FOURTH FIVE-YEAR REVIEW REPORT

For

L. A. CLARKE and SON SUPERFUND SITE

MASSAPONAX

SPOTSYLVANIA COUNTY, VIRGINIA

SEPTEMBER, 2010

PREPARED BY:

United States Environmental Protection Agency
Region III
Philadelphia, Pennsylvania

Approved by:

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U.S. EPA, Region III

Date:

9/29/10

Table of Contents

List of Acronyms

ARARs	Applicable or Relevant and Appropriate Requirements
CASI	Commonwealth Atlantic- Spotsylvania, Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cPNA	Carcinogenic Polynuclear Aromatic
DNAPL	Dense Non-Aqueous Phase Liquids
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
OU	Operable Unit
PNA	Polynuclear Aromatics
RAO	Remedial Action Objective
RD/RA	Remedial Design/Remedial Action
RF&P	Richmond, Fredericksburg, and Potomac Railroad
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SARA	Superfund Amendments and Reauthorization Act of 1986

SDWA	Safe Drinking Water Act
SU	Standard Units
TPNA	Total Polynuclear Aromatics
VDEQ	Virginia Department of Environmental Quality

Executive Summary

The L.A. Clarke and Son Superfund site ("site") is located in Massaponax, Spotsylvania County, Virginia. The facility is a former wood treating facility that applied creosote on railroad ties and telephone poles.

To facilitate management of the cleanup, the remediation activities have been divided into five operable units (OUs) as follows:

Operable Unit 1:	Site Security
Operable Unit 2:	Demolition & Disposal
Operable Unit 3	Site Water Controls
Operable Unit 4	Site Soils
Operable Unit 5	Ground Water

A Record of Decision ("ROD") covering the first four OUs was issued on March 31, 1988. The Remedial Action ("RA") work under the ROD is as follows: OU 1 addressed site security by installing a fence around the site and signage; OU 2 addressed the demolition and disposal at the site by demolishing the process buildings, disposing of the then existing railroad ties, telephone poles, and unused treated wood, and decommissioning the wastewater surface impoundment; OU 3 addressed site water controls; and, OU 4 addressed treatment and disposal of the contaminated surface soil, subsurface soil, and sediments. EPA temporarily deferred additional RI/FS work and development of an OU 5 ROD for ground water.

The site has undergone various cleanup actions while a final remedy addressing ground water is being determined. The completed portions of the remedy include:

- Installing partial fencing and signage to deter trespassers from entering the site;
- Demolishing all process area buildings and other structures;
- Removing all remaining telephone poles, railroad ties, and other debris;
- Decommissioning the former wastewater impoundment (removing, treating, and off-site disposal of surface water, sludge, and underlying contaminated soils);
- Excavating and disposing off-site of contaminated sediments from the drainage ditches and flood plain.

The trigger for this Five-Year Review was the date of the previous Five-Year Review on September 29, 2005.

The assessment of this Five-Year Review found that the remedy was constructed in accordance with the requirements of the ROD, as amended by Explanation of Significant Differences (ESD) Numbers 1, 2, and 3. The immediate threats to human health and the environment have been addressed.

A protectiveness statement cannot be made at this time for the remedy at OU1. Although the fencing and signage help to deter trespassers from entering the upland portion of the site and past sampling has indicated that the surface soil at the upland portion of the site meets the to-be-proposed revised cleanup level of 60 milligrams per kilogram for carcinogenic polynuclear aromatic hydrocarbons (cPNAs), confirmatory sampling of the flood plain must be performed to assure the sediments have not been re-contaminated and, possibly exposing trespassers to unacceptable levels of contaminants. It is expected that the confirmatory sampling will take approximately 15 months to complete, at which time a protectiveness determination will be made.

The remedy at OU 2 is protective of human health and the environment. The demolition of process area buildings and structures; removal and off-site disposal of debris; removal and off-site treatment and disposal of the surface water, emulsion, and sediments in the surface impoundment; and the excavation and off-site disposal of the contaminated soil underlying the surface impoundment have removed these elements from possibly exposing trespassers at the site to contaminant levels exceeding site cleanup levels.

A protectiveness statement is not applicable for OU3 since no remedial action was undertaken on site water controls.

The remedy at OU 4 is broken into four phases: surface soils; subsurface soils; flood plain and drainage ditch sediments; and Westvaco Pond sediments. A protectiveness determination cannot be made on subsurface soils since EPA has deferred action on subsurface soils to a remedy to be selected for ground water. The remedy for surface soils is expected to be protective of human health and the environment and will be documented in the decision document EPA expects to propose changing the cleanup level for cPNAs to 60 mg/kg. A protectiveness determination on flood plain and Westvaco Pond sediments cannot be made at this time until further information is obtained, which will include confirmatory samples of the flood plain and drainage ditch sediments to determine whether the flood plain and/or drainage ditches have become re-contaminated and to sample Westvaco Pond sediments to determine whether they exceed the cleanup level. It is expected that the confirmatory sampling will take approximately 15 months to complete, at which time a protectiveness determination will be made.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name: L. A. Clarke and Son Superfund site		
EPA ID: VAD007972482		
Region:3	**State: Virginia**	**City/County: Massaponax, Spotsylvania County**
SITE STATUS		
NPL status: X Final □ Deleted □ Other (specify) _____		
Remediation status (choose all that apply) X Under Construction □ Operating Complete		
Multiple OUs?* X Yes No	**Construction Completion date:**	
Has site been put into reuse? Yes **X** No		
REVIEW STATUS		
Lead agency: X EPA □ State □ Tribe □ Other Federal Agency _____		
Author name: Andrew Palestini		
Author title: RPM	**Author Affiliation: EPA**	
Review period: 01/25/2010 to August 2010**		
Date(s) of site inspection: 06/16/2010		
Type of review: **X** Post-SARA □ Pre-SARA □ NPL-Removal only □ Non-NPL Remedial Action Site □ NPL State/Tribe-lead □ Regional Discretion		
Review number: □ first second third X other – fourth		
Triggering action: □ Actual RA Onsite Construction at OU#____ □ Actual RA Start at OU#____ □ Construction Completion X Previous Five-Year Review Report □ Other (specify) _____		
Triggering action date: 09/29/2005		
Due Date: 09/29/2010		

"OU" refers to operable unit.** Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN

Issues:

- Petition from PRP to base cleanup levels for cPNAs in surface soils on industrial exposure (Operator, Fabricator, and Laborer job classifications) rather than residential exposure.

- Beaver dams are causing flooding in the vicinity of drainage ditches 2 and 3.

- Institutional controls have not yet been selected.

- Site protective cover not complete.

- Westvaco Pond sediments not addressed.

- Determine whether the sediments in the Massaponax Creek flood plain have been re-contaminated.

Recommendations:

- EPA needs to issue another decision document that takes into account current and reasonably anticipated future land use.

- Remove beaver dams prior to the fall/early winter when historically heavier precipitation may cause flooding of the railroad siding.

- EPA will work with PRPs to develop institutional controls to limit future use of the site to the Operator, Fabricator, and Laborer job classifications.

- Provide 1.5 feet of cover over areas where treatment is required.

- Evaluate sediments in Westvaco Pond.

- PRP needs to sample the flood plain area to determine whether they have been re-contaminated by the drainage ditches in the upland area.

Protectiveness Statements:

A protectiveness statement cannot be made at this time for the remedy at OU1. Although the fencing and signage help to deter trespassers from entering the upland portion of the site and past sampling has indicated that the surface soil at the upland portion of the site meets the to-be-proposed revised cleanup level of 60 milligrams per kilogram for polynuclear aromatic hydrocarbons (cPNAs), confirmatory sampling of the flood plain must be performed to assure the sediments have not been re-contaminated and, possibly exposing trespassers to unacceptable levels of contaminants. It is expected that the confirmatory sampling will take approximately 15 months to complete, at which time a protectiveness determination will be made.

The remedy at OU 2 is protective of human health and the environment. The demolition of process area buildings and structures; removal and off-site disposal of debris; removal and off-site treatment and disposal of the surface water, emulsion, and sediments in the surface impoundment; and the excavation and off-site disposal of the contaminated soil underlying the surface impoundment have removed these elements from possibly exposing trespassers at the site to contaminant levels exceeding site cleanup levels.

The remedy at OU 4 is broken into four phases: surface soils, subsurface soils, flood plain and drainage ditch sediments, and Westvaco Pond sediments. A protectiveness determination cannot be made on subsurface soils since EPA has deferred action on subsurface soils to a remedy to be selected for ground water. The remedy for surface soils is expected to be protective of human health and the environment and will be documented in the decision document EPA expects to propose changing the cleanup level for cPNAs to 60 mg/kg. A protectiveness determination on flood plain and Westvaco Pond sediments cannot be made at this time until further information is obtained, which will include confirmatory samples of the flood plain and drainage ditch sediments to determine whether the flood plain and/or drainage ditches have become re-contaminated and to sample Westvaco Pond sediments to determine whether they exceed the cleanup level. It is expected that the confirmatory sampling will take approximately 15 months to complete, at which time a protectiveness determination will be made.

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: Insufficient Data (ID)
This Environmental Indicator has been modified from current human exposure under control because we do not know if trespassers could be exposed to unacceptable levels of contamination in the Massaponax Creek flood plain.

Groundwater Migration: Groundwater Migration Not Under Control (GMNC)

Sitewide RAU: The site is expected to achieve Sitewide Ready for Anticipated Use on September 30, 2014.

Other Comments:
N/A

Five-Year Review Report
For
L. A. Clarke Superfund Site
Massaponax, Virginia

I. Introduction

The purpose of a 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 reviews 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 §121states:

> *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], 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.*

The Agency interpreted this requirement further in the NCP; 40 Code of Federal Regulations (CFR) §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 Region III has conducted a statutory Five-Year Review of the remedial actions implemented at the L. A. Clarke Superfund site (site) in Massaponax, Virginia. This review was conducted by the Remedial Project Manager (RPM) from January 25, 2010 to August 2010. This report documents the results of the review.

This is the fourth Five-Year Review for the site. The triggering action for this review is the date of the previous Five-Year Review report, as shown in EPA's WasteLAN database: September 29, 2005. EPA is performing this statutory Five-Year Review because hazardous substances, pollutants, or contaminants are left on site above levels that allow for unlimited use and unrestricted exposure.

II. Site Chronology

The purpose of this section of the five-year review report is to list all important site events and relevant dates.

Table 1: Chronology of Site Events

Event	Date
Wood preserving operations	June 1937 to 1988
Inactive period	April 1979 – June 1980
L.A. Clarke and Son Site listed on the NPL	July 10, 1986
Remedial Investigation/Feasibility Study Report Complete	February 1988
Record of Decision signed Operable Unit 1 (OU-1), surface soils and sediments	March 31, 1988
Remedial Design/Remedial Action OU-1 Consent Decree	July 17, 1989
Administrative Order By Consent (AOC III-89-30-DC) Ground water	September 6, 1989
Explanation of Significant Differences (ESD) 1 issued Demolish process buildings, eliminate soil flushing	December 29, 1989
ESD 1 work complete	January 13, 1993
ESD 2 issued Excavate lagoon sludge with off-site incineration	March 31, 1994
First Five-Year Review Report	September 30, 1994
Order to Withdraw AOC III-89-30-DC Ground water	September 29, 1995
Administrative Order By Consent for Removal Order Ground water	September 29, 1995
ESD 2 work complete	February 28, 1997

Event	Date
ESD 3 issued Excavate floodplain sediments with off-site disposal	June 14, 1999
Second Five-Year Review Report	September 30, 1999
ESD 3 work complete	October 2001
Third Five-Year Review Report	September 29, 2005

III. Background

The purpose of this section of the five-year review report is to describe the characteristics of the site and to identify the threats that were posed to the public and the environment at the time of the initial Record of Decision (ROD).

Physical Characteristics

The site is located in Spotsylvania County, Virginia, approximately 4.5 miles southeast of Fredericksburg (see Figure 1). The location is approximately one quarter mile east of Route 608, north of Massaponax Creek. The site encompasses approximately 44 acres in area, including the L.A. Clarke and Son property and additional area south of the property. Figure 2 identifies the approximate boundaries of the site, the location of railroad lines, Westavaco Pond, and Massaponax Creek and its flood plain.

The site is separated by the CSXT railroad siding, as shown on the map. The former wood treating plant was located north of the siding, and the former wastewater surface impoundment and flood plain south of the siding. Both the wood treatment plant and impoundment were located on the west end of the site. A former soil waste pile was also located in the west-central portion of the site. The nearest residence is approximately 1000 feet away from the northern site boundary.

Surface runoff from the site flows into a series of drainage ditches which discharge into the flood plain/wetland. Ground water at the site flows in a southwesterly direction within two water-bearing zones. The shallow aquifer flows beneath the former operations area and surfaces at the southern property boundary in the wetlands area. Ground water from the site also enters the drainage ditches which outfall in the wetland. A deeper aquifer flows under the site and the wetlands.

Water from the wetlands flows through several tributaries which flow to Massaponax Creek. Westvaco Pond lies in the most western portion of the site.

Land and Resource Use

The site consists of an upland area and the Massaponax Creek associated flood plain/wetland area. As stated above, the site is divided by a rail spur which is still in use by a neighboring property owner. All of the process buildings, structures, and tanks have been removed from the site. The office/decontamination building is in the process of being replaced by a trailer. The site is situated near a secondary road in a mostly rural area. The site is not in use at this time and is overgrown with brush and grasses. There are a few residential homes upgradient of the site, approximately 1000 feet from the site. These homes were previously placed on public water service by Spotsylvania County to allay the homeowners' fear of possible impacts from ground water contamination from the site. The L.A. Clarke and Son property is presently zoned industrial.

A fence was installed at the property under Operable Unit 1 (OU-1), site security, to deter trespassing. However, because of the active railroad spur, the fence is not continuous. Rather, the fence was placed along most of the perimeter of the site, especially where trespassers would likely enter. Signs have been placed on the fence to warn against trespassing. The flood plain area is not fenced.

Massaponax Creek eventually discharges into Ruffins Pond approximately two miles downstream. Ruffins Pond is used for recreational swimming and fishing. Westavaco Pond is not known to be used for swimming or fishing.

History of Contamination

Wood preserving operations began at the site in June 1937 and continued until 1988, except for one inactive period between April 1979 and June 1980. Railroad ties, telephone poles, and fence posts were preserved at the site by injecting them with a mixture of creosote and coal tar in a sealed compartment under high temperature and pressure.

L.A. Clarke and Son leased the land from the Richmond, Fredericksburg & Potomac Railroad ("RF&P") until 1976, when the Clarke family bought the property. In 1980, the Clarke family sold the facility to the Curtas family who then operated the facility until it closed in 1988. RF&P has since been sold to Commonwealth Atlantic Properties, with the RD/RA being performed by a subsidiary, Commonwealth Atlantic-Spotsylvania Inc. ("CASI").

In the early 1970's, wastewater treatment consisted of draining process wastewaters into two concrete-lined pits located north of the process facility. Historical aerial photography indicates that these pits were present at least from 1953 to 1974. Overflow from the concrete pits went to an earthen pit, and excess water was discharged to drainage ditches and sprayed on the ground around the storage yard to control dust.

Four additional waste pits have been identified in aerial photos dating back to 1937. All of these pits had been filled in by 1979.

In 1975, L.A. Clarke and Son, Inc. was issued a National Pollution Discharge Elimination System ("NPDES") permit for outfalls from two drainage ditches on-site. These drainage ditches still function today to maintain the dry upland condition of the property.

Initial Response

The PRP extended public water lines to those residences in close proximity to the site even though it was stated in the Responsiveness Summary portion of the ROD that residential wells in the vicinity of the site were not being significantly impacted by contamination from the wood treating operations.

Basis for Taking Action

In the Remedial Investigation/Feasibility Study ("RI/FS"), dated February 1988, it was determined that the site contained contaminated soils and sediments which may present an imminent and substantial endangerment to public health, welfare, or the environment. The site contamination consists of the by-products of creosote: polynuclear aromatic hydrocarbons ("PNAs"), benzene, carbozole, and dense non-aqueous phase liquids ("DNAPL"). Other subsequent investigations confirmed that contamination was either transported off-site via surface flow or has migrated along thin alluvial planes to the flood plain area of Massaponax Creek. In addition, a survey of bottom feeding fish from Westvaco Pond contained in the RI/FS revealed carcinogenic lesions around the gills and mouth of several specimens. These abnormalities may be due to direct contact with creosote contaminated sediments.

IV. Remedial Actions

The purpose of this section of the five-year review report is to discuss initial plans, implementation history, and current status of the remedy.

Remedy Selection

A Record of Decision ("ROD") covering the first four OUs was issued on March 31, 1988. The Remedial Action ("RA") work under the ROD is as follows: OU 1 addressed site security by installing a fence around the site and signage; OU 2 addressed the demolition and disposal at the site by demolishing the process buildings, disposing of the then existing railroad ties, telephone poles, and unused treated wood, and decommissioning the wastewater surface impoundment; OU 3 addressed site water controls; and, OU 4 addressed treatment and disposal of the contaminated surface soil and sediments. EPA temporarily deferred additional RI/FS work and development of an OU 5 ROD for ground water. Although ground water information was obtained during

the RI indicating that the aquifers underlying the site were contaminated, additional information is required to determine the lateral and vertical extent of the contamination, the mechanism for transporting contaminants in the aquifers, and to develop remedial alternatives.

The purpose of OU 3 is to determine whether it is feasible to prevent clean water from becoming contaminated by entering the drainage ditches on the site. However, the results of a study indicated that it was not feasible to prevent the clean water from entering the drainage ditches and no further work was performed under this operable unit. For this reason, there will not be a protectiveness statement for OU 3 in this five-year review report.

The 1988 ROD addressed the surface conditions and contamination at the site requiring remedial action. The primary objective of the 1988 ROD is to eliminate soil and sediment contamination which presented an unacceptable risk to human health and the environment. To address these hazards, the remedy selected in the OU 1 ROD contained the following major components:

- Biological treatment of contaminated soil under the then existing process buildings via in-situ soil flushing with a surfactant solution followed by in-situ bioreclamation;

- Biological treatment of all other contaminated soil and sediment via on-site landfarming. All contaminated surface soil which could not be treated in-situ, sediments (ditches 1, 2, and 3 and wetlands), buried pit materials, and subsurface wetland soils would be excavated/dredged and consolidated for treatment in the landfarming unit. The total amount of soil and sediments to be treated was estimated to be 119,000 cubic yards;

- Backfill excavated areas with treated soil and sediment. Cover backfill areas with topsoil and vegetate;

- Biological treatment of the soil pile (which was a regulated unit under the Resource, Conservation and Recovery Act ("RCRA") via land treatment in place;

- Biological treatment in a tank of the sludge from the wastewater surface impoundment, in accordance with RCRA (the bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol is a listed waste under RCRA, with the designation K001); and

- Ground water monitoring during and post treatment.

Incidental Ingestion/Dermal Contact

The Remedial Action Objectives ("RAOs") in the ROD set forth cleanup standards that EPA determined would be protective of current workers and future residents assuming incidental ingestion and dermal contact with soils contaminated with cPNAs. It was determined in the ROD that a 1.0E-6 risk level would be appropriate for protection of the current workers and future residents. To achieve this risk level, EPA selected cleanup levels for carcinogenic polynuclear aromatic hydrocarbons ("cPNAs") in surface soil of 0.22 milligrams per kilogram ("mg/kg") for the workers and 0.08 mg/kg for residents. In addition, the remedy in the ROD required a one and a half foot cover of clean soil be placed on top of the treated soil after it was placed back to the area it was excavated.

Conditions at the site have changed significantly since the cleanup standards were established in the ROD. All wood treating operations have ceased and all buildings and equipment associated with the process have been cleared. There are no worker activities occurring which could potentially result in soil contact and the current owner has indicated that it has no intention of allowing the site to be used for residential development. In addition, future residential use is considered unlikely by EPA based on current land uses, the presence of flood plains and lakes to the north and south of the site and the presence of an active rail spur through the site.

The Consent Decree contains a provision which allows the PRP to petition EPA to change the soil cleanup level. In response, RF&P submitted a proposal to change the cleanup level to 60 mg/kg as benzo(a)pyrene equivalents for cPNAs, utilizing the reasonably anticipated future use of the site being industrial and subsequent re-analysis of the risk assessment utilizing current methodologies. The petition proposes that a change in surface soil cleanup is appropriate, based on the reasonably anticipated future use of the site as being industrial, with the Operator, Fabricator, and Laborer labor classifications being the most likely workers at the site. Changing a cleanup level requires EPA to issue a decision document. EPA has not issued the decision document but has preliminarily accepted the proposal. Thus, the cleanup level has not yet been formally revised.

Prior to the previous five-year review, EPA performed a re-evaluation of RF&P's proposed revision to the cleanup level for surface soil and decided that a soil cleanup level of 60 mg/kg benzo(a)pyrene equivalents for cPNAs would still be protective; however, the total cancer risk at this cleanup level would lie at the 5E-05 risk level instead of at the 1.0E-5 risk level. The 5.0E-5 risk level remains within the Reasonable Maximum Exposure range and is considered protective, assuming the only workers at the site would be the Operator, Fabricator, and Laborer job classifications. However, exposure at this level would not be protective for general industrial workers. (The exposure duration of the Operator, Fabricator, and Laborer is shorter than the exposure duration for the general industrial worker.) The PRP has previously indicated a desire to build industrial structures (e.g., warehouses) with offices. Possible use of the site by

office workers and other general industrial worker classifications would require a re-evaluation of risk, or possibly additional cleanup measures.

Ingestion of Shallow Ground Water

The ROD requires that concentrations of site-related contaminants in the subsurface soil should not exceed criteria which are protective of the shallow aquifer underlying the site as it is EPA policy to return ground water to its beneficial use (i.e. a potential drinking water supply). Based upon site-specific circumstances, the ROD established a 1.0E-5 risk level as a reasonable goal for protecting the aquifer and established target cleanup levels for the subsurface soil of 10.3 mg/kg and 94.03 mg/kg for cPNAs and benzene, respectively, to achieve these goals. The ROD further stated that the target cleanup levels would be confirmed via studies during the Remedial Design phase of the cleanup and indicated that remedial alternatives for restoration of ground water to applicable or relevant and appropriate requirements ("ARARs") would be determined in a subsequent ROD.

EPA deferred the action necessary to address ground water (including any subsurface soil cleanup that would be required) to another OU for this site, OU 5. Deferring action regarding the remediation of subsurface soil and ground water to a separate ROD will enable EPA to comprehensively evaluate remedial alternatives for ground water in one document as opposed to implementing any requirements for ground water in separate documents for two operable units. In an effort to try and expedite the ground water remediation, EPA entered into an Administrative Order on Consent with RF&P in September 1995 to perform the remaining investigation, design, and clean-up as a non-time critical removal action. However, work under this Removal Order was suspended while RF&P evaluated another site conceptual model. This work was accomplished under the Administrative Order on Consent.

Institutional Controls

The remedy in the ROD included enacting institutional controls for the site; however, because the wood treating operations were still ongoing at the time the ROD was issued, the ROD could not contemplate restricting future use of the site for the Operator, Fabricator, and Laborer job classifications on which the 60 mg/kg cleanup level is based. In order for the site to be protective for this revised future use scenario, institutional controls are required for this specific use. Therefore, institutional controls need to be addressed in a future decision document to restrict future use of the site to the Operator, Fabricator, and Laborer job classifications.

Remedy Implementation

RF&P entered into a Consent Decree with EPA on July 17, 1989, to conduct the Remedial Design/Remedial Action ("RD/RA") of the remedy selected in the ROD. This RD/RA is being conducted under the oversight of EPA as the lead agency and the Virginia Department of Environmental Quality ("VDEQ") as the support agency.

After issuing the ROD, EPA determined that certain changes should be made to the selected remedy. These changes are identified in Explanation of Significant Differences ("ESDs") because the changes do not fundamentally alter the overall approach intended by the ROD. The significant differences between the remedy presented in the ROD and the remedy that will be implemented are discussed below. Except for the specific changes discussed below, all terms of the ROD and previous ESDs remain in effect.

On December 29, 1989, EPA issued ESD number 1 to revise the remedy for the soil in the former process area. In-situ flushing was originally selected to remediate the soil under the then existing process buildings because the wood treating facility was still in operation at the time the ROD was issued. Because RF&P stopped operations and agreed to dismantle the process buildings, EPA selected landfarming as the selected remedy.

On March 31, 1994, EPA issued ESD number 2 to revise the selected remedy for the sludge in the wastewater surface impoundment from biological treatment in a tank to off-site incineration. Work was completed and the wastewater surface impoundment was decommissioned in March 1997. This effort included removal and off-site disposal of approximately 240,000 gallons of wastewater, approximately 153,000 gallons of emulsion and sludge, 172 tons of liner material, and 96 cubic yards of contaminated soil from underneath the impoundment liner.

On June 14, 1999, EPA issued ESD number 3 to revise the selected remedy for the flood plain and drainage ditch sediments from biological treatment via on-site landfarming to off-site disposal in a landfill, as long as disposal was performed in conformance with RCRA Land Disposal Restrictions. The estimated amount of sediment removed under ESD number 3 was approximately 1,028 tons or about 771 cubic yards.

System Operation/Operation and Maintenance

Operation and Maintenance costs typically include sampling and monitoring efforts as well as the operation and maintenance of any collection and/or treatment systems, maintenance of monitoring and/or recovery wells, and maintenance of cover systems (mowing and lime addition and repairs, as needed). However, no active treatment is occurring at this site nor are there any cover systems to maintain; therefore, no operation or maintenance is required in this respect. Only general site maintenance is required, including maintaining security fencing, signage, and monitoring wells. CASI has not provided detailed information regarding actual expenditures for these costs.

V. Progress Since Last Five-Year Review

The purpose of this section of the five-year review report is to discuss the progress taken on follow-up actions included in the previous Five-Year Review report.

The third Five-Year Review report, signed on September 29, 2005, contained the following protectiveness statement based on the findings of the review:

> The actions taken to date are protective of human health in the short term. Currently, exposure pathways that could result in unacceptable risks are being controlled through implementation of the completed portions of the remedy namely, fencing, demolition and off-site disposal of all of the process buildings and tanks, decommissioning of the wastewater surface impoundment, and excavation and off-site disposal of the sediments in the drainage ditches and the flood plain. A determination with respect to environmental impacts associated with Westavaco Pond cannot be made at this time as the sediments in the pond need to be evaluated.
>
> The selected remedy is expected to be protective of human health and the environment upon completion and, in the interim, exposure pathways that could result in unacceptable risks are being controlled. It should be noted that EPA is evaluating a proposed change to the surface soil cleanup level.

Below is the table from the previous Five-Year Review report listing the four issues related to the then current site operations, conditions, or activities which would prevent the remedy from being protective.

Issues

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
PRP petition to change cleanup levels based on industrial rather than residential exposure	No	Yes
Institutional controls have not yet been selected.	No	Yes
Site protective cover not complete	No	Yes
Westvaco Pond sediments not addressed	No	Yes

Below is the table from the previous Five-Year Review report listing the recommendations and follow-up actions pertaining to the four issues identified in the above table.

Issue	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
PRP petition to change cleanup levels based on industrial use rather than residential exposure	EPA needs to issue another decision document based upon current and reasonably anticipated future land use and including institutional controls.	EPA		July 2006	N	Y
Institutional controls not selected.	EPA will work with PRPs to develop institutional controls.	PRPs EPA	EPA	September 2006	N	Y
Site protective cover not complete.	Provide 1.5 feet of cover over areas where treatment is required.	PRP	EPA	November 2006	N	Y
Westvaco Pond sediments not addressed.	Evaluate sediments in Westvaco Pond.	PRP	EPA	June 2006	N	Y

None of the items listed above have been addressed in the five years since the last five-year review. The PRPs made a proposal to EPA at a meeting on September 13, 2005 (just prior to EPA signing the previous five-year review report) for a new settlement (consent decree) under which CASI would transfer the property and the responsibility for cleaning up the site to another entity. EPA allowed a suspension of ongoing work during the negotiations for this intricate agreement which would have included the items listed above as well as continuing the investigation work for the subsurface soil and the ground water operable unit (OU 5). In August 2010, it became apparent that the parties were unable to negotiate a settlement. EPA is now planning re-starting work at the site with CASI, making sure the items listed in the above table are completed.

VI. Five-Year Review Process

The purpose of this section of the five-year review report is to describe the activities performed during the Five-Year Review process as well as to provide a summary of findings.

Administrative Components

The site visit for this Five-Year Review occurred on June 16, 2010. The VDEQ project manager was not able to attend the site visit.

The Five-Year Review team was led by Andrew Palestini of EPA, the Remedial Project Manager for the L.A. Clarke and Son site, and included Vance Evans, EPA's Community Involvement Coordinator, and members from the Regional Technical Advisory staff with expertise in the application of risk assessment and hydrology. Mr. Thomas Modena, VDEQ project manager, assisted in the review as the representative of the support agency. A site-specific approach was developed for this fourth Five-Year Review.

The approach established for the Five-Year Review included:

- Community Involvement –Notifying the community that EPA is conducting a Five-Year Review at the site and providing information on whom to contact and how to get more information about the process and notifying the community of how to obtain a copy of the fourth Five-Year Review report upon its completion;

- Document and Data Review – Reviewing significant site documents and environmental monitoring data. Researching the Applicable or Relevant and Appropriate Requirements (ARARs) cited in the ROD for possible revisions as well as potentially new ARARs which may be significant to the site circumstances. Checking published toxicity references for site-related contaminants to determine if there have been changes since the site-specific risk assessment, which may be relevant to the review team's evaluation of remedy protectiveness.

- Site Inspection – Visiting and inspecting the site to visually confirm and document the conditions of the site, the surrounding area, and those portions of the remedy that have been completed.

- Five-Year Review Report - Developing and reviewing the Five-Year Review Report.

The Five-Year Review schedule extended from January 25, 2010 to August 2010.

Community Involvement

There has been little community interest since the Record of Decision was issued. A notice was placed in the Fredericksburg Free Lance Star on June 28, 2010.

Document Review

This Five-Year Review included a review of relevant documents including:

- The L.A. Clarke and Son Superfund Site Record of Decision, March 31, 1988.
- Explanation of Significant Differences, L.A. Clarke and Son Superfund Site, December 29, 1989.
- Second Explanation of Significant Differences, L.A. Clarke and Son Site, March 31, 1994.
- Third Explanation of Significant Differences, L.A. Clarke and Son Superfund Site, June 14, 1999.
- Supplemental Floodplain Investigation Workplan, L.A. Clarke Superfund Site, December 10, 2004.
- Third Five-Year Review Report for the L.A. Clarke and Son Superfund Site, September 29, 2005.
- Scoping document for the L.A. Clarke Superfund Site, December 8, 2005.

Data Review

Normally, EPA reviews site-related data as part of the five-year review process. However, for this five-year review, EPA did not perform a review of site-related data. The reasons are:

1. There are no operating data to review since there aren't any operating systems at the site performing long-term cleanup.
2. EPA performed a re-evaluation of the proposed revision to the soil cleanup level in the previous five-year review report. In that re-evaluation, EPA determined that a lifetime cancer risk of 5.0E-5 can be achieved under the revised future exposure of industrial use classification for Operators, Fabricators, and Laborers at the proposed cleanup level of 60 mg/kg cPNAs.
3. EPA allowed a suspension of additional investigative work while progress was being made in the negotiations for an agreement under which the PRP would reach an agreement with another entity who would assume responsibility for cleanup of the site. As stated previously, CASI approached EPA with a proposal in which CASI would transfer all of its responsibility to clean up the site to the other entity. Under this proposal, EPA, CASI, and the other entity would enter into a consent decree which would lay out the terms of the other

entity becoming the sole PRP at the site as well as the terms of the remaining work to be performed to complete the cleanup of the site, both short-term as well as long-term. The issues listed in the previous five-year review report constitute part of the remaining work to be performed. The negotiations took this long because this unique settlement involves many protections to make sure the site is properly cleaned up. However, since the parties failed to negotiate a settlement, EPA is preparing to complete the remaining work with CASI, including the issues listed in the previous five-year review report.

Site Inspection

The site inspection was conducted on June 16, 2010. The purpose of the inspection was to observe the site conditions by making a visual inspection of the site and to observe whether any development had occurred on or near the site. Attending the site inspection were Mr. Channing Martin, attorney for CASI, and Mr. Andrew Palestini, Remedial Project Manager for EPA.

All 44 acres of the site were visually inspected. The site remains overgrown. The vegetation on the surface of the site was in very good condition, with lush growth evident. The fencing appeared to be in satisfactory condition. The one change at the site was the demolition and removal of the previous office/decontamination building. This was being replaced with a trailer. An electrician was at the site the day of the inspection to supply the trailer with electricity. The trailer will be used as a meeting place on site.

No new development has occurred on or near the site.

Two of the surface drainage ditches were flooded. Although the area received a lot of precipitation in the winter and spring, the flooding is mainly a result of beaver dams in the culverts under the railroad tracks. This has been an issue at the site for many years. The dams should be removed prior to the late fall/early winter season to prevent flooding of the railroad tracks during the higher precipitation season.

There was no evidence that any trespassers had entered the site.

VII. Technical Assessment

The purpose of this section of the Five-Year Review is to answer the following three questions:

- Is the remedy functioning as intended by the decision documents?
- Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?

- Has any other information come to light that could call into question the protectiveness of the remedy?

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

No.

The cleanup levels for cPNAs in surface soil selected in the 1988 ROD (0.22 mg/kg for site workers and 0.08 mg/kg for residential users) have not been met. Although EPA has preliminarily accepted CASI's submittal to change the future use scenario for the site and the soil clean-up level (under which the current soil conditions would be considered protective), no decision documents (ROD or ESD) have been issued to formalize these changes. These changes cannot be made until the public has a chance to review and comment on them.

The following portions of the selected remedy, as amended, have been conducted to make the property protective: demolition of process area buildings and structures; installation of site fencing; removal and off-site treatment and disposal of the surface water, emulsion, and sediments in the surface impoundment; excavation and off-site disposal of the contaminated soil underlying the surface impoundment; and, excavation and off-site disposal of the drainage ditch and flood plain sediments.

As stated previously in this five-year review report, EPA and CASI have been negotiating a consent decree by which another entity would become the responsible party for cleaning up the site. EPA agreed to suspend further work at the site as long as adequate progress was being made toward completing these negotiations. Since a settlement could not be reached, EPA is preparing to complete the remaining work at the site with CASI.

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

No.

The exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy would not all still be valid because there have been major changes to EPA risk assessment guidance in 1989 (which went into effect after the ROD was issued), 1991, and 2001 and some toxicity factors have been changed since 1989.

In the ROD, EPA set forth cleanup standards that would achieve a 1.0 E-6 risk level for current workers and on-site potential future residents for incidental ingestion and dermal contact with soils contaminated with cPNAs. Although EPA has preliminarily accepted CASI's submittal to change the future use scenario for the site which would result in a revised soil clean-up level, no decision documents (ROD or ESD) have been issued to formalize these changes. These changes cannot be made until the public has a chance to review and comment on them.

Remedial Action Objectives

The overall remedial action objective in the ROD is to eliminate soil and sediment contamination which presents an unacceptable risk to human health and the environment. Specifically, the three RAOs in the ROD are:

- Concentrations of site-related contaminants in surface soil and sediments should not exceed criteria protective of current workers and potential future residents for incidental ingestion and dermal contact. Since actual exposure to workers to the soils of concern was occurring at the time of the ROD, a risk level of 1.0 E-6 was determined to be appropriate in this case. To achieve the 1.0 E-6 risk level for on-site workers, cPNA concentrations in surface soils should not exceed 0.22 mg/kg. To achieve the same risk level for potential future residents, surface soils should not exceed 0.08 mg/kg cPNA.
- Concentrations of site-related contaminants in subsurface soils (at or below an average of 1.5 feet from ground surface) should not exceed criteria protective of the shallow aquifer underlying the site as a potential drinking water supply. Because (1) the closest home wells drawing from the shallow aquifer are located an estimated 1000 feet from the site boundary and (2) these residential wells are currently either side gradient or upgradient of the site, a 1.0 E-5 risk at the site boundary remains a reasonable goal for protecting these home well owners as well as other current and future users of the aquifer of concern. In addition, this goal is achievable through the use of soil/sediment treatment technologies. To achieve this goal, target clean-up levels for site-related contaminated subsurface soil have been developed. The target clean-up level for cPNA in subsurface soil to achieve this goal is 10.3 mg/kg. For benzene, the target clean-up level to achieve this goal is 94.03 ug/kg. These target clean-up levels shall be confirmed via studies in the remedial design phase. (Note, remedial alternatives for restoration of ground water to ARARs of concern will be determined in a subsequent ROD.)
- Concentrations of site-related contaminants in soils and sediments should not exceed criteria protective of aquatic life in surface water, e.g. Massaponax Creek. There are no federal or state standards for soils to achieve such protection. The Public Health Evaluation has determined, via surface water modeling, that prevention of adverse effects on aquatic life in surface water due to inputs from surface water runoff and ground water infiltration can be achieved by reducing TPNA levels in soils and sediments to target clean-up levels of 352 mg/kg. If necessary, this level shall be confirmed during the remedial design.

EPA anticipates that the cleanup levels for surface soils listed above will be revised in an upcoming decision document to reflect advances in science and statistical methods

and a change in the future use scenario. That decision document will include (as necessary) revised cleanup standards to remediate ground water, will ascertain whether sediments in Massaponax Creek, Ruffins Pond, or Westvaco Pond exceed the cleanup level, and will verify whether the sediments in the floodplain have become re-contaminated.

Changes in Standards and To Be Considereds

There have been no changes in ARARs or TBCs that affect the protectiveness of the remedy.

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

Yes.

Ground water investigation work has found contamination on the opposite side of Massaponax Creek. Additional investigative work is necessary to determine the mechanism of contaminant migration on both sides of the creek.

The sediment sampling in Massaponax Creek and Ruffins Pond that was performed for the RI occurred in 1986 and 1987. This sampling indicated no levels of PNAs in either location of ecological concern. However, since this sampling occurred 23 years ago and the facility operated for an additional few years after the sampling, additional sediment sampling is needed to confirm that the sediments still pose no risk to human health or the environment.

Technical Assessment Summary

The cleanup actions taken to date have improved conditions at the site and have moved the site toward acceptable protectiveness levels. The investigative work of subsurface soils and ground water will identify migration mechanisms causing contamination in the flood plain areas. These investigations will facilitate the identification and selection of actions to deal with the contaminated ground water. Institutional controls will have to be identified and put into effect to restrict future use of the site for the Operator, Fabricator, and Laborer job classifications and to ensure no disturbance of soil barriers, if applicable. In addition, these future investigations should evaluate whether new, unacceptable ecological risks have been identified at the site.

VIII. Issues

The purpose of this section of the five-year review report is to provide details on any issues related to the current site operations, conditions, or activities which would prevent the remedy from being protective.

Table 4: Issues

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
PRP petition to change cleanup levels based on industrial rather than residential exposure	No	Yes
Beaver dams are causing flooding in the vicinity of drainage ditches 2 and 3	No	Yes
Institutional controls have not yet been selected	No	Yes
Site protective cover not complete	No	Yes
Westvaco Pond sediments not addressed	No	Yes
Determine whether the sediments in the Massaponax Creek flood plain have been re-contaminated	No	Yes

IX. Recommendations and Follow-Up Actions

The purpose of this section is to specify the required and suggested improvements to current site operations, activities, remedy, or conditions.

Table 5: Recommendations and Follow-Up Actions

Issue	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
PRP petition to change cleanup levels based on industrial use rather than residential exposure	EPA needs to issue another decision document based upon current and reasonably anticipated future land use which includes institutional controls.	EPA	EPA	November 2011	N	Y
Beaver dams are causing flooding in the vicinity of drainage ditches 2 and 3	Remove beaver dams prior to the fall/early winter when historically heavier precipitation may cause flooding of the railroad siding.	PRP	EPA	Fall/ Early Winter 2010	N	Y
Institutional controls not selected.	EPA will work with PRPs to develop institutional controls.	PRPs EPA	EPA	September 2011	N	Y
Site protective cover not complete.	Provide 1.5 feet of cover over areas where treatment is required.	PRP	EPA	November 2012	N	Y
Westvaco Pond sediments not addressed.	Evaluate sediments in Westvaco Pond.	PRP	EPA	November 2011	N	Y
Determine whether the sediments in the Massaponax Creek flood plain have been re-contaminated	The flood plain area will be sampled to determine whether they have been re-contaminated by the drainage ditches in the upland area.	PRP	EPA	November 2011	N	Y

X. Protectiveness Statements

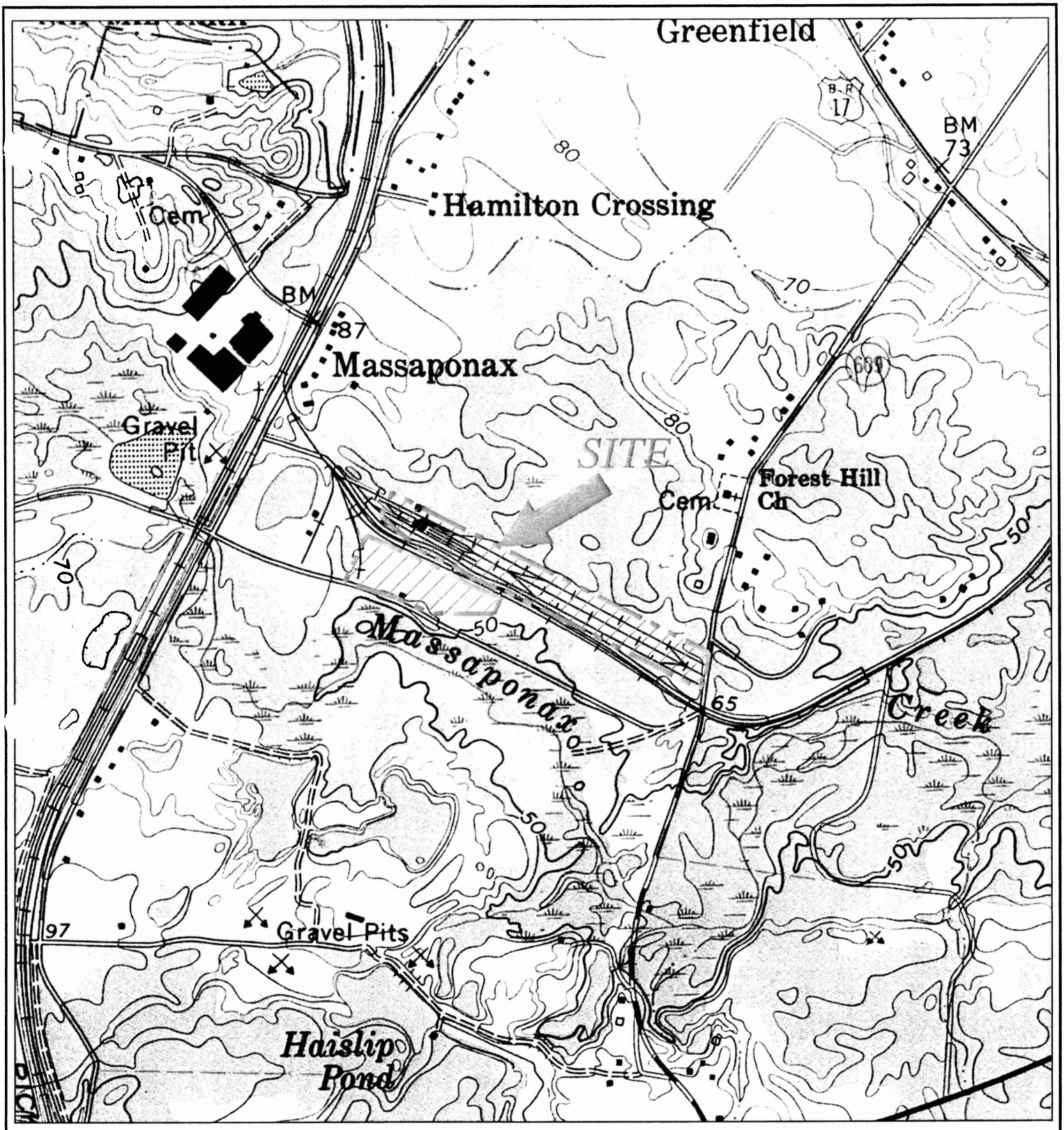
A protectiveness statement cannot be made at this time for the remedy at OU1. Although the fencing and signage help to deter trespassers from entering the upland portion of the site and past sampling has indicated that the surface soil at the upland portion of the site meets the to-be-proposed revised cleanup level of 60 milligrams per kilogram for carcinogenic polynuclear aromatic hydrocarbons (cPNAs), confirmatory sampling of the flood plain must be performed to assure the sediments have not been re-contaminated and, possibly exposing trespassers to unacceptable levels of contaminants. It is expected that the confirmatory sampling will take approximately 15 months to complete, at which time a protectiveness determination will be made.

The remedy at OU 2 is protective of human health and the environment. The demolition of process area buildings and structures; removal and off-site disposal of debris; removal and off-site treatment and disposal of the surface water, emulsion, and sediments in the surface impoundment; and the excavation and off-site disposal of the contaminated soil underlying the surface impoundment have removed these elements from possibly exposing trespassers at the site to contaminant levels exceeding site cleanup standards.

The remedy at OU 4 is broken into four phases: surface soils; subsurface soils; flood plain and drainage ditch sediments; and Westvaco Pond sediments. A protectiveness determination cannot be made on subsurface soils since EPA has deferred action on subsurface soils to a remedy to be selected for ground water. The remedy for surface soils is expected to be protective of human health and the environment and will be documented in the decision document EPA expects to propose changing the cleanup level for cPNAs to 60 mg/kg. A protectiveness determination on flood plain and Westvaco Pond sediments cannot be made at this time until further information is obtained, which will include confirmatory samples of the flood plain and drainage ditch sediments to determine whether the flood plain and/or drainage ditches have become re-contaminated and to sample Westvaco Pond sediments to determine whether they exceed the cleanup level. It is expected that the confirmatory sampling will take approximately 15 months to complete, at which time a protectiveness determination will be made.

XI. Next Review

Since site conditions do not allow for unlimited use and unrestricted exposure, EPA will conduct another Five-Year Review of the L.A. Clarke and Son site by September 2015, five years from the date of this review.



N

VIRGINIA

QUADRANGLE LOCATION

COMMONWEALTH ATLANTIC – SPOTSYLVANIA INC.

DRWN: BJS	DATE: 4/2005	KEY ENVIRONMENTAL INCORPORATED	
CHKD: RJH	DATE: 4/2005		
APPD: JSZ	DATE: 4/2005		
SCALE: 1" = 1,000'			

L.A. CLARKE SUPERFUND SITE
SPOTSYLVANIA COUNTY, VIRGINIA

REFERENCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE OF GUINEA, VIRGINIA.

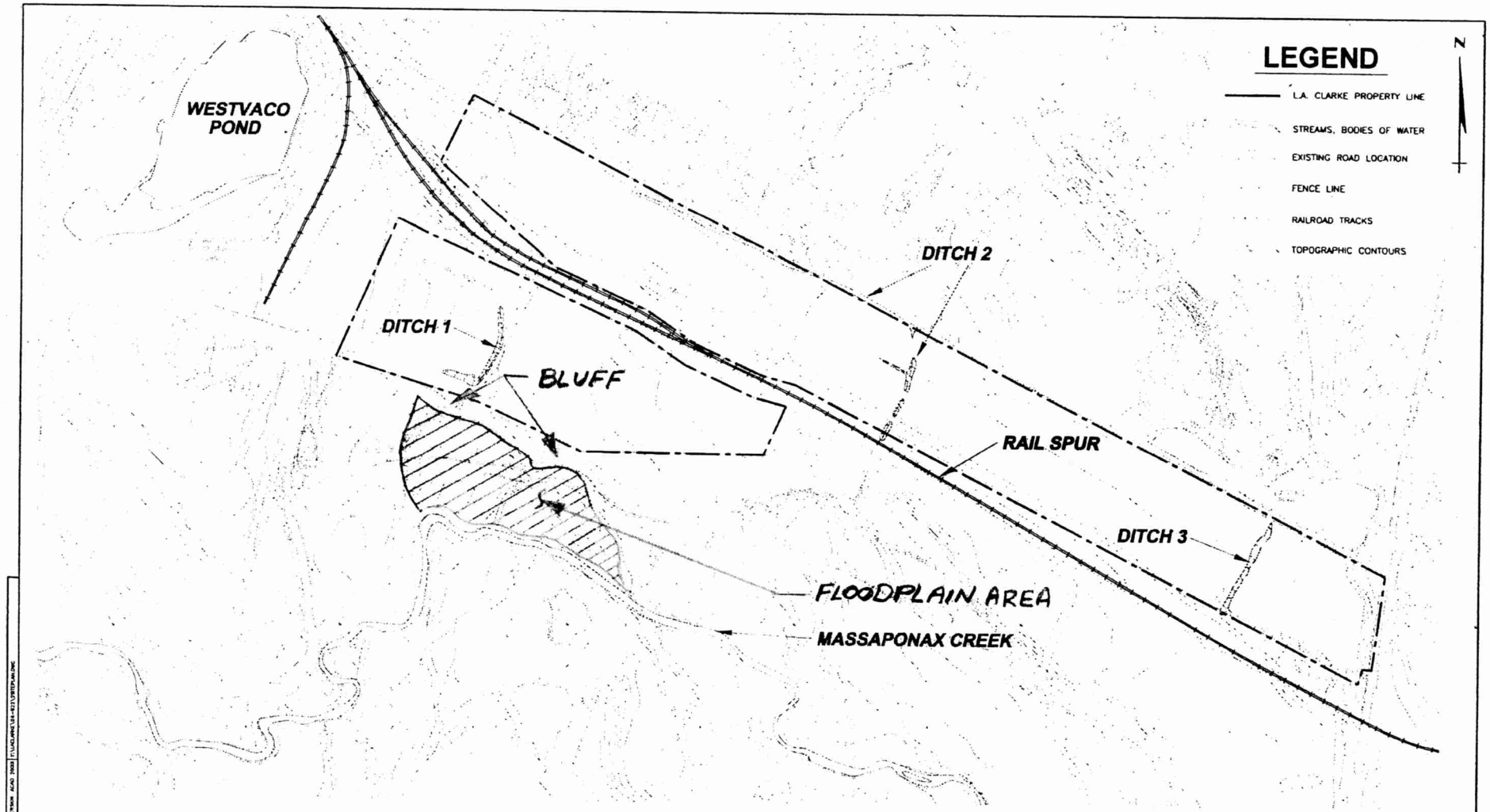
ISSUE DATE:

ROSSLYN FARMS
INDUSTRIAL PARK
1200 ARCH ST., SUITE 200
CARNEGIE, PA 15106

SITE LOCATION MAP

DRAWING NUMBER
05-010
FIGURE 1-1

CDS – FILE: Y:\LA CLARKE\04-922\FIG_1LOCMAP.DWG



REFERENCES 1. SITE PLAN BY HYDROSYSTEMS, INC., 1991.
2. TOPOGRAPHY PROVIDED BY RF&P RR CO.

REV #	DATE	DESCRIPTION	APPD

REV. DATE: 11/10/2004

ROSELYN FARMS INDUSTRIAL PARK
1200 ARCH ST., SUITE 300
CARNEGIE, PA 15106

COMMONWEALTH ATLANTIC – SPOTSYLVANIA INC.
RICHMOND, VIRGINIA

DRWN:	BJS	DATE:	2/25/05
CHKD:	RJH	DATE:	2/25/05
APPD:	JSZ	DATE:	2/25/05
SCALE:	AS SHOWN		

KEY ENVIRONMENTAL INCORPORATED

L.A. CLARKE SUPERFUND SITE
SPOTSYLVANIA COUNTY, VIRGINIA

GENERAL SITE ARRANGEMENT

DRAWING NUMBER 04-822
FIGURE 1-2