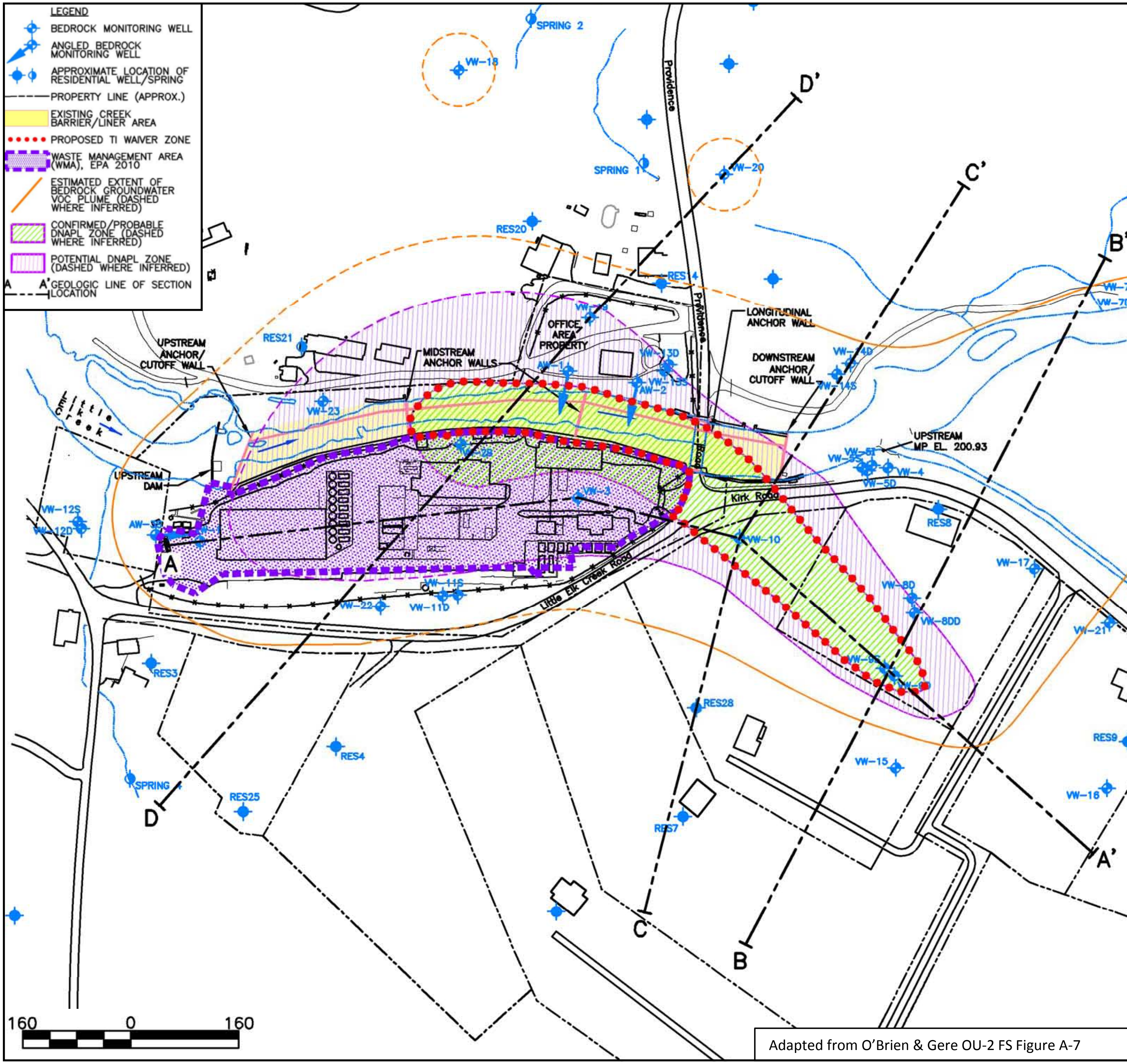
Adapted from O'Brien & Gere OU-2 FS Figure 2-1

Spectron, Inc.
Superfund Site

Figure 5
Approximate Extent of Plant Area/ Waste Management Area

US EPA
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103

United States Environmental Protection Agency



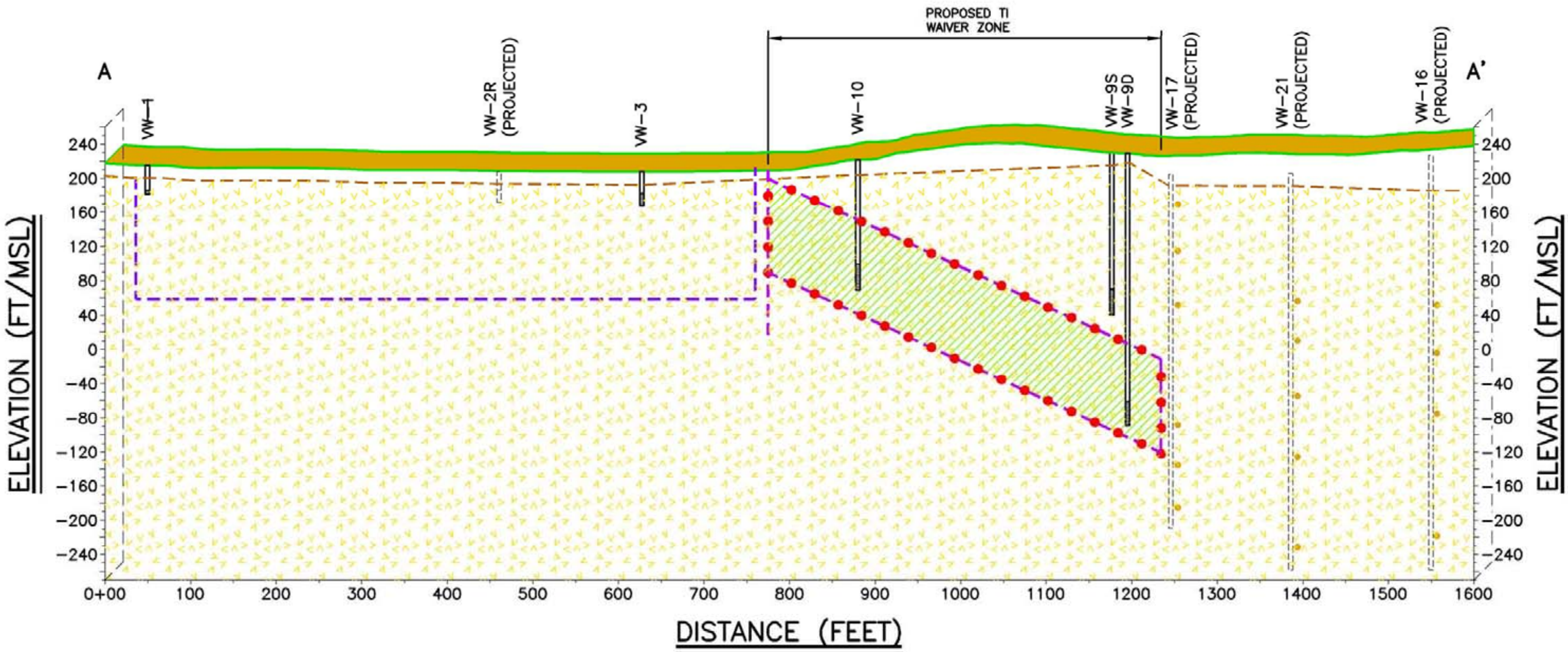
Adapted from O'Brien & Gere OU-2 FS Figure A-7

Spectron, Inc.
Superfund Site

Figure 6
Technical Impracticability Zone

US EPA
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103

EPA United States Environmental Protection Agency



Spectron, Inc.
Superfund Site

Figure 7
TI Zone – Section A-A'

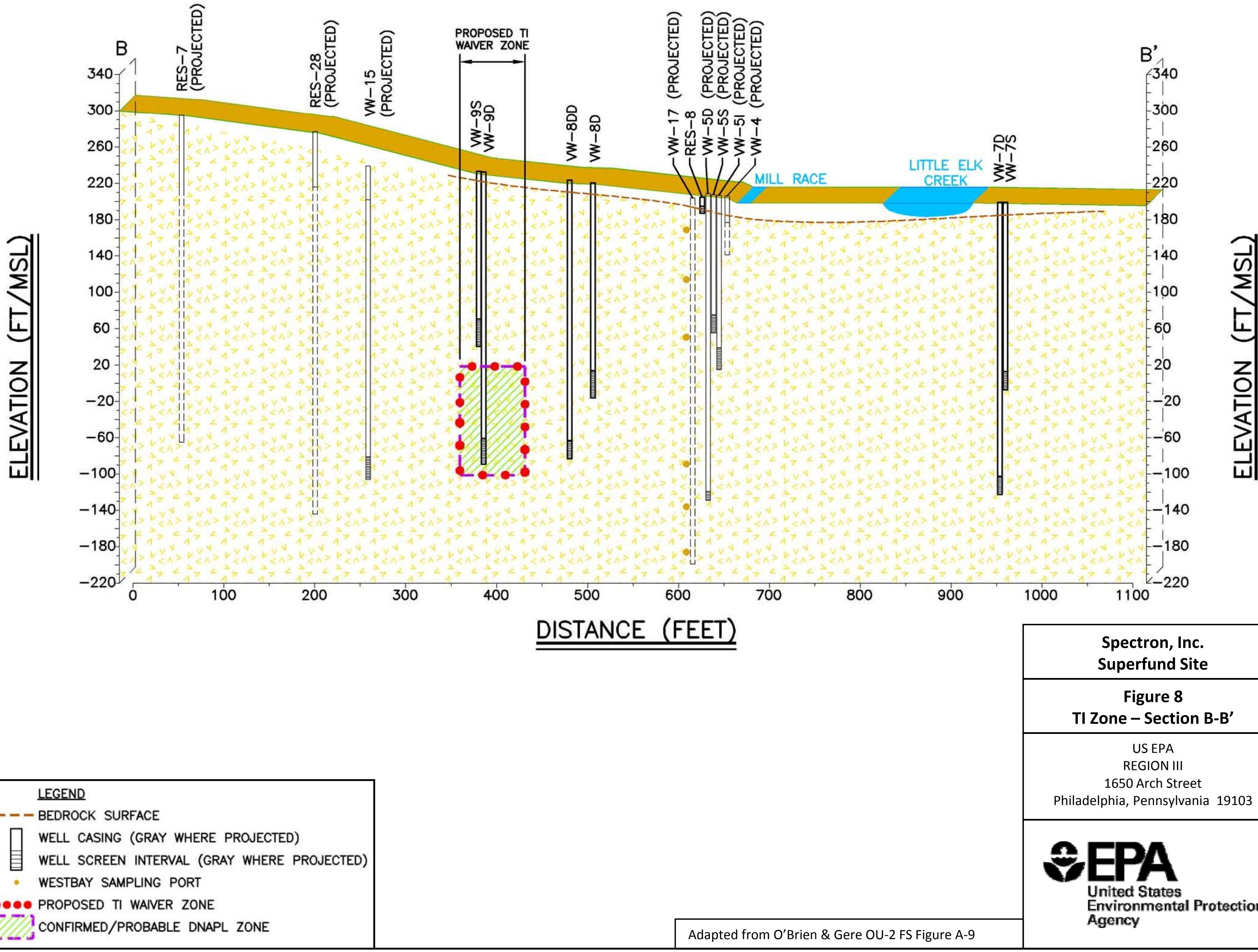
US EPA
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103

EPA
United States Environmental Protection Agency

LEGEND

- BEDROCK SURFACE
- WELL CASING (GRAY WHERE PROJECTED)
- WELL SCREEN INTERVAL (GRAY WHERE PROJECTED)
- WESTBAY SAMPLING PORT
- PROPOSED TI WAIVER ZONE
- CONFIRMED/PROBABLE DNAPL ZONE
- WASTE MANAGEMENT AREA (WMA), EPA 2010

Adapted from O'Brien & Gere OU-2 FS Figure A-8



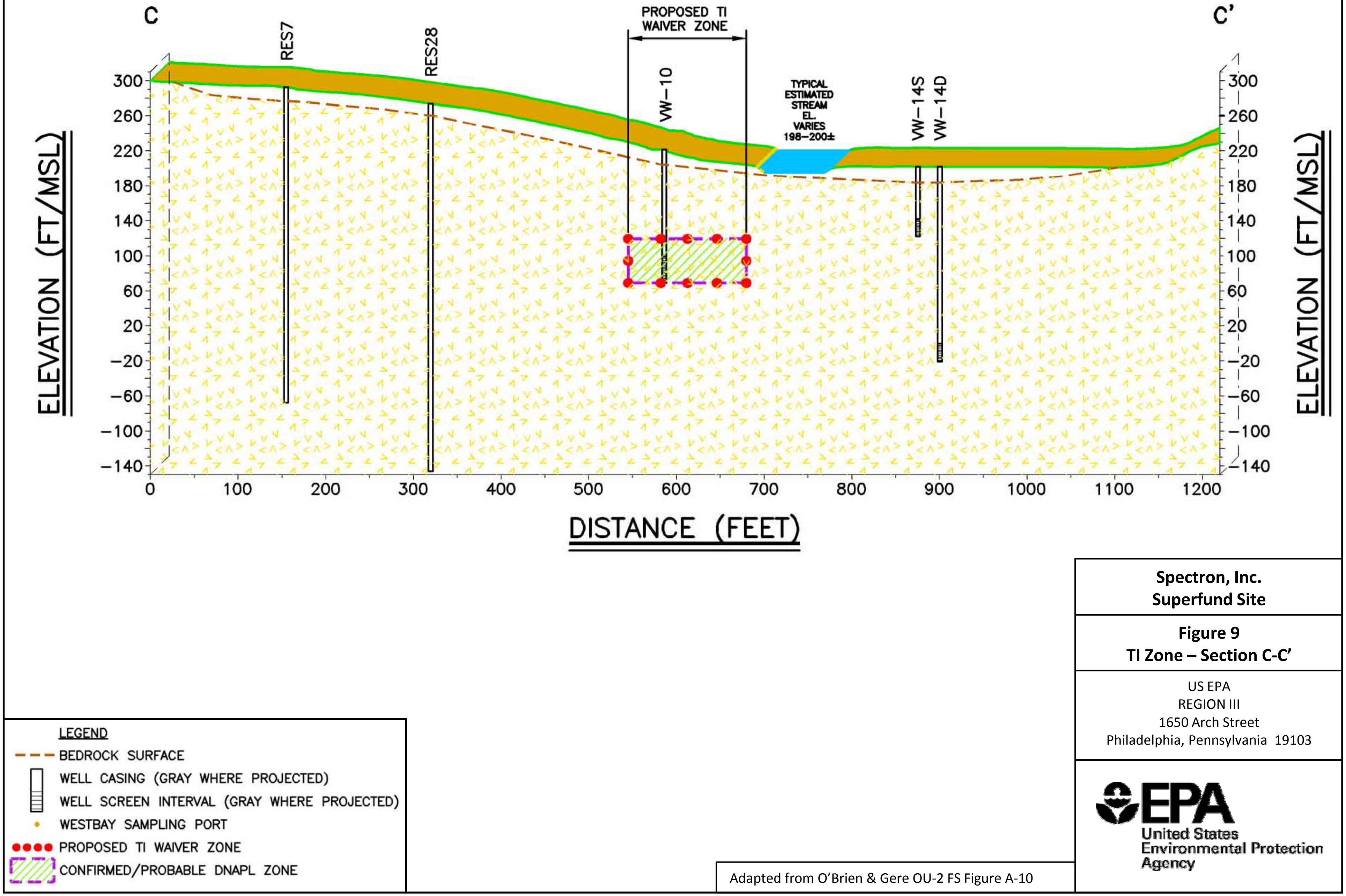
Adapted from O'Brien & Gere OU-2 FS Figure A-9

Spectron, Inc.
Superfund Site

Figure 8
TI Zone – Section B-B'

US EPA
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103

United States Environmental Protection Agency



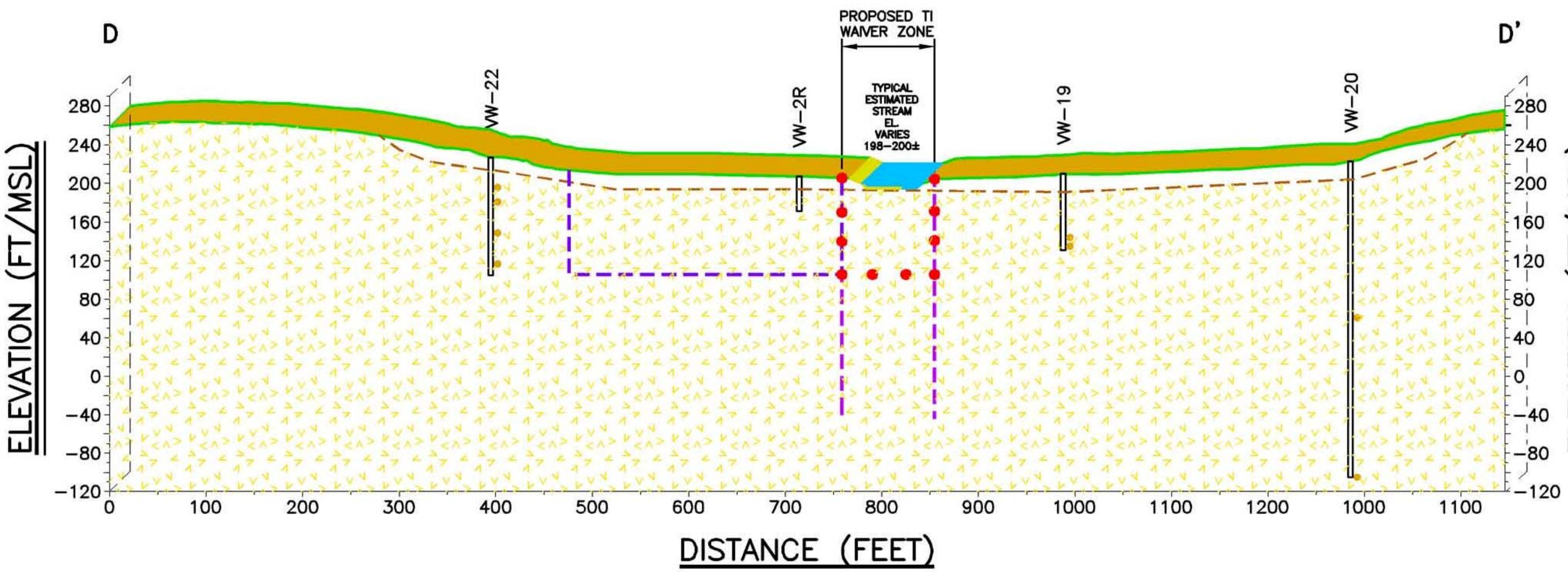
Adapted from O'Brien & Gere OU-2 FS Figure A-10

Spectron, Inc.
Superfund Site

Figure 9
TI Zone – Section C-C'

US EPA
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103

EPA
United States Environmental Protection Agency



LEGEND

- BEDROCK SURFACE
- WELL CASING (GRAY WHERE PROJECTED)
- WELL SCREEN INTERVAL (GRAY WHERE PROJECTED)
- WESTBAY SAMPLING PORT
- PROPOSED TI WAIVER ZONE
- CONFIRMED/PROBABLE DNAPL ZONE
- WASTE MANAGEMENT AREA (WMA), EPA 2010

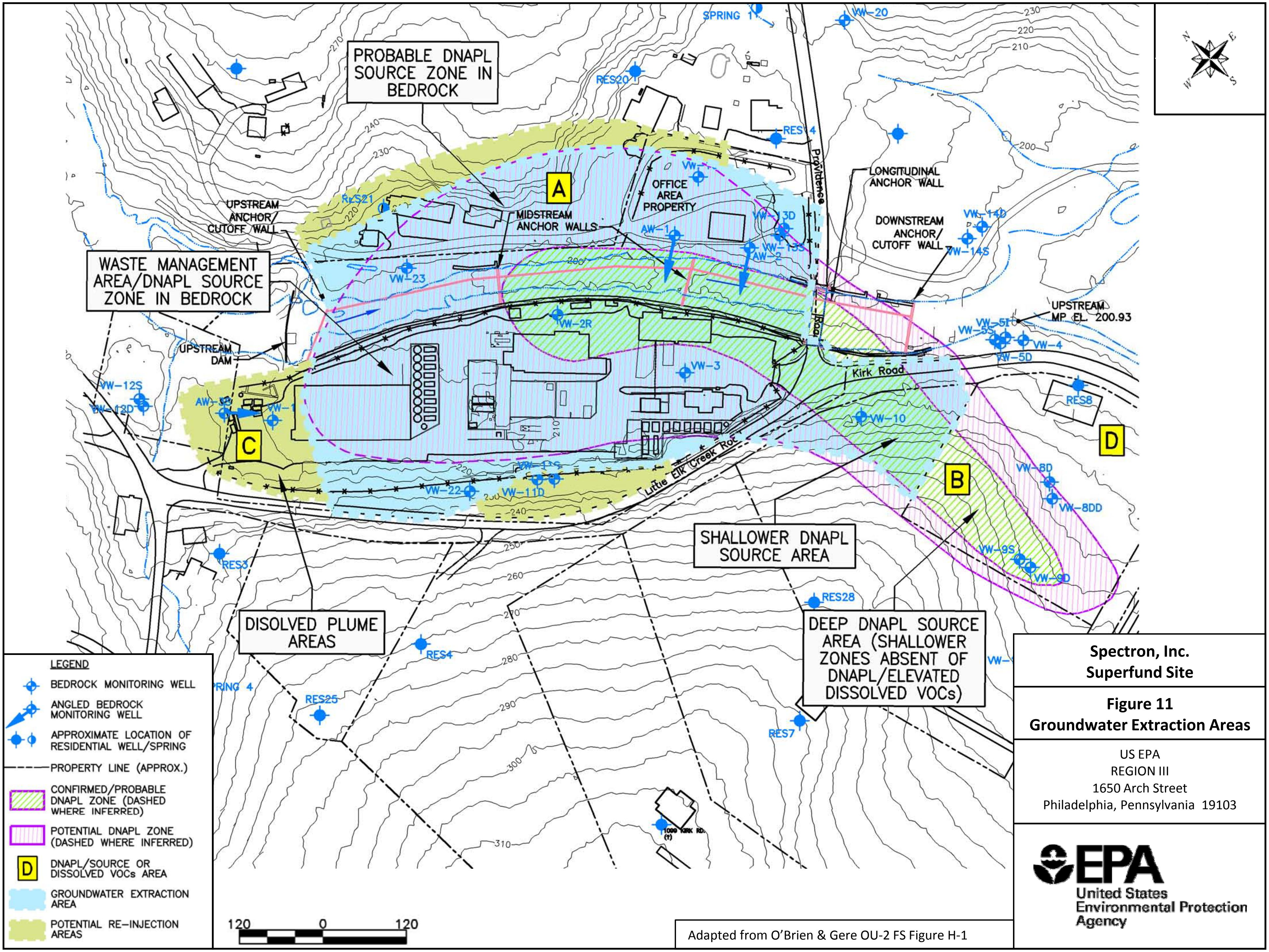
Adapted from O'Brien & Gere OU-2 FS Figure A-11

Spectron, Inc.
Superfund Site

Figure 10
TI Zone – Section D-D'

US EPA
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103

United States Environmental Protection Agency



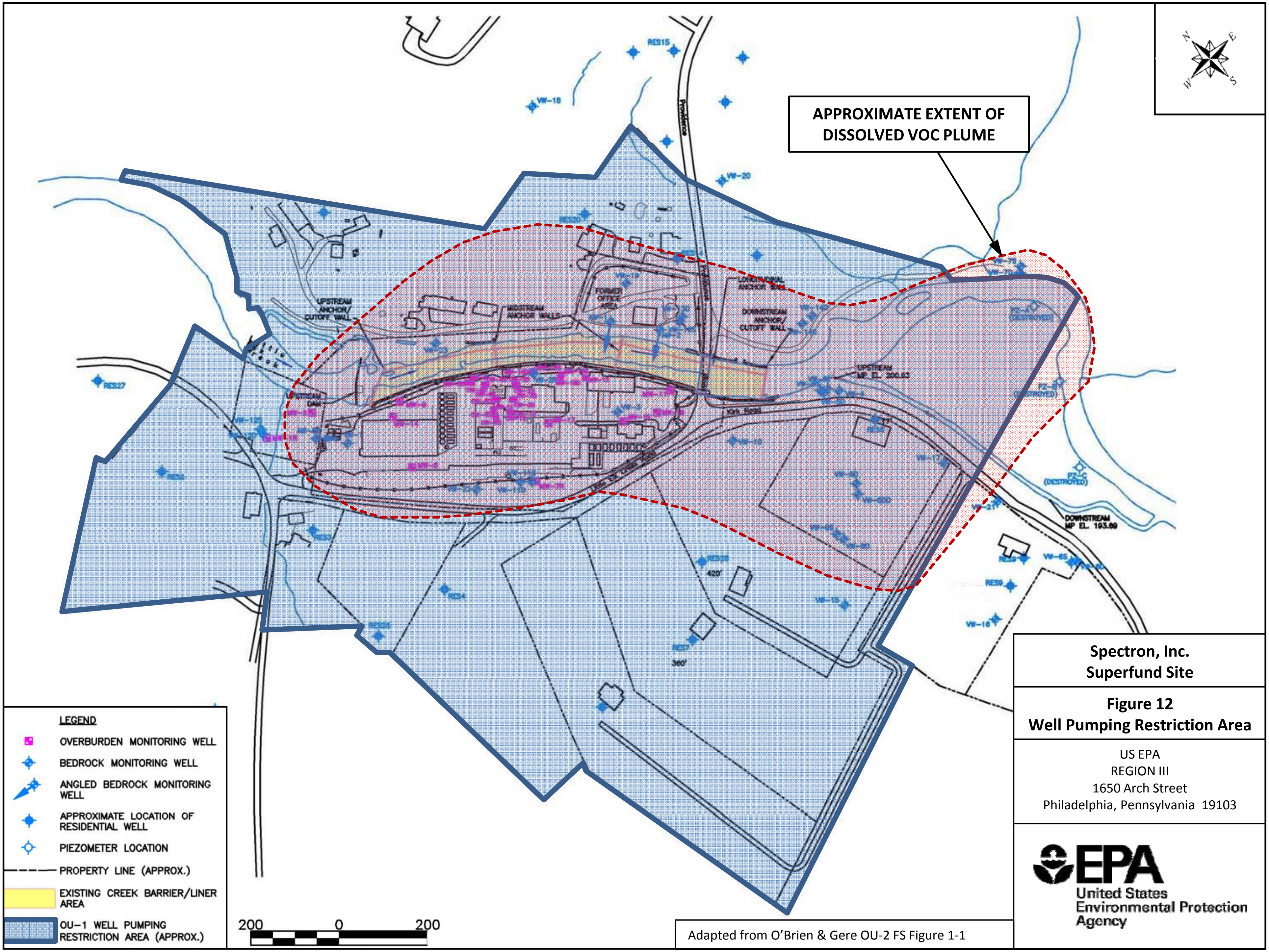
Adapted from O'Brien & Gere OU-2 FS Figure H-1

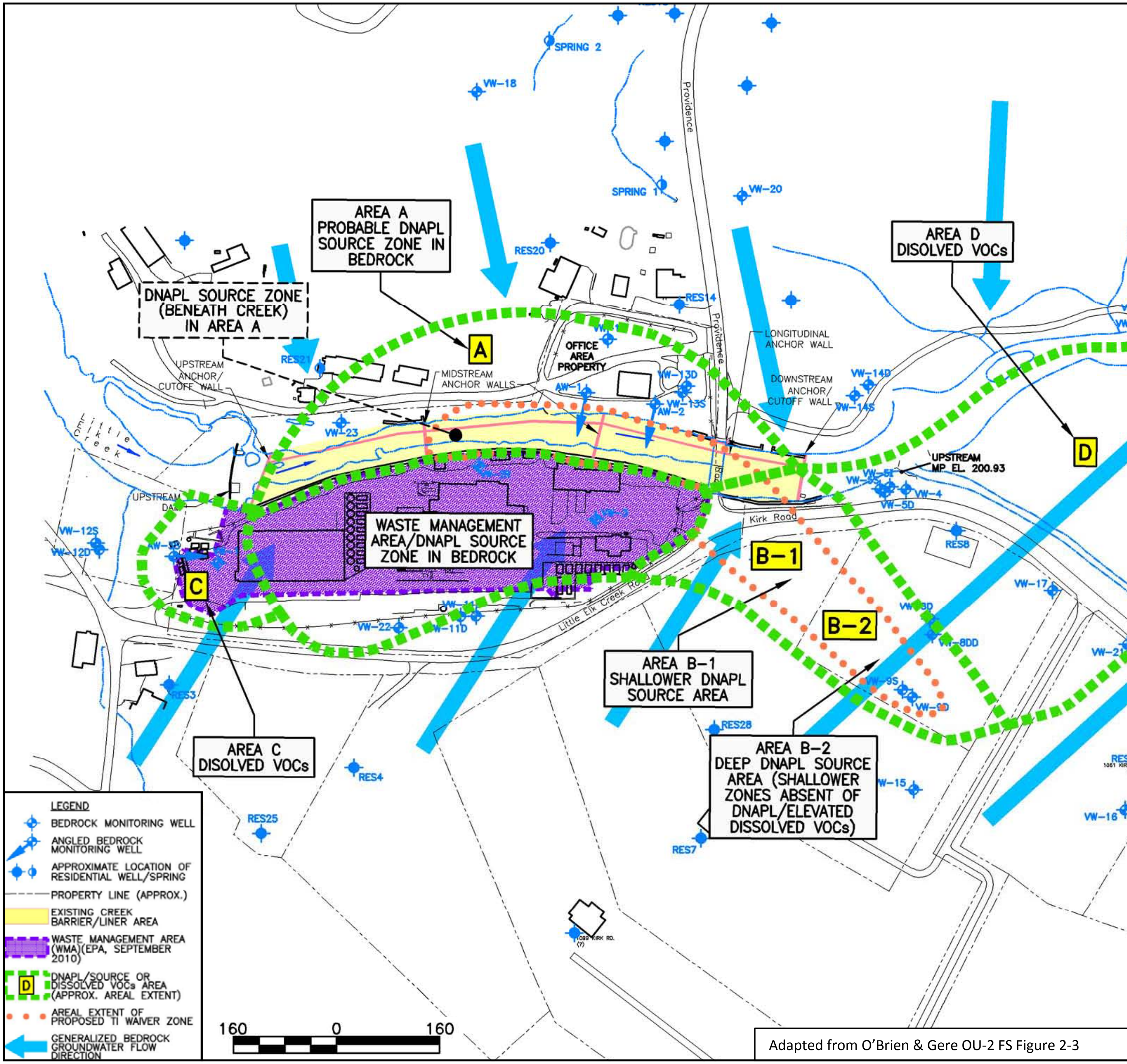
Spectron, Inc.
Superfund Site

Figure 11
Groundwater Extraction Areas

US EPA
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103

United States Environmental Protection Agency


APPROXIMATE EXTENT OF DISSOLVED VOC PLUME
LEGEND
OVERBURDEN MONITORING WELL
BEDROCK MONITORING WELL
ANGLED BEDROCK MONITORING WELL
APPROXIMATE LOCATION OF RESIDENTIAL WELL
PIEZOMETER LOCATION
PROPERTY LINE (APPROX.)
EXISTING CREEK BARRIER/LINER AREA
OU-1 WELL PUMPING RESTRICTION AREA (APPROX.)
200 0 200
Adapted from O'Brien & Gere OU-2 FS Figure 1-1
Spectron, Inc.
Superfund Site
Figure 12
Well Pumping Restriction Area
US EPA
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103
EPA United States Environmental Protection Agency



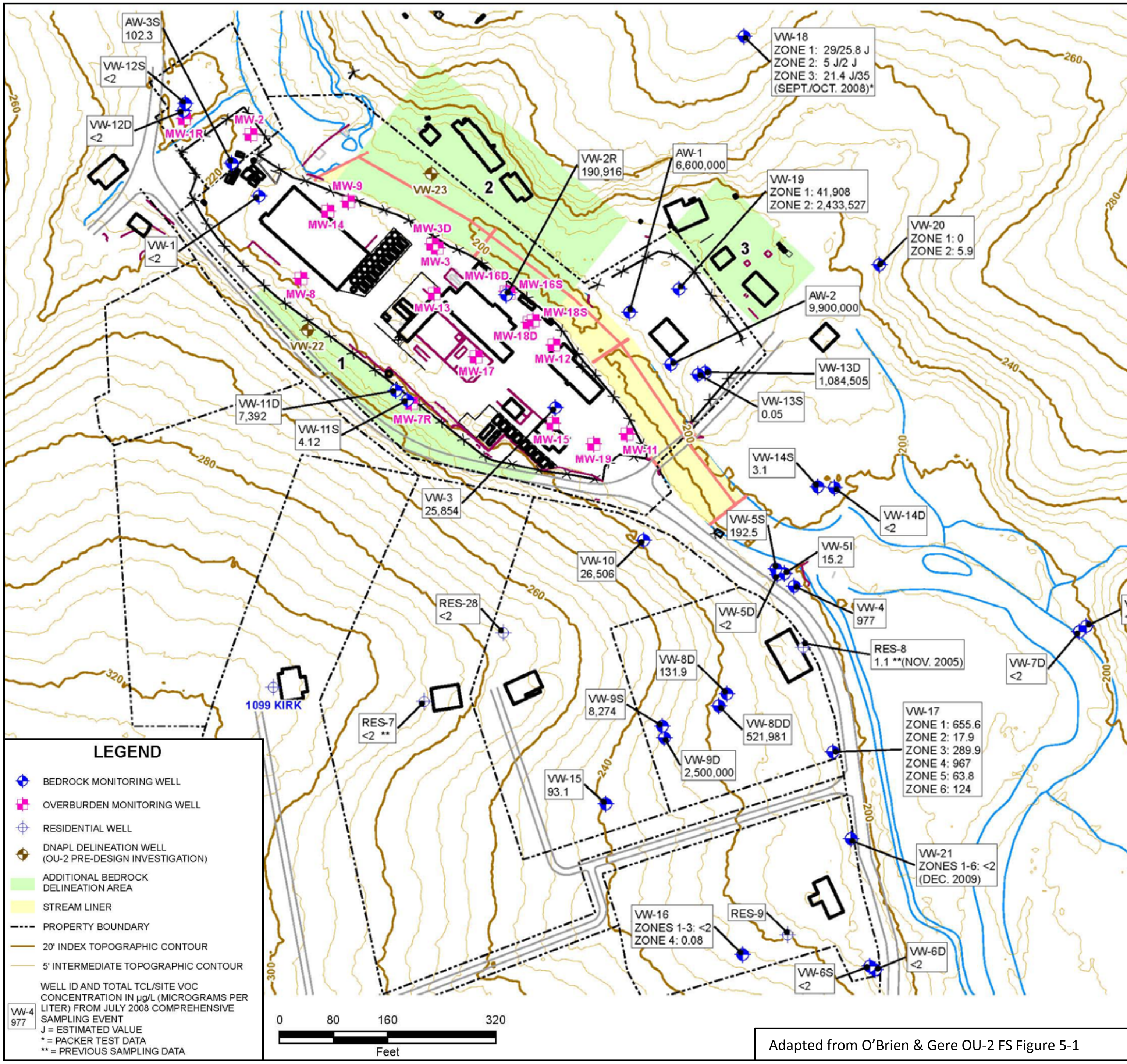
Adapted from O'Brien & Gere OU-2 FS Figure 2-3

Spectron, Inc.
Superfund Site

Figure 13
Groundwater Contaminant Plume Areas

US EPA
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103

EPA United States Environmental Protection Agency



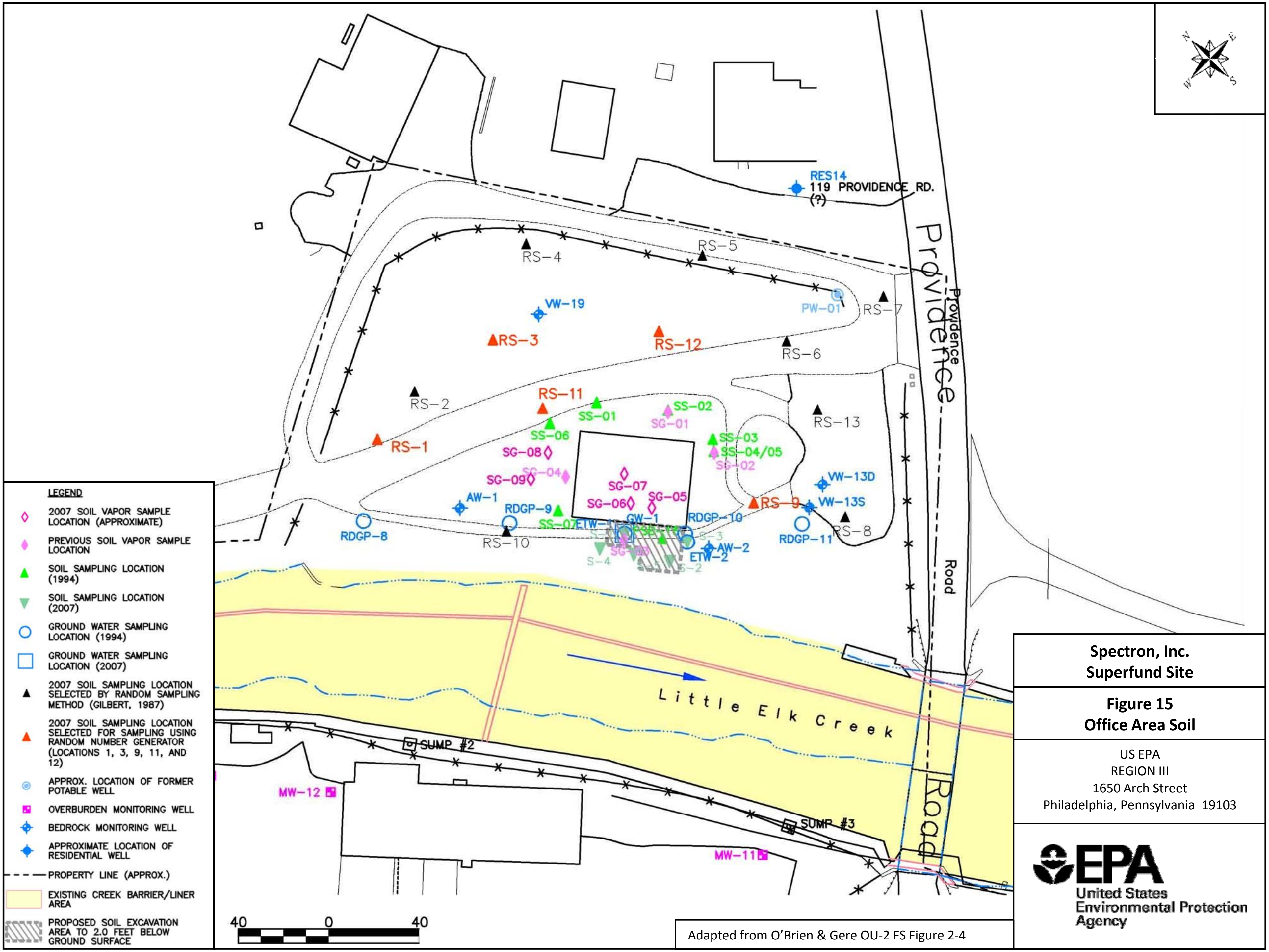
Adapted from O'Brien & Gere OU-2 FS Figure 5-1

Spectron, Inc.
Superfund Site

Figure 14
DNAPL Delineation Areas

US EPA
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103

EPA
United States
Environmental Protection
Agency



Adapted from O'Brien & Gere OU-2 FS Figure 2-4

Spectron, Inc. Superfund Site

Figure 15
Office Area Soil

US EPA
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103

EPA United States Environmental Protection Agency

Tables

Table 1
Contaminants of Concern and Performance Standards
Spectron, Inc. Superfund Site
Operable Unit 2 Interim Record of Decision

Groundwater

Compound	Maximum Detected Concentration	Performance Standard	
		EPA MCL/Non-Zero MCLG	MDE GWCS
1,1,2,2-Tetrachloroethane	67	-	1
1,1,2-Trichloroethane	170	3*	-
1,1,1-Trichloroethane	81,000	200	-
1,1-Dichloroethane	11,000	-	80
1,1-Dichloroethene	5,200	7	-
1,2,4-Trichlorobenzene	190	70	-
1,2-Dichlorobenzene	1,700	600	-
1,2-Dichloroethane	84	5	-
Benzene	900	5	-
Bis (2-chloroethyl) ether	560	-	0.0096
Chlorobenzene	4,600	100	-
Chloroform	36	80	-
cis-1,2-Dichloroethene	10,000	70	-
Ethylbenzene	3,200	700	-
4-Methyl-2-Pentanone	22,000	-	50
Methylene Chloride	1,300,000	5	-
Tetrachloroethylene	29,000	5	-
Toluene	6,700	1,000	-
Trichloroethylene	8,700	5	-
Vinyl Chloride	300	2	-
Xylene (total)	5,800	10,000	-

All groundwater concentrations in µg/L
MDE Groundwater Cleanup Standard is Relevant and Appropriate if no MCL/non-zero MCLG exists
** - Non-Zero MCLG*
Once performance standards are achieved for all Site COCs, a risk assessment shall be performed to confirm that exposure to groundwater would result in a cumulative excess carcinogenic risk of less than or equal to 10^{-4} and a cumulative excess non-carcinogenic HI of less than or equal to 1.

Soil

Contaminant	Maximum Detected Concentration	Performance Standard
Arsenic	31.6	21.6
Lead	1,460	400

All soil concentrations in mg/kg

Table 2
Performance Standards for Little Elk Creek
Spectron, Inc. Superfund Site
Operable Unit 2 Interim Record of Decision

Compound	Performance Standard
Volatile Organic Compounds (VOCs)	
Acetone	5,500
Benzene	2.2
2-Butanone	7,000
Chlorobenzene	130
Chloroethane	3.6
Chloroform	5.7
1,1-Dichloroethane	800
1,2-Dichloroethane	0.38
1,1-Dichloroethene	0.057
trans-1,2-Dichloroethene	140
Ethylbenzene	530
Methylene Chloride	4.6
4-Methyl-2-Pentanone	6,300
Naphthalene	6.5
1,1,2,2-Tetrachloroethane	0.17
Tetrachloroethene	0.69
Toluene	1,300
1,1,1-Trichloroethane	200
1,1,2-Trichloroethane	0.59
Trichloroethene	2.5
Vinyl Chloride	0.025
Semi-Volatile Organic Compounds (SVOCs)	
bis(2-Chloroethyl) Ether	0.03
4-Chloroaniline	150
1,2-Dichlorobenzene	420
1,4-Dichlorobenzene	63
4-Methylphenol	180
1,2,4-Trichlorobenzene	35

All concentrations in µg/L
The Performance Standards for Little Elk Creek were initially established in the 2004 OU-1 ROD.

Table 3
EPA Region 3 Ecologically Protective Backfill Values
Spectron, Inc. Superfund Site
Operable Unit 2 Interim Record of Decision

Compound*	Backfill Value	Reference
Acenaphthene	20	e
Anthracene	0.1	e
Benzo (a) Pyrene	0.1	e
1,1-Biphenyl	60	e
p-Chloroanaline	20	e
Chlorobenzene	0.05	e
2-Chlorophenol	7	e
DDT and metabolites	0.21	b
p-Dichlorobenzene	20	e
2,4-Dichlorophenol	20	e
1,4-Dichlor-2-butene	1,000	e
Dieldrin	0.049	b
Diethyl Phthalate	100	e
Dimethyl Phthalate	200	e
Di-n-Butylphthalate	200	e
2,4-Dinitrophenol	20	e
Ethyl Benzene	0.05	e
Ethylene Glycol	97	e
Fluoranthene	0.1	e
Fluorene	30	e
Hexachlorocyclopentadiene	10	e
Naphthalene	0.1	e
Nitrobenzene	40	e
2-Nitrophenol	7	e
4-Nitrophenol	7	e
n-Nitrosodiphenylamine	20	e
PAHs, LMW	29	d
PAHs, HMW	11	b
PCBs, Total	0.371	h
Pentachlorobenzene	20	e
Pentachlorophenol	5	c
Phenanthrene	0.1	e
Phenol	30	e
Pyrene	0.1	e
Pyridine	0.1	e
Styrene	0.1	e
2,3,7,8-Tetrachlorodibenzofuran	0.00084	e
2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.00000315	e
2,3,4,6-Tetrachlorophenol	20	e
Toluene	0.05	e
1,2,4-Trichlorobenzene	20	e
2,4,5-Trichlorophenol	4	e
2,4,6-Trichlorophenol	9	e
Xylenes (total)	0.05	e

Analyte*	Backfill Value	Reference
Aluminum	pH<5.5	a
Antimony	2.7	b
Arsenic	18.0	c
Barium	330.0	d
Beryllium	40.0	d
Boron	0.5	e
Cadmium	3.6	b
Chromium (3/6)	260/1300	f/b
Cobalt	13.0	c
Copper	70.0	c
Iron	2000.0	g
Lead	110.0	f/b
Manganese	220.0	c
Mercury (inorg.)	0.00051	h
Nickel	38.0	c
Selenium	0.5	c
Silver	42.0	f/b
Titanium	1.0	e
Tin	51.5	e
Vanadium	78.0	f/b
Zinc	120.0	d
Cyanide	5.0	e

References:
a: EPA Eco-SSL - Al is only considered at pH 5.5 or less
b: EPA Eco-SSL Mamalian NOEC with 10 conversion factor to LOEC
c: EPA Eco-SSL Plant geometric mean of NOEC and LOEC
d: EPA Eco-SSL Invertebrate geometric mean of NOEC and LOEC
e: EPA Region 2, Region 4, or the lower of the R2/R4 values
f: EPA Eco-SSL Avian NOEC with 10 conversion factor to LOEC
g: Oak Ridge National Lab NOEC with 10 conversion factor to LOEC Soil
h: Oak Ridge National Lab PRG Wildlife

All concentrations in mg/kg

*For analytes and compounds not listed, state Safe Fill Standards derived for the protection of ecological receptors may be used. If ecological-based values are not available, values for Residential Direct Contact may be used.

Slight exceedances of these values may be acceptable if the backfill area is spatially limited, the soils are amended with organics to reduce bioavailability, or if toxicity testing of the backfill material demonstrates that it does not pose risk.

Site-specific background concentrations established during the Remedial Investigation and approved by EPA may also be considered.

Table 4
Technical Impracticability Waiver Compound List
Spectron, Inc. Superfund Site
Operable Unit 2 Interim Record of Decision

Compound	ARAR	
	EPA MCL/non-zero MCLG	MDE GWCS
1,1,2,2-Tetrachloroethane	-	1
1,1,2-Trichloroethane	3*	-
1,1,1-Trichloroethane	200	-
1,1-Dichloroethane	-	80
1,1-Dichloroethene	7	-
1,2-Dichlorobenzene	600	-
1,2-Dichloroethane	5	-
Chlorobenzene	100	-
Chloroform	80	-
cis-1,2-Dichloroethene	70	-
4-Methyl-2-Pentanone	-	50
Methylene Chloride	5	-
Tetrachloroethene	5	-
Trichloroethene	5	-
Vinyl Chloride	2	-

All concentrations in µ g/L
MDE Groundwater Cleanup Standard is Relevant and Appropriate if no MCL /non-zero MCLG exists
** - Non-Zero MCLG*

Table 5
Applicable or Relevant and Appropriate Requirements
Spectron, Inc. Superfund Site
Operable Unit 2 Record of Decision

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Details Regarding ARARs in the Context of the Selected Remedy
Federal ARARs				
Clean Water Act: Federal Ambient Water Quality Criteria for the Protection of Aquatic Life	33 U.S.C. §1314	Relevant and Appropriate	Non-enforceable guidelines established pursuant to Section 304 of the Clean Water Act that set the concentrations of pollutants which are considered protective of human health based on water and fish ingestion and to protect aquatic life. Federal ambient water quality criteria may be relevant and appropriate to CERCLA cleanups based on the uses of a water body.	Little Elk Creek is designated as Use I and Maryland Surface Water Quality Standards (SWQS) are considered Applicable. However, due to the close proximity of residential wells along Little Elk Creek, the Federal Ambient Water Quality Criteria (AWQC) for consumption of fish and drinking water are also considered Relevant and Appropriate for Little Elk Creek.
Federal Coastal Zone Management Act of 1972, Coastal Zone Act Reauthorization Amendments of 1990	16 U.S.C. §1451 et seq. 15 CFR Part 930.17, 20, 31-33, 37(a), and 39(b-d)	Applicable	Requires that activities directly affecting the coastal zone are conducted in accordance with the approved state coastal zone management program.	The Site is within the coastal zone and all substantive requirements shall be met.
National Historic Preservation Act of 1966, as Amended	36 CFR Parts 800.4(b-c), (e), 800.5(e), 800.9	Applicable	Requires consideration of effects on properties included on or eligible for the National Register of Historic Places.	The Site is located in Little Elk Creek Historic District which is eligible for inclusion on the National Register of Historic Places. Adverse impacts shall be mitigated or minimized if cultural resources are determined to be present.
Federal Regulation of Activities in or Affecting Floodplains	40 CFR Part 6.302(b) and Part 6 Appendix A	Applicable	Sets forth EPA requirements for carrying out provisions of Executive Order 11988 (Floodplain Management).	Substantive requirements of this regulation apply to all activities at the Site, because the Site is in a floodplain. Construction within the floodplain shall be conducted in accordance with this regulation.

Table 5
Applicable or Relevant and Appropriate Requirements
Spectron, Inc. Superfund Site
Operable Unit 2 Record of Decision

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Details Regarding ARARs in the Context of the Selected Remedy
Federal Fish and Wildlife Coordination Act	16 U.S.C. §661 et seq. 40 CFR Part 6.302(g)	Applicable	Requires federal agencies that are involved in actions that will result in the control or structural modification of any natural stream or body of water for any purpose to take action to protect the fish and wildlife resources which may be affected by the action. Consultation with the US Fish and Wildlife Service and the appropriate state agency is required.	Substantive requirements shall be met.
Federal Clean Water Act (CWA): National Pollution Discharge Elimination System (NPDES)	33 USC §1251 et seq. 40 CFR Part 122.1(b)(1) 40 CFR Part 122.2 40 CFR Part 122.29 40 CFR Parts 122.41(a), (d), (e), (j)(1), and (m)(1) and (4); 122.44-45, 125.1-3, and 125.100-104	Applicable	Enforceable standards for all discharges to waters of the United States.	Discharge limits shall be met by the discharge from the GWTS and any point source discharge from the construction zone. Only substantive requirements shall be met and no permit shall be required.
Safe Drinking Water Act	42 U.S.C § 300g-l 40 CFR Part 141.61	Applicable	Establishes Maximum Contaminant Levels (MCLs) for public water supplies.	Applicable as groundwater cleanup standards outside the Waste Management Area (WMA) and Technical Impracticability Zone (TI Zone).
	40 CFR Part 141.50-51	To Be Considered	Establishes Maximum Contaminant Level Goals (MCLGs) for public water supplies.	MCLGs are non-enforceable health-based goals that will be considered for drinking water.

Table 5
Applicable or Relevant and Appropriate Requirements
Spectron, Inc. Superfund Site
Operable Unit 2 Record of Decision

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Details Regarding ARARs in the Context of the Selected Remedy
Federal Underground Injection Control Program	40 CFR Part 144	Applicable	Federal requirements for the classification and operation of injection wells.	Substantive requirements are applicable if treated groundwater water is reinjected. No permit shall be required.
Federal – Identification and Listing of Hazardous Waste	40 CFR Part 261	Applicable	Provides definitions and criteria for triggering hazardous waste management requirements.	Applicable to any waste handled during Site activities.
Federal Standards Applicable to Generators of Hazardous Waste	40 CFR Part 264.10-19 40 CFR Part 264.30-37 40 CFR Part 264.50-56 40 CFR Part 264.111 40 CFR Part 264.114 40 CFR Part 264.170 -179 40 CFR Part 264.190 200 40 CFR Part 264.220 -223, 226-230 40 CFR Part 264.250 -254, 256-259 40 CFR Part 264.1030-1036	Applicable	Establishes standards for owners and operators of facilities which treat and dispose of hazardous waste.	The substantive requirements shall apply to the handling of hazardous waste during site activies.

Table 5
Applicable or Relevant and Appropriate Requirements
Spectron, Inc. Superfund Site
Operable Unit 2 Record of Decision

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Details Regarding ARARs in the Context of the Selected Remedy
	40 CFR Part 264.1050-1063 40 CFR Part 264.1080-1088 40 CFR Part 264.1100-1102			
Federal Council on Environmental Quality	40 CFR Part 1500.2(f)	Relevant and Appropriate	Requires use of all practicable means, to restore and enhance the quality of the human environment and avoid or minimize any possible adverse effects upon the quality of the human environment.	Substantive requirements shall be met.
Federal – Control of Air Emissions from Air Strippers at Superfund Groundwater Sites	OSWER Directive 9355.0-28 June 15, 1989	To Be Considered	This policy guides the requirement for additional controls on air strippers at Superfund Sites.	To be considered regarding air emissions from existing GWTS.

Table 5
Applicable or Relevant and Appropriate Requirements
Spectron, Inc. Superfund Site
Operable Unit 2 Record of Decision

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Details Regarding ARARs in the Context of the Selected Remedy
State of Maryland ARARs				
Maryland – Control of Noise Pollution	COMAR 26.02.03.01 COMAR 26.02.03.02 A(2), B(2) COMAR 26.02.03.03 A, B(2), and D(2 and 3)	Applicable	Provides limits on noise levels for the protection of human health and welfare and exemptions to those limits, and specifies standards to be met by sound level meters to be used to determine compliance.	Substantive standards of these regulations shall be met at the Site property boundaries during construction and during operation of the ground water treatment plant, unless the activity in question is subject to an exemption under COMAR 26.02.03.03 B(2).
Maryland - Regulations of Water Supply, Sewage Disposal, and Solid Waste; Well Construction	COMAR 26.04.04.02 COMAR 26.04.04.07 COMAR 26.04.04.11	Applicable	Contains specific standards for construction, maintenance, and abandonment of wells.	Substantive standards are applicable to extraction and monitoring wells. The regulation is also applicable to injection wells which may be used to reinject treated water.
Sanitary Landfills--General	COMAR 26.04.07.04 C(5)	Applicable	Establishes limitations of the types of material that can be used as clean-fill.	Clean fill will be used as backfill for the Office Area. No permit will be required.
Maryland -Board of Well Drillers: General Regulations	COMAR 26.05.01.01 COMAR 26.05.01.02	Applicable	Prohibits well drilling by any person without a license, unless an exception in subsection B applies.	Applies to all well drilling during OU-2 activities.
Maryland - Waterworks and Systems Operators	COMAR 26.06.01.01 COMAR 26.06.01.03 COMAR 26.06.01.05 COMAR 26.06.01.06	Applicable	Requires certification of wastewater treatment operators by the State Board of Waterworks and Water Systems Operators.	Substantive requirements shall apply to continued operation of the SI/GWTS.

Table 5
Applicable or Relevant and Appropriate Requirements
Spectron, Inc. Superfund Site
Operable Unit 2 Record of Decision

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Details Regarding ARARs in the Context of the Selected Remedy
Maryland – Water Quality	COMAR 26.08.02.02	Applicable and/or Relevant and Appropriate as discussed under Further Detail.	Criteria to maintain surface water quality and define designated uses.	Little Elk Creek is a surface water of the State of Maryland and, pursuant to COMAR 26.08.02.07F(5), it is designated for Use I . Use I surface water discharge criteria are considered applicable and Use I-P discharge criteria are considered relevant and appropriate.
	COMAR 26.08.02.03	Applicable	Provide criteria for surface water quality and certain discharges to surface waters.	The GWTS discharge and any point source discharge from site activities shall meet the surface water quality and general water quality criteria.
	COMAR 26.08.02.03 –1 B		Established boundaries for fresh water, estuarine, and salt water bodies.	Little Elk Creek is within a fresh water boundary.
	COMAR 26.08.02.03 –2 A and G		Provides numerical criteria and describes where criteria apply.	Specific criteria for listed toxic substances must be met for any point source discharge.
	COMAR 26.08.02.03 –3 A		Establishes water quality criteria for specific water uses	Discharge from GWTS and any point source discharge from site activities shall meet Use I criteria.
	COMAR 28.08.02.05		Describes how mixing zones can be used in calculating discharge concentrations.	Applicable to water discharged from any point source during site activities.
	COMAR 26.08.02.07		Requires that surface water be protected according to designated use and states that any stream segment not listed in COMAR 26.08.02.08 is designated Use I.	Discharge from GWTS and any point source discharge from site activities shall meet Use I criteria.
Maryland – Water Pollution: Discharge Limitations	COMAR 26.08.03.01	Applicable	Determines permissibility of discharge and established standards.	The substantive standards of this requirement shall be met, but no permit will be required.
	COMAR 26.08.03.07 D and E		Determines discharge monitoring requirements for discharges of toxic substances.	

Table 5
Applicable or Relevant and Appropriate Requirements
Spectron, Inc. Superfund Site
Operable Unit 2 Record of Decision

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Details Regarding ARARs in the Context of the Selected Remedy
Maryland – Water Pollution: Discharge Permit Limits	COMAR 26.08.04.02 – 1 A and D	Applicable	Determines permit requirements.	Any point source discharge shall meet all substantive criteria, but no permit will be required.
Maryland – Water Pollution: Monitoring	COMAR 26.08.04.03 A	Applicable	Establishes discharge monitoring requirements.	The substantive standards of this requirement shall be met by the SI/GWTS.
Maryland Underground Injection Control	COMAR 26.08.07.01 -.04	Applicable	Requirements for the classification and operation of injection wells.	Incorporates by reference 40 CFR 144. Substantive requirements are potentially applicable if treated water is reinjected. No permit shall be required.
Maryland – Air Quality: General Emissions Standards, Prohibitions	COMAR 26.11.06.01 COMAR 26.11.06.02 COMAR 26.11.06.03 COMAR 26.11.06.06 COMAR 26.11.06.08 COMAR 26.11.06.09	Applicable	Provides air quality standards, general emission standards and restrictions for air emissions from sources or installations.	Substantive requirements shall apply to all equipment capable of generating emissions, such as equipment during earthwork and the GWTS air stripper.
Maryland – Air Quality: Toxic Air Pollutants	COMAR 26.11.15.01 COMAR 26.11.15.03 COMAR 26.11.15.04 A and C COMAR 26.11.15.05 COMAR 26.11.15.06	Applicable	Requires emissions of Toxic Air Pollutants (TAPs) from new and existing sources to be quantified, establishes ambient air quality standards and emission limitations for TAPs from new sources, and requires best available control technology.	Substantive requirements apply to emissions from SI/GWTS. No permit shall be required.

Table 5
Applicable or Relevant and Appropriate Requirements
Spectron, Inc. Superfund Site
Operable Unit 2 Record of Decision

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Details Regarding ARARs in the Context of the Selected Remedy
Maryland – Air Quality: Toxic Air Pollutants	COMAR 26.11.15.07 COMAR 26.11.16.03 COMAR 26.11.16.05 COMAR 26.11.16.06 COMAR 26.11.15.07 COMAR 26.11.15.09	Applicable	Requires emissions of Toxic Air Pollutants (TAPs) from new and existing sources to be quantified, establishes ambient air quality standards and emission limitations for TAPs from new sources, and requires best available control technology.	Substantive requirements apply to emissions from SI/GWTS. No permit shall be required.
Maryland – Disposal of Hazardous Controlled Substances	COMAR 26.13.01.03 COMAR 26.13.02.01 -.06 COMAR 26.13.02.11 -.15A	Applicable	Provide definitions and criteria for triggering hazardous waste management requirements.	Applicable to any waste handled during remedial action.
	COMAR 26.13.03.01 B(1) and (6) COMAR 26.13.03.05 E		Establishes standards for handling and storage of hazardous waste.	Wastes that are hazardous wastes per COMAR 26.13.02 and are disposed offsite shall be handled in accordance with the substantive requirements of COMAR 26.13.03.05 E
	COMAR 26.13.04.01 - .04		Established standards for transporting hazardous wastes.	Applicable to any hazardous waste transported offsite during remedial action.
	COMAR 26.13.05.01 A (2) COMAR 26.13.05.10 -1, 2, 4A(1), B, C, and D, 6A(1)-(5), (7) and (8), 7A COMAR 26.13.05.12		Establishes standards for handling and storage of hazardous waste.	Applicable to any hazardous waste handled during remedial action.

Table 5
Applicable or Relevant and Appropriate Requirements
Spectron, Inc. Superfund Site
Operable Unit 2 Record of Decision

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Details Regarding ARARs in the Context of the Selected Remedy
Maryland – Water Management: Construstion on Nontidal Waters and Floodplains	COMAR 26.17.04.01	Applicable	Governs construction, reconstruction, repair, or alteration of a dam, reservoir, or waterway obstruction or any change of the course, current, or cross section of a stream or body of water within the State including any changes to the 100-year frequency floodplain of free-flowing waters. Identify requirements for construction in nontidal waters and floodplains.	Substantive criteria shall be met but no permit will be required.
	COMAR 26.17.04.02			
	COMAR 26.17.04.04 C, D, E, F			
	COMAR 26.17.04.07 B (3-7)			
	COMAR 26.17.04.08 B (1-3), C (1-2), and E (1-2)			
	COMAR 26.17.04.11 B (3, 5, 6, and 7)		Criteria for evaluating permit applications.	Prevents construction that is not in the public interest and sets criteria for construction within the 100 year floodplain. Substantive requirements shall be met but no permit will be required.
	COMAR 26.17.04.11 E		Allows state to grant variances.	
Maryland – Stormwater Management	COMAR 26.17.02.02	Applicable	Provides for specific minimum control requirements and design for stormwater management.	The substantive requirements are applicable unless such activity is exempted under COMAR 26.17.02.05 B, however, no permit shall be required.
	COMAR 26.17.02.05 A and B			
	COMAR 26.17.02.06 A(3)			
	COMAR 26.17.02.08			
Maryland – Erosion and Sediment Control	COMAR 26.17.01.01	Applicable	Requires erosion and sedimentation controls for activities involving land clearing, grading, and other earth disturbances.	Substantive requirements shall apply, primarily to Office Area Soil remediation. No permit shall be required.
	COMAR 26.17.01.05 A and B			
	COMAR 26.17.01.07 B			
	COMAR 26.17.01.08 A and B			

Table 5
Applicable or Relevant and Appropriate Requirements
Spectron, Inc. Superfund Site
Operable Unit 2 Record of Decision

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Details Regarding ARARs in the Context of the Selected Remedy
Maryland – Water Appropriation or Use	COMAR 26.17.06.01 COMAR 26.17.06.03 COMAR 26.17.06.04 COMAR 26.17.06.05	Applicable	Establishes criteria for water use.	Substantive requirements shall apply to groundwater removal via the SI/GWTS and extraction, however, no permit shall be required.
Maryland Groundwater Cleanup Standards	MDE Cleanup Standards for Soil and Groundwater Interim Final Guidance Version 2.1	Relevant and Appropriate	Establishes numerical cleanup standards for soil and groundwater.	Relevant and appropriate as groundwater cleanup standards outside of the WMA and TI Zone and as soil cleanup standards for the Office Area.
Maryland – Obstruction of Passage of Fish Prohibition	Maryland Code – Title 4 of Natural Resources Article §4-501	Applicable	Prohibits placement of an obstruction across the mouth of any creek or stream that would impound and prevent free passage of any fish to and from the water or up and down the stream.	Applicable to continued operation of the SI/GWTS.

Appendix A

SPECTRON, INC. SITE
OU2 ADMINISTRATIVE RECORD FILE *
INDEX OF DOCUMENTS

I. SITE IDENTIFICATION

1. Letter to Mr. Paul Mraz, Spectron, Inc., from Mr. Ronald Nelson, Maryland Office of Environmental Programs, re: Notification that Maryland Office of Environmental Programs has determined that certain structural deficiencies exist that require corrective measures, 11/29/82. A September 29, 1982, Complaint and Order regarding structural deficiencies, is attached. **

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* Administrative Record File available 7/5/12, updated 9/20/12.

** Marked documents can be referenced in the Spectron, Inc. Site OU 1 Administrative Record File and are incorporated herein by reference.

II. REMEDIAL ENFORCEMENT PLANNING

1. Letter to Mr. Anthony Conte, U.S. EPA, and Mr. Mike Chesik, U.S. EPA, from Mr. Robert Sanchez, U.S. EPA, re: 122(j) notification of negotiations concerning actions to be taken in response to release of hazardous substances, 8/14/03. Certified mail receipts are attached. **

2. Letter to Ms. Sharon Shutler, U.S. EPA, and Mr. Simeon Hahn, U.S. EPA, from Mr. Robert Sanchez, U.S. EPA, re: 122(j) notification of negotiations concerning actions to be taken in response to release of hazardous substances, 8/14/03. A Certified mail receipt is attached. **

III. REMEDIAL RESPONSE PLANNING

1. Report: Draft Focused Remedial Investigation Report, prepared by Environmental Resource Management, Inc. (ERM), 5/4/94. ***

2. Comments on the draft Focused Remedial Investigation, Galaxy/Spectron Site, prepared by Maryland Department of the Environment (MDE), (undated). A September 30, 1994, transmittal letter to Mr. Gerald Hoover, U.S. EPA, from Mr. Rick Grills, MDE, is attached. ***

3. U.S. EPA concurrence with, and additional comments on, the draft Focused Remedial Investigation, 10/18/94. An October 19, 1994, transmittal memorandum to Mr. Gerald Hoover, U.S. EPA, from Ms. Bernice Pasquini, U.S. EPA, is attached. ***

4. Letter to Mr. Gerald Hoover, U.S. EPA, from Mr. Rick Grills, MDE, re: Revisions and additions to MDE's comments on the draft Focused Remedial Investigation, 11/4/94. ***

5. Letter to Mr. Michael Parr, DuPont Chemicals, from Mr. Gerald Hoover, U.S. EPA, re: Transmittal of EPA and MDE comments on the draft Focused Remedial Investigation, and request for a response to these comments within 30 days, 1/9/95. ***

6. Letter to Mr. Jerry Hoover, U.S. EPA, from Mr. Michael Parr, E.I. Dupont Nemours Company, re: Follow up letter to discussion on December 13, 1994, regarding potential need for additional air quality characterization at the Galaxy/Spectron Site, 1/18/95. **

7. Letter to Mr. Gerald Hoover, U.S. EPA, from Mr. James, LaRegina and Mr. Edward Sullivan, ERM, re: Response

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*** Marked documents can be referenced in the Spectron Incorporated Administrative Record File and are incorporated herein by reference.

to EPA's comments on draft Focused Remedial Investigation, 3/24/95. ***

8. Letter to Ms. Jane Schaefer, Cecil County Health Department, from Ms. Sarah Casper, U.S. EPA, re: Update on site activities and indication that report entitled, "Residential Well and Creek Water Sampling Results, Galaxy/Spectron," is being sent, 12/20/95. **

9. Document entitled, "Effluent Biotoxicity Testing Protocol for Industrial and Municipal Effluents," prepared by Maryland Department of the Environment (MDE), 1/22/96. **

10. Report: Removal Action Conceptional Design Report, prepared by Advanced GeoServices Corp., 3/1/96. **

11. Letter to Mr. Christopher Rogers, Cecil County Government, from Ms. Sarah Casper, U.S. EPA, re: Addressing concern regarding proposed subdivision of the Spectron property, 6/14/96. A June 4, 1996, memorandum to Ms. Marcia Preston, U.S. EPA, from Mr. Chip Hosford, U.S. EPA, regarding additional address for Mr. Paul Mraz, is attached. **

12. Transmittal letter to Ms. Sarah Casper, U.S. EPA, from Mr. Paul Mraz, Cecil County Government, re: Attached letter requesting information on the feasibility of subdividing the Spectron property, 6/3/96. The letter is attached. **

13. Preliminary Public Health Assessment, prepared by Agency for Toxic Substances and Disease Registry (ATSDR), 9/30/96. **

14. Report: Remedial Investigation/Feasibility Study (RI/FS) Work Plan for the Galaxy/Spectron Site in Elkton, Maryland, prepared by ERM, 1/28/97. ***

15. Memorandum to Mr. Randy Sturgeon, U.S. EPA, from Ms. Jennifer Hubbard, U.S. EPA, re: Minor comments on the review of the Spectron Creek Risk Assessment, 5/5/97. An April 18, 1997, Risk Assessment (RA), is attached. **

16. Letter to Mr. Randy Sturgeon, U.S. EPA, from Mr. Derek Evans and Mr. Edward Sullivan, Environmental Resources Management (ERM), re: Notification of ERM completion of subtask of Task 2G of the Remedial Investigation/Feasibility Study (RI/FS) Work Plan for the Galaxy/Spectron Site, 7/16/97. An undated MDE comments on the July 16, 1997, ERM letter, the July 16, 1997, Roy F. Weston comments on the July 16, 1997, ERM letter, and a August 29, 1997, facsimile transmittal memorandum, to Mr. Randy Sturgeon, U.S. EPA, from Mr. Tom Cornuet, Roy F. Weston, Inc., are attached. **

17. Letter to Ms. Deirde Murphey, MDE, from Mr. Randy Sturgeon, U.S. EPA, re: Comments on the calculated risk caused by the contaminants from the Spectron Superfund Site, 8/14/97. **

18. Response to ERM comments on RI/FS Literature Review, prepared by MDE, 8/27/97. An August 27, 1997, transmittal letter to Mr. Randy Sturgeon, U.S. EPA, from Mr. Rick Grills, MDE, is attached. **

19. Data Package, Galaxy/Spectron Site, 1/12/98. Undated, data results from groundwater sampling and residential well sampling, are attached. **

20. Letter to Ms. Sarah Caspar, U.S. EPA, from Mr. Rick Grills, MDE, re: Transmittal of comments regarding a report entitled, "Final Removal Action Design Report, Galaxy/Spectron Site, Elkton, Maryland," 4/17/98. The comments are attached. **

21. Letter to Ms. Karen Melvin, U.S. EPA, from Mr. Michael Parr, E.I. Dupont Nemours Company, re: Request by Galaxy/Spectron Group for permission from EPA to implement work described in EPA's April 15, 1998, Action Memorandum, in accordance with the remedial design and in accordance with the Applicable Relevant Requirements (ARARs), 4/27/98. **

22. Facsimile Memorandum to Mr. Randy Sturgeon, U.S. EPA, Mr. Rick Grills, MDE, and Mr. Ramon Benitez, U.S. Army Corp of Engineers (U.S. ACE), from Mr. John Fiore, Maverick Construction Management Services, Inc., re: Notification of Work Plans that were scheduled for submission the past Friday will be sent out by the

following Tuesday morning, 7/26/98. A July 26, 1998, memorandum to the Galaxy/Spectron Group, from Mr. John Fiore, Maverick Construction Management Services, Inc., regarding material required to bring to the July 29, 1998, meeting, directions to Singerly Fire Company (Station 14) and a meeting agenda, are attached. **

23. Report: Galaxy/Spectron Superfund Site, Removal Action, Draft Execution Plan, prepared by Conti Environmental, Inc., 7/27/98. **

24. Letter to Mr. Randy Sturgeon, U.S. EPA, from Mr. John Fiore, Maverick Construction Management Services, Inc., re: Maverick Construction Management Services, Inc.'s resubmittal of Conti Environmental's Health and Safety, Erosion and Sediment Control, and Removal Action Executable Work Plan, 8/10/98. **

25. Bar Graph entitled, "Galaxy/Spectron Removal Action Construction", 8/10/98. An August 1, 1987, Base Grading Plan, an August 24, 1998, Drawing entitled, "Air Monitoring Stations, Galaxy/Spectron Superfund Site, Elkton, Maryland" and a March 11, 1998, Diagram entitled, "Habitat Restoration Block Diagrams," are attached. **

26. Letter to Mr. Randy Sturgeon, U.S. EPA, from Mr. John Fiore, Maverick Construction Management Services, Inc., re: Summary of Removal action measures that will be protective to the public, as discussed during the August 12, 1998, public meeting, 8/10/98. **

27. Report: Proposed Water Treatment System, prepared by Conti Environmental, Inc., 9/29/98. **

28. Report: Baseline Environmental Monitoring Event Pre-Construction Findings Report, prepared by Advanced GeoServices Corporation, 12/98. A December 12, 1998, transmittal letter from Mr. Brian Carling, and Mr. William Richardson, Advanced GeoServices Corp., is attached. **

29. Report: Removal Action Groundwater Treatment Work Plan, prepared by O'Brien & Gere Engineers, Inc.,

1/99. An January 27, 1999, transmittal letter to Mr. Timothy Joness, Maverick Construction Management Services, Inc., from Mr. Randy Sturgeon, U.S. EPA, is attached. **

30. Report: Health and Safety Plan, prepared by O'Brien & Gere Laboratories, Inc., 1/99. A January 27, 1999, transmittal letter to Mr. Timothy Joness, Maverick Construction Management Services, Inc., from Mr. Randy Sturgeon, U.S. EPA, is attached. **

31. Letter to Mr. Richard Grills, MDE, from Mr. Thomas Komar, O'Brien & Gere Engineers, Inc., re: Indication that enclosed data was generated as a result of the influent characterization and flow testing program, 4/2/99. A packet of 42 data tables and an undated, field investigation summary, are attached. **

32. Electronic memorandum to Mr. Randy Sturgeon, U.S. EPA, from Mr. Michael Parr, E.I. Dupont Nemours Company, re: Notification that site cleanup work has begun including additional work on fish passage, 07/22/99. **

33. Report: Bench-Scale Treatability Study, prepared by O'Brien & Gere Laboratories, Inc., 6/10/99. A June 10, 1999, letter to Ms. Margaret Chauncey, MDE, from Mr. Thomas Komer, O'Brien & Gere Laboratories, Inc., regarding the results of the Treatability Study, is attached. **

34. Facsimile transmittal memorandum to Mr. Randy Sturgeon, U.S. EPA, from Mr. Ed Sullivan, ERM, re: Notification that ERM data sent as per earlier discussion, 12/10/99. December 18, 1991, and December 19, 1991, analytical results, are attached. **

35. Report: Project Start Up Plan, prepared by O'Brien & Gere Laboratories, Inc., 1/20/00. A February 23, 2000, transmittal letter to Mr. Randy Surgeon, U.S. EPA, and Mr. Rick Grills, MDE, from Mr. Tim Joness, Maverick Construction Management Sevices, Inc. regarding the Project Start Up Plan, is attached. **

36. Report: Removal Action Construction Certification Report, prepared by Advanced Geoservices Corp., 1/24/00. **

37. Document entitled, "Spectron Scoping Meeting, January 18, 2000, Summary of Meeting Notes," prepared by Roy F. Weston, Inc., for EPA, (undated). **

38. Electronic memorandum to Mr. Randy Sturgeon, U.S. EPA, re: Testing on the PACT reactor and observation on liner float, 3/29/00. **

39. Electronic memorandum, to Mr. Anthony Iacobone, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Comments on Spectron treatment performance relating to concern that system was under designed, 04/25/00. **

40. Electronic memorandum to Mr. Anthony Iacobone, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Listing of key issues involved with ensuring that the Spectron plant works, 05/03/00. **

41. Electronic memorandum to Mr. Anthony Iacobone, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Comments on the preparation of a field report regarding the May 3, 2000, Spectron treatment plant visit, 5/03/00. **

42. Electronic memorandum, to Mr. Anthony Iacobone, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Comments on outstanding issues at the site, including black "plume" from the discharge pipe, growth of grass around discharge pipe and carbon dust inside the building, 05/04/00. **

43. Electronic memorandum to Mr. Randy Sturgeon, U.S. EPA, from Mr. Christopher Guy, U.S. EPA, re: Suggestions on the cause for the appearance of the black plume, 5/5/00. **

44. Electronic memorandum, to Mr. Randy Sturgeon, U.S. EPA, from Mr. Anthony Iacobone, U.S. EPA, re: Comments on VOC effluent level and the possible cause of the black plume, 5/08/00. **

45. Electronic memorandum to Mr. Randy Sturgeon, U.S. EPA, from Ms. Margaret Chauncey, MDE, re: Comments on by-pass pipe location and closing of the by-pass valve, 05/12/00. **

46. Memorandum to file, from Ms. Margaret Chauncey, MDE, re: Possible PRP investigation for the possibility of diverting clean water from recharging the creek, 5/16/00. **

47. Electronic memorandum to Mr. Randy Sturgeon, U.S. EPA, from Ms. Margaret Chauncey, MDE, re: Comments on various issues including: Reception of fax with latest data for Little Elk Creek, question as to whether bypass pipe was charging influent water while samples were being collected, VOC levels in surface water samples and request to keep the "no swimming, no fishing" signs up, 06/09/00. **

48. Report: Updated Evaluation Report, prepared by Advanced GeoServices Corporation, Inc., 6/29/00. A June 29, 2000, transmittal letter to Mr. Randy Sturgeon, U.S. EPA, and Mr. Rick Grills, MDE, from Timothy Joness, Maverick Construction Management Services, Inc., regarding background information relating to the Stream Linear Float Evaluation Report, is attached. **

49. Letter to Mr. Randy Sturgeon, U.S. EPA, and Ms. Margaret Chauncey, MDE, from Mr. Timothy Joness, Maverick Construction Management Services, Inc., re: Comments on measures to address the liner float issue and note that first sludge generated by the groundwater was uncharacteristically hazardous, 8/31/00. **

50. Electronic memorandum to Mr. Timothy Joness, Maverick Construction Management Services, Inc., from Mr. Randy Sturgeon, U.S. EPA, re: Request to begin the air stripper and note to check the amount of air emissions that would cause a health problem, 09/28/00. **

51. Analytical Data Package, prepared by O'Brien & Gere Laboratories, Inc., 10/16/00. An October 25, 2000,

transmittal letter to Mr. Tim Jones, Maverick Construction Management Services, Inc., from Mr. Thomas Komar, O'Brien and Gere, Laboratories, Inc., is attached. **

52. Memorandum to Mr. Randy Sturgeon, U.S. EPA, Mr. Karl Kalbacher, MDE, Mr. Rick Grills, MDE, Mr. Robert Summers, MDE and Mr. Edward Gertler, MDE, from Ms. Margaret Chauncey, MDE, re: Galaxy/Spectron Superfund Site groundwater treatment system off-line, 10/20/00. **

53. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Forwarded message addressing the DNAPL problem and web site listing providing more information on the subject, 10/25/00. **

54. Letter to Mr. Craig Branchfield, Solutia, Inc., from, Mr. Randy Sturgeon, U.S. EPA, re: Update on October 23, 2000, site visit to address maintenance problems relating to a plant shutdown that occurred the prior week, 10/26/00. **

55. Electronic memorandum to Mr. Craig Branchfield, Solutia, Inc., from Mr. Randy Sturgeon, U.S. EPA, re: Accuracies in the data on the Spectron Groundwater Report, 10/27/00. **

56. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Further addressing of inaccuracies in the data on Spectron Groundwater Report, 10/27/00. **

57. Electronic memorandum to Mr. Craig Branchfield, Solutia, Inc., from Mr. Randy Sturgeon, U.S. EPA, re: Question regarding Turbidity-Decant reporting on the Spectron Groundwater Report, 10/27/00. **

58. Memorandum to Mr. Randy Sturgeon, U.S. EPA, and Ms. Margaret Chauncey, MDE, from Mr. Tim Joness, Maverick Construction Management Services, Inc., re: Update of several issues at the site including, removal of carbon from creek, removal of topsoil from creek bank,

installation of bag filters prior to the air stripper, testing of sludge in roll off container, and finalization of temporary treatment system, 11/00. **

59. Letter to Mr. Randy Sturgeon, U.S. EPA, from Mr. Timothy Joness, Maverick Construction Management Services, Inc., re: Temporary groundwater treatment system implemented to treat groundwater passing through the downstream cutoff wall, 11/3/00. **

60. Electronic memorandum to Mr. Craig Branchfield, Solutia, Inc., and Timothy Joness, Maverick Construction Management Services, Inc., from Mr. Randy Sturgeon, U.S. EPA, re: Instrumentation relating to effluent flows, 11/8/00. **

61. Letter to Mr. Randy Sturgeon, U.S. EPA, from Mr. Timothy Joness, Maverick Construction Management Services, Inc., re: Proposed Plan for addressing liner float and groundwater, 11/13/00. **

62. Electronic memorandum to Mr. Craig Branchfield, Solutia, Inc., from Mr. Randy Sturgeon, U.S. EPA, re: Suggestion that streams are analyzed at a range in the next round of GWTS tests, 11/15/00. **

63. Letter to Mr. Craig Branchfield, Solutia, Inc., from Mr. Randy Sturgeon, U.S. EPA, re: U.S. EPA review of air model development to predict residence’s exposure to air releases, 11/15/00. An October 19, 2000, memorandum to Ms. Patricia Flores-Brown, U.S. EPA, from Ms. Randy Sturgeon, U.S. EPA, regarding the comments on the air modeling analysis and statistical data, is attached. **

64. Document entitled; “Analytical results method 624,” prepared by O’Brien and Gere, Laboratories, Inc. Laboratories, Inc., 11/15/00. **

65. Certificate of Analysis-Volatiles, Galaxy/Spectron Superfund Site, 11/16/00. A November 22, 2000, facsimile transmittal memorandum to Mr. Randy Sturgeon, U.S. EPA, from Ms. Margaret Chauncey, MDE, regarding transmittal of sample results, is attached. **

66. Letter to Mr. Craig Branchfield, Solutia, Inc., from Mr. Randy Sturgeon, U.S. EPA, re: EPA's "Off-Site Policy" regarding sludge disposal, 11/21/00. **

67. Transmittal letter to Mr. Randy Sturgeon, U.S. EPA, from Mr. Edward Sullivan, ERM, re: The October and November 2000, Progress Report in accordance with the RI/FS ACO, 12/5/00. The reports are attached. **

68. Letter to Mr. Timothy Joness, Maverick Construction Management Services, Inc., from Mr. Thomas Komar, U.S. EPA, re: Summary of events that led to the addressing of accumulation of carbon in the treatment process, 12/6/00. **

69. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Spectron Site visit to sample the effluent discharge inside the treatment building, 12/08/00. **

70. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Approval of ERM proposal regarding DNAPL monitoring approval, 12/08/00. **

71. Transmittal letter to Mr. Randy Sturgeon, U.S. EPA, and Ms. Margaret Chauncey, MDE, from Mr. Timothy Joness, Maverick Construction Management Services, Inc., re: Transmittal of an October 2000, O & M Report/Temporary Treatment System Work Plan, a December 6, 2000, letter regarding the treatment shutdown that occurred between October 19-21, 2000, November 2000, analytical results and a December 11, 2000, Work Plan, are attached, 12/11/00. **

72. Electronic memorandum to Mr. Randy Sturgeon, U.S. EPA, from Mr. Robert Sanchez, U.S. EPA, re: Decision regarding Spectron's groundwater temporary treatment system, 12/18/00. A December 18, 2000, letter to Mr. Randy Sturgeon, U.S. EPA, from Mr. Craig Branchfield, Solutia, Inc., regarding approval of groundwater temporary treatment system, is attached. **

73. Letter to Mr. Craig Branchfield, Solutia, Inc., from Mr. Robert Sanchez, U.S. EPA, re: Approval of temporary groundwater treatment facility, 1/4/01. A handwritten map is attached. **

74. Letter to Mr. Craig Branchfield, Solutia, Inc., from Mr. Robert Sanchez, U.S. EPA, re: Agenda for January 18, 2001, meeting, 1/5/01. The January 18, 2001, agenda is attached. **

75. Transmittal letter to Mr. Robert Sanchez, U.S. EPA, and Ms. Margaret Chauncey, MDE, from Mr. Timothy Joness, Maverick Construction Management Services, Inc., re: Forwarded December 15, 2000, and December 16, 2000, Groundwater Treatment System analytical results, 1/8/01. The results are attached. **

76. Transmittal letter to Mr. Robert Sanchez, U.S. EPA, and Ms. Margaret Chauncey, MDE, from Mr. Timothy Joness, Maverick Construction Management Services, Inc., re: Forwarded December 28, 2000, and December 29, 2000, Groundwater Treatment System analytical results, 1/14/01. The results are attached. **

77. Transmittal letter to Mr. Robert Sanchez, U.S. EPA, and Ms. Margaret Chauncey, MDE, from Mr. Timothy Joness, Maverick Construction Management Services, Inc., re: Enclosure of O'Brien & Gere's Laboratories, Inc., analytical results from the forth sampling event, 1/26/01. The sampling results are attached. **

78. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Ms. Paula Kovacs, DecisonQuest, re: Approval of Spectron citizen sampling letters for distribution to citizens regarding the monitoring program, 1/31/01. **

79. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Spectron groundwater treatment plant data, 2/10/01. **

80. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Swimming advisory fact sheet distribution to residents, 2/10/01. **

81. Electronic Memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Observation that attached numbers for the treatment plant indicate that the bioreactor is performing poorly, 2/10/01. **

82. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Ms. Margaret Chauncey, MDE, re: Waste disposal practices at Spectron, 2/12/01. **

83. Transmittal letter to Mr. Robert Sanchez, U.S. EPA, from Mr. W. David Fennimore, Earth Data, Inc., re: Transmission of the January 2002, progress report (PRP Group) for the Galaxy/Spectron Superfund Site, 2/14/01. The progress report is attached. **

84. Letter to Mr. W. David Fennimore, Earth Data, Inc., from Mr. Robert Sanchez, U.S. EPA, re: Confirmation of receipt of Maverick Construction’s February 12, 2001, disposal letter concerning non-hazardous waste, 2/21/01. A February 12, 2001, letter to Mr. Robert Sanchez, U.S. EPA, from Mr. Timothy Joness, Maverick Construction Management Services, Inc., regarding determination that sludge and carbon discharge into Little Elk Creek is non-hazardous, a January 3, 2001, letter to Mr. Timothy Joness, from Mr. Kenneth Jones, O’Brien and Gere, Laboratories, Inc., regarding request for permission for O’Brien and Gere, Laboratories, Inc., to dispose of filter cakes, and a July 5, 2000, analytical result packet, are attached. **

85. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Ms. Margaret Chauncey, U.S. EPA, re: Approval of soil storage on site and necessity of issuance of a permanent EPA ID number for continuance of generating hazardous waste, 2/23/01. **

86. Facsimile transmittal memorandum, to Mr. Rick Grills, and Ms. Margaret Chauncey, U.S. EPA, from Mr. Robert Sanchez, U.S. EPA, re: The attendance list for the February 20, 2001, Spectron meeting, 2/28/01. The attendance list is attached. **

87. Electronic Memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Copy of document entitled, "Research Brief 75: An Advanced Characterization Study of a Chlorinated Solvent Contaminated Aquifer", 3/8/01. **

88. Letter to Mr. Thomas Morris, IBM Corporation, from Mr. Randy Sturgeon, U.S. EPA, re: Notification that all electronic data submittals must be submitted as per the format specified in the EPA Region III, "Electron Data Deliverable Specification Manual," 3/15/01. **

89. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. W. David Fennimore, Earth Data, Inc., re: Changes made to notice letters and answer to question regarding soils generated as part of removal action, 3/26/01. **

90. Letter to Mr. W. David Fennimore, Earth Data, Inc., from Mr. Robert Sanchez, U.S. EPA, re: General guidance as to the handling and disposal of waste on site, 3/26/01. **

91. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Approval of ERM's October 5, 2000, proposal regarding monitoring and recovering DNAPL in AW-1 for the two following months, 3/30/01. **

92. Letter to Mr. Robert Sanchez, U.S. EPA, from Mr. Edward Sullivan, ERM, re: Attachment of February 2001, progress report in accordance with the RI/FS

Administrative Order on Consent (AOC), 4/2/01. A February 2001, progress report, is attached. **

93. Facsimile memorandum to Mr. Jim Gravette, MDE, from Mr. Robert Sanchez, U.S. EPA, re: Rough calculation of the discharge rate of the liner when it is floating, 4/10/01. An undated diagram is attached. **

94. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. W. David Fennimore, Earth Data, Inc., re: Treatment shut-down the prior night due to a high level in the equalization tank, 4/11/01. **

95. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Ms. Carrie Deitzel, U.S. EPA, re: Letter to be written by contractor regarding drilling, fact sheet that is needed for RI/FS report and residences requiring notification prior to drilling, 4/11/01. **

96. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Conversation with Mr. Tom Komar, O'Brien and Gere, Laboratories, Inc., regarding the Spectron treatment performance, 4/13/01. **

97. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Question to Mr. Tim Joness, Maverick Construction Management Services, Inc., regarding how the PACT system would meet NPDES compliance, 4/13/01. **

98. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: April 11, 2000, site visit for oversight on the borehole geophysical logging effort at Spectron, 4/13/01. **

99. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Attached summary report for the requested sediment sampling results, 4/13/01. **

100. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Summary of discussion with Mr. Rick Grills, MDE, regarding future site work, 4/13/01. **

101. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: August 1, 2001, reschedule date for re-sampling of four wells (VW-1, VW-3, VW-4 and AW-3S), 4/13/01. **

102. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Review of the PRP's request to turn on the air stripper and questions regarding EPA's plan for the removal action, 4/13/01. **

103. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Attached letter regarding temporary groundwater treatment system, 4/13/01. **

104. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Site visit to Spectron for the purpose of administering electroshock for anadromous fish, 4/13/01. **

105. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Request for Mr. Sturgeon to add citizen's name and address to mailing list, 4/13/01. **

106. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Approval granted to Mr. Tim Joness, Maverick Construction Management Services, Inc., to start the air stripper and indication that Mr. Sturgeon will respond with U.S. EPA comments regarding the site sampling, 4/13/01. **

107. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Request to update well depth for domestic well samples, 4/13/01. **

108. Electronic Memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Update on preparation of field report, 4/13/01. **

109. Electronic Memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Request to look into the bag filter issue and the black discharge, 4/13/01. **

110. Letter to Mr. W. Dave Fennimore, Earth Data, Inc., from Mr. Robert Sanchez, U.S. EPA, re: Notification that U.S. EPA has reviewed the RI/FS Work Plan Addendum No. 2 for Additional Bedrock Investigation, 5/16/01. **

111. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. W. David Fennimore, Earth Data, Inc., re: Acknowledgment of review of February 2001, residential well samples, 5/21/01. **

112. Electronic memorandum to Ms. Jennifer Hubbard, U.S. EPA, from Mr. Edward Sullivan, ERM, re: ERM lab correctly analyzed December, 1991, lab results for MW-11 data, 5/21/01. **

113. Electronic memorandum to Mr. Randy Sturgeon, U.S. EPA, from Ms. Margaret Chauncey, MDE, re: Review of O'Brien and Gere's mass balance estimates of maximum potential air stripper emissions, 6/2/01. **

114. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Ms. Jennifer Hubbard, U.S. EPA, re: U.S. EPA response to ERM comments on Spectron Work Plan, 6/14/01. **

115. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Jim Gravette, MDE, re: Determination that the 100% removal design drawing is incomplete and related comments to the design drawing, 7/02/01. **

116. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Randy Sturgeon, U.S. EPA, re: Request for Mr. Sanchez to review at listing of July 10, 2001, internet seminar regarding Natural Attenuation of Chlorinated Solvents in Groundwater, 7/02/01. **

117. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Jim Gravette, MDE, re: Comments on Certification Report, 7/2/01. **

118. Transmittal letter to Mr. Robert Sanchez, U.S. EPA, from Mr. Edward Sullivan, ERM, re: A June 2001, Progress Report for Galaxy/Spectron Site, 7/16/01. The progress report is attached. **

119. Memorandum to file, from Mr. Robert Sanchez, U.S. EPA, re: Spectron PRP Removal Cost Evaluation, 7/19/01. **

120. Electronic memorandum to Mr. W. David Fennimore, Earth Data, Inc., from Mr. Robert Sanchez, ERM, re: Request for EPA and MDE to better understand the stream liner design and the willingness of EPA and MDE contacts to travel to ERM's office, if necessary, to facilitate this objective, 8/06/01. **

121. Electronic memorandum to Mr. W. David Fennimore, Earth Data, Inc., from Mr. Robert Sanchez, U.S. EPA, re: Approval of residential well sampling results conducted in May 2001, and the approval of well sampling results for the respective residents, 8/08/01. **

122. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. W. David Fennimore, Earth Data, Inc., re: Notification that Mr. W. David Fennimore has a scheduled meeting with O'Brien and Gere, Laboratories, Inc., concerning the hydraulics of the stream liner system, 8/15/01. **

123. Letter to Mr. Robert Sanchez, U.S. EPA, from Mr. Edward Sullivan, ERM, re: July 2001, Progress Report for Galaxy/Spectron Site, 8/21/01. The progress report is attached. **

124. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Mark Kluger, Dajak, LLC., re: The use of pressure pulse technology as a potential means to assist in removing free contaminants from the site, 11/20/01. **

125. Letter to Mr. Robert Sanchez, U.S. EPA, from Mr. William Butler, ERM, re: Submission of September 2001, and November 2001, Progress Reports, 12/11/01. The September 2001, and November 2001, Progress Reports are attached. **

126. Letter to Mr. Robert Sanchez, U.S. EPA, from Mr. William Butler, ERM, re: Submission of December 2001, Progress Report, 1/11/02. A December 2001, Progress Report, is attached. **

127. Electronic Memorandum to Ms. Bernice Pasquini, U.S. EPA, from Mr. Robert Sanchez, U.S. EPA, re: Notification that on January 30, 2002, Earth Data, Inc., team will visit the Spectron Site to remove accumulated DNAPL from AW-1 and set the packer as per the approved work plan, 1/28/02. **

128. Electronic memorandum to Mr. Louis Founier, Star Company, from Mr. Robert Sanchez, U.S. EPA, re: Response to the notification that Star Company is working on two proposals for contamination removal, 02/11/02. **

129. Electronic memorandum to Mr. W. David Fennimore, Earth Data, Inc., from Mr. Robert Sanchez, U.S. EPA, re: The need to set up a meeting with risk assessor to develop an Eco Risk Assessment (ERA), 2/20/02. **

130. Letter to Mr. John Brezenski, USACE, from Mr. Robert Sanchez, U.S. EPA, re: Request for Roy F. Weston, Inc. to assist with the development of the Proposed Remedial Action Plan (PRAP), 2/27/02. Draft Spectron notes in response to the letter, and a June 6, 2000, and June 7, 2000, Remedial Technologies Development Forum training course workbook, are attached. **

131. Document entitled, “Spectron Meeting notes between Mr. Robert Sanchez, U.S. EPA, and Roy F. Weston, Inc.,” prepared by U.S. EPA, 3/6/02. **

132. Electronic memorandum to Mr. Robert Sanchez, U.S. EPA, from Mr. Jim Gravette, MDE, re: Reply to electronic memorandum regarding the installation of soil cover on site flood plains, 3/27/02. **

133. Letter to Mr. W. David Fennimore, Earth Data Inc., from Mr. Robert Sanchez, U.S. EPA, re: Request for a schedule for completion of a Groundwater Isolation and Collection System Status Report, 4/22/02. **

134. Memorandum to file from Mr. Robert Sanchez, U.S. EPA, re: Record of telephone conversation concerning comments to Alternative #10, 4/22/02. An April 9, 2002, letter to Mr. Robert Sanchez, U.S. EPA from Mr. W. David Fennimore, Earth Data, Inc., and a FS addendum, is attached. **

135. Letter to Mr. Robert Sanchez, U.S. EPA, from Mr. W. David Fennimore, Earth Data, Inc., re: Submission of the April 2002, Progress Report, 05/22/02. **

136. Letter to Mr. Robert Sanchez, U.S. EPA, from Mr. James Gravette, MDE, re: Response to written request regarding the effectiveness of the Little Elk Creek Removal Action Containment/Groundwater Collection System, 8/26/02. A September 24, 2002, facsimile transmission memorandum to Mr. W. David Fennimore, Earth Data, Inc., from Mr Robert Sanchez, U.S. EPA, regarding An August 26, 2002, letter from MDE, is attached. **

137. Letter to Mr. Robert Sanchez, U.S. EPA, from Mr. W. David Fennimore, Earth Data, Inc., re: October 2002, Progress Report, 12/19/02. The report is attached. **

138. Report: <u>Progress Report for the Stream Isolation/Groundwater Collection and Treatment System</u>, prepared by O’Brien and Gere, Laboratories, Inc. Engineers, Inc., 1/03. A January 9, 2003, transmittal letter to Mr. Robert Sanchez, U.S. EPA, from Mr.

Michael Kozar, O'Brien and Gere, Laboratories, Inc. Engineers, Inc., is attached. **

139. Letter to Mr. Robert Sanchez, U.S. EPA, from Mr. W. David Fennimore, Earth Data, Inc., re: November 2002, Progress Report, 01/06/03. The report is attached. **

140. Memorandum to Mr. Eric Johnson, U.S. EPA, and Ms. Jennifer Hubbard, U.S. EPA, from Mr. Robert Sanchez, U.S. EPA, re: Little Elk Creek as a Public Water Supply Risk Assessment Request, 01/31/03. The following are attached: **

a) a document entitled "Appendix D.9, MD Stream Use Designations;"

b) a September 3, 1998, letter to Mr. Andy Weber, Conti Environmental, Inc., from Mr. Edward Gertler, MDE, regarding Discharge Criteria;

c) a Code of Maryland Regulations (COMAR)Subsection 26.08.02.02;

d) a July 15, 1998, letter to Ms. Sarah Caspar, U.S. EPA, from Mr. Edward Sullivan, ERM, regarding Creek Surface Water Sample results and Stream Sampling Analytical results.

141. Letter to Mr. Robert Sanchez, U.S. EPA, from Mr. W. David Fennimore, Earth Data, Inc., re: December 2002, Progress Report, 02/04/03. **

142. Electronic memorandum to Mr. Jim Gravette, MDE, from Mr. Robert Sanchez, U.S. EPA, re: Comments on December, 2002, monthly report, 3/03/03. **

143. Letter to Mr. Robert Sanchez, U.S. EPA, from Mr. W. David Fennimore, Earth Data, Inc., re: A January 2003, Progress Report, 03/04/03. **

144. Memorandum to file, from Mr. Robert Sanchez, U.S. EPA, re: Indication that the office area is within the boundaries of the site, 03/22/03. **

145. 249. Electronic Memorandum to Mr. Jim Gravette, MDE, and Mr. Rick Grills, MDE, from Mr. Robert Sanchez, U.S. EPA, re: Historical information concerning designated stream usage, 6/17/03. **

146. 254. Memorandum to Mr. Robert Sanchez, U.S. EPA, from Ms. Jennifer Hubbard, U.S. EPA, re: Evaluation of swimming risks from Spectron stream data, 7/31/03. **

147. Letter to Mr. David Fennimore, Earth Data, Inc., from Mr. Robert Sanchez, U.S. EPA, re: Discovery of chemical stabilizer and request for sampling of Ground Water Treatment System influent and effluent, 7/31/03. A February 19, 2003, memorandum from Ms. Jennifer Hubbard, U.S. EPA, to Mr. Robert Sanchez, U.S. EPA, regarding consideration of 1,4-Dioxane, is attached. **

148. Letter to Mr. David Fennimore, Earth Data, Inc., from Mr. Robert Sanchez, U.S. EPA, re: Removal of Swimming Advisory on Little Elk Creek, 7/31/03. A July 31, 2003, memorandum to Mr. Robert Sanchez, U.S. EPA, from Ms. Jennifer Hubbard, U.S. EPA, regarding comments on swimming risks at Little Elk Creek, is attached. **

149. Report: Volatization from a Stream with Resulting Annual Average Air Concentrations, Galaxy/Spectron Superfund Site, U.S. EPA, (undated). A July 17, 2000, transmittal memorandum to Mr. Randy Sturgeon, U.S. EPA, from Ms. Patricia Flores-Brown, U.S. EPA, is attached. **

150. Report: Supplemental Submittal, Bedrock RI Data Package, Discussion Document, Remedial Investigation, Galaxy/Spectron Site, prepared by Environmental Resources Management, 2/6/01. P. 300001-300063.

151. Report: Focused Surface Water and Sediment Sampling Plan, Spectron Superfund Site, Elkton, Maryland, prepared by O'Brien & Gere, 1/06. P. 300064-300093. ΔΔ

152. Technical Memorandum to Mr. W. David Fennimore, Earth Data Northeast, Inc., and Spectron Site Waste Generator and Transporter Group II, from Mr. Michael Kozar and Mr. Michael Christopher, O'Brien & Gere, re: Spectron Superfund Site, Office Area – Remedial Investigation Data Review, 3/15/06. P. 300094-300110. A July 2007, Figure 5 – Soil Vapor Sample Location Plan, is attached.

153. Report: Screening-Level Ecological Risk Assessment (SLERA), Galaxy/Spectron Superfund Site, Elkton, Maryland, prepared by O'Brien & Gere, 8/07. P. 300111-300174. ΔΔ

154. Letter Report to Ms. Rashmi Mathur, U.S. EPA, from Mr. Michael Kozar, O'Brien & Gere Engineers, Inc., re: Revised Work Plan Addendum for Comprehensive Ground Water Sampling Event – Bedrock Remedial Investigation, 6/20/08. P. 300175-300187. Related documents are attached. ΔΔ

155. Letter Report to Ms. Stephanie Wenning, U.S. EPA, from Mr. Michael Kozar, O'Brien & Gere Engineers, Inc., re: Revised Work Plan for Soil Vapor/Indoor Air and Shallow Ground Water Sampling, 6/5/09. P. 300188-300209. ΔΔ

ΔΔ Document has been redacted to protect the privacy of individuals. Redactions are evident from the face of the document.

156. Report: Quality Assurance Project Plan, Vapor Sampling, Spectron Inc. Superfund Site, Elkton, Maryland, prepared by O'Brien & Gere, 7/09. P. 300210-300279. ΔΔ †

157. Report: Operable Unit 2, Human Health Risk Assessment, Spectron Inc. Superfund Site, Elkton, Maryland, prepared by O'Brien & Gere, 11/09. P. 300280-300521. ΔΔ ‡

158. Report: Remedial Investigation Report for Operable Unit 2 (Bedrock Groundwater), Spectron, Inc. Superfund Site, Elkton, Maryland, Part 1 of 3 – Report Body, Tables, Figures, prepared by O'Brien & Gere, 10/10. P. 300522-300906. ΔΔ

159. Report: Remedial Investigation Report for Operable Unit 2 (Bedrock Groundwater), Spectron, Inc. Superfund Site, Elkton, Maryland, Part 2 of 3 – Appendices A - E, prepared by O'Brien & Gere, 10/10. P. 300907-301140. ΔΔ

160. Report: Remedial Investigation Report for Operable Unit 2 (Bedrock Groundwater), Spectron, Inc. Superfund Site, Elkton, Maryland, Part 3 of 3 – Appendices G – N & P - U, prepared by O'Brien & Gere, 10/10. P. 301141-302540. ΔΔ §

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† Attachments B & C of this document were not relied on for this Administrative Record File and have not been included in the File.

‡ The raw analytical data of Appendix A was tabulated and included elsewhere in the report. This appendix was not relied on for this Administrative Record File and has not been included in the File.

§ The raw analytical data of Appendix O was tabulated and included elsewhere in the report. This appendix was not relied on for this Administrative Record File and has not been included in the File.

161. Report: Final Feasibility Study for Operable Unit 2, Bedrock Groundwater and Office Area, Spectron Inc. Superfund Site, Elkton, Maryland, prepared by O'Brien & Gere, 6/12. P. 302541-302962. ΔΔ

162. Interim Proposed Plan for Record of Decision, Spectron Inc. Superfund Site, Operable Unit 2, Elkton, Maryland, 7/12. P. 302963-303045.

163. Letter to Mr. John Epps, U.S. EPA, from Mr. W. David Fennimore, Earth Data Northeast, Inc., re: Comments on the Interim Proposed Plan for Record of Decision for Operable Unit #2, 8/7/12. P. 303046-303048.

164. Letter to Mr. John Epps, U.S. EPA, from Ms. Jennifer DiJoseph and Mr. Paul Stratman, Advanced GeoServices, re: Request for implementation of option OAS-2, 8/21/12. P. 303049-303050.

V. COMMUNITY INVOLVEMENT

1. Newsletter from Cecil County Health Department, entitled “Newsletter, Galaxy/Spectron Superfund Site,” 11/96. **

2. Newsletter from Cecil County Health Department, entitled “Newsletter No. 3, Galaxy/Spectron Superfund Site,” 12/96. **

3. Newsletter from Cecil County Health Department, entitled “Newsletter No. 4, Galaxy/Spectron Superfund Site,” 2/97. **

4. Newsletter from Cecil County Health Department, entitled “Newsletter No. 6, Galaxy/Spectron Superfund Site,” 7/97. **

5. Newsletter from Cecil County Health Department, entitled “Newsletter No. 10, Galaxy/Spectron Superfund Site,” 6/98. **

6. U.S. EPA Public Notice, Spectron, Inc. Superfund Site, re: US EPA Issues Interim Proposed Remedial Action Plan, (undated). P. 500001-500001.

7. U.S. EPA Public Notice, Spectron, Inc. Superfund Site, re: US EPA Issues Interim Proposed Remedial Action Plan, 7/9/12. P. 500002-500002.

8. Transcript of Public Meeting Minutes, In Re: Proposed Remedial Action Plan, Spectron, Inc. Superfund Site, 7/18/12. P. 500003-500066.

Appendix B

MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Boulevard • Baltimore MD 21230
410-537-3000 • 1-800-633-6101 • www.mde.state.md.us

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Robert M. Summers, Ph.D.
Secretary

July 23, 2012

Mr. John Epps, Remedial Project Manager
U.S. Environmental Protection Agency
Region III
Hazardous Site Cleanup Division
Western PA/MD Branch (3HS22)
1650 Arch Street
Philadelphia, PA 19103-2029

Re: Interim Proposed Plan for Spectron, Inc. Superfund Site
Operable Unit 2
Elkton, Maryland, June 2012

Dear Mr. Epps:

The Maryland Department of the Environment, Land Restoration Program (MDE/LRP) has reviewed the above referenced document. MDE/LRP concurs with Applicable or Relevant and Appropriate Requirements (ARARs) selected in the Interim Proposed Plan for the Operable Unit 2 that consists of bedrock groundwater and Office Area.

The Preferred Alternative (PA) for the bedrock groundwater presented in the document includes the following: (1) Delineation of the capture zone of the existing Stream Isolation/Groundwater Collection and Treatment System (SI/GWTS) and the delineation of the extent of dense non-aqueous phase liquid (DNAPL); (2) Continued operation and maintenance of the SI/GWTS, including modifications/upgrades necessary to treat extracted bedrock groundwater; (3) DNAPL collection/extraction and off-site treatment; (4) Groundwater extraction and treatment using the existing GWTS; (5) Groundwater monitoring; (6) Surface water monitoring; (7) Monitored natural attenuation evaluation; (8) Residential well monitoring and wellhead treatment; (9) Vapor intrusion monitoring and mitigation; and (10) Land and groundwater use restrictions.

The ARARs in this Proposed Plan relating to groundwater, DNAPL and the continued operation of the SI/GWTS, such as federal and Maryland air emission regulations, surface water quality regulations, and hazardous waste management regulations, would continue to be met under all proposed remedial alternatives. The groundwater ARARs will not be met within a portion of the bedrock groundwater contaminant plume identified as a Technical Impracticability (TI) Zone and Source Area Waste Management Area (WMA) but will be required to be met within the remainder of the groundwater contaminant plume outside of the TI Zone and WMA.

AR303189

The U.S. Environmental Protection Agency (EPA) has determined that meeting groundwater cleanup ARARs for compounds that were detected in DNAPL in TI Zone and WMA will be technically impracticable from an engineering perspective due to the following factors: (1) DNAPL is present at the Site in bedrock at depths up to 360 feet bgs; (2) Extraction or complete hydraulic containment of DNAPL is not feasible due to very low permeability of the bedrock and decreased number and interconnectivity of fractures with depth; and (3) Aggressive pumping or injection of in-situ treatment amendments may potentially mobilize DNAPL and impact residential wells that are currently unaffected. Although EPA has determined that it is technically impracticable to restore bedrock groundwater to meet groundwater ARARs within the TI Zone and WMA, as an alternative remediation strategy to ensure protection of human health, the remedial alternatives were designed to: (1) Treat DNAPL to the maximum extent practicable; (2) Contain DNAPL and associated dissolved volatile organic compounds where treatment is impracticable; (3) Prevent potential exposure to DNAPL and contaminated groundwater through monitoring and institutional controls; and (4) Restore bedrock groundwater outside the TI Zone and WMA to meet groundwater ARARs.

The PA for the Office Area includes: delineation, excavation and off-site disposal of contaminated soil, backfill of excavation using clean fill, and land and groundwater use restrictions. The chemical, location, and action-specific ARARs will be met at the Office Area.

If you should have any questions, please contact me at (410) 537-3493.

Sincerely,

Irene Rybak

Irena Rybak
Project Manager
Land Restoration Program

cc: Mr. Horacio Tablada
Mr. James R. Carroll
Mr. Kim Lemaster

MARYLAND DEPARTMENT OF THE ENVIRONMENT
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September 19, 2012

Mr. John Epps, Remedial Project Manager
U.S. Environmental Protection Agency
Region III
Hazardous Site Cleanup Division
Western PA/MD Branch (3HS22)
1650 Arch Street
Philadelphia, PA 19103-2029

Re: Interim Record of Decision, Operable Unit 2, Bedrock Groundwater & Office Area
Spectron, Inc. Superfund Site, Elkton, Cecil County, Maryland, September 2012.

Dear Mr. Epps:

The Maryland Department of the Environment, Land Restoration Program (MDE/LRP) has completed its review of the Interim Record of Decision (Interim ROD) for Operable Unit 2 (OU-2) Bedrock Groundwater and Office Area Soil at the Spectron Inc. Superfund Site located in Elkton, Cecil County, Maryland. This letter transmits the MDE/LRP's concurrence with the U.S. Environmental Protection Agency's (EPA's) selected remedy for the OU-2 Bedrock Groundwater Source Area and the portion of Operable Unit 1 (OU-1) Office Area Soil that was not addressed under OU-1 in a September 16, 2004 Record of Decision (ROD) and March 29, 2012 ROD Amendment.

The OU-2 is defined as the Bedrock Groundwater Source Area and the Bedrock Groundwater Dissolved Volatile Organic Compounds (VOC) Plume. The above-referenced Interim ROD specifies the selected remedy for the Bedrock Groundwater Source Area and additional data collection to facilitate the selection of a remedy for the Bedrock Groundwater Dissolved VOC Plume in a future ROD. The final remedy for OU-2, addressing the Bedrock Groundwater Dissolved VOC Plume, will be determined at a later time and specified in a future ROD.

The selected remedy for the Bedrock Groundwater Source Area includes the following: (1) Delineation of the Stream Isolation and Groundwater Treatment System (SI/GWTS) capture zone and dense non-aqueous phase liquid (DNAPL) extent; (2) Continued operation and maintenance of the SI/GWTS, including modifications/upgrades necessary to treat extracted bedrock groundwater; (3) DNAPL collection/extraction and off-site treatment/disposal; (4) Groundwater extraction and treatment using the existing GWTS; (5) Groundwater monitoring; (6) Surface water monitoring; (7) Monitored natural attenuation evaluation;

(8) Residential well monitoring and wellhead treatment; (9) Vapor intrusion monitoring and mitigation; and (10) Land and groundwater use restrictions.

The selected remedy for the Bedrock Groundwater Source Area also includes a Technical Impracticability (TI) Waiver of groundwater Applicable or Relevant and Appropriate Requirements (ARARs) for a portion of the Bedrock Groundwater Source Area due primarily to the presence of DNAPL in deep bedrock and the low permeability of the geologic formation. Additionally, groundwater will not be remediated to groundwater ARARs within the Waste Management Area (WMA) at the Site because waste would be left in place as a component of the OU-1 remedy, per the 2004 OU-1 ROD. Although EPA has determined that it is technically impracticable to restore bedrock groundwater to meet groundwater ARARs within the TI Zone and WMA, the bedrock groundwater will be restored to meet groundwater ARARs outside of the TI Zone and WMA.

The selected remedy for the Office Area Soil consists of excavation of soil, placement under OU-1 asphalt (or equivalent) cap, confirmatory soil sampling and analysis, backfill of excavation using clean fill, and land and groundwater use restrictions. The remedy for the Office Area Soil was revised after the public meeting held by EPA on July 18, 2012 to present the preferred alternatives in the proposed plan. Based on comments submitted during the public comment period, the placement of the excavated soil under OU-1 asphalt (or equivalent) cap was selected, rather than off-site disposal that is consistent with the remedy selected in the 2004 OU-1 ROD.

If you have any questions, please contact me or Irena Rybak, Project Manager, at (410) 537-3493.

Sincerely,

James R. Carroll, Program Manager
Land Restoration Program

JC:ir

cc: Mr. Horacio Tablada
Mr. Kim Lemaster
Ms. Peggy Smith
Ms. Irena Rybak

Appendix C

TABLE 10.1 RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SPECTRON SUPERFUND SITE, ELKTON, MARYLAND

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

Environmental Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water (Well Water)	Drinking Water	Potable Water Sites	None	--	--	--	0 E+00	--	--	--	--	0 E+00
			Chemical Total				0 E+00					0 E+00
		Exposure PointTotal					0 E+00					0 E+00
	Exposure Medium Total						0 E+00					0 E+00
	Drinking Water	Potable Water Sites (Shower)	None	--	--	--	0 E+00	--	--	--	--	0 E+00
			Chemical Total				0 E+00					0 E+00
		Exposure Point Total					0 E+00					0 E+00
	Exposure Medium Total						0 E+00					0 E+00
Envrionmental Medium Total							0 E+00					0 E+00
Receptor Total							0 E+00					0 E+00

Total Risk Across All Media = 0E+00

Total Hazard Across All Media = 0E+00

TABLE 10.2 RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SPECTRON SUPERFUND SITE, ELKTON, MARYLAND

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

Environmental Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water (Well Water)	Drinking Water	Potable Water Sites	None	--	--	--	0 E+00	--	--	--	--	0 E+00
			Chemical Total				0 E+00					0 E+00
		Exposure PointTotal					0 E+00					0 E+00
	Exposure Medium Total						0 E+00					0 E+00
Envrionmental Medium Total							0 E+00					0 E+00
Receptor Total							0 E+00					0 E+00

Total Risk Across All Media = 0 E+00

Total Hazard Across All Media = 0 E+00

TABLE 10.3 RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SPECTRON SUPERFUND SITE, ELKTON, MARYLAND

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

Environmental Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Office Area Surface Soil	Arsenic	7.4E-05		7.0E-06	8.E-05	Hyperpigmentation (In); Vascular (V); PNS (N)	1.4E-01		1.8E-02	2.E-01
			Chemical Total	7.4E-05	--	7.0E-06	8.E-05		1.4E-01	--	1.8E-02	2.E-01
		Exposure Point Total					8.E-05					2.E-01
	Exposure Medium Total						8.E-05					2.E-01
Medium Total							8.E-05					2.E-01
Bedrock Ground Water	Ground Water	Potable Water Sites	1,1,1-Trichloroethane					Liver	2E+00		4E-01	3E+00
			1,1-Dichloroethane					Liver	4E-01		3E-02	5E-01
			1,1-Dichloroethene					Liver	7E-01		9E-02	8E-01
			1,2,4-Trichlorobenzene					Increased adrenal weight (E); Vacuolization of zona fasciculata in the cortex	5E-01		6E-01	1E+00
			1,2-Dichloroethane	2E-02		1E-03	2E-02					
			Benzene	1E-04		2E-05	1E-04	Blood and immune system	2E+00		3E-01	2E+00
			Bis(2-chloroethyl) ether (2-chloroethyl ether)	6E-03		2E-04	6E-03					
			Chlorobenzene					Liver histopathology (H)	2E+00		8E-01	3E+00
			cis-1,2-Dichloroethene					Blood	8E+00		7E-01	8E+00
			Methylene Chloride	3E-02		1E-03	3E-02	Hepatic (H)	2E+02		7E+00	2E+02
			Tetrachloroethylene (PCE)	4E-02		2E-02	6E-02	Hepatotoxicity (H); Weight gain (W)	2E+01		1E+01	3E+01
			Trichloroethylene (TCE)	3E-04		5E-05	4E-04	Liver, kidney, fetus	2E+02		4E+01	3E+02
			Vinyl Chloride	3E-04		2E-05	3E-04	Hepatic (H)	4E-01		2E-02	5E-01
			Xylene (Total)					Decreased body weight (W); Mortality (M)	2E-01		1E-01	4E-01
			Chemical Total	1E-01		3E-02	1E-01		5E+02		6E+01	5E+02
		Exposure PointTotal					1E-01					5E+02
	Exposure Medium Total						1E-01					5E+02
	Ground Water	Potable Water Sites (Shower)	1,1,1-Trichloroethane									
			1,1-Dichloroethane					Kidney		5E-01		5E-01
			1,1-Dichloroethene					Liver		5E-01		5E-01
			1,2,4-Trichlorobenzene									
			1,2-Dichloroethane		1E-02		1E-02	Hepatic		6E-01		6E-01
			Benzene		6E-05		6E-05	Blood and immune system		7E-01		7E-01
			Bis(2-chloroethyl) ether (2-chloroethyl ether)		3E-04		3E-04					
			Chlorobenzene					Liver, kidney		2E+00		2E+00
			cis-1,2-Dichloroethene									
			Methylene Chloride		6E-03		6E-03	Liver		3E+01		3E+01
			Tetrachloroethylene (PCE)		9E-04		9E-04	Neurological (N)		2E+00		2E+00
			Trichloroethylene (TCE)		1E-04		1E-04	Central nervous system, liver, endocrine system		2E+01		2E+01
			Vinyl Chloride		7E-06		7E-06	Liver		5E-02		5E-02

TABLE 10.3 RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SPECTRON SUPERFUND SITE, ELKTON, MARYLAND

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

Environmental Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
			Xylene (Total)					Impaired motor coordination (decreased rotarod performance)		1E+00		1E+00
			Chemical Total		2E-02		2E-02			6E+01		6E+01
		Exposure Point Total					2E-02					6E+01
	Exposure Medium Total						2E-02					6E+01
Envrionmental Medium Total							1E-01					6E+02
Receptor Total							1E-01					6E+02

Total Risk Across All Media = 1E-01

Total Hazard Across All Media = 6E+02

Total Liver HI Across All Media = 6E+02
Total Kidney HI Across All Media = 3E+02
Total Nervous System Effects HI Across All Media = 2E+01
Total Other Effects HI Across All Media = 1E+01

TABLE 10.4 RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SPECTRON SUPERFUND SITE, ELKTON, MARYLAND

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

Environmental Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Office Area Surface Soil	Arsenic	5 E-05		4 E-06	6 E-05	Hyperpigmentation (In); Vascular (V); PNS (N)	1 E+00		1 E-01	1 E+00
			Chemical Total	5 E-05	--	4 E-06	6 E-05		1 E+00	--	1 E-01	1 E+00
		Exposure Point Total					6 E-05					1 E+00
	Exposure Medium Total						6 E-05					1 E+00
Medium Total							6 E-05					1 E+00
Bedrock Ground Water	Ground Water	Potable Water Sites	1,1,1-Trichloroethane					Liver	5E+00		9E-01	6E+00
			1,1-Dichloroethane					Liver	1E+00		8E-02	1E+00
			1,1-Dichloroethene					Liver	2E+00		2E-01	2E+00
			1,2,4-Trichlorobenzene					Increased adrenal weight (E); Vacuolization of zona fasciculata in the cortex	1E+00		1E+00	3E+00
			1,2-Dichlorobenzene					First effects occur in kidney, liver, and blood	4E-01		2E-01	6E-01
			1,2-Dichloroethane	1E-02		6E-04	1E-02					
			Benzene	7E-05		1E-05	9E-05	Blood and immune system	4E+00		6E-01	5E+00
			Bis(2-chloroethyl) ether (2-chloroethyl ether)	3E-03		9E-05	3E-03					
			Chlorobenzene					Liver histopathology (H)	5E+00		2E+00	7E+00
			cis-1,2-Dichloroethene					Blood	2E+01		2E+00	2E+01
			Ethylbenzene					Hepatic (H); Renal (R)	6E-01		3E-01	9E-01
			Methylene Chloride	2E-02		7E-04	2E-02	Hepatic (H)	5E+02		2E+01	5E+02
			Tetrachloroethylene (PCE)	2E-02		1E-02	4E-02	Hepatotoxicity (H); Weight gain (W)	5E+01		3E+01	8E+01
			Toluene					Kidney weight (R)	2E+00		5E-01	2E+00
			Trichloroethylene (TCE)	2E-04		3E-05	2E-04	Liver, kidney, fetus	5E+02		9E+01	6E+02
			Vinyl Chloride	2E-03		1E-04	3E-03	Hepatic (H)	1E+00		6E-02	1E+00
			Chemical Total	6E-02		1E-02	7E-02		1E+03		1E+02	1E+03
		Exposure PointTotal					7E-02					1E+03
	Exposure Medium Total						7E-02					1E+03
Envrionmental Medium Total							7E-02					1E+03
Receptor Total							7.E-02	Receptor HI Total				1.E+03

Total Risk Across All Media = 7E-02

Total Hazard Across All Media = 1E+03

Total Liver HI Across All Media = 1E+03
Total Kidney HI Across All Media = 6E+02
Total Nervous System Effects HI Across All Media = 1E+00
Total Other Effects HI Across All Media = 3 E+01

TABLE 10.5 RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SPECTRON SUPERFUND SITE, ELKTON, MARYLAND

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Environmental Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil & Subsurface Soil	Surface Soil & Subsurface Soil	Office Area Surface Soil & Subsurface Soil	Arsenic	2E-06	3E-10	2E-07	2E-06	Hyperpigmentation (In); Vascular (V); PNS (N)	3E-01	2E-04	3E-02	4E-01
			Chemical Total	2E-06	3E-10	2E-07	2E-06		3E-01	2E-04	3E-02	4E-01
		Exposure Point Total					2E-06					4E-01
	Exposure Medium Total						2E-06					4E-01
Envrionmental Medium Total							2E-06					4E-01
Receptor Total							2E-06				Receptor HI Total	4E-01

Total Risk Across All Media = 2E-06

Total Hazard Across All Media = 4E-01

Total Nervous System Effects HI Across All Media = 4 E-01

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TABLE 10.6 CT
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
SPECTRON SUPERFUND SITE, ELKTON, MARYLAND

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

Environmental Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water (Well Water)	Drinking Water	Potable Water Sites	None	--	--	--	0E+00	--	--	--	--	0E+00
			Chemical Total				0E+00					0E+00
		Exposure PointTotal					0E+00					0E+00
	Exposure Medium Total						0E+00					0E+00
	Drinking Water	Potable Water Sites (Shower)	None	--	--	--	0E+00	--	--	--	--	0E+00
			Chemical Total				0E+00					0E+00
		Exposure Point Total					0 E+00					0E+00
	Exposure Medium Total						0 E+00					0E+00
Envrionmental Medium Total							0 E+00					0E+00

Total Risk Across All Media = 0 E+00

Total Hazard Across All Media = 0 E+00

TABLE 10.7 CT
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
SPECTRON SUPERFUND SITE, ELKTON, MARYLAND

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

Environmental Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water (Well Water)	Drinking Water	Potable Water Sites	None	--	--	--	0 E+00	--	--	--	--	0 E+00
			Chemical Total				0 E+00					0 E+00
		Exposure PointTotal					0 E+00					0 E+00
	Exposure Medium Total						0 E+00					0 E+00
Envrionmental Medium Total							0 E+00					0 E+00
Receptor Total							0 E+00					0 E+00

Total Risk Across All Media = 0 E+00

Total Hazard Across All Media = 0 E+00

TABLE 10.8 CT
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
SPECTRON SUPERFUND SITE, ELKTON, MARYLAND

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Office Area Surface Soil	Arsenic	4 E-05		1 E-06	4 E-05	Hyperpigmentation (In); Vascular (V); PNS (N)	7 E-02		3 E-03	7 E-02
			Chemical Total	4 E-05	--	1 E-06	4 E-05		7 E-02	--	3 E-03	7 E-02
		Exposure Point Total					4 E-05					7 E-02
	Exposure Medium Total						4 E-05					7 E-02
Envrionmental Medium Total							4 E-05					7 E-02
Bedrock Ground Water	Ground Water	Potable Water Sites	1,1,1-Trichloroethane					Liver	2E+00		3E-01	2E+00
			1,2-Dichloroethane	5E-03		2E-04	6E-03					
			Benzene	3E-05		5E-06	4E-05	Blood and immune system	1E+00		2E-01	1E+00
			Bis(2-chloroethyl) ether (2-chloroethyl ether)	1E-03		4E-05	2E-03					
			Chlorobenzene					Liver histopathology (H)	2E+00		5E-01	2E+00
			cis-1,2-Dichloroethene					Blood	5E+00		4E-01	6E+00
			Methylene Chloride	8E-03		3E-04	8E-03	Hepatic (H)	1E+02		5E+00	1E+02
			Tetrachloroethylene (PCE)	1E-02		6E-03	2E-02	Hepatotoxicity (H); Weight gain (W)	1E+01		8E+00	2E+01
			Trichloroethylene (TCE)	2E-04		1E-05	3E-04	Liver, kidney, fetus	2E+02		3E+01	2E+02
			Vinyl Chloride	9E-05		4E-06	9E-05	Hepatic (H)	3E-01		2E-02	3E-01
			Chemical Total	3E-02		6E-03	3E-02		3E+02		4E+01	4E+02
		Exposure PointTotal					3E-02					4E+02
	Exposure Medium Total						3E-02					4E+02
	Ground Water	Potable Water Sites (Shower)	1,1,1-Trichloroethane									
			1,2-Dichloroethane		3E-03		3E-03	Hepatic		3E-01		3E-01
			Benzene		1E-05		1E-05	Blood and immune system		4E-01		4E-01
			Bis(2-chloroethyl) ether (2-chloroethyl ether)		6E-05		6E-05					
			Chlorobenzene					Liver, kidney		1E+00		1E+00
			cis-1,2-Dichloroethene									
			Methylene Chloride		1E-03		1E-03	Liver		2E+01		2E+01
			Tetrachloroethylene (PCE)		2E-04		2E-04	Neurological (N)		9E-01		9E-01
			Trichloroethylene (TCE)		1E-03		1E-03	Central nervous system, liver, endocrine system		2E+00		2E+00
			Vinyl Chloride		1E-06		1E-06	Liver		2E-02		2E-02
			Chemical Total		5E-03		5E-03			2E+01		2E+01
		Exposure Point Total					5E-03					2E+01
	Exposure Medium Total						5E-03					2E+01
Envrionmental Medium Total							4E-02					4E+02
Receptor Total							4 E-02	Receptor HI Total				4 E+02

Total Risk Across All Media = 4E-02

Total Hazard Across All Media = 4E+02

Total Liver HI Across All Media = 4E+02
Total Kidney HI Across All Media = 2E+02
Total Nervous System Effects HI Across All Media = 3E+00
Total Other Effects HI Across All Media = 7E+00

TABLE 10.9 CT
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
SPECTRON SUPERFUND SITE, ELKTON, MARYLAND

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

Environmental Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Office Area Surface Soil	Arsenic	3 E-05		9 E-07	3 E-05	Hyperpigmentation (In); Vascular (V); PNS (N)	7 E-01		2 E-02	7 E-01
			Chemical Total	3 E-05	--	9 E-07	3 E-05		7 E-01	--	2 E-02	7 E-01
		Exposure Point Total					3 E-05					7 E-01
	Exposure Medium Total						3 E-05					7 E-01
Medium Total							3 E-05					7 E-01
Bedrock Ground Water	Ground Water	Potable Water Sites	1,1,1-Trichloroethane					Liver	5E+00		5E-01	6E+00
			1,1-Dichloroethane					Liver	1E+00		4E-02	1E+00
			1,1-Dichloroethene					Liver	2E+00		1E-01	2E+00
			1,2-Dichlorobenzene					First effects occur in kidney, liver, and blood	4E-01		1E-01	5E-01
			1,2,4-Trichlorobenzene					Increased adrenal weight (E); Vacuolization of zona fasciculata in the cortex	1E+00		8E-01	2E+00
			1,2-Dichloroethane	6E-03		2E-04	6E-03					
			Benzene	4E-05		3E-06	4E-05	Blood and immune system	4E+00		3E-01	4E+00
			Bis(2-chloroethyl) ether (2-chloroethyl ether)	2E-03		3E-05	2E-03					
			Chlorobenzene					Liver histopathology (H)	5E+00		1E+00	6E+00
			cis-1,2-Dichloroethene					Blood	2E+01		9E-01	2E+01
			Ethylbenzene					Hepatic (H); Renal (R)	6E-01		2E-01	7E-01
			Methylene Chloride	9E-03		2E-04	9E-03	Hepatic (H)	5E+02		1E+01	5E+02
			Tetrachloroethylene (PCE)	1E-02		4E-03	2E-02	Hepatotoxicity (H); Weight gain (W)	5E+01		2E+01	6E+01
			Toluene					Kidney weight (R)	2E+00		1E-01	2E+00
			Trichloroethylene (TCE)	3E-04		2E-06	3E-04	Liver, kidney, fetus	5E+02		1E+01	5E+02
			Vinyl Chloride	6E-05		3E-04	3E-04	Hepatic (H)	1E+00		1E-02	1E+00
			Chemical Total	3E-02		4E-03	3E-02		1E+03		4E+01	1E+03
		Exposure PointTotal					3E-02					1E+03
	Exposure Medium Total						3E-02					1E+03
Envrionmental Medium Total							3E-02					1E+03
Receptor Total							3 E-02				Receptor HI Total	1 E+03

Total Risk Across All Media =	3E-02
Total Hazard Across All Media =	1E+03

Total Liver HI Across All Media =	1E+03
Total Kidney HI Across All Media =	6E+02
Total Nervous System Effects HI Across All Media =	7E-01
Total Other Effects HI Across All Media =	2E+01

TABLE 10.10 CT
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
SPECTRON SUPERFUND SITE, ELKTON, MARYLAND

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Environmental Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil & Subsurface Soil	Surface Soil & Subsurface Soil	Office Area Surface Soil & Subsurface Soil	None	--	--	--	0 E+00		--	--	--	0 E+00
			Chemical Total				0 E+00					0 E+00
		Exposure Point Total					0 E+00					0 E+00
	Exposure Medium Total						0 E+00					0 E+00
Envrionmental Medium Total							0 E+00					0 E+00
Receptor Total							0 E+00				Receptor HI Total	0 E+00

Total Risk Across All Media = 0 E+00

Total Hazard Across All Media = 0 E+00

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Appendix D

Item Description		Quantity	Unit	Unit Cost	Total
CAPITAL COSTS:					
Pre-Design Costs					
MPE Field Pilot Testing for DNAPL Recovery					
Pilot Workplan		1	l.s.	$ 5,000	$ 5,000
Pilot Test Installation / Setup		1	l.s.	$ 10,000	$ 10,000
Pilot Test Breakdown		1	l.s.	$ 1,000	$ 1,000
O&M/Monitoring - 1 month		1	month	$ 52,500	$ 52,500
Pilot Test Report		1	l.s.	$ 10,000	$ 10,000
DNAPL Delineation Wells					
Well Installation / Testing /Construction		3	each	$ 135,000	$ 405,000
Capture Zone Investigation/Evaluation					
Well / Piezometer Installation		400	ft	$ 200	$ 80,000
Monitoring / Evaluation		1	l.s.	$ 15,000	$ 15,000
Groundwater Sampling & Analysis		4	event	$ 70,000	$ 280,000
Aquifer Test		1	l.s.	$ 50,000	$ 50,000
Bedrock Flow Modeling		1	l.s.	$ 40,000	$ 40,000
Engineering Evaluation		1	l.s.	$ 25,000	$ 25,000
SUBTOTAL					$ 973,500
Stream Isolation/GWTS Upgrades					
Additional Equalization		1	l.s.	$ 100,000	$ 100,000
GAC Building Sheeting and retro		1	l.s.	$ 20,000	$ 20,000
Plant Equipment and Piping Replacement		1	l.s.	$ 180,000	$ 180,000
SUBTOTAL					$ 300,000
Ground Water Extraction System					
PLANT AREA COSTS					
Extraction Well Installation		5	each	$ 30,000	$ 150,000
Trenching & Piping to Plant Building		1	l.s.	$ 125,000	$ 125,000
Electrical and Controls Installation		1	l.s.	$ 75,000	$ 75,000
Startup and Testing		1	l.s.	$ 25,000	$ 25,000
SUBTOTAL					$ 375,000
OFFICE AREA REMEDIATION COSTS					
Extraction Well Installation		4	each	$ 30,000	$ 120,000
Trenching & Piping to Plant Building		1	l.s.	$ 90,000	$ 90,000
Electrical and Controls Installation		1	l.s.	$ 50,000	$ 50,000
Restoration		1	l.s.	$ 30,000	$ 30,000
SUBTOTAL					$ 290,000
SYSTEM EQUIPMENT AND PROCESS MODIFICATIONS					
Equipment		0	l.s.	$ -	$ -
Building Expansion / Modifications		1	l.s.	$ 10,000	$ 10,000
Process Piping		0	l.s.	$ -	$ -
Electrical and Controls Installation / PLC Upgrades		1	l.s.	$ 30,000	$ 30,000
Startup and Testing		1	l.s.	$ 10,000	$ 10,000
SUBTOTAL					$ 50,000
SUBTOTAL					$ 1,988,500
Project Management / Misc. Correspondence (5%)					$ 99,425
Remedial Design (8%)					$ 159,080
Construction Management (6%)					$ 60,900
Institutional Controls					
Institutional Controls Plan		1	l.s.	$ 5,000	$ 5,000
Groundwater/Surface Water Use Restriction		1	l.s.	$ 5,000	$ 5,000
Land Use Restriction		1	l.s.	$ 5,000	$ 5,000
SUBTOTAL					$ 15,000
SUBTOTAL					$ 2,322,905
Contingency	15%				$ 348,436
TOTAL CAPITAL COST					**$ 2,671,341**

Item Description		Quantity	Unit	Unit Cost	Total
ANNUAL O&M COSTS:					
Stream Isolation/GWTS					
Stream Isolation/GWTS O&M Cost		7	year	$ 368,706	$ 2,580,942
Stream Isolation/GWTS Electricity		7	year	$ 50,000	$ 350,000
Stream Isolation/GWTS Equipment Replacement		7	year	$ 20,000	$ 140,000
Annual Progress Reports		7	year	$ 20,000	$ 140,000
Stream Isolation/GWTS O&M Cost Increase		30	year	$ 25,000	$ 750,000
Stream Isolation/GWTS Electricity Increase		30	year	$ 12,500	$ 375,000
SUBTOTAL					$ 4,335,942
Performance Monitoring					
Vapor Intrusion Evaluation		30	year	$ 500	$ 15,000
Groundwater Sampling & Analysis/MNA Monitoring		30	year	$ 25,000	$ 750,000
Performance Assessment Report		30	year	$ 10,000	$ 300,000
SUBTOTAL					$ 1,065,000
Off-Site Treatment/Disposal of DNAPL		30	year	$ 3,500	$ 105,000
SUBTOTAL					$ 5,505,942
Project Management / Misc. Correspondence (5%)					$ 275,297
Engineering/Technical Support (5%)					$ 275,297
SUBTOTAL					$ 6,056,536
Contingency	15%				$ 908,480
TOTAL ANNUAL O&M COST					**$ 6,965,016**
PERIODIC COSTS:					
Five Year Review Report (every 5 years)		6	each	$ 12,000	$ 72,000
Update Institutional Controls Plan (every 5 years)		6	each	$ 2,500	$ 15,000
LUCAP / Status Report (every 2 yrs)		15	each	$ 2,000	$ 30,000
Liner Cleanout/Flushing (every 5 yrs)		6	event	$ 150,000	$ 900,000
Liner Replacement		1	event	$ 5,500,000	$ 5,500,000
GWTS Replacement / Repairs		1	l.s.	$ 750,000	$ 750,000
Vapor Intrusion Sampling (5 properties every 5 years)		6	each	$ 25,000	$ 150,000
Well Abandonment		8000	ft	$ 3	$ 24,000
Demobilization		1	event	$ 10,000	$ 10,000
Remedial Action Report		1	l.s.	$ 25,000	$ 25,000
SUBTOTAL					$ 7,476,000
Project Management (5%)					$ 373,800
SUBTOTAL					$ 7,849,800
Contingency	15%				$ 1,177,470
TOTAL PERIODIC COST					**$ 9,027,270**
SUMMARY:					
Total Capital Cost					$ 2,671,341
Total Annual O&M Cost					$ 6,965,016
Total Periodic Cost					$ 9,027,270
TOTAL					**$ 18,663,627**
PRESENT VALUE ANALYSIS:					
Capital Cost					$ 2,671,341
Present Worth of O&M and Periodic Costs					$ 7,085,347
Estimated Net Present Value (I = 5%)					**$ 9,756,688**

NOTES:

Year	Capital Costs	Annual O&M Costs	Periodic Costs	Periodic Costs (with Project Management and Contingency)	P/F @5% (1+i)^-n	Total Present Worth Dollars @ 5%
1	$2,671,341	$96,773	$0	$0	1.0000	$2,768,113
2	$ -	$96,773	$2,000	$2,415	0.9524	$94,464
3	$ -	$96,773	$0	$0	0.9070	$87,776
4	$ -	$96,773	$2,000	$2,415	0.8638	$85,682
5	$ -	$96,773	$189,500	$228,821	0.8227	$267,867
6	$ -	$96,773	$2,000	$2,415	0.7835	$77,716
7	$ -	$96,773	$0	$0	0.7462	$72,213
8	$ -	$96,773	$2,000	$2,415	0.7107	$70,491
9	$ -	$96,773	$0	$0	0.6768	$65,499
10	$ -	$96,773	$191,500	$231,236	0.6446	$211,437
11	$ -	$96,773	$0	$0	0.6139	$59,410
12	$ -	$96,773	$2,000	$2,415	0.5847	$57,993
13	$ -	$96,773	$0	$0	0.5568	$53,887
14	$ -	$96,773	$2,000	$2,415	0.5303	$52,601
15	$ -	$96,773	$5,689,500	$6,870,071	0.5051	$3,518,730
16	$ -	$96,773	$52,000	$62,790	0.4810	$76,752
17	$ -	$96,773	$50,000	$60,375	0.4581	$71,991
18	$ -	$96,773	$52,000	$62,790	0.4363	$69,617
19	$ -	$96,773	$50,000	$60,375	0.4155	$65,298
20	$ -	$96,773	$241,500	$291,611	0.3957	$153,697
21	$ -	$96,773	$50,000	$60,375	0.3769	$59,227
22	$ -	$96,773	$52,000	$62,790	0.3589	$57,274
23	$ -	$96,773	$50,000	$60,375	0.3418	$53,721
24	$ -	$677,036	$52,000	$62,790	0.3256	$240,866
25	$ -	$677,036	$239,500	$289,196	0.3101	$299,597
26	$ -	$677,036	$52,000	$62,790	0.2953	$218,473
27	$ -	$677,036	$50,000	$60,375	0.2812	$207,390
28	$ -	$677,036	$52,000	$62,790	0.2678	$198,161
29	$ -	$677,036	$50,000	$60,375	0.2551	$188,109
30	$ -	$677,036	$300,500	$362,854	0.2429	$252,637
Total	$ 2,671,341	$ 6,965,016	$ 7,476,000	$ 9,027,270		**$ 9,756,688**

Present Worth Discounting Factor	5.0%

Note: Capital Costs are not discounted; therefore, they are shown in Year 1