September 2006

SUPERFUND PRELIMINARY SITE CLOSE-OUT REPORT
MacKenzie Chemical Works Site
Central Islip, Suffolk County, New York

I. INTRODUCTION

The United States Environmental Protection Agency (EPA) has determined that construction at the MacKenzie Chemical Works site has been completed in accordance with the *Close-Out Procedures for National Priorities List Sites (OSWER Directive 9320.2-09 A-P, January 2000).*

Based upon field observations associated with EPA's construction of the remedy and a September 13, 2006 inspection of the site, EPA has determined that the remedy (in-situ vapor extraction [ISVE] for the contaminated soils, in-situ chemical oxidation [ISCO] for the contaminated groundwater, limited excavation and off-site disposal of semi-volatile organic compound [SVOC]-contaminated soils, long-term groundwater monitoring, and institutional controls) has been constructed in accordance with the March 2003 Record of Decision (ROD) and all plans and specifications. EPA has also determined that no further response (other than continued operation of the ISVE system, continued chemical oxidant applications, and long-term groundwater monitoring) is anticipated. In addition, the contingency remedies for the soil and groundwater called for in the ROD do not appear to be needed. EPA has initiated the activities necessary to achieve performance standards and site completion.

II. SUMMARY OF SITE CONDITIONS

Site Location and Description

The MacKenzie Chemical Works site is located in a residential/light commercial area encompassing approximately 1.4 acres. The property originally contained numerous buildings and structures, including three one-story block buildings (a former manufacturing building and two warehouses) and a two-story block building (a former laboratory/warehouse), all of which have been recently removed. The property is bounded to the north by the Long Island Rail Road and commercial properties, to the east by a residential property and an abandoned parking lot, to the south by Railroad Avenue and residential properties, and to the west by Cordello Avenue and vacant land.

The local topography surrounding the site consists of relatively flat terrain with a very slight southerly downward slope (*i.e.*, a difference in elevation of approximately 70 feet over several miles). Subsurface features reportedly included two former concrete-lined waste lagoons (backfilled with clean soils), at least one cesspool, and at least nine storm-water drywells. Surficial geology is comprised of one to two feet of topsoil/fill underlain by the sand and gravel of the upper geologic unit. Depth to groundwater is approximately 50 feet below ground surface

(bgs). Local groundwater flow at the site moves south to southeast. No surface water bodies exist at or near the site. There are no streams or stream-cut channels at or near the property. The nearest surface water bodies are Champlin Creek, which is located over a mile south of the property and the Connetquot River, which is located approximately two miles east of the property.

There are three primary water-bearing aquifers underlying Suffolk County, comprising a federally-designated sole source of drinking water for Long Island. Therefore, groundwater in the vicinity of the site is a potential source of drinking water. The only known private well near or downgradient of the property is located on a residential property that is hydrologically sidegradient. Sampling of this well has shown that it is not impacted by site-related contaminants. The nearest municipal drinking water supply well is located approximately 3,500 feet southeast of the property (well beyond the contaminant plume) and is screened at a depth of 710 feet bgs.

The property, which has been used for industrial/commercial purposes since 1948, is presently zoned industrial; according to the Town of Islip Department of Planning and Development, it is not anticipated that the land use will change in the future.

Background

The property was used from approximately 1948 to 1987 for the manufacture of various chemical products by MacKenzie Chemical Works, Inc. (MCW), including fuel additives and metal acetylacetonates. Over the years of operation, the Suffolk County Department of Health Services (SCDHS) and the Suffolk County Fire Department documented poor housekeeping and operational procedures. According to SCDHS, MCW stored 1,2,3-trichloropropane (1,2,3-TCP) in three 10,000-gallon tanks on the property. Other potential historical waste sources include other storage tanks[1], leaking drums, two waste lagoons, a cesspool, and storm-water drywells. Spills, explosions, and fires occurred at the facility, including a methyl ethyl ketone (MEK) spill in 1977, a nitrous oxide release in 1978, and an MEK fire in 1979. Based on these and other events, SCDHS ordered MCW to perform a general property cleanup, including the excavation and drumming of stained surface soils. This effort was completed in 1979.

Based on a 1983 assessment conducted by EPA, MCW arranged for the disposal of thirty-three drums of stained surface soils (from the 1979 cleanup effort) and twenty-two drums of liquid wastes. MCW operations at the property ceased in 1987. In 1993, SCDHS installed nine downgradient temporary well points in order to assess the horizontal and vertical extent of groundwater contamination. The results of the SCDHS effort indicated the presence of elevated levels of 1,2,3-TCP, tetrachloroethylene (PCE), and trichloroethylene (TCE) in downgradient groundwater. In 1993, New York State Department of Environmental Conservation (NYSDEC) completed an investigation of the property. The results of the NYSDEC effort indicated the presence of elevated levels of 1,2,3-TCP, PCE, and TCE in on-site soils and groundwater. Semi-volatile organic compounds (SVOCs) were detected in on-site soils.

---

[1] All tanks associated with MCW operations were decommisioned. Most were scrapped in the 1990s.

In January 1998, NYSDEC commenced a remedial investigation and feasibility study (RI/FS) to determine the nature and extent of contamination at and emanating from the property and to identify and evaluate remedial alternatives. During this investigation, NYSDEC emptied the two concrete-lined and intact waste lagoons of all soil and sludge materials and backfilled them with clean soils. The excavated material was disposed of at an appropriate waste-receiving facility. In June 1999, based on the preliminary findings of the RI, NYSDEC requested that EPA take a response action at the property. In response to NYSDEC's request, EPA collected groundwater samples from off-property monitoring wells, two municipal supply wells, and one private well in April 2000. Based upon the results of this investigation, EPA concluded that immediate actions were not required, but that remedial actions should be considered to address potential long-term threats. NYSDEC completed the RI/FS in August 2000.

The site was proposed for inclusion on the National Priorities List (NPL) in June 2001; it was listed on the NPL in September 2001. Based upon the results of the RI/FS, in March 2003, EPA signed a ROD, selecting a remedy for the site. The key components of the selected remedy include treatment of the unsaturated soils exceeding New York State Technical and Administrative Guidance Memorandum No. 94-HWR-4046 (TAGM) objectives for volatile organic compounds (VOCs) using thermally-enhanced ISVE; excavation and off-site disposal of approximately 100 cubic yards of SVOC-contaminated soils which exceed TAGM levels for SVOCs; demolition, decontamination as necessary, and off-site disposal of the laboratory building; treatment of the contaminated groundwater using in-situ chemical oxidation (*e.g.*, air sparging with ozone injection); long-term groundwater monitoring; institutional controls restricting the installation and use of groundwater wells at and downgradient of the property until groundwater quality has been restored; and engineering controls, such as fencing and signs, in order to protect the integrity of the remedy and to limit facility access until cleanup levels have been attained. The ROD also identified a contingency remedy for the soil (excavation and off-site treatment/disposal of the contaminated soils) and a contingency remedy for the groundwater (treatment using a permeable reactive barrier) should treatability studies show that the selected remedies would not be effective.

A search for potential responsible parties is ongoing.

Remedial Construction Activities

Building Demolition

In August 2004, Earth Tech demolished the laboratory building. To facilitate the implementation of the soil remedy, the remaining buildings were demolished in August 2006. Since their structural integrity was questionable, installing vapor extraction wells to address contaminated soils under the slabs would have presented safety risks to the remediation workers. Metal from the buildings was recycled. Wood and rubble was disposed of in an EPA-approved facility in Suffolk County. None of the debris required decontamination.

Soil Remediation

Factors that contribute to the effectiveness of a conventional ISVE system are the chemical and physical properties of the contaminants and the soil characteristics. Based on the results of the RI, it was concluded in the ROD that the site's soils would be conducive to vapor extraction. The ROD also concluded that the chemical and physical properties of 1,2,3-TCP suggested that thermal enhancement might be necessary for ISVE to be effective in the contaminant's removal (*i.e.*, heating would make 1,2,3-TCP more volatile).

In October 2003, Earth Tech, Inc. (Earth Tech), a consultant to EPA, commenced treatability studies related to the ISVE remedy. During the treatability studies, it was determined that thermal enhancement of the ISVE system was not necessary. The ISVE treatability study was completed in December 2004, at which time, full-scale operation commenced.

The ISVE system was expanded in the Summer of 2006 to include contaminated soils around and underlying the slabs of two former on-site buildings (the buildings had been demolished, leaving only the slabs). The expanded system was brought on line on September 13, 2006. There are presently fourteen soil-vapor extraction wells (four through the building slabs) over a 0.5-acre area. A single 2,000-pound vapor-phase granular-activated carbon vessel is used to treat the ISVE effluent.

To date, approximately 1,600 pounds of 1,2,3-TCP have been removed. The data indicate that 1,2,3-TCP comprises 99.2% of the contaminants observed in the influent samples of the ISVE system.

It is anticipated that it will take the ISVE system five years to achieve soil cleanup levels.

Soil Excavation

On August 28, 2006, Earth Tech excavated approximately 20 cubic yards of SVOC-contaminated soils which exceeded the TAGM objectives for SVOCs. The excavated soils were stockpiled. The soils were removed from the site to the Brookhaven Landfill on September 28, 2006.

Groundwater Remediation

In October 2003, Earth Tech commenced field-scale treatability studies related to the ISCO (*e.g.*, air sparging with ozone injection). Based upon the results of the air sparging and ozone injection treatability study, it was concluded that this particular application of the ISCO technology was insufficient to effectively remediate the groundwater. A bench-scale evaluation of enhancements to the technology was performed, resulting in the proposed deployment of ISCO using persulfate. Treatability studies using persulfate were conducted in the Spring of 2006, leading to the full-scale deployment of this technology in August 2006. Injections are accomplished through sixty-eight on-site injection wells and six downgradient injection wells. Two rounds of on-site injections and one round of off-site injections have been completed.

Quarterly groundwater sampling was initiated in May 2004 as part of the effort to establish baseline conditions for groundwater. The current and historic data suggest that the remedial action has resulted in significant improvements in groundwater quality with respect to total site-related VOC concentrations. The most recent round of groundwater sampling reported a tenfold drop in 1,2,3-TCP concentrations in the well that has been historically the most contaminated. Based upon these data, on September 29, 2006, the groundwater remedy became operational and functional with the approval of the groundwater interim remedial action (RA) report.

It is anticipated that persulfate injections will be required every two months for one year and on an as-needed maintenance basis for up to four additional years in order to reach Maximum Contaminant Levels in the groundwater.

Construction for Entire Site

On September 13, 2006, a final inspection was conducted by EPA, NYSDEC, and Earth Tech representatives. No significant deficiencies or punch list items were identified during this inspection related to the remedy. Based on the results of the inspections, it has been determined that the construction for the remedy has been completed, the remedy that has been implemented is consistent with the ROD, EPA's contractors have constructed the remedy in accordance with all plans and specifications, and no further response (other than continued operation of the ISVE system, ISCO injections, and long-term monitoring) is anticipated.

Engineering and Institutional Controls

The site has been fenced in order to protect the integrity of the remedy and to limit facility access until cleanup levels have been attained.

The ROD envisioned institutional controls restricting the installation and use of groundwater wells at and downgradient of the site until groundwater quality has been restored. Institutional controls at the site would rely on existing SCDHS regulations that require new residences and businesses to hook up to public water supplies whenever public water mains are reasonably available; where such mains are not available, the SCDHS regulations require proposed wells for new residences and businesses to be tested for water quality prior to use. For certain contaminant ranges, appropriate treatment is to be provided. The area affected by site-related contamination is provided with public water mains. Application of these regulations should minimize the potential for exposure to contaminated drinking water. It is assumed that Suffolk County would continue to enforce its requirements for at least as long as the groundwater is affected by site-related contamination.

Redevelopment

The property, which has been used for industrial/commercial purposes since 1948, is presently zoned industrial. According to the Town of Islip Department of Planning and Development, it is not anticipated that the land use will change in the future. At the completion of all remedial activities, it is anticipated that the entire 1.4 acres will be available for industrial/commercial redevelopment.

III. DEMONSTRATION OF CLEANUP ACTIVITY QUALITY ASSURANCE AND QUALITY CONTROL

RA activities at the site were undertaken in a manner consistent with the ROD and with all plans and specifications. EPA analytical methods were used for all monitoring samples during all RA activities. All procedures and protocols followed for groundwater, soil, and air sample collection and analyses during the RA have been documented and the sample analyses were performed at state-certified laboratories. The QA/QC program used throughout the RA was rigorous and in conformance with EPA and NYSDEC standards; therefore, EPA and NYSDEC have determined that all analytical results are accurate to the degree needed to assure satisfactory execution of the RA, and that they are consistent with both the ROD and the plans and specifications.

IV. ACTIVITIES AND SCHEDULE FOR COMPLETION

The activities that remain to be completed for the site include approving the soil RA report, groundwater interim RA Report, and groundwater RA Report; operation of the ISVE system; performance of long-term response actions related to restoring groundwater quality; demobilizing the ISVE and ISCO system facilities; conducting a final inspection; preparing a Close-Out Report; and deleting the site from the NPL. These activities will be completed according to the following schedule:

Activity	Responsibility	Date
Approve Interim Groundwater RA Report*	EPA	09/06
Long-Term Response	EPA	09/06-09/11
First Five-Year Review	EPA	09/11
Complete ISVE System Operation	EPA	09/11
Conduct Final Inspection	EPA	09/11
Approve Soil RA Report	EPA	09/11
Approve Groundwater RA Report	EPA	09/11
Prepare Final Close-Out Report	EPA	09/11
Deletion from NPL	EPA	6/12

* Note: the groundwater remedy became operational and functional with the approval of the Interim Groundwater RA Report.

V. SUMMARY OF REMEDIATION COSTS

To date, approximately $1,192,000 has been spent to implement the soil remedy, including the ISVE, limited SVOC excavation, and building demolition. Approximately $1,020,000 has been spent to implement the groundwater remedy.

VI. FIVE-YEAR REVIEW

Upon completion of remedial activities at the site, hazardous substances will be reduced to levels which will permit unlimited use of, and unrestricted exposure to, soil and groundwater, under its current land use. It is the policy of EPA to conduct five-year reviews when remedial activities, including monitoring, will continue for more than five years. Since it will take more than five years to attain cleanup levels at the site, a review will be conducted no less often than once every five years.

The first five-year review will be completed on or before five years from the approval date of this document (*i.e.*, September 2011).

Approved:

William McCabe 10-3-06

George Pavlou, Director — Date
Emergency and Remedial Response Division