

**Five-Year Review Report
Sinclair Refinery Site
Village and Town of Wellsville
Allegany County, New York**

**Prepared by
U.S. Environmental Protection Agency**

September 2007



EXECUTIVE SUMMARY

This is the third five-year review for the Sinclair Refinery site, located in the Village and Town of Wellsville, Allegany County, New York. The site is being addressed in two operable units (OUs). OU1 consists of the landfill remediation and river rechannelization and has been completed. OU2 consists of the surface soils and groundwater at the former refinery. The remediation of the surface soils has been completed. The remedy for the groundwater is not yet complete and is expected to be completed in several years.

Based upon its review of all relevant data, including the two Records of Decision, investigation reports, design reports, progress monitoring and operation and maintenance reports, Five-Year Review reports, and the recently conducted site inspection, the U.S. Environmental Protection Agency (EPA) concludes that the actions taken at the Sinclair Refinery site currently protect human health.

Five-Year Review Summary Form

SITE IDENTIFICATION

Site name (from WasteLAN): Sinclair Refinery

EPA ID (from WasteLAN): NYD980535215

Region: 2

State: NY

City/County: Wellsville/Allegany

SITE STATUS

NPL status: Final Deleted Other (specify) _____

Remediation status (choose all that apply): Under Construction Constructed Operating

Multiple OUs?* YES NO

Construction completion date: N.A.

Has site been put into reuse? YES NO N/A

REVIEW STATUS

Lead agency: EPA State Tribe Other Federal Agency _____

Author name: Michael J. Negrelli

Author title: Remedial Project Manager

Author affiliation: EPA

Review period:** 10/01/2002 to 09/30/2007

Date(s) of site inspection: 8/14/2007

Type of review:

Post-SARA Pre-SARA NPL-Removal only
 Non-NPL Remedial Action Site NPL State/Tribe-lead
 Regional Discretion Statutory

Review number: 1 (first) 2 (second) 3 (third) Other (specify) _____

Triggering action:

Actual RA Onsite Construction at OU # _____

Actual RA Start at OU# _____

Construction Completion

Previous Five-Year Review Report

Other (specify) _____

Triggering action date (from WasteLAN): 09/30/2002

Does the report include recommendation(s) and follow-up action(s)? yes no

Is human exposure under control? yes no not yet determined

Is contaminated groundwater under control? yes no not yet determined

Is the remedy protective of the environment? yes no not yet determined

* ["OU" refers to operable unit.]

** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form (continued)

Recommendations and Follow-Up Actions

The completed portions of the remedy have been implemented and are functioning as intended by the site's decision documents. There is an ongoing remedial action associated with cleanup of the groundwater plumes at the site (Phase 2 groundwater remedy). This report includes recommended follow-up actions associated with this final remedial action (see Table 4).

Protectiveness Statement

The implemented actions for OU1 and OU2 protect human health in the short-term because exposure pathways for site contaminants are limited by current site and groundwater use and controlled by the engineered, access, and institutional controls that are currently in place. Long-term human health protectiveness will be achieved when the final OU2 remedy is implemented and the final site institutional controls are selected and implemented. For the most part, the implemented remedy protects the environment. However, there have been concerns raised by unanticipated releases and some high benthic concentrations. Consequently, it is not evident that the selected remedy is fully protective of the environment. Additional measures are being implemented as part of the OU2 groundwater remedy to address these concerns. EPA will decide on the adequacy of those measures and its determination will be made in either an addendum to this report or an explanation of significant differences to the OU2 ROD.

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I. Introduction

This five-year review was conducted by Michael Negrelli, U.S. Environmental Protection Agency (EPA) Remedial Project Manager (RPM). This review was conducted pursuant to Section 121(c) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, 42 U.S.C. Section 9601, et seq., and 40 C.F.R. 300.430(f)(4)(ii) and in accordance with the Comprehensive Five-Year Review Guidance, OSWER Directive 9355.7-03B-P (June 2001). The purpose of a five-year review is to ensure that implemented remedies protect public health and the environment and that they function as intended by the decision documents. This document will become part of the site file.

This is the third five-year review for the Sinclair Refinery site. Upon completion of all remedial actions, contaminants will remain at this site. This five-year review is being conducted as a statutory requirement. A site inspection for this five-year review was held on August 14, 2007.

This site is being addressed in two operable units (OUs). OU1 consists of the landfill remediation and river rechannelization and has been completed. OU2 consists of the surface soils and groundwater at the former refinery. The remediation of the surface soils has been completed. The remedy for the groundwater is not yet complete and is not expected to be completed for several years.

II. Site Chronology

Table 1, appended to this report, summarizes site-related events from discovery to construction completion.

III. Background

Physical Characteristics

The Sinclair Refinery site is situated between the Genesee River and South Brooklyn Avenue, one-half mile south of downtown Wellsville, in Allegany County, New York. The northerly flowing Genesee River forms the eastern and southern boundaries of the site, South Brooklyn Avenue forms the western boundary, and an old refinery access road forms the northern boundary. The site consists of two areas: a 90-acre refinery area and a 10-acre landfill area. A 14-acre tank farm, located approximately one-quarter mile west of the site, was investigated as part of the remedial investigation and found to have no contaminants of concern and is no longer considered part of the site. All of the response actions are limited to the 100 acres of the refinery and landfill.

Geology/Hydrogeology

The refinery area is characterized by generally flat land sloping gently towards the Genesee River. Site geology is dominated by fluvial and glacial sediments, which are highly variable unconsolidated

deposits composed of sands, clays, and gravel. Fill material is also present in site soils, similarly composed of sands, clays, and gravel. Within the unconsolidated deposits beneath the site are at least three hydrogeologic units: an upper aquifer comprised of recent fluvial deposits, an aquitard comprised of glaciolacustrine clay, and a poorly defined lower aquifer comprised of glacial sands. Depths to the glaciolacustrine clay layer at the refinery range on average between 15 and 30 feet from the surface and average depth to the water table ranges between 5 and 10 feet from the surface. Groundwater flow at the site is generally to the north and east, discharging directly into the Genesee River. The Genesee River is a local source of drinking water, and the intake for the Village of Wellsville municipal water supply is located approximately one-quarter mile upstream of the site. Water on the site is supplied by the Village municipal system.

The area where the site is located also contains a man-made wetland area referred to as the main drainage swale. This wetland habitat was created as a result of the construction of a dike to prevent the Genesee River from eroding portions of the site. The Genesee River is also an important ecological resource for the State of New York, as well as being the primary drinking water source for the Village of Wellsville.

Land and Resource Use

When refinery operations ceased in 1958 as the result of a fire, the Sinclair Refining Company transferred the majority of the site property to the Village of Wellsville, which, in turn, conveyed some of the parcels to various companies and other entities. Currently, five companies and the State University of New York at Alfred's Wellsville Campus occupy the site. About 30 structures exist on-site, made of either brick or corrugated aluminum and steel frame construction. Other site features include a storm water sewer system, a sanitary sewer system, the main drainage swale, and a shallow drainage swale running perpendicular to the river near the site's north boundary. Features at the landfill portion of the site include a capped landfill and a recently built flood-control dike.

As previously mentioned, the site is located one-half mile south of downtown Wellsville, a village with a population of about 5,200. Additionally, approximately 500 people use the buildings located on the site on a daily basis. Site usage is considered active and the site is expected to continue to be actively used.

History of Contamination

The refinery was built in 1901 for the processing of Pennsylvania grade crude oil. The Sinclair Refining Company purchased the refinery in 1919 and operated it through 1958, when a fire halted operations. In 1969, the Sinclair Refining Company merged with the Atlantic Richfield Company (ARCO). During the operating history of the refinery, the company manufactured products such as heavy oils and grease for lubrication applications, light oil for fuel, naphtha, gasolines, aniline, lighter fluid and paraffin. Additionally, a Wellsville, Addison and Galeton railroad line and spurs passed through the site which serviced the refinery. Also during Sinclair's refinery operations, tetraethyl lead sludge generated in the refinery process was temporarily buried in pits within the

refinery area. The sludge was then oxidized or burned, causing the creation of lead oxide. The burned sludges were eventually reburied within the landfill located along the southernmost portion of the site. Other wastes generated during the course of the refinery operations included tank sludges from a solvent plant, sludges from an oil separator, acids, pesticides, waste oil and heavy metals. While these wastes were primarily disposed of at the landfill located at the site, manufacturing and waste handling operations at the time also led to the contamination of the refinery surface soils, subsurface soils and groundwater.

Initial Response

In 1981, debris from the Sinclair landfill was reported to have washed into the Genesee River due to erosion. Reports from the community and site inspections conducted by the New York State Department of Environmental Conservation (NYSDEC) indicated that the site warranted proposal for the National Priorities List (NPL). In September 1983 the Sinclair Refinery site was placed on the NPL.

In 1983, EPA and NYSDEC signed a cooperative agreement that identified NYSDEC as the lead agency responsible for overseeing the remedial cleanup activities at the site. In 1984, NYSDEC initiated a Remedial Investigation/Feasibility Study (RI/FS) to determine the nature and extent of contamination at the site and evaluate alternatives for the long-term remediation of the landfill portion of the site. In 1985, EPA authorized an initial remedial measure at the site, consisting of the relocation of the surface water intake for the Village of Wellsville's public water supply. The intake was moved to a location one-quarter of a mile upstream from the site in order to eliminate the possibility of landfill wastes contaminating the Village's drinking water supply. The relocation of the drinking water intake was completed in the Spring of 1988. In 1987, EPA took over lead agency status from NYSDEC following a work stoppage due to a contract dispute between NYSDEC and its contractor.

Basis for Taking Action

For purposes of investigation and remediation, the Sinclair Refinery site is being addressed in two distinct operable units. OU1, which consists of the 10-acre landfill portion of the site, (formerly consisting of the Central Elevated Landfill Area (CELA), the South Landfill Area (SLA), and the area between the two landfills) and OU2, which consists of the 90-acre former refinery.

The OU1 RI/FS identified the following wastes deposited in the landfill: cloth filters used for straining oil; sludges from an oil/water separator; tank sludges from the solvent plant; "off-specification" products; oil-soaked soils and sludges (deposited daily); burnt Fullers Earth (used for filtering); tank sludges (deposited weekly); acid spills; cinders and ash from the coal-fired boiler plant; tetraethyl lead; pesticides; waste oil; and heavy metals.

As a result of the OU1 RI/FS, EPA selected a cleanup plan for the landfill portion of the site which was embodied in a September 26, 1985 Record of Decision (ROD) for OU1. The remedial actions

identified in the 1985 ROD included the partial channelization of the Genesee River to protect the landfill from erosion and flooding, removal and disposal of drums from the surface of the CELA, the excavation of the SLA and its consolidation onto the CELA, backfilling of the excavated area with clean fill, the construction of a cap over the consolidated landfill, and the construction of a fence around the consolidated landfill. ARCO agreed to implement the remedial actions listed above, with modifications to the original plan for partial channelization of the Genesee River. This agreement was memorialized in a judicial Consent Decree which was signed by the United States and ARCO and entered with the U.S. District Court for the Western District of New York on May 19, 1989.

Subsequently, the required work was organized into three separate remedial actions, namely: the partial channelization of the Genesee River (completed in 1992); the drum removal, excavation, consolidation, and backfilling of the SLA (completed in 1992); and the capping and fencing of the consolidated landfill (completed in 1994).

The OU1 ROD had also called for remedial alternatives addressing the refinery portion of the site to be evaluated as part of a supplemental (OU2) RI/FS. ARCO agreed to perform the OU2 RI/FS as memorialized in an Administrative Consent Order issued by the EPA on July 28, 1988. The results of the OU2 RI/FS identified volatile and semi-volatile organic compounds and metals as contaminants of concern in the refinery area. Sampling and analysis of the surface soils indicated the presence of arsenic and lead above action levels selected for the site. Sampling and analysis of subsurface soils indicated the presence of volatile and semi-volatile organic compounds and arsenic and lead as well, but at levels lower than that found in the surface soils. Sampling and analysis of the groundwater in the refinery area indicated three distinct plumes (the “northern,” “central,” and “southern” plumes) in the shallow aquifer with levels of benzene, toluene, ethylbenzene, xylene, nitrobenzene, naphthalene, arsenic, chromium and lead above action levels selected for the site.

As a result of the OU2 RI/FS, EPA selected a remedy for the second operable unit in a ROD (OU2 ROD) signed on September 30, 1991. Cleanup measures in the OU2 ROD included the excavation of surface soils exceeding the remedial cleanup criteria for arsenic and lead and their consolidation into the landfill prior to closure, monitoring of surface water, groundwater, and soil gas to track potential contaminant migration from subsurface soils, and pumping and treatment of contaminated site groundwater. Unilateral Administrative Orders (UAOs) for Remedial Design and Remedial Action were issued by EPA to ARCO on May 1, 1992 and September 8, 1992 for the OU2 work, which was organized into two separate remedial actions. These consisted of the surface soils excavation and disposal as the first remedial action, completed in 1994, and the monitoring and groundwater remediation components as the second remedial action, which is currently on-going.

Enforcement Activities

Since EPA took over lead agency status in 1987, EPA and ARCO have entered into a number of agreements allowing ARCO to carry out the required work under EPA oversight. In 1988, EPA and

ARCO entered into a judicial Consent Decree, which was entered with the U.S. District Court for the Western District of New York on May 19, 1989, to perform the remedial design and remedial action for OU1. These activities (river channelization, landfill consolidation, landfill cap construction) were successfully completed between 1992 and 1994. Additionally, ARCO agreed to perform the OU2 RI/FS as memorialized in an Administrative Consent Order issued by the EPA on July 28, 1988. The RI/FS was successfully completed in 1991 upon EPA's issuance of the OU2 ROD.

Following the selection of the OU2 remedy in the 1991 ROD, EPA sought to negotiate a Consent Decree with ARCO for the performance of the remedial design and remedial action for OU2. In order for ARCO to expedite the remedy selected for the refinery surface soils and enable most of the excavated material to be placed under the landfill cap before its closure, ARCO requested that EPA issue a UAO for the remedial design and remedial action of the refinery surface soils. The UAO was issued by EPA on May 1, 1992, and the remedial action was successfully completed in 1994. EPA and ARCO were ultimately unable to negotiate a Consent Decree for the groundwater remedy and consequently EPA issued a second UAO to ARCO on September 8, 1992 for the remedial design and remedial action of the groundwater portion of the remedy. Subsequently, in 1993, ARCO petitioned EPA to implement an air sparging/soil vapor extraction (AS/SVE) remedy with a smaller pumping and treatment component of the remedy called for in the OU2 ROD, claiming the AS/SVE system would be as effective in meeting ROD performance standards and less costly. EPA agreed to allow ARCO to pursue this proposal as a site-wide pilot program with the caveat that if monitoring data collected during the implementation of the AS/SVE system could not demonstrate the effectiveness of the system in achieving the cleanup goals of the ROD, then another program to meet those cleanup goals would have to be implemented by ARCO. This "phased approach" to groundwater remediation was memorialized in a February 28, 1994 letter from EPA to ARCO. ARCO has provided EPA with monitoring data since the Phase 1 systems began operating. The monitoring data are discussed in more detail below. Following EPA's review of the Phase 1 monitoring data over an approximate seven-year period, EPA determined that the Phase 1 remedy was ultimately ineffective in meeting the cleanup goals of the OU2 ROD and that a Phase 2 program, focused on the extraction and treatment of groundwater, needed to be implemented. EPA issued a letter to ARCO on September 19, 2002 to memorialize this determination.

IV. Remedial Actions

Genesee River - Partial Channelization

The remedial action for partial channelization of the Genesee River was carried out in accordance with the requirements of the Judicial Consent Decree between ARCO and the USEPA effective May 19, 1989. The objectives of this phase of the remediation included the following:

- Protection of the consolidated landfill from bank erosion and flood inundation during floods up to a 100-year event on the Genesee River;

- Protection of the east bank, from an existing sheet pile weir to approximately 2000 feet from the existing riprap upstream of the weir; and
- Improvement of river flow conditions approaching the weir located downstream from the landfill.

The design to accomplish this work was approved by EPA on February 21, 1990 and construction commenced on July 24, 1990. The work was carried out by ARCO's contractor and overseen by the U.S. Army Corps of Engineers through an interagency agreement with EPA. EPA performed a final inspection of the construction on October 3, 1991; the remedial action was completed upon EPA's approval of the Remedial Action Report on March 27, 1992.

South Landfill Area Excavation and Consolidation

The remedial action for the SLA was implemented in accordance with the Judicial Consent Decree between ARCO and the USEPA, effective May 19, 1989, and consisted of the following:

- Excavation and consolidation of the wastes from the 2.3-acre SLA onto the 9.2-acre CELA;
- Filling the excavated area with clean fill from an off-site source; and
- Placement of a temporary cover over the portion of the CELA which received waste from the SLA, pending the final remediation of the CELA.

The design to accomplish this work was approved by EPA on September 26, 1990 and construction commenced on October 15, 1990. The excavation was completed in November 1990, but backfilling of the excavated area was suspended due to the onset of the winter season and completed the following year. The work was carried out by ARCO's contractor and overseen by the U.S. Army Corps of Engineers through an interagency agreement. EPA performed a final inspection of the construction on October 3, 1991; the remedial action was completed upon EPA's approval of the Remedial Action Report on March 27, 1992.

Landfill Capping

The remedial action for the capping of the consolidated landfill was also carried out in accordance with the requirements of the Judicial Consent Decree between ARCO and the USEPA effective May 19, 1989. The objectives of this phase of the remediation included the following:

- Removal of drums from the landfill, with empty drums shredded and placed over the surface of the waste and drums with contents being disposed of off-site;
- Construction of a soil-bentonite cutoff wall around the landfill perimeter;

- Stabilization of soft sludge wastes within the landfill;
- Regrading of the landfill;
- Construction of a geosynthetic and soil cap over the landfill surface to be tied in to the soil-bentonite cutoff wall;
- Construction of a passive gas vent system within the cap;
- Installation of monitoring wells around the landfill, piezometers within the landfill, and pipe sleeves within the landfill cap for possible future access; and
- Installation of a permanent security fence around the capped landfill.

The design to accomplish this work was approved by EPA on December 6, 1991 and construction commenced in June 1992. The work was carried out by ARCO's contractor and overseen by the U.S. Army Corps of Engineers through an interagency agreement. EPA performed a final inspection of the construction on July 8, 1993; the remedial action was completed upon EPA's approval of the Remedial Action Report on January 28, 1994.

Surface Soils Excavation and Disposal

The remedial action for the refinery surface soils excavation was implemented in accordance with an Administrative Order issued by the EPA to ARCO on May 1, 1992. The objectives of the remedial action consisted of the following:

- Excavation of refinery surface soils exhibiting concentrations above 1000 parts per million (ppm) of lead and 25 ppm of arsenic to a depth of one foot below surface;
- Consolidation of the excavated soils into the landfill prior to closure;
- Filling the excavated area with 6 inches of clean soil and 6 inches of topsoil; and
- Revegetation of the disturbed areas.

The design to accomplish this work was approved by EPA on May 29, 1992 and construction commenced on July 8, 1992. The work was completed in early 1994, necessitating some of the excavated soil to be disposed of at an approved off-site facility. The work was carried out by ARCO's contractor and overseen by the U.S. Army Corps of Engineers through an interagency agreement. EPA performed a final inspection of the construction on May 10, 1994; the remedial action was completed upon EPA's approval of the Remedial Action Report on November 23, 1994.

Groundwater Remediation - Phase 1

The OU2 ROD called for the pumping and treatment of contaminated groundwater at the site with the goal of achieving drinking water standards. EPA issued an administrative order for the remedial design and remedial action of this remedy to ARCO on September 8, 1992. In late 1993, ARCO approached EPA with a proposal to implement an air sparging/soil vapor extraction (AS/SVE) remedy, which would essentially remediate the subsurface sources of groundwater contamination at the site, with a smaller component of pumping and treatment, claiming these systems would be as effective in meeting the OU2 ROD performance standards and less costly. EPA agreed to allow ARCO to pursue this proposal as a site-wide pilot program (Phase 1) with the caveat that if monitoring data collected during the implementation of the AS/SVE system could not demonstrate the effectiveness of the system in achieving the cleanup goals of the ROD, then another program to meet those cleanup goals would have to be implemented by ARCO (Phase 2). This phased approach to the groundwater remediation was memorialized in a February 28, 1994 letter from EPA to ARCO. In 1995, ARCO began Phase 1 at the site which essentially applied AS/SVE to the southern and central plumes at the site and a limited pumping and treatment component (three recovery wells) at the downgradient edge of the northern plume. After a failed attempt to apply AS/SVE at the upgradient portion of the northern plume, an AS/SVE system was later added further downgradient in a more geologically suitable location. ARCO provided EPA with continuous monitoring data since the systems began operating.

Groundwater Remediation - Phase 2

The results of the Phase 1 monitoring data have indicated that AS/SVE is not effective in meeting drinking water standards in the groundwater plumes on site. Although the systems implemented by ARCO have effectively removed large quantities (approximately 150,000 pounds) of subsurface contamination from the vadose zone (the subsurface soils area that becomes seasonally saturated with a rising and falling water table), the systems have had little, if any, effect on the groundwater plumes. Conversely, the limited pumping and treatment that has been carried out at the site does appear to be an effective means of reducing contaminant levels in the groundwater aquifer, and monitoring results show the area of the plumes nearest to the recovery wells to be at or near maximum contaminant levels. In September 2002, EPA notified ARCO by letter that the Phase 1 program had not met the performance standards of the OU2 ROD and that a Phase 2 program, focused mainly on the original pumping and treatment remedy from the OU2 ROD, needed to be implemented.

Genesee River and Associated Wetlands

Source remediation (Phase 1) was expected to result in the protection of surface water, sediments, and wetlands. However, after source remediation was implemented, certain instances of site contamination not identified at the time of the OU2 ROD have been observed. Around 1997, the first instance of light nonaqueous phase liquid (LNAPL) sheens were reported on the surface of the

Genesee River adjacent to the site. Over time, these occurrences have become more prevalent, particularly during summer and early fall when the water table at the site is seasonally depressed. Concurrently, LNAPL was recorded in some of the site monitoring wells. Visual inspections of the main drainage swale indicated the presence of sheens and other discolorations, and sampling events indicated discrete areas within swale sediments with high levels of inorganic contamination. Consequently, EPA directed ARCO to perform an investigation of the riverbank and riverbed of the Genesee River adjacent to the site to determine the extent of the LNAPL contamination. This investigation was performed in 2000, and the report submitted by ARCO indicates the presence of LNAPL contamination in the riverbank and parts of the riverbed adjacent to the site. In 2001, ARCO began a study of site contamination with respect to the indigenous species of the main drainage swale. The results of this study, concluded in 2004, indicated the presence of arsenic hot spots in swale sediment that could cause toxic impairment to the benthic community as well as the presence of limited LNAPL contamination. Another contaminant release from the site was documented in 1999, with the measurement of nitrobenzene in the Genesee River above ambient water quality standards. This singular occurrence was measured adjacent to the “MW-70 area” of the site, named for proximity to the MW-70 monitoring well. Subsequent measurements of the river water indicated that nitrobenzene levels had dropped to levels below ambient water quality standards. These events suggested the need for further site investigations and in September 2002, EPA notified ARCO by letter that a comprehensive investigation of these areas needed to be performed pursuant to the additional response actions section of the 1992 administrative order. Consequently, a pre-design investigation was initiated by ARCO in 2003 to ensure that adequate data were collected to design the Phase 2 remedy to mitigate all remaining areas of contamination at the site.

Operation and Maintenance, Monitoring, and Institutional Controls

OU1: Routine operation and maintenance (O&M) of the OU1 remedy has been ongoing since the completion of the remedial action in 1994. Annual reports are provided to EPA for review. O&M activities include quarterly inspections of the landfill cap and associated systems and annual subsidence surveys and groundwater monitoring events. Typical maintenance activities include mowing the vegetation on the cap surface and removing overgrowth around well heads and the riprap on the riverbank. Eroded topsoil on the cap is replaced and reseeded as needed. Review of the annual reports and inspections during site visits indicate that all systems are operating efficiently. There is also access controls in place for OU1 in the form of a security fence which is being maintained to prevent unauthorized access to the landfill. In addition, there is a restrictive covenant tied to the deed for the 10-acre parcel containing the landfill. The covenant provides for: no excavation, operation or parking of vehicles, or any activity that would otherwise disturb the facilities on the premises; access to the site for maintenance by ARCO; and the owner will notify ARCO if any party or event disturbs the facilities.

OU2: Portions of the groundwater remedy for OU2 are ongoing and those systems that are currently operating undergo routine operation and maintenance. These systems include groundwater extraction wells and a wastewater treatment plant. These systems will continue to operate until the OU2 Phase 2 groundwater remedy is fully operational and functional. ARCO employs a company,

On-Site Health and Safety Services, Inc., which maintains an office at the wastewater treatment plant and company personnel are on-site full time during normal business hours to monitor and maintain the remedial systems. Weekly reports are provided to EPA which summarize health and safety issues, operations activities, maintenance activities, repairs, and planned activities. A site inspection is performed daily including visual monitoring of the river surface for LNAPL. Monitoring wells are sampled annually and the analyzed data are presented to EPA in an annual report. This report is used to show general trends over time of the effects of the remedial systems on site contamination. Compliance monitoring is also performed for the water discharged from the wastewater treatment plant; the results are reported monthly and the effluent is consistently in compliance with the discharge permit.

In addition to groundwater, the OU2 ROD also called for the long-term monitoring of surface water and soil gas to track any potential contaminant migration from the subsurface soils. The LNAPL manifestations that have been documented both in the groundwater and the surface water of the Genesee River and main drainage swale are speculated to be the result of contaminants bound to the subsurface soils. Monitoring of the LNAPL outbreaks are done visually and outbreaks on the river surface are kept in check with the deployment of booms and absorbent pads as an interim remedy. A study to measure dissolved contaminants in the Genesee River was carried out from October 1999-April 2000 and some samples showed nitrobenzene above ambient water quality standards. The results of these monitoring and sampling events have resulted in EPA's decision that additional response actions are required and, in September 2002, EPA notified ARCO by letter that a comprehensive investigation of these areas needs to be performed pursuant to the additional response actions section of the 1992 administrative order. In addition, a soil gas survey was carried out in 1993, in which EPA surveyed the buildings on-site with the New York State Department of Health. Only one building at the site was found to have a basement which would potentially be impacted by soil gas. The building is owned by the State University of New York. The basement of this building is a boiler room, consisting of a boiler and mechanical heat conveyance devices and no further action was considered necessary.

The OU2 ROD also specified that institutional controls, in the form of local zoning ordinances, would be recommended to account for any construction activity that would alter present site use, particularly with respect to opening an exposure pathway to subsurface soils and to prevent groundwater usage until such time as ambient water quality standards are met in the aquifer. Actions to establish institutional controls for OU2 are being undertaken by ARCO. ARCO has made contact with all of the land owners at the site and has circulated ideas concerning engineering and institutional controls. No specific agreements with land owners have yet been entered into largely because the OU2 remedy has not been fully implemented. However, all land owners at the site understand that the shallow aquifer zone is known to be contaminated and, since the groundwater is not considered to be a resource by any of the land owners, using deed restrictions as a means to prevent use or exposure to the groundwater is acceptable to all concerned. Although only about one third of the site is in the Village, there is an agreement between the Town and Village for the Village to supply the entire site with water services, thus the groundwater is not used as a potable water source. ARCO reports that the land owners are in agreement that distilling any environmental

exposure requirements into generic and easily understandable land use and building restrictions would be in everyone's best interest. It is anticipated that the use restrictions would be placed in the deed restrictions described above. An added level of institutional controls would be achieved using building codes. ARCO will pursue the application of building codes to limit exposure to subsurface contamination once the final remedy has been implemented. In summary, OU2 institutional controls will include groundwater use restrictions and land use restrictions, including restrictions concerning construction activities. These institutional controls, after review and approval by EPA, will become an integral part of ensuring the protectiveness of the site remedy.

While there will be long-term institutional controls put in place at this site, there does not appear to be any interim measures needed since the site properties are supplied by a public water supply. In addition, ARCO employs a full-time presence at the site through On-Site Health and Safety Services, Inc. The employees of this company are trained in health and safety issues associated with hazardous waste sites and are aware of the nature and extent of the subsurface contamination at the site. This allows for on-site coordination and consultation with respect to any health and safety issues involving site occupants or emergency responders. Most recently, ARCO worked with the State University of New York in their plans to construct a building on the site to ensure that health and safety procedures would be followed during any subsurface intrusions and that any excavated soils would be managed in accordance with site project plans. Additionally, ARCO has arranged for health and safety training for Wellsville Department of Public Works (DPW) personnel that may be required to respond to emergencies at the site.

V. Progress Since the Last Review

The previous five-year review conducted by EPA in 2002 was required by statute even though the final remedial action had not yet been completed. As such, the 2002 five-year review report provided a summary of those remedial actions that had been completed by that time and acknowledged that the groundwater remedy and monitoring activities comprised an on-going remedial action. The 2002 five-year review report included the following recommendations and follow-up actions with respect to the on-going remedial action:

- Begin the design of the OU2 Phase 2 groundwater remedy.
- Investigate LNAPL contamination of the river and swale.
- Select supplemental remedial action with respect to LNAPL contamination.
- Implement supplemental remedial action with respect to LNAPL contamination.
- Implement the OU2 Phase 2 groundwater remedy.
- Implement institutional controls for OU2 subsurface soils and groundwater.

In the five years since the last review, EPA has directed and overseen ARCO's efforts to meet many of these goals. In 2007, the design of the OU2 Phase 2 groundwater remedy was completed for groundwater extraction and treatment. The investigation of the LNAPL contamination was completed in 2004 and identified isolated pockets of LNAPL in the river bank, river sediments, and drainage swale. The selection of the remedial action to address these sources of LNAPL

contamination is currently in the final stage and the design for mitigating the LNAPL outbreaks has been conducted to the 95% completion stage. The final configuration for addressing the LNAPL contamination of the river and swale will likely include both excavation and containment and completion of the design and implementation of the remedy are expected to occur in 2008. Implementation of the OU2 Phase 2 groundwater remedy began in 2007 and is expected to be fully operational by 2009.

Progress on implementing institutional controls for OU2, as discussed in Section IV of this Report, is essentially at the same stage as the last five-year review as the OU2 remedial action remains on-going. Once the final remedial action is constructed, OU2 institutional controls will include groundwater use restrictions and land use restrictions, including restrictions concerning construction activities and, after review and approval by EPA, will become an integral part of the site remedy. Finally, although the final remedial action remains an on-going action, human health remains protected through both the on-going remedial action and interim measures. Protection of the environment will be fully achieved upon completion of the final remedial action.

VI. Five-Year Review Process

Five-Year Review Team

Michael Negrelli, EPA Remedial Project Manager (RPM), prepared the five-year review report. The five-year review team also included Marian Olsen, human health risk assessor, Edward Modica, hydrogeologist, Michael Basile, community involvement coordinator (CIC), and Carol Berns, site attorney. NYSDEC and ARCO have also provided information necessary for this review.

Community Notification and Involvement

The EPA CIC for the Sinclair Refinery site, Michael Basile, published a notice in the *Wellsville Reporter*, a local newspaper, in July 2007, notifying the community of the initiation of the five-year review process. The notice indicated that EPA would be conducting a five-year review of the remedy for the site to ensure that the implemented remedy remains protective of human health and the environment and is functioning as designed. It was also indicated that once the five-year review was completed, the Five-Year Review Report would be made available in the local site repository. The notice, which includes the RPM's mailing address, email address, and telephone number, solicits public comments or questions related to the five-year review process or to the site.

Document Review

The following documents, data, and information were reviewed in completing the five-year review:

- OU1 Record of Decision, EPA, September 1985;
- OU2 Record of Decision, EPA, September 1991;
- EPA WasteLAN database;

- Main Drainage Swale Investigation Report, ARCO, November 2003;
- Pre-Design Investigation Report - Phase II Remediation at OU2, ARCO, August 2004;
- Pre-Final Remedial Design Report - Phase II Remediation at OU2, ARCO, November 2005;
- Final Design Report - Phase II-1 Remediation at OU2, ARCO, March 2007;
- 2002 Annual Progress Monitoring Report Phase 1 - OU2, ARCO, March 2003;
- 2003 Annual Progress Monitoring Report Phase 1 - OU2, ARCO, September 2003;
- 2004 Annual Progress Monitoring Report Phase 1 - OU2, ARCO, August 2005;
- 2005 Annual Progress Monitoring Report Phase 1 - OU2, ARCO, December 2006;
- 2006 Annual Progress Monitoring Report Phase 1 - OU2, ARCO, August 2007;
- 2002 Annual Reports of Operation and Maintenance Activities - OU1, February 2003;
- 2003 Annual Reports of Operation and Maintenance Activities - OU1, Apr/Jun 2004;
- 2004 Annual Reports of Operation and Maintenance Activities - OU1, Apr/May 2005;
- 2005 Annual Reports of Operation and Maintenance Activities - OU1, Nov/Dec 2006;
- 2006 Annual Reports of Operation and Maintenance Activities - OU1, May/Aug 2007;
- Sinclair Refinery Site Five-Year Review Reports, September 1997 and September 2002; and
- EPA Comprehensive Five-Year Review Guidance, June 2001.

Data Review

The data reviewed to support the determination that the OU1 remedy is functioning as intended by the OU1 ROD are contained in the OU1 Annual Reports of Operation and Maintenance Activities referenced above. Recent groundwater data are summarized in Tables 2 and 3, appended to this report, and are culled from the OU2, Phase 1 Progress Monitoring Reports referenced above.

Site Inspection

Michael Negrelli, RPM, conducted a site inspection on August 14, 2007. During the site inspection, the RPM did not observe any problems or deviations from the on-going remedial action being implemented at the site, nor were any problems or deviations observed with respect to operation and maintenance activities.

VII. Technical Assessment

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

OU1: Yes. The landfill cap, fence, drainage system, and monitoring wells are intact and in good repair. The landfill and associated systems are inspected routinely and actions are taken where and when appropriate in accordance with the operation and maintenance manual.

OU2: No. The selected remedy for OU2 has not been fully implemented. The surface soil removal component discussed under "Remedial Actions," above, has been implemented as intended by the decision document. However, the groundwater remedial action has yet to be fully implemented in accordance with the decision document. The contaminated groundwater plumes have been generally

defined and some of the impacted groundwater is extracted and treated. EPA has directed the potentially responsible party, ARCO, to implement the groundwater remedial action in accordance with the OU2 ROD by letter dated September 19, 2002. This remedial action has been identified as Phase 2 of the groundwater remediation and is discussed above. Currently, however, the plumes do not extend to areas where groundwater is used as a potable water supply, and the land owners and site occupants are all informed that the shallow aquifer zone is known to be contaminated and are in agreement regarding the use of deed restrictions as a means to prevent improper use of the groundwater on site.

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

There have been no changes in the physical conditions of the site over the past five years that would change the protectiveness of the remedy. Four companies and the State University of New York at Alfred's Wellsville Campus occupy the site. The site includes approximately 30 structures made of either brick or corrugated aluminum and steel frame construction. The landfill portion of the site is capped. The property is zoned industrial.

The site was separated into two operable units. OU1 included the remediation of the landfill portion of the site (September 26, 1985 ROD) and partial channelization of the Genesee River to protect the landfill from erosion and flooding. The OU2 (September 30, 1991 ROD) includes the excavation of surface soils based on arsenic and lead contamination and pumping and treatment of contaminated site groundwater. The remediation goals were 25 ppm for arsenic and 1000 ppm for lead based on industrial land use.

Soil

The OU1 remediation included removal and disposal of drums; excavation; and backfilling. Other activities included the construction of a cap over the consolidated landfill, and installation of a fence around the landfill. OU1 was completed in 1994. Current ongoing O&M activities are designed to maintain the cap and fence around the property. The combination of the removal of contaminated soils, installation of a cap over the landfill, and the ongoing O&M provide effective barriers to exposure to contaminated soils.

The OU2 remedial actions were designed to address contaminated areas of the refinery where surface soils were found to contain elevated concentrations of lead and arsenic (i.e., former tetraethyl lead sludge pits; former railroad tracks). The remediation included excavation of surface soils exceeding the remedial cleanup criteria for arsenic and lead (described above) and their consolidation into the landfill prior to closure.

Access and institutional controls in place for OU1 include a security fence which prevents unauthorized access to the landfill and thus exposure. Additionally, there is a restrictive covenant associated with the deed to the land. The covenant provides for: no excavation, operation or parking

of vehicles, or any activity that would otherwise disturb the facilities on the premises; access to the site for maintenance by ARCO; and notification by the owner to ARCO if any party or event disturbs the facilities.

The combination of landfill cover and institutional controls to further prevent exposures indicate that the remedial actions are protective. Review of the toxicity data for arsenic and lead indicate that the remediation goals remain protective based on current toxicity data for these chemicals under an industrial land use.

Groundwater

Groundwater contamination is being addressed under OU2 . The goal of the program is to meet drinking water standards. The Genesee River is a local source of drinking water, and the intake for the Village of Wellsville municipal water supply is located approximately one-quarter mile upstream of the site. The groundwater at the site is classified as a potable source (Class GA) but drinking water on the site is supplied by the Village municipal system.

The Applicable or Relevant and Appropriate Requirements for groundwater cleanup include EPA's Maximum Contaminant Levels (MCLs) and New York State's groundwater quality standards. The OU2 Phase II-1 Progress Monitoring Reports (December 2006 and August 2007) were used to evaluate the contaminant concentrations in groundwater to appropriate standards. A comparison of the maximum concentration on-site to the appropriate federal and state standards is provided in Table 2, appended to this report.

At the current time the groundwater at the site is not being used for ingestion as the Village supplies the entire site with water services and therefore the exposure pathway has been interrupted.

The ROD established the federal MCLs and NYSDEC Class GA groundwater standards as the cleanup criteria for contaminants of concern identified in Table 2. Since the original ROD the MCL for arsenic was changed from 50 µg/l to 10 µg/l as acknowledged in the previous 5-year review. The toxicity values for several of the chemicals of concern in groundwater were modified over the past five years (e.g., toluene, vinyl chloride, 1,1,1-trichloroethane, cis-1,2-dichloroethene, total xylenes, and benzene). Chemicals that are being updated through the Integrated Risk Information System, EPA's consensus toxicity system, include arsenic, ethylbenzene, 1,1,1-trichloroethane, cis-1,2-dichloroethene, and nitrobenzene. The EPA MCLs and NYSDEC Class GA GW standards remain protective.

Soil Vapor Intrusion.

Soil vapor intrusion based on groundwater concentrations was also evaluated for on-site contamination (Table 3, appended to this report). The comparisons were based on evaluating the maximum concentrations found during the 2004 sampling event to the concentrations in groundwater associated with residential vapor concentrations associated with risks of 1×10^{-6} or an HI = 1.0. The

comparison values in groundwater were obtained from the OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway for Groundwater and Soil.

The concentration of nitrobenzene exceeds a noncancer HI = 1 and is above screening levels. Although a soil-gas survey was completed in accordance with the OU2 ROD in 1993, exceeding the screening value for nitrobenzene suggests the need for further evaluation regarding the potential for vapor intrusion for existing structures. Accordingly, EPA will conduct this evaluation by the end of 2008. Furthermore, in the event of new construction of buildings on the site, an evaluation of the need for vapor intrusion mitigation systems will be performed.

Overall, based on the past remedial actions including the capping of the landfill that prevent potential exposure to soils and ongoing groundwater monitoring at the site and use of public water supplies, the remedy remains protective under the industrial scenario.

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

No other information has come to light since the 2002 five-year review that could call into question the protectiveness of the remedy. The prior five-year review cited the intermittent LNAPL outbreaks as new information that was not identified in the OU2 RI/FS and ROD. As discussed above, LNAPL remediation has become part of the Phase 2 groundwater remedy. However, a final decision by EPA on what measures are necessary and appropriate to address environmental concerns has not been made. The appearance of intermittent LNAPL outbreaks on the surface of the Genesee River, the past detection of nitrobenzene in river water adjacent to a portion of the site, and the detection of arsenic hot spots in swale sediment that could cause toxic impairment to the benthic community all informed EPA's 2003 decision to direct ARCO to perform a pre-design investigation to ensure that adequate data were collected to design the Phase 2 groundwater remedy to mitigate all remaining areas of contamination at the site. The final actions necessary to protect the environment will be part of the Phase 2 groundwater remedy.

VIII. Recommendations and Follow-up Actions

Table 4, appended to this report, summarizes the recommendations and follow-up actions stemming from this 5-year review.

IX. Protectiveness Statement

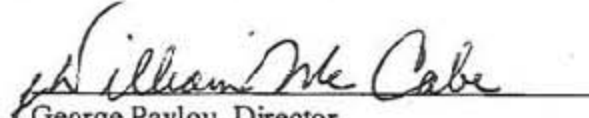
The implemented actions for OU1 and OU2 protect human health in the short-term because exposure pathways for site contaminants are limited by current site and groundwater use and controlled by engineered, access, and institutional controls that are currently in place. Long-term human health protectiveness will be achieved when the final OU2 remedy is implemented and the final site institutional controls are selected and implemented. For the most part, the remedy protects the environment. However, there have been concerns raised by unanticipated releases and some high

benthic concentrations. Consequently, it is not evident that the selected remedy is fully protective of the environment. Additional measures are being implemented as part of the Phase 2 groundwater remedy. EPA will decide on the adequacy of those measures and its determination will be made in either an addendum to this report or an explanation of significant differences to the OU2 ROD.

X. Next Five-Year Review

The next five-year review for the Sinclair Refinery site should be completed by September 2012.

Approved:


George Pavlou, Director
Emergency and Remedial Response Division

9-26-07
Date

APPENDICES

Table 1: Chronology of Site Events	
Event	Date
Debris from landfill first reported in Genesee River	1981
Village, County, and State take steps to mitigate erosion of the landfill from Genesee River flood waters	1983
Site placed on National Priorities List (NPL)	1983
Record of Decision (ROD) for OU1	1985
Relocation of Village water supply intake completed	1988
Remedial Investigation/Feasibility Study started for OU2	1988
OU1 Consent Decree between EPA, ARCO entered with court	1989
Remedial Investigation/Feasibility Study completed for OU2	1991
Record of Decision for OU2	1991
EPA issues administrative order to ARCO for OU2 Remedial Action - Surface Soils	1992
EPA issues administrative order to ARCO for OU2 Remedial Action - Groundwater	1992
Remedial Action for River Channelization portion of OU1 completed	1992
Remedial Action for Landfill Consolidation portion of OU1 completed	1992
Remedial Action for Landfill Capping portion of OU1 completed	1994
Remedial Action for OU2 completed - Surface Soil Remediation	1994
Removal Action completed - Valley Steel property, soils	1995
Removal Action completed - Valley Steel property, drums	1995
Removal Action completed - Sinclair oil/water separator and powerhouse	1995
Remedial Design for Phase 1 groundwater remedy portion of OU2 completed	1995
Remedial Action for Phase 1 groundwater remedy portion of OU2 completed	1995
Long-Term Remedial Action for Phase 1 groundwater remedy portion of OU2 started	1996
EPA issues first Five-Year Remedy Assessment	1997
EPA issues second Five-Year Remedy Assessment	2002

Event	Date
Long-Term Remedial Action for Phase 1 groundwater remedy completed	2003
Remedial Design for Phase 2 groundwater remedy portion of OU2 started	2003
Supplemental OU2 - Phase 2 groundwater investigation completed	2004
Remedial Design for Phase 2 groundwater remedy portion of OU2 completed	2007
EPA issues third Five-Year Remedy Assessment	2007
Remedial Action (construction) for Phase 2 groundwater remedy portion of OU2 completed	2009*
Long-Term Remedial Action for Phase 2 groundwater remedy portion of OU2 started	2009*

* projected

Table 2. Comparison of Maximum Concentration to the EPA MCL and the NYS Class GA Groundwater Standards.

Chemical	EPA MCL (mg/l)	NYSDEC Class GW Standard * (mg/l)	Max. Conc. & Location & Date	Result
Benzene	0.005	0.001	0.0618 MW-69A 6/2005	Exceeds NYS AWQS and EPA MCL
Toluene	1.0	0.005 (based on principal organic contaminant standard for groundwater)	0.039 MW-70 6/2005	Exceeds NYS AWQS
Ethylbenzene	0.700	0.005 (based on principal organic contaminant standard for groundwater)	0.056 MW-55 6/2005	Exceeds NYS AWQS
Xylenes (total)	10.0	0.005 (based on principal organic contaminant standard for groundwater)	0.0749 MW-70 6/2005	Exceeds NYS AWQS
1.1.1-Trichloroethane	0.200	0.005	0.010 MW-69A 5/2004	Exceeds NYSDEC Class GW Standard
1,1-Dichloroethane	NA	0.005	0.046 MW-69A 5/2004	Exceeds NYSDEC Class GW Standard
cis-1,2-dichloroethene	0.070	0.005	0.003 MW-69A 6/2005	Below EPA MCL and NYSDEC Class GW Standard
Vinyl Chloride	0.002	0.002	0.0048 MW-69A 6/2005	Exceeds EPA MCL and NYSDEC Class GW Standard

Aniline	NA	0.005 (based on principal organic contaminant standard for groundwater)	2.230 (J) OW-01 6/2005	Exceeds NYSDEC Class GW Standard
Nitrobenzene	NA	0.0004	6.03 OW-03 6/2005	Exceeds NYSDEC Class GW Standard
Arsenic	0.010	0.025	0.0715 OW-01 6/2005	Exceeds EPA MCL and NYSDEC Class GW Standard

* Values from <http://www.dec.ny.gov/regs/4590.html>

Table 3. Comparison of maximum detected concentrations of COPCs detected in the monitoring wells to their respective vapor intrusion screening criteria. (Data from May 2004 groundwater monitoring).

Chemical of Concern	Maximum Detected Concentration (ug/l)	Vapor Intrusion Screening Value (ug/l)	Vapor Intrusion Screening Value (ug/l)
		Cancer Risk = 1×10^{-6} Noncancer Hazard = 0.1	Cancer Risk = 1×10^{-4} Noncancer Hazard = 1
Benzene	61.8	1.4 (cancer)	140 (cancer)
Toluene	39.4	15.0 (noncancer)	1,500 (noncancer)
Ethylbenzene	62.9	Comparison values not available.	Comparison values not available.
Total xylenes (based on m-xylene)	74.9	2,200 (noncancer)	22,000 (noncancer)
1,1,1-trichloroethane	10.4	310 (noncancer)	3,100 (noncancer)
1,1-dichloroethane	46.4	220 (noncancer)	2,200 (noncancer)
Cis-1,2 dichloroethene	2.8	21 (noncancer)	210 (noncancer)
Vinyl chloride	4.8	0.25 (c)	25 (cancer)
Aniline	7,100	(not sufficiently volatile)	
Nitrobenzene	6,030	200 (noncancer)	2,000 (noncancer)
Arsenic	71.5	(not sufficiently volatile)	

Footnotes:

(c): Value is based on a Cancer endpoint

(nc): Value is based on a Noncancer endpoint

Bold The maximum detected concentration of the contaminant of concern has exceeded its respective vapor intrusion risk-based criterion.

Table 4: Recommendations and Follow-up Actions

Issue	Recommendations and Follow-up Actions	Party Responsible	Over-sight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Phase 2 ground water remedy not yet constructed	Complete the design and construction of the Phase 2 (OU2 ROD) groundwater remedy	ARCO	EPA	Oct 2009	N	Y
OU2 groundwater remedy may differ from that identified in the ROD	Any changes in the final remedy may require an appropriate EPA decision document	EPA	EPA	2008-2010	N	Y
Institutional controls not implemented	Implement institutional controls for OU2 subsurface soils and groundwater	ARCO, Wells-ville, and land owners	EPA	2008-2010	N	Y
Institutional controls may differ from those identified in the ROD	Any changes in the final remedy may require an appropriate EPA decision document	EPA	EPA	2010	N	Y
Evaluate the potential for vapor intrusion for existing structures	Conduct vapor intrusion evaluation and recommend mitigation measures if necessary	EPA	EPA	2008	N	Y
Further evaluate the potential for vapor intrusion in the event of new building construction on the site	Conduct vapor intrusion evaluation and recommend where appropriate that new building construction on the site include vapor intrusion mitigation	EPA	EPA	2008-2012	N	Y

List of Acronyms

ARCO	Atlantic Richfield Company
AS/SVE	Air sparging/soil vapor extraction
CELA	Central Elevated Landfill Area
CERCLA	Comprehensive Environmental Response, Liability and Compensation Act
CIC	Community Involvement Coordinator
COPC	Chemical of Potential Concern
DPW	Department of Public Works
EPA	United States Environmental Protection Agency
FS	Feasibility Study
LNAPL	Light non-aqueous phase liquid
MCL	Maximum Contaminant Level
mg/L	Milligrams per Liter
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
O&M	Operation and Maintenance
OU	Operable Unit
PPM	Parts per Million
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SLA	South Landfill Area
UAO	Unilateral Administrative Order
ug/L	Micrograms per Liter