SECOND FIVE-YEAR REVIEW REPORT

For

H&H Inc. Burn Pit Superfund Site

Hanover County, Virginia

June, 2010

PREPARED BY:

United States Environmental Protection Agency
Region III
Philadelphia, Pennsylvania

Approved by:

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Hazardous Site Cleanup Division
U.S. EPA, Region III

Date: 6/25/10
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## List of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARARs</td>
<td>Applicable or Relevant and Appropriate Requirements</td>
</tr>
<tr>
<td>CD</td>
<td>Consent Decree</td>
</tr>
<tr>
<td>CERCLA</td>
<td>Comprehensive Environmental Response, Compensation, and Liability Act</td>
</tr>
<tr>
<td>CFR</td>
<td>Code of Federal Regulations</td>
</tr>
<tr>
<td>CIC</td>
<td>Community Involvement Coordinator</td>
</tr>
<tr>
<td>EPA</td>
<td>United States Environmental Protection Agency</td>
</tr>
<tr>
<td>ESD</td>
<td>Explanation of Significant Differences</td>
</tr>
<tr>
<td>HVE</td>
<td>High Vacuum Extraction</td>
</tr>
<tr>
<td>IC</td>
<td>Institutional Control</td>
</tr>
<tr>
<td>MEK</td>
<td>Methyl Ethyl Ketone</td>
</tr>
<tr>
<td>mg/kg</td>
<td>milligrams per kilogram</td>
</tr>
<tr>
<td>MNA</td>
<td>Monitored Natural Attenuation</td>
</tr>
<tr>
<td>NCP</td>
<td>National Oil and Hazardous Substances Pollution Contingency Plan</td>
</tr>
<tr>
<td>NPL</td>
<td>National Priorities List</td>
</tr>
<tr>
<td>OUI</td>
<td>Operable Unit One</td>
</tr>
<tr>
<td>OU2</td>
<td>Operable Unit Two</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>Operations and Maintenance</td>
</tr>
<tr>
<td>PCBs</td>
<td>Polychlorinated Biphenyls</td>
</tr>
<tr>
<td>PRP</td>
<td>Potentially Responsible Party</td>
</tr>
<tr>
<td>PCOR</td>
<td>Preliminary Close Out Report</td>
</tr>
<tr>
<td>RA</td>
<td>Remedial Action</td>
</tr>
<tr>
<td>RAO</td>
<td>Remedial Action Objective</td>
</tr>
<tr>
<td>RCRA</td>
<td>Resource Conservation and Recovery Act</td>
</tr>
<tr>
<td>RD</td>
<td>Remedial Design</td>
</tr>
<tr>
<td>RI</td>
<td>Remedial Investigation</td>
</tr>
<tr>
<td>RI/FS</td>
<td>Remedial Investigation/Feasibility Study</td>
</tr>
<tr>
<td>ROD</td>
<td>Record of Decision</td>
</tr>
<tr>
<td>RPM</td>
<td>Remedial Project Manager</td>
</tr>
<tr>
<td>SARA</td>
<td>Superfund Amendments and Reauthorization Act of 1986</td>
</tr>
<tr>
<td>SDWA</td>
<td>Safe Drinking Water Act</td>
</tr>
<tr>
<td>SVOCs</td>
<td>Semi-Volatile Organic Compounds</td>
</tr>
<tr>
<td>TSCA</td>
<td>Toxic Substances Control Act</td>
</tr>
<tr>
<td>UV</td>
<td>Ultraviolet</td>
</tr>
<tr>
<td>VA DSHW</td>
<td>Virginia Department of Solid and Hazardous Waste</td>
</tr>
<tr>
<td>VDEQ</td>
<td>Virginia Department of Environmental Quality</td>
</tr>
<tr>
<td>VOCs</td>
<td>Volatile Organic Compounds</td>
</tr>
</tbody>
</table>
Executive Summary

The remedy for the H&H Inc. Burn Pit Site (Site) in Hanover County, Virginia, has included excavation and offsite disposal of contaminated soils and sediments and construction, monitoring, and operation and maintenance of an Enhanced Soil Vapor Extraction (ESVE) system to extract and treat contaminated soil gas and groundwater. The Site achieved construction completion with the signing of the Preliminary Close Out Report (PCOR) on June 15, 2000. The PCOR was also the trigger for the first Five-Year Review for the Site which was completed on June 24, 2005. This is the second Five-year Review for the Site.

The first Five-Year review reported that the remedy was constructed in accordance with the requirements of the Record of Decision (ROD). An Explanation of Significant Differences (ESD), dated September 29, 1999, was issued to replace the conventional groundwater pumping described in the ROD with an ESVE system. The ESD also called for the use of carbon adsorption in place of UV oxidation as the treatment technology for organics in the extracted groundwater. The first Five-Year review reported that the remedy was functioning as designed.

EPA determined in the first Five-year Review that the remedy was protective of human health and the environment in the short term because all current threats at the Site had been addressed through excavation and off-site disposal of contaminated soil and sediments, the installation of security fencing, access controls, and signage. To ensure the remedy would be protective during the process of meeting groundwater cleanup goals, EPA recommended in the first Five Year Review that institutional controls be implemented to prevent the use of contaminated groundwater.

EPA finds in this second Five-Year Review that the remedy is protective of human health and the environment in the short term because all threats at the Site are being addressed. The plume of groundwater contamination at the Site continues to be limited to a single property. While groundwater monitoring over the last five years indicates that total volatile organic compound (VOC) concentrations are declining, certain VOCs in groundwater remain well above protective levels and do not appear to have declined substantially over time. Accordingly, EPA recommends in this second Five-Year Review that a strategy be developed and implemented to address those VOC concentrations of concern which are not declining at a substantial rate and remain well above protective levels.

As recommended in the first Five-Year Review, EPA selected institutional controls governing use of contaminated groundwater underlying the Site in a second ESD (dated July 2, 2007). EPA anticipates that these controls will be implemented by the end of 2010. The imminent institutional controls will prevent use of the contaminated groundwater without EPA approval while the referenced strategy is developed and implemented. A revised estimate of the time to achieve groundwater cleanup goals will developed as part of the implementation of the referenced strategy.

While the vapor intrusion pathway does not present an unacceptable risk to human health at this time, the future construction and occupation of building over or near the contaminated groundwater may present an unacceptable risk until groundwater is restored to protective levels.
Accordingly, EPA recommends in this Five Year Review that the risk posed by the vapor intrusion pathway be assessed in the event that construction is planned and groundwater has not been restored to protective levels.

GPRA Measure Review

As part of this Five Year Review the GPRA measures have also been reviewed. The GPRA measures and their status are provided as follows:

Environmental Indicators
Human Health: Current Human Exposure Under Control (HEUC)
Groundwater Migration: Groundwater Migration Not Under Control (GMNC)

Site-Wide RAU
The Site is not yet considered Site-Wide Ready for Anticipated Use (SWRAU) but is expected to achieve SWRAU status on September 30, 2011.
## Five-Year Review Summary Form

### SITE IDENTIFICATION

<table>
<thead>
<tr>
<th>Site name:</th>
<th>H&amp;H Inc. Burn Pit Superfund Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA ID:</td>
<td>VAD980539878</td>
</tr>
<tr>
<td>Region:</td>
<td>3</td>
</tr>
<tr>
<td>State:</td>
<td>VA</td>
</tr>
<tr>
<td>City/County:</td>
<td>Hanover County</td>
</tr>
</tbody>
</table>

### SITE STATUS

<table>
<thead>
<tr>
<th>NPL status:</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remediation status:</td>
<td>Construction Complete.</td>
</tr>
<tr>
<td>Multiple OUs?*</td>
<td>Yes</td>
</tr>
<tr>
<td>Construction Completion date:</td>
<td>06/15/2000</td>
</tr>
<tr>
<td>Has site been put into reuse?</td>
<td>Yes. Reportedly, the Site is used as a timber lot</td>
</tr>
</tbody>
</table>

### REVIEW STATUS

<table>
<thead>
<tr>
<th>Lead agency:</th>
<th>EPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author name:</td>
<td>Darius Ostrauskas</td>
</tr>
<tr>
<td>Author title:</td>
<td>Remedial Project Manager</td>
</tr>
<tr>
<td>Author Affiliation:</td>
<td>US EPA Region 3</td>
</tr>
<tr>
<td>Review period:</td>
<td>10/01/2009 to 06/24/2010</td>
</tr>
<tr>
<td>Date(s) of site inspection:</td>
<td>4/21/2010</td>
</tr>
<tr>
<td>Type of review:</td>
<td>Post-SARA</td>
</tr>
<tr>
<td>Review number:</td>
<td>2 (second)</td>
</tr>
<tr>
<td>Triggering action:</td>
<td>Construction Completion</td>
</tr>
<tr>
<td>Triggering action date:</td>
<td>06/24/2005</td>
</tr>
<tr>
<td>Due Date:</td>
<td>06/24/2010</td>
</tr>
</tbody>
</table>

* "OU" refers to operable unit.
Issues:

Levels of certain VOCs in groundwater remain well above protective levels and do not appear to be declining at a substantial rate.

Vapor intrusion may present an unacceptable risk in the future if a building is constructed and occupied over or near the contaminated groundwater.

Recommendations:

Develop and implement a strategy to address remaining VOC levels of concern in groundwater.

Assess the vapor intrusion pathway in the event that construction is planned and groundwater restoration is still in progress.

Protectiveness Statement(s):

The remedy is considered protective of human health and the environment in the short term. All threats posed by contaminated soils and sediments have been addressed through excavation and off-site disposal. Monitoring indicates contaminated groundwater is captured on-site and is limited to a single property. Imminent institutional controls for this property prevent the use of the contaminated groundwater without EPA approval. A revised estimate of the time to meet groundwater cleanup goals will be developed as part of the recommended strategy.

To be protective in the long term, further evaluation of the vapor intrusion pathway is recommended in the event that construction is planned and groundwater restoration is still in progress.
Second Five-Year Review Report
For
H&H Inc. Burn Pit Superfund Site
Hanover County, Virginia

I. Introduction

The purpose of the second Five-Year review is to determine whether the remedy at a Site is protective of human health and the environment. The methods, findings, and conclusions of such a review are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and recommendations to address them.

The United States Environmental Protection Agency (EPA) is preparing this Five-Year Review report pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA §121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106] of this title, the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

NCP §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

EPA has conducted the second Five-Year Review of the remedial actions implemented at the H&H Inc. Burn Pit Site in Hanover County, Virginia (Site). This review was conducted from October 2009 to June 2010. This report documents the results of the review.

This is the second five-year review for the H&H Inc. Burn Pit Site. The triggering action for this review is the date of the first Five Year Review - June 24, 2005. The five-year reviews are required due to the fact that hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unrestricted exposure.
II. Site Chronology

Table 1: Chronology of Site Events through 2010

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site used to burn solvents from printing press cleaning operations,</td>
<td>1960-1976</td>
</tr>
<tr>
<td>printing ink residues, and other materials.</td>
<td></td>
</tr>
<tr>
<td>Virginia Department of Health, Division of Solid and Hazardous Waste</td>
<td>1981</td>
</tr>
<tr>
<td>(VA DSHW) (now the Virginia Department of Environmental Quality or</td>
<td></td>
</tr>
<tr>
<td>VADEQ), initiated an investigation of the Site.</td>
<td></td>
</tr>
<tr>
<td>VA DSHW supervised removal of approximately 1000 drums and some</td>
<td>1982</td>
</tr>
<tr>
<td>stained soil from the site. Installed sediment and erosion controls and</td>
<td></td>
</tr>
<tr>
<td>monitoring wells.</td>
<td></td>
</tr>
<tr>
<td>Final Listing on EPA National Priorities List (NPL)</td>
<td>March 1989</td>
</tr>
<tr>
<td>Remedial investigation/Feasibility Study and Proposed Plan released to</td>
<td>December 21, 1993</td>
</tr>
<tr>
<td>the public</td>
<td></td>
</tr>
<tr>
<td>Revised Proposed Plan released to the public</td>
<td>December 22, 1994</td>
</tr>
<tr>
<td>Record of Decision (ROD) issued</td>
<td>June 30, 1995</td>
</tr>
<tr>
<td>Administrative Order on Consent for Remedial Design Signed</td>
<td>September 30, 1996</td>
</tr>
<tr>
<td>Remedial Design Start</td>
<td>October 4, 1996</td>
</tr>
<tr>
<td>Actual Remedial Action Start</td>
<td>October 6, 1997</td>
</tr>
<tr>
<td>Remedial Design/Remedial Action Consent Decree (CD) Entered by the</td>
<td>November 5, 1997</td>
</tr>
<tr>
<td>Court</td>
<td></td>
</tr>
<tr>
<td>Construction dates – Operable Unit One (OU1) Soils (start, finish)</td>
<td>Start August 17, 1998</td>
</tr>
<tr>
<td></td>
<td>Finish September 16, 1998</td>
</tr>
<tr>
<td>Construction dates – OU1 Sediments (start, finish)</td>
<td>Start May 17, 1999</td>
</tr>
<tr>
<td></td>
<td>Finish May 28, 1999</td>
</tr>
<tr>
<td>Explanation of Significant Differences (ESD) issued to allow for</td>
<td>September 29, 1999</td>
</tr>
<tr>
<td>substitution of HVE for traditional pumping and replacing UV oxidation</td>
<td></td>
</tr>
<tr>
<td>with activated carbon for treatment of organics</td>
<td></td>
</tr>
<tr>
<td>Remedial design complete</td>
<td>September 30, 1999</td>
</tr>
<tr>
<td>Construction dates – OU2 Groundwater (start, finish)</td>
<td>Start November 8, 1999</td>
</tr>
<tr>
<td></td>
<td>Finish May 17, 2000</td>
</tr>
<tr>
<td>Construction completion date (PCOR)</td>
<td>June 15, 2000</td>
</tr>
<tr>
<td>First Five Year Review</td>
<td>June 24, 2005</td>
</tr>
<tr>
<td>ESD issued to select institutional controls which prevent use and</td>
<td>July 2007</td>
</tr>
<tr>
<td>pumping of contaminated groundwater without EPA approval</td>
<td></td>
</tr>
<tr>
<td>Shutdown Evaluation Report issued</td>
<td>February 2008</td>
</tr>
</tbody>
</table>
III. Background

Physical Characteristics

The H&H Inc. Burn Pit Site is located in Hanover County, Virginia, approximately 12 miles northwest of the City of Richmond, on Mountain Road (Route 33) and 0.5 mile south of the small community of Farrington, Virginia (See Figure 1 - Site Location Map). The approximately 1-acre Site is located on a 73.5-acre wooded lot.

Land and Resource Use

The Site lies within a wooded parcel of land owned by T. Frank Flippo and Sons, a Virginia limited partnership formed on July 15, 1985. The property is reportedly used as a timber lot. Surrounding property use is suburban/rural residential. According to John Gordon, Jr. of the Hanover County Board of Supervisors, the Hanover County Comprehensive Plan targets the Site and surrounding property for business park development starting in about five years.

Groundwater in the community surrounding the Site is used as a source of drinking water. However, the plume of contaminated groundwater is limited to a single property.

History of Contamination

From approximately 1960 to 1976, the Site was owned and operated by the Haskell Chemical Company, Inc., and was used to burn solvents from printing press cleaning operations, printing ink residues, and other materials collected by the Haskell Chemical Company and otherwise brought to the site for disposal. Much of the waste was brought in 55-gallon drums and stored on-site. The wastes were then emptied into two pits within a bermed area and burned (see Figure 2 - Site Map). Operations ceased in 1976, and the site became part of a newly-formed holding company called HH Incorporated in 1977. The property was conveyed to the present owners, T. Frank Flippo and Sons, a Virginia limited partnership, in July 1985.

Initial Response

Initial site investigation and cleanup activities were conducted by the Virginia environmental agencies in 1981 and 1982. These activities included the crushing and removal of approximately 1000 empty drums, the removal of stained soil, initiation of a soil and sediment erosion control program, and installation of monitoring wells. Further investigation by EPA followed, with final listing on the NPL occurring in March 1989.
Basis for Taking Action

The Remedial investigation affirmed the presence of elevated levels of Polychlorinated Biphenyls (PCBs), Volatile Organic Compounds (VOCs), and metals in surface and subsurface soils and surface sediments in the former burn pit area. VOCs were found in groundwater within a plume extending several hundred feet west from the former burn pit area. The risk assessment identified the following contaminants of concern (by media):

Soil
- PCBs
- Lead

Sediment
- PCBs
- Copper
- Lead
- Zinc

Groundwater
- PCBs
- Benzene
- Bis (2-chloroethyl)ether
- 1,2-dichloroethane
- 1,1-dichloroethene
- Vinyl chloride
- 2-Butanone (i.e., MEK).

Future Site residents were determined to be at primary risk from these contaminants of concern, with drinking of groundwater and incidental ingestion of soil posing the greatest risk. The baseline risk assessment estimated the reasonable maximum total lifetime cancer risks for future site residents to be $2.0 \times 10^{-3}$ for adults and $1.2 \times 10^{-3}$ for children under six years old. These risks exceeded the acceptable risk range of $10^{-4}$ to $10^{-6}$ established in Section 300.430(e)(2)(i)(A) of the NCP. The baseline risk assessment also estimated the hazard index for noncarcinogenic effects for future Site residents to be 8.4 for adults and 19 for children under six years old, under reasonable maximum exposure (RME) conditions. These risks exceeded 1.0, which is the acceptable hazard index level.

IV. Remedial Actions

Remedy Selection

On June 30, 1995, the Director of the EPA Region 3 Hazardous Waste Management Division signed the Record of Decision (ROD) identifying measures to be taken to address the unacceptable risks to human health and the environment identified in
the Remedial Investigation/Feasibility Study (RI/FS) process. The selected remedy, as described in the ROD, consisted of the following:

- Excavation of contaminated soil in the unsaturated zone above the water table (i.e., above the depth of four to six feet) where soil cleanup levels in Table 12 of the ROD are exceeded;
- Excavation of contaminated sediments from the drainage ways downgradient of the bermed burn pit area where contaminant concentrations exceed the sediment cleanup levels listed in Table 12 of the ROD;
- Disposal of contaminated soils and sediments that do not exhibit hazardous characteristics in a landfill permitted in accordance with the Resource Conservation and Recovery Act (RCRA) Subtitle D requirements;
- Treatment and disposal of contaminated soils and sediments that exhibit hazardous characteristics at a RCRA-permitted Subtitle C facility;
- Disposal of soils found to contain polychlorinated biphenyls (PCBs) above 50 mg/kg at a Toxic Substances Control Act (TSCA) landfill;
- Extraction of contaminated groundwater containing Site-related contaminants above the groundwater cleanup levels listed in Table 12 of the ROD;
- Treatment of contaminated groundwater by precipitation and sedimentation to remove metals and by ultra violet (UV) oxidation to destroy organics;
- At the option of responsible parties who may implement the remedial action, if treatability studies performed during remedial design demonstrated to EPA that the technologies are effective, air sparging and soil vapor extraction may be implemented to accelerate the removal of VOC contamination from soils and groundwater.
- Implementation of a monitoring program to verify performance of the groundwater treatment system and detect any impacts to the tributary, surrounding wetlands, and the nearest residents downgradient of the Site.

Remedy Implementation

In September 1996, EPA and several responsible parties signed an Administrative order on Consent for Remedial Design (Design AOC) and a Consent Decree (RD/RA Consent Decree) under which the responsible parties (PRPs) agreed to design and implement the remedial action selected by EPA in the ROD. Remedial Design activities commenced under the Design AOC while the RD/RA Consent Decree was being approved. On November 5, 1997, the Court entered the Consent Decree. The PRPs’ contractors mobilized to the Site in 1998 to begin remedial action in the field. Excavation and removal of all soils and sediments exceeding performance standard cleanup levels in the ROD was completed in May 1999.

On September 29, 1999, EPA issued an Explanation of Significant Differences (ESD) allowing substitution of Enhanced Soil Vapor Extraction (ESVE) for traditional pumping and replacing UV oxidation with activated carbon for treatment of organics. Physical construction of the OU2 (groundwater) remedy began November 1999 and was

System Operation and Maintenance

Operation of the ESVE system was initiated on May 17, 2000, and has continued since that date. The ESVE system is a dual-phase system which extracts both groundwater and soil vapor via wells (see Figure 2 for extraction well locations). After several weeks of sampling to confirm the system was operating as designed, a routine of quarterly influent and effluent water and soil vapor sampling was established in accordance with the approved Final Remedial Design (September, 1999). After the 2nd Quarter of 2003, with approval from EPA, quarterly groundwater monitoring was reduced to semi-annual monitoring in the 2nd and 4th quarters of each year (see Figure 2 for monitoring well locations). The groundwater monitoring consists of groundwater sampling and measurement of groundwater elevations. As part of the operation and maintenance of the ESVE system, system operation parameters such as well vacuum pressure are recorded and the influent/effluent of the treatment system is sampled. Site security fencing and the ESVE system are periodically inspected and any necessary repairs are made. System Operation Reports are submitted quarterly. The PRPs have chosen not to disclose to EPA their O&M costs. In the September 1999 ESD, EPA estimated the O&M costs for the HVE system would be approximately $175,000 for the first year, $145,000 per year during the second and third years, and $115,000 per year thereafter.

V. Progress Since The First Five-Year Review

System Operation and Maintenance

The ESVE system operation has continued over the last five years. There have been periods of downtime due to major maintenance activities, including replacement of the vacuum blower system, replacement of the equalization tank pump and associated electrical system, repair of transfer pumps and repair of alarms associated different parts of the system. Minor periods of downtime have occurred due to sampling events, bi-weekly bag-filter changeouts and routine minor maintenance activities.

Semi-annual groundwater monitoring has continued in the 2nd and 4th quarters of each year and has continued to include measurement of groundwater elevations to confirm the direction of groundwater flow under the Site as well as sampling for groundwater contaminants of concern. Semi-annual groundwater monitoring reports summarizing the results of each monitoring event have continued to be prepared. In addition, ESVE system operation reports have been continued to be prepared on a quarterly basis.

With EPA approval, the ESVE system was shutdown between May 2006 and December 2006, to assess the effect of a system shutdown on groundwater conditions.
Groundwater was sampled three times during the shutdown period – May 2006, August 2006 and November 2006. Post-shutdown sampling was conducted in the 2nd and 4th quarters of 2007. Water elevations were also measured during each of these sampling events. In February 2008, the PRP group submitted a Shutdown Evaluation Report which evaluated the groundwater sampling and water elevation data generated during the shutdown period. The Shutdown Evaluation report recommended that monitored natural attenuation be considered as the next action at the Site.

Institutional Control Selection and Implementation

In the first Five Year Review for the Site, EPA recommended implementing institutional controls to prevent the use of contaminated groundwater at the Site while groundwater was being restored to the selected cleanup goals. In July 2007, EPA issued a second ESD for the Site in which it selected institutional controls as follows:

Institutional Controls to (1) prevent use of groundwater containing substances identified in the “Groundwater” section of Table 12 of the ROD at levels exceeding the cleanup levels identified therein (the “Contaminant Plume”), (2) prevent groundwater pumping at and near the site which might cause the Contaminant Plume to migrate beyond the reach of the treatment system selected in the ROD (including any modifications thereto) and installed at the Site, and (3) prevent interference with wells, pumps, and other equipment at the Site comprising the treatment system selected in the ROD (including any modifications thereto). These institutional controls shall remain in effect until the performance standards for groundwater identified in Section X.C. 1 of the ROD have been met.

As of this writing, the United States and the property owner have agreed to terms under which the owner shall implement these controls at the Site in a Consent Order lodged with the court on May 3, 2010. All groundwater contamination attributable to the Site and which presents an unacceptable risk to human health underlies the owner’s property. The subject Consent Decree requires that the property owner 1) shall not use or permit others to use contaminated groundwater under the property except as authorized by EPA, 2) shall not pump the contaminated groundwater or permit others to pump such groundwater except as authorized by EPA and 3) shall not interfere with, or permit others to interfere with wells, pumps, and other equipment comprising the treatment system selected by EPA for implementation at the Site except as authorized by EPA. Furthermore, the owner has agreed to reserve, in any deed or other instrument conveying an interest in property included within the Site, an easement and restrictive covenant imposing these restrictions upon the grantee.

VI. Process For Second Five-Year Review

Administrative Components

EPA assembled background documents, developed an informal review schedule, and identified members of the review team in November of 2009. Anthony Sturtzer of
Alcoa (the RP group technical coordinator) and State Project Manager Tom Modena were subsequently informed that the second Five-Year Review was underway. EPA’s team for the second Five-Year was led by Darius Ostrauskas, EPA’s Remedial Project Manager (RPM) for the Site, and included Vance Evans, EPA’s Community Involvement Coordinator (CIC), Nancy Rios-Jafolla, EPA Risk Assessor, Bruce Rundell, EPA Hydrogeologist, and other members of the EPA Regional Technical Advisory staff with expertise in the application of Applicable or Relevant and Appropriate Requirements (ARARs), hydrogeology, and risk assessment. Tom Modena of the Virginia Department of Environmental Quality assisted in the review as the representative of the support agency.

The Review team established an informal review schedule extending from November 2009 through June 2010, and including the following components.

- **Community Involvement** – Notify the community through a newspaper advertisement and contact with community residents. The advertisement and contacts (a) provide information on who to contact regarding the Five-Year Review as well as how to obtain additional information on the process, (b) solicit any issues and/or concerns and (3) notify the community of how to obtain a copy of the completed Five-Year Review Report.

- **Document and Data Review** – Review significant documents, including system operation data, groundwater monitoring data and the Shutdown Evaluation Report. Determine if there are changes that affect the validity of the cleanup standards (e.g. Applicable or Relevant and Appropriate Requirements (ARARs), “to be considered’s” (TBCs), assumptions about contaminant characteristics and potential exposure). EPA risk assessor to review contaminants of concern and their cleanup levels, as identified in the ROD and as modified by any subsequent revisions, to determine if there have been any changes to the site-specific risk assessment that may be relevant to the review team’s evaluation of remedy protectiveness.

- **Site Inspection** – Visit and inspect the site to visually confirm and document the conditions of the remedy, the Site, and the surrounding area.

- **Five-Year Review Report** – Develop and review

**Community Involvement**

On April 21, 2010, EPA RPM Darius Ostrauskas and EPA CIC Vance Evans inspected the Site and interviewed a key community member. Information regarding this interview can be found in the Interview section below.

On May 20, 2010, an advertisement was placed in the Hanover Herald-Progress newspaper notifying the community that EPA was conducting a Five-Year Review of the Site. The advertisement included an overview of the response actions taken at the Site.
and the purpose of the Five-Year Review and identified a contact from whom additional information related to the Site may be obtained.

Document Review

This Five-Year Review included a review of relevant documents, including available O&M records and monitoring data. Applicable or relevant and appropriate requirements (ARARs) identified in the ROD were reviewed. The following documents were reviewed during the second Five-Year Review period:

- Record of Decision (June 30, 1995)
- Explanation of Significant Differences (September 29, 1999)
- Preliminary Close Out Report (June 15, 2000)
- Interim Remedial Action Report, OU2 (Groundwater) (May 21, 2001)
- Quarterly Operations Reports (2000 through 1st Quarter 2010)
- Groundwater Monitoring Reports (2000 through 4th Quarter, 2009)
- Shutdown Evaluation Report (February 2008)
- Proposed Consent Decree regarding implementation of institutional controls
- Explanation of Significant Differences (July 2, 2007)

Data Review

As discussed in the first Five-Year Review, the ESVE system collects contaminated groundwater and soil vapors from onsite extraction wells. Collected groundwater is monitored before and after treatment. The system is monitored remotely from the offices of Groundwater and Environmental Services, Inc., a contractor hired by the PRPs, and is physically inspected periodically.

Effluent discharged from the treatment system should meet the effluent limits and flow rates established by the VDEQ Water Division in accordance with the Virginia State Water Control Law, Code of Virginia §§ 62.1-44.42 et seq., and Virginia Pollution Discharge Elimination System Regulations (VR 680-14-00). The treatment system has consistently met the discharge performance standards.

Information/data reviewed under the second Five-Year review include system operations reporting, groundwater monitoring data and the Shutdown Evaluation Report.

To facilitate optimization of the ESVE System and otherwise assess progress toward meeting groundwater cleanup goals, the system was shutdown from May 2006 to December of 2006 and monitoring of groundwater was conducted before, during and after this shutdown period. The data generated during this monitoring was summarized and evaluated in a Shutdown Evaluation Report dated February 2008. The report
indicated that VOC recovery by the ESVE system was substantial during the first several years of operation but had declined substantially by the start of the shut down period.

A review of groundwater contaminant concentration data for monitoring wells over the last five years indicates that total VOC concentrations in many monitoring wells have declined over this period (see Figure 3- Total VOCs). On the other hand, certain contaminant concentrations have increased during the period of system operation and remain at concentrations well above protective levels. These contaminants include tetrachloroethene (PCE), trichloroethene (TCE) and cis-1,2-dichloroethene (1,2-DCE) in monitoring well MW-3 (see Figure 4- MW3 Data). It is notable that the ROD for the Site does not identify TCE, 1,2-DCE or PCE as contaminants of concern and does not identify Performance Standard Cleanup Levels for these compounds. Also, levels of vinyl chloride in extraction well EW-3 have not declined substantially in the last five years and remain well above protective levels (see Figure 5- Vinyl Chloride in EW-3). This data indicates that actions over the last five years have not been effective in reducing the concentration of these particular VOCs and suggests that substantial reduction in concentrations over the next ten years may not be reasonably expected.

Given the above, EPA recommends in this Five-Year Review, development and implementation of a strategy to address VOC concentrations which are not declining at a substantial rate and still exceed protective levels. The development of this strategy should consider the Shutdown Evaluation Report of February 2008, all available groundwater monitoring data and other available information.

Based on available data, the areal extent of all remaining groundwater contaminant levels of concern is limited to the former bermed burn pit area and well MW-4 which is located about fifty feet downgradient of the former burn pit. As noted earlier, this impacted groundwater is wholly located on property which is subject to institutional controls which prevent the use of the contaminated groundwater under the subject property without the approval of EPA.

The possibility of vapor intrusion (i.e., the potential migration of subsurface volatile compounds into overlying buildings) was evaluated as part of the first Five-Year Review and was found not to be a contaminant pathway of concern. This evaluation assumed the closest building of concern was approximately 1000 feet away. Recent observations confirm there are no occupied buildings within 100 feet of the contaminated groundwater at this time. In this case, vapor intrusion does not present an unacceptable risk under existing land use. However, until the contaminated groundwater is restored to protective levels, vapor intrusion may present an unacceptable risk to occupants of any building which is constructed over or near the contaminated groundwater. An assessment of this potential risk should be performed in the event that construction at the Site is proposed.
Site Inspection

On April 21, 2010, EPA RPM Darius Ostrauskas conducted an inspection of the Site, accompanied by EPA CIC Vance Evans. The gravel access road to a small building containing the treatment system was in good condition, as were the fencing, gate and lock around the building and access control for the gravel road (locked chain across road). All monitoring wells were locked and appeared to be in good condition. The extraction wells were all operational and appeared to be in good condition as did the treatment system. The vacuum gauge at the well head of one extraction well was broken but the vacuum gauge in the treatment building for the subject extraction well was operating. With the exception of the treatment building and wells, the Site was vacant. The Site is reportedly used as a timber harvest lot but there was no evidence of recent logging activity. There was no evidence of trespassing on the property. Land use around the property (scattered residential use and vacant land) had not changed since the last Five Year Review.

Interview

On April 21, EPA RPM Darius Ostrauskas and EPA CIC Vance Evans interviewed John Gordon, who resides within a quarter mile of the Site and is on the Hanover County Board of Supervisors. He said he was not aware of any questions or complaints regarding the Site or Site-related activities. He indicated the property containing the Site as well as surrounding undeveloped property are designated for business park development under the Hanover County Comprehensive Land Use Plan. He indicated that such development may start in 4 or 5 years and that any new development in Hanover County is required by a county ordinance to connect to public water. He added that the county does not approve any development that does not have access to public water. Mr. Gordon was informed that the Five Year review process was underway. CIC Vance Evans discussed the possibility of issuing a fact sheet to residents around the Site regarding the Five Year Review. Mr. Gordon asked for a copy of the final Five-Year Review Report once it is released.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

Yes, the remedy is functioning as intended by the ROD, as modified by the ESD. Threats posed by contaminated soil and sediments have been addressed through excavation and off-site disposal. Monitoring indicates contaminated groundwater is being limited to a single property which is subject to imminent institutional controls which prevent use of groundwater without EPA approval.

As noted under Data Review, the ESVE system is no longer reducing certain VOCs in groundwater at a substantial rate. A strategy to address areas where contamination still exists at high levels is recommended in order to accelerate cleanup.
revised estimate of the time to meet groundwater cleanup goals should be developed as part of this strategy.

In addition, the construction and occupation of a building over or near the subject groundwater contamination may present an unacceptable risk until groundwater is restored to protective levels. An assessment of the risk posed by vapor intrusion should be conducted in the event that construction is proposed and groundwater restoration is still in progress.

**Question B:** Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy still valid?

Yes.

The Site review team has determined that there have been no changes in ARARs, TBCs or exposure assumptions identified in the ROD that affect the protectiveness of the remedy. In addition, the Performance Standard Cleanup Levels identified in the ROD have not been changed. The ROD did not explicitly identify RAOs.

EPA received a petition from the PRPs dated April 20, 1999, which proposed revised cleanup levels for groundwater at the Site. Subsequently, in a letter dated December 9, 1999, to the PRPS, EPA approved revised groundwater cleanup levels based on this petition and data generated during the OU2 Remedial Action. The revised groundwater cleanup levels identified in the letter included cleanup levels for certain groundwater contaminants which remain above protective levels and do not have a Performance Standard Cleanup Level identified in the ROD. However, the Performance Standard Cleanup Levels for groundwater identified in the ROD have not been modified to date. This information should be considered in the recommended strategy for accelerating cleanup of groundwater.

**Question C:** Has any other information come to light that could call into question the protectiveness of the remedy?

No. Available information indicates the remedy is protective in the short term. Assessment of the vapor intrusion pathway is recommended in the event that construction is planned while groundwater restoration is still in progress.

**Technical Assessment Summary**

According to the data reviewed, the site inspection, and the interviews, the remedy is protective under current land use. There have been no changes to the physical conditions of the Site that would affect the protectiveness of the remedy at this time. There have been no significant changes to the exposure assumptions, toxicity data, cleanup levels, or remedial action objectives that could affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy under current land use. However, until groundwater is restored to protective levels, the construction and occupation of a building over the contaminated groundwater...
in the future may present an unacceptable risk to human health. In this case, this five year review recommends that an assessment of the vapor intrusion pathway in the event that construction is planned and groundwater restoration is still in progress.

VIII. Issues

<table>
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<tr>
<th>Issues</th>
<th>Affects Current Protectiveness (Y/N)</th>
<th>Affects Future Protectiveness (Y/N)</th>
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<tbody>
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<td>Groundwater contaminant levels of concern do not appear to be declining at a substantial rate.</td>
<td>N</td>
<td>Y</td>
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<tr>
<td>Vapor intrusion pathway may pose an unacceptable risk under future land use</td>
<td>N</td>
<td>Y</td>
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IX. Recommendations and Follow-Up Actions

<table>
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<tr>
<th>Issue</th>
<th>Recommendations and Follow-up Actions</th>
<th>Party Responsible</th>
<th>Oversight Agency</th>
<th>Milestone Date</th>
<th>Affects Protectiveness (Y/N)</th>
<th>Current</th>
<th>Future</th>
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<tbody>
<tr>
<td>Develop and implement a strategy to address remaining groundwater contaminants of concern.</td>
<td>EPA, PRP, VADEQ</td>
<td>EPA, PRP</td>
<td>VADEQ</td>
<td>12/30/2010</td>
<td>N</td>
<td>Y</td>
<td></td>
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<td>Assess vapor intrusion pathway in the event that construction is planned and groundwater restoration is still in progress</td>
<td>EPA, PRP, VADEQ</td>
<td>EPA, PRP</td>
<td>VADEQ</td>
<td>To Be Determined</td>
<td>N</td>
<td>Y</td>
<td></td>
</tr>
</tbody>
</table>

X. Protectiveness Statement

The remedy is considered protective of human health and the environment in the short term. All threats posed by contaminated soils and sediments have been addressed through excavation and off-site disposal. Monitoring indicates contaminated groundwater is captured on-site and is limited to a single property. Imminent institutional controls for this property prevent the use of the contaminated groundwater without EPA approval. A revised estimate of the time to meet groundwater cleanup goals will be developed as part of the recommended strategy.

To be protective in the long term, further evaluation of the vapor intrusion pathway is recommended in the event that construction is planned and groundwater restoration is still in progress.

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XI. Next Review

The next Five-Year Review for the H&H Inc. Burn Pit Superfund Site is required by June 2015, five years from the date of this review.
Figure 1 - Site Location Map
Figure 2- Site Map
SITE MAP

HH BURN PIT
HANOVER COUNTY, VIRGINIA

SOURCE: Remedial Investigation Report
Ecology and Environment, Inc. - 1993

Groundwater & Environmental Services, Inc.
2001 JOHN STREET, SUITE 201, RICHMOND, VA 23219

SCALE IN FEET DATE FIGURE
0 50 2-4-93 1

LEGEND
- PERIMETER DREW
- APPROXIMATE CIRCLING OF FORMER BURN PIT
- 30' X 50' CHAIN LINK FENCE WITH GATE
- TREELINE
- MONITORING WELL
- EXCAVATION WELL LOCATION
- PINZOMETER LOCATION (APPROXIMATE)
Figure 3- Total VOCs
FIGURE 14-1
TOTAL VOCs
GROUNDWATER CONCENTRATION VERSUS TIME
HH BURN PIT SUPERFUND SITE

Y-scale is logarithmic.

Concentration (µg/L)
SAMPLE COLLECTION DATE

MW-1
MW-1D
MW-2
MW-3
MW-3D
MW-4
MW-4D
MW-5
MW-5D
MW-6
MW-7
Figure 4

1,2-DCE, TCE and PCE in MW-3
1,2-DCE, TCE, and PCE in MW-3
GROUNDWATER CONCENTRATION VERSUS TIME
HH BURN PIT SUPERFUND SITE

Y-scale is logarithmic.
Figure 5
Benzene and Vinyl Chloride in Well EW-3
BENZENE AND VINYL CHLORIDE IN EW-3
GROUNDWATER CONCENTRATION VERSUS TIME
HH BURN PIT SUPERFUND SITE

- Benzene
- Vinyl Chloride

Concentration [µg/L]

SAMPLE COLLECTION DATE

GES - HH Burn Pit  
Page 1 of 1  
April 2010