



Department of Environmental Conservation
Division of Environmental Remediation

Decision Document

Interim Remedial Measure
Former General Motors North Tarrytown
Assembly Plant
Village of Sleepy Hollow, Westchester County
Site No. C360070

July 2007

DECISION DOCUMENT SUMMARY INTERIM REMEDIAL MEASURE

Former General Motors Assembly Plant Brownfield Cleanup Program Site Site No. C360070 Village of Sleepy Hollow, Westchester County, New York

Statement of Purpose and Basis

The attached Decision Document summarizes the actions to be carried out as a non-time critical Interim Remedial Measure (IRM) at the Former General Motors Assembly Plant Site ("Site"). The action qualifies as an IRM in accordance with Technical and Administrative Guidance Memorandum HWR-92-4042 ("Interim Remedial Measures") as follows: 1) it can be undertaken without additional extensive investigation and evaluation; 2) it will prevent, mitigate, or remedy environmental damage or the consequences of environmental damage attributable to the site; 3) it will lessen obvious risks to the environment; and 4) it will reduce the scope and cost of the final remedy. The IRM to be completed consists of a "removal" as identified in the National Contingency Plan at 40 CFR §300.415(d) in that it includes the excavation of highly contaminated soils which will reduce the potential for the spread of contamination.

Description of the Interim Remedial Measure:

The major elements of the IRM include:

- Excavation and off-site disposal of grossly contaminated soil, containing elevated concentrations of lead, at PAOC 7 (southern part of former Body Plant) and PAOC 29 (northern area of site adjacent to Kingsland Point Park); soils with concentrations >5000 ppm for lead will be removed above the water table at both PAOC 7 and PAOC 29, and >10,000 ppm for lead at targeted depths below the water table at PAOC 7 and at all affected depths below the water table at PAOC 29;
- Excavation and off-site disposal of grossly contaminated soil, containing elevated concentrations of chromium and trichloroethene, at PAOC 47 (along the western edge, near the mid-point of the site adjacent to the southern area of Kingsland Point Park); excavation limits in this area will be set at background/TAGM #4046 cleanup goals, or applicable BCP Soil Cleanup Objectives;
- Excavation and off-site disposal of petroleum impacted soil from the area of a former 10,000 gallon underground storage tank (near the northwest corner of the former chassis plant);
- Chemical oxidants will be delivered, via injection through injection wells, to treat residual groundwater contamination in the area of PAOC 47 and the former 10,000 gallon underground storage tank;
- Site-wide remedial action plan for the implementation of engineering and institutional controls (EC/IC) to prevent public contact with soils and historic fill materials that exceed soil screening values, prevent runoff of contaminated soil, minimize precipitation from infiltrating through residual contamination, mitigate intrusion of soil vapors and methane into indoor air spaces in future

buildings, monitor groundwater in natural attenuation zones, and provide a mechanism to manage and mitigate short term exposure to subsurface materials during construction activities.

- ▶ As a part of the IRM the Department will require a demarcation barrier consisting of a geotextile fabric or a structural surface (e.g., concrete or asphalt) over soil or fill that does not meet TAGM 4046 generic cleanup guidance, or applicable BCP Soil Cleanup Objectives. It has come to the Department's attention that, through the review and approval process for the Lighthouse Landing project, the Village of Sleepy Hollow will require the placement of the geotextile fabric under open space, landscaped areas and under roadways. Therefore, the Department recognizes that the Village requirement is more stringent and it will apply for work performed at the site.

Once the Remedial Investigation is complete (for off-site as well as on-site) an overall site remedy will be proposed, which will include off-site issues. The selection of a final remedy will be preceded by the issuance of a draft Remedial Work Plan (RWP), a public comment period and a public meeting to be held in the vicinity of the Site. The RWP will consider the current, intended and reasonably anticipated future land uses of the site as required pursuant to ECL 27-1415(3)(i) and may include additional on-site and/or off-site remedial activities. After consideration of all comments received, the Department will document its selection of the final remedy in the approved RWP, which final remedy will provide for the protectiveness of public health and the environment pursuant to ECL 27-1415 and the implementing regulations at 6 NYCRR 375-1 and 375-3.

Approved



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Director, Bureau E

Division of Environmental Remediation

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
1.0 INTRODUCTION	1
2.0 SITE LOCATION AND DESCRIPTION	1
2.1 Operational/Disposal History	2
2.2 Previous IRMs	3
3.0 SUMMARY OF SITE CHARACTERISTICS	4
3.1 Site Geology/Hydrology	4
3.2 Nature and Extent of Contamination	5
4.0 SUMMARY AND EVALUATION OF IRM	6
4.1 Removal of Grossly Contaminated Material with Elevated Lead Concentrations	6
4.1.1 Additional Information to be Collected	7
4.2 Removal of Grossly Contaminated Material with Elevated Chromium and	8
Trichloroethene Concentrations	8
4.3 Removal of Grossly Contaminated Material with Residual Petroleum	9
4.4 Treatment of Residual Contamination in Groundwater	10
4.5 Site Wide Engineering/Institutional Controls	11
5.0 IRM REMEDIAL GOALS	12
6.0 PROGRAM STATUS	14
7.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION	15

FIGURES

Figure 1	Site Location Map
Figure 1A	Location of Proposed Excavation Areas
Figure 2	Lead in Soil - PAOC 7
Figure 3	Lead in Groundwater - PAOC 7
Figure 4	Lead in Soil - PAOC 29
Figure 5	Lead in Groundwater - PAOC 29
Figure 6	VOCs in Soil - PAOC 47
Figure 7	VOCs in Groundwater - PAOC 47
Figure 8	Chromium in Soil - PAOC 47
Figure 9	Chromium in Groundwater - PAOC 47
Figure 10	Extent of Residual Oil Area - Former 10,000 Gallon UST
Figure 11	Subsurface Cross Section - Former 10,000 Gallon UST
Figure 12	Groundwater Elevation Contours - May 27, 2004

Figure 13 Remedial Costs vs. Percent of Lead Removed (“Knee of the Curve”)
 Figure 14 PAOC 7 Proposed IRM Boundary
 Figure 15 PAOC 29 Proposed IRM Boundary
 Figure 16 PAOC 47 Proposed IRM Boundary
 Figure 17 Former 10,000 Gallon UST Area Proposed IRM Boundary

TABLES

Table 1 Lead Analysis of Soil (during RI)
 Table 2 Summary of Costs for Lead Removal Alternatives
 Table 3 Lead Mass Calculations
 Table 4 Soil Cleanup Objectives for the Removal of Source Area Soil

APPENDIX A RESPONSIVENESS SUMMARY

INTERIM REMEDIAL MEASURE DECISION DOCUMENT

**Former General Motors North Tarrytown Assembly Plant
Village of Sleepy Hollow, Westchester County, New York
Site No. C360070
July 2007**

1.0 INTRODUCTION

The New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health (NYSDOH), has selected an Interim Remedial Measure (IRM) to address subsurface soils and groundwater contaminated with lead, chromium, trichloroethene (TCE) and petroleum related constituents at the Former General Motors North Tarrytown Assembly Plant Site. The IRM includes: 1) excavating contaminated soils in the area of Potential Area Of Concern (PAOC) 7, PAOC 29, PAOC 47, and former 10,000 gallon underground storage tank (see Figures 14, 15, 16, and 17); 2) injection of chemical oxidants into the ground to treat the residual contamination in the groundwater at PAOC 47 and former 10,000 gallon underground storage tank area; 3) implementation of engineering and institutional controls (EC/ICs) to prevent public contact with soils and historic fill materials that exceed soil screening values, mitigate intrusion of soil vapors and methane into indoor air spaces in future buildings, monitor groundwater in natural attenuation zones, and provide a mechanism to manage and mitigate short term exposure to subsurface materials during construction activities.

It has come to the Department's attention through letters, brochures, etc., that there are other potential future uses of parts of the West and/or East Parcels (i.e., restoration of an estuary channel, establishment of an 18th century tenant farm). Further, the off-site, sediment investigation is ongoing. Once the Remedial Investigation is complete (for off-site as well as on-site) an overall site remedy will be proposed, which will include off-site issues. The selection of a final remedy will be preceded by the issuance of a draft Remedial Work Plan (RWP), a public comment period and a public meeting to be held in the vicinity of the Site. The RWP will consider the current, intended and reasonably anticipated future land uses of the site as required pursuant to ECL 27-1415(3)(i) and may include additional on-site and/or off-site remedial activities. After consideration of all comments received, the Department will document its selection of the final remedy in the approved RWP, which final remedy will provide for the protectiveness of public health and the environment pursuant to ECL 27-1415 and the implementing regulations at 6 NYCRR 375-1 and 375-3.

2.0 SITE LOCATION AND DESCRIPTION

The Site is located along the eastern shore of the Hudson River, occupies approximately 96.5 acres and is bisected by an active passenger and freight rail corridor (see Figure 1). The Site is the location of a former automobile assembly plant owned and operated by General Motors Corporation

since 1914. At the time GM ceased assembly operations in July 1996, the main Site features included two large manufacturing buildings consisting of more than 2.5 million square feet of floor space, as well as associated utility buildings and material storage structures. The assembly plant and support buildings were decommissioned and all structures have been demolished, except for two large floor slabs (covering much of the surface area on the west side of the railroad tracks) and a section of a pedestrian bridge over the rail lines.

2.1 Operational /Disposal History

Below is a summary of the operational/disposal history of the Site:

- In 1830, a Brickyard was established on the southern portion of the Site at the foot of Beekman Avenue, on the south side of the Pocantico Bay (which has since been filled). The brickyard closed in 1861.
- In 1885, the Rand Drill Company acquired the abandoned brickyard property. The facility was used to manufacture percussion rock drills. In 1905, the Ingersoll Sergeant Drill Company merged with Rand to become Ingersoll Rand. The Ingersoll Rand Company ceased operations at the Site in 1909.
- In 1899, property on the north side of the former bay (adjacent to Kingsland Point) was purchased by the Mobile Company of America (Mobile) and a three-story brick and steel facility was constructed to manufacture steam powered vehicles. By 1903, Mobile ceased operations, as the internal gasoline engine became more popular.
- In 1904, the Maxwell Briscoe Company (Maxwell Briscoe) purchased the Mobile Facility for the purpose of manufacturing automobiles. By 1909, Maxwell-Briscoe expanded the former Mobile Site into a complex of assembly buildings, machine shops, woodworking facilities and painting/varnishing operations. In 1909, Maxwell Briscoe also acquired the Ingersoll-Rand Property on the south side of the bay, increasing the size of the manufacturing floor space to more than 300,000 square feet. Maxwell Briscoe added a small foundry, and the Ingersoll-Rand buildings were converted to machine, sheet metal, and woodworking shops.
- United States Motor Company (US Motor) acquired Maxwell Briscoe as a subsidiary in 1913. Later in that same year, US Motor declared bankruptcy and Maxwell Briscoe ceased manufacturing automobiles in Sleepy Hollow.
- The Chevrolet Motor Company (which later became a division of GM) originally acquired the former Maxwell Briscoe Property and automobile manufacturing facility in 1914.
- Since that time, GM has only assembled automobiles at the Site, with the exception of a

period during World War II when airplane wings and light military vehicles were assembled at the Site.

- With the exception of the salaried parking lot, commercial and industrial development of the Site was accomplished through progressive advancement of fill. With the construction of the railroad in the second half of the 19th century, the portion of the Site east of the tracks (East Parcel) was isolated from Pocantico Bay by a strip of fill placed to support the tracks. During the 1920s and 1930s, the Village of Sleepy Hollow used part of this East Lot area for municipal refuse and ash disposal. The Village of Sleepy Hollow eventually filled the remainder of the East Lot area with non-refuse fill. By 1960, GM acquired this 29.5-acre parcel from the Village of Sleepy Hollow and added additional fill obtained from dredging the Hudson River navigation channel to support construction of a parking lot. GM has only used the East Lot to park or transfer cars. Historical fill was initially placed on the western portion of the Site, around Pocantico Bay, during the early 1900s for the industrial developments that preceded the arrival of GM. GM subsequently completed a series of fill projects between 1924 through 1960, which expanded the shoreline to its current configuration. The final extension of the waterfront was filled with sediments dredged from the Hudson River navigation channel.

The contamination present at the Site is associated with historical fill and past operations at the former GM facility. The primary contaminants of concern are metals (mainly lead, some soil concentrations were greater than 10,000 ppm), polycyclic aromatic hydrocarbons (PAHs) and petroleum compounds. Investigations indicate relatively minor impact to groundwater. Exceedances of standards, criteria, and guidance (SCGs) include lead, PAHs and petroleum related contaminants in soils as well as some slightly elevated groundwater concentrations of lead, certain petroleum constituents and some localized elevated concentrations of TCE and chromium in groundwater along the middle of the western edge of the property. Soil gas samples in the East Lot (east of the railroad tracks) indicated high levels of methane under the asphalt covering a large part of that parcel; there were also some elevated concentrations of methane in the northern section of the West Lot. In addition to the contamination present upland, there are some impacts to near-shore sediments in the River immediately adjacent to the Site.

2.2 Previous IRMs

Between November 1997 and April 1998, during the facility decommissioning process, GM completed an Interim Correctives Measures Project (ICM). The ICM consisted of soil removal from nine PAOCs where various oils or other nonhazardous fluids had leaked from plant equipment during facility operations as well as the removal of two out-of-service underground storage tanks (USTs). The USTs were located adjacent to the Chassis Plant; all other areas addressed by the ICM project were located within the unfinished basements or crawl spaces of the Chassis Plant and Body Plant. The affected surfaces in these areas consisted of sand fill. Almost all of the work conducted in basement/crawl spaces consisted of hand equipment excavation by

crews of laborers because these areas were generally not accessible by excavating equipment.

Following excavation of contaminated soil/fill at each location, confirmatory samples were taken and analyzed before backfilling with clean sand to original grade. The work conducted as a part of this project is documented in the ICM Report prepared by EMCON in 2001. These areas were further investigated further during the Remedial Investigation (RI).

The out-of-service USTs removed during this project consisted of one 1,000-gallon gasoline UST (originally installed and used by GM) and one 10,000-gallon bunker-fuel tank that was apparently abandoned in place before GM developed that area of the Site in the 1920s. The 1,000-gallon UST was properly remediated by a soil removal conducted during the ICM project.

An area of residual petroleum contamination remained at the former 10,000-gallon UST location after the ICM project. Removal of all of the residual contamination was not possible because limited access caused by the ongoing demolition activities. This area was further characterized during the RI to confirm the extent of residual contamination in this area; the remaining contamination in this area will be addressed as a part of the current IRM.

Overall, approximately 2,000 cubic yards of soil and several hundred tons of demolished concrete were removed (and disposed of off-site) during the ICM project.

3.0 SUMMARY OF SITE CHARACTERISTICS

3.1 Site Geology/Hydrology

Approximately 90 percent of the Site acreage is developed on fill material of varying composition and thickness. The fill is generally made up of fine to course sands with lesser amounts of gravel, silt, and clay. Varying amounts of debris were encountered within the fill which included cinders, brick fragments and other solid material. The fill is underlain in areas by soft organic clay and peat deposits associated with the Hudson and Pocantico Rivers; in other areas silt and clay underlies the fill. Beneath these deposits, a layer of compact granular till (a mixture of material of varying sizes including silty sand with gravel and occasional cobbles) overlies the bedrock with a thickness ranging from one foot to over 10 feet. The underlying bedrock is a weathered to relatively competent gneiss. The depth to bedrock is extremely variable across the Site ranging from approximately 20 feet below ground surface to more than 100 feet.

Regionally, groundwater flow is to the west towards the Hudson River, although there are local variations to this pattern associated with influences from surface water bodies such as streams, wetlands, and ponds. Groundwater in the vicinity of the Site is not used as a potable water supply. It is unlikely that groundwater beneath the Site would be used as a potable water supply in the future since the area is serviced by the local municipal water supply system and the

natural water bearing units beneath the Site are expected to have relatively low yields.

3.2 Nature and Extent of Contamination [see 12/06 Preliminary Draft RI Report for details]

Through the investigation process at this Site potential areas of concern, or PAOCs, were identified. A total of 47 numbered PAOCs, plus the 10,000 gallon underground storage tank (UST), a area near a bulkhead, background fill, groundwater, and soil gas were identified and are summarized in Table 1 of the December 2006 Preliminary Draft Remedial Investigation Report.

Contamination at the Site is associated with historical fill and past operations at the former GM facility. There is widespread, low-level soil contamination present across the Site at levels that exceed the recommended soil cleanup objectives presented in the Division of Environmental's (DER's) Technical and Administrative Guidance Memorandum (TAGM) #4046. In certain areas of the Site there are areas where significantly higher levels of soil contamination are present.

The primary contaminants of concern are metals (mainly lead, some soil concentrations were greater than 10,000 ppm), polycyclic aromatic hydrocarbons (PAHs) and petroleum compounds. Investigations indicate relatively minor impact to groundwater. Exceedances of standards, criteria, and guidance (SCGs) include lead, PAHs and petroleum related contaminants in soils as well as some slightly elevated groundwater concentrations of lead, certain petroleum constituents, and some localized elevated concentrations of TCE and chromium in groundwater along the middle of the western edge of the property. Soil gas samples in the East Lot (east of the railroad tracks) indicated high levels of methane under the asphalt covering a large part of that parcel.

As a part of the scoping for the development of the Remedial Investigation (RI) work plans, all available data was evaluated. Based on that data certain areas of the Site were identified for needing additional characterization while other areas were sampled to confirm the validity of the previous investigations.

As a part of the RI scoping the results from previous soil samples for lead were evaluated. Based on the distribution of these results it was apparent that 1) there were low-level exceedances of TAGM 4046 numbers across the Site, and 2) there were certain areas where there was an unusually high "departure" from the normal concentrations present across the Site. As a result, there were five areas of the Site identified as potential source areas for lead requiring additional investigation. In three of these areas (PAOCs 1, 9, and 46) the previous result for lead could not be reproduced during the RI, even though samples were collected in very close proximity to the previous samples. Two of these areas were identified as source areas containing grossly contaminated soils with elevated concentrations of lead (PAOC 7 and PAOC 29).

One of the new monitoring wells installed during the RI was placed along the eastern edge

of the Site, near the north-south midpoint of the Site (OW-24). The groundwater sample from that well indicated the presence of chromium and trichloroethene (TCE) contamination. Additional boreholes were installed to characterize this area (PAOC 47). This area is included in the areas to be addressed as a part of this IRM.

In addition to the three areas discussed above, the area of a former 10,000 gallon underground storage tank will be included as an area to be addressed as a part of this IRM.

The areas mentioned above are discussed in greater detail below.

4.0 SUMMARY AND EVALUATION OF THE IRM

A more detailed description for implementing the IRM is included in the document entitled, "Proposed Interim Remedial Measures, Former General Motors Assembly Plant Site, Sleepy Hollow, New York," prepared by Blasland, Bouck and Lee, Inc., dated January 2007. In addition, the December 2006 Preliminary Draft Remedial Investigation Report presents backup information used in the development of this IRM. See Section 5 of this document for a discussion on the goals for this IRM.

4.1 Removal of Grossly Contaminated Materials with Elevated Lead Concentrations

Based upon existing soils characterization data, approximately 5340 cubic yards of lead contaminated soil will be excavated in the area of PAOC 7 and PAOC 29 (see Figures 14 and 15). The IRM will result in the excavation, to the extent feasible, of fill material where lead concentrations are greater than (>) 5,000 PPM above the water table and at targeted areas/depths >10,000 PPM below the water table. The excavations will occur in two PAOCs within the West Parcel; PAOC 7 (including historic Fill Areas H, F and G) and PAOC 29.

Following completion of the excavation activities, a demarcation barrier (of geotextile material) will be installed and the excavation area will be backfilled and compacted with select fill (saturated zone) and structural fill (unsaturated zone) to existing grades. Select fill for all remedial excavations will meet Technical Administrative Guidance Memorandum (TAGM) 4046 recommended cleanup levels or applicable BCP Soil Cleanup Objectives, as appropriate. Structural fill for such excavations may be obtained from on-site stockpiles (on-site stockpiles are millings piles generated when former plant buildings were decommissioned) and need not meet the same levels as those for select fill, but must be approved by NYSDEC prior to placement. Regardless of the material used to backfill remedial excavations, a Site-wide cap system of either two feet of clean soil meeting TAGM 4046 generic cleanup guidance or applicable BCP Soil Cleanup Objectives for the intended use of the property, or structural surface [i.e., buildings, roads/parking lots, etc.] will be in place (see Section 4.5).

PAOC 7

At PAOC 7, the practicable depth of the excavation will extend from the surface to the groundwater table (approximately 4 feet below the surface of the former Body Plant basement elevation) where lead concentrations are >5,000 PPM, and to targeted depths (8-12 feet) within the same excavation footprint to remove additional fill containing lead >10,000 PPM. There are areas where concentrations of lead in the soil is present above 10,000 PPM, but it is not feasible to remove this material. An example of this situation exists in the area of sample number SI-7-B39; lead contamination is present at a concentration of 13,700 PPM at a depth of 8 to 9 feet below the ground surface. The sample results from this borehole at depths less than 8 feet are all at or below 2910 PPM, with three of the four sample results being below 700 PPM. In this area it is not feasible to remove relatively uncontaminated soil, excavating five feet into the groundwater, in order to remove the material at a depth of 8-9 feet (the sample below this sample, taken at a depth of 10-11 feet, indicated the presence of 1550 PPM lead). In addition, groundwater samples in this area have indicated little to no impact to the groundwater.

Prior to excavation, the overlying raised concrete slabs and grade beams will be demolished and set aside for future on-site recycling and re-use. Figure 14 presents the approximate footprints and depths of material to be removed from PAOC 7.

PAOC 29

At PAOC 29, the depth of the excavation to remove concentrations of lead >5,000 PPM will be from the surface to the water table (approximately 2 feet below the ground surface in this area of the Site) and the depth of the excavation to remove concentrations of lead >10,000 PPM will be to the bottom of the fill unit (approximately 6 to 10 feet below ground surface). The existing surface concrete and/or asphalt cover (up to 12 inches thick) will be set aside for future on-site recycling and re-use. Following completion of the excavation activities, a geotextile demarcation barrier will be installed and the excavation area will be backfilled and compacted with select fill (saturated zone) and structural fill (unsaturated zone) to existing grades. Structural fill may be obtained from on-site stockpiles (millings piles generated when former plant buildings were decommissioned). Figure 15 presents the approximate footprint and depth of material to be removed from PAOC 29.

4.1.1 Additional Information to be Collected

The physical conditions at the Site would change as a result of the proposed development project. Areas currently covered by asphalt or concrete slabs may be covered by a soil cover in the future, which could result in the potential for precipitation to infiltrate through unsaturated soils containing residual contamination.

Additional testing of historic fill at PAOCs 7 and 29 will be conducted to evaluate the potential for infiltration of precipitation to cause leaching of lead from the fill to groundwater in the future; if it is determined to be necessary additional measures will be taken to protect

groundwater. Testing will include representative sampling and analysis of fill using the USEPA Synthetic Precipitation Leaching Procedure (SPLP) to simulate acid-rain conditions. SPLP results will be evaluated in conjunction with all available lead data for Site fill and groundwater to determine if additional measures, such as the placement of an impermeable layer beneath the final soil cap, are warranted.

4.2 Removal of Grossly Contaminated Materials with Elevated Chromium and Trichloroethene Concentrations (PAOC 47)

Based upon existing soils characterization data, approximately 3600 cubic yards of concrete and soil contaminated with chromium and trichloroethene (TCE) will be excavated in the area of PAOC 47 (see Figure 16). PAOC 47 is the location of a subsurface pit which was filled in at some point in the past. The maximum projected depth of excavation is approximately 13 feet below ground surface (bgs) (approximately 7 feet below the bottom of the filled pit).

The lateral boundaries of the pit excavation were essentially confirmed in the second phase of RI sampling. The pit has concrete walls and a concrete bottom that have been confirmed through the RI test borings. Sampling results inside, as compared to outside of the pit walls, revealed that chromium is most concentrated within the proposed excavation boundaries (see Figure 8) up to a maximum level of 3,750 PPM. The maximum level detected in soil samples outside the pit edge was 42.4 PPM in soil below the groundwater table and 38.1 PPM in soil above the groundwater table. Relative to the chromium levels detected in RI samples collected from comparable Site fill or native soil in this part of the Site (10.1- 44.5 PPM) and in RI samples collected from the surface soil of Kingsland Point Park (32 - 35.3 PPM), levels of chromium observed in soil or fill immediately outside the proposed excavation are representative of local or Site background conditions. The levels of TCE found in soil within the PAOC 47 area are relatively low (parts-per-billion) overall, even within the proposed excavation boundaries. However, the maximum concentrations of TCE in groundwater were detected on the downgradient edge of the pit, suggesting that the source lies within or immediately below the pit. Uncertainties regarding the distribution of TCE in the saturated zone soils will be addressed with the implementation of the selected remedy for groundwater described in Section 4.4, below.

The lateral extent of soil removal has been defined by the pit walls and associated RI sampling. The depth of soil removal will be subject to additional sampling to confirm the vertical extent of grossly contaminated soil beneath the pit. Excavation of the impacted materials will generally be conducted using conventional construction equipment, such as backhoes, excavators, front-end loaders, dump trucks, etc. During excavation, steps will be taken to minimize potential leaching of contaminants to groundwater, as well as to minimize dust generation. The excavated materials will be stockpiled on staging areas constructed at the Site for testing and processing. The excavated material may be subject to treatability studies to determine if any of this material can be treated on-site and rendered suitable for future reuse on the Site. Any proposed reuse will

be subject to NYSDEC approval. Materials that are not approved for such reuse will be tested for waste classification and disposed off-site.

A geotextile demarcation barrier will be installed at the base and sidewalls of the excavation before backfilling. Select fill will be used to backfill the saturated zone. Structural fill will be placed above the water table. Following completion of the excavation activities, the excavation area will be backfilled to existing grade.

4.3 Removal of Grossly Contaminated Materials with Residual Petroleum

During the decommissioning of the GM facility, a former No.6 heating oil underground storage tank (UST), abandoned in place prior to 1930, was discovered (April 1998) and removed, along with over 700 cubic yards of oil-contaminated fill. Due to the presence of the adjacent building, a comprehensive removal of contaminated material below the building was not possible at that time. The excavation was restored with clean stone and sand and capped with asphalt until the remaining residual contamination would be accessible following building and foundation demolition.

This component of the IRM will involve the excavation of approximately 5,100 CY of petroleum-impacted soil as delineated by the 3-foot contour interval (representing thickness of visually stained soils observed during the installation of soil borings during RI field work/sample collection) in the petroleum source area (Figure 17). This area will include soil removal to depths of up to approximately 21 feet below current grade. Un-impacted soil, located above the petroleum-impacted soil, will be reused as backfill material above the water table to restore the excavation to grade. As part of the IRM in this area of the Site, areas north and south of the proposed excavation will be treated in-situ to further remediate the saturated zone, as described in Section 4.4. The excavated materials will be stockpiled on staging areas constructed at the Site for testing and processing. The excavated material may be subject to treatability studies to determine if any of this material can be treated on-site and rendered suitable for future reuse on the Site. Any proposed reuse will be subject to NYSDEC approval. Materials that are not approved for such reuse will be tested for waste classification and disposed off-site. Water generated during the excavation and dewatering activities will be collected and treated.

This component of the IRM applies to the bulk of the remaining residual oil bound to the saturated zone fill beneath the original excavation and under the former Chassis Plant foundation. Excavation boundaries were proposed based on test borings and field screening of soil samples in the first phase of the RI. The second phase of the RI included soil borings on all sides of the proposed excavation limits to quantitatively determine the levels of petroleum-derived VOCs and semi-volatile organic compounds (SVOCs) at these suggested boundaries. The soil quality results from this delineation sampling indicate that the contamination found at the proposed edge of excavation was limited to two out of nine boring locations exhibiting an SVOC (chrysene), and four of the nine borings exhibiting one or more VOCs (benzene, isopropylbenzene, n-

propylbenzene, naphthalene, and/or xylenes) at levels marginally above TAGM 4046 guidance values within the 9-12 foot depth interval. These findings represent relatively low levels of residual petroleum contamination at the edges of the proposed “source” excavation where the grossly contaminated soil pinches out to a thinning interval beneath uncontaminated overburden. This data confirms that the source area boundaries are appropriate. Soil and groundwater sampling outside this zone revealed conditions that generally meet or only slightly exceed TAGM 4046 guidance for VOCs and SVOCs in soil and standards for groundwater, despite qualitative (i.e., visual appearance of soil samples collected during the installation of soil borings) evidence of residual contamination. This is likely due to the fact that the material has been in the subsurface for many decades and degradation by natural attenuation has been occurring. An additional remedial measure, to further address residual petroleum contamination outside the excavation boundary, is described in Section 4.4.

A demarcation barrier will be installed at the base and sidewalls of the excavation before backfilling. Select fill will be used to backfill the saturated zone.

4.4 Treatment of Residual Contamination in Groundwater

After the soil removal components of the IRM have been completed, there will be some relatively low-level residual contamination left behind in the groundwater. An additional remedial measure will be taken to further address residual contamination outside the excavation boundaries at PAOC 47 and at the excavation of petroleum contaminated soil at/adjacent to the location of the former 10,000 gallon underground storage tank (UST).

As a part of this component of the IRM, chemical oxidants will be delivered to the TCE-impacted saturated zone at PAOC 47 and to the petroleum-impacted saturated zone at the 10,000 gallon UST area via injection wells. Chemical oxidants applied in this process typically consist of hydrogen peroxide, potassium permanganate, ozone and associated supplemental reagents. Bench scale treatability tests will be conducted to support oxidant selection and dosage. The injection wells will be placed within the areas of impacted groundwater at the Site, and will target the depth intervals where analytical data indicated that groundwater contains TCE at concentrations greater than the groundwater quality standards at PAOC 47, and the petroleum-impacted saturated zone associated with the 10,000 gallon UST. The general area for groundwater treatment for this IRM is shown on Figures 16 and 17. Final delineation of the treatment zones will be accomplished simultaneously with treatability and pilot testing. A pilot study will be conducted to evaluate the radius of influence surrounding the individual injection wells to ensure that the oxidizing agents will be delivered in a manner that promotes contact with the volatile organic compounds (VOCs) such as TCE in the subsurface soil and groundwater.

Multiple injections of oxidizing agents will be applied as necessary to meet the completion criteria. The treatment of residual contamination will be considered complete when

either of the following conditions are met: 1) achievement of groundwater quality standards for petroleum constituents (VOCs and SVOCs) at the 10,000 gallon UST area, and the achievement of groundwater quality standards for TCE at PAOC 47, or 2) the observance of asymptotic conditions, as agreed to by NYSDEC, in monitoring wells within the treatment area. Groundwater monitoring will be conducted during and after the treatment period to confirm effectiveness of the IRM.

4.5 Site-Wide Engineering/Institutional Controls

This remedial action will be defined in a Site-wide remedial action plan for the implementation of engineering and institutional controls (EC/ICs) to prevent public contact with soils and historic fill materials that exceed TAGM 4046 values or applicable BCP Soil Cleanup Objectives, mitigate intrusion of soil vapors and methane into indoor air spaces in future buildings, monitor groundwater in natural attenuation zones, and provide a mechanism to manage and mitigate short-term exposure to subsurface materials during construction activities. The EC/IC components of the Site-wide plan consist of the following:

- A demarcation barrier consisting of a geotextile fabric or a structural surface (e.g., concrete or asphalt) over soil or fill that does not meet TAGM 4046 generic cleanup guidance, or applicable BCP Soil Cleanup Objectives;
- A final barrier cap system throughout the entire Site consisting of either:
 - A 2-foot thick surface soil cover for landscaped or naturally-vegetated areas meeting applicable BCP Soil Cleanup Objectives for restricted-residential or active recreational uses; if necessary, based upon additional testing (see Section 4.1.1), steps will be taken to minimize infiltration through unsaturated soil exhibiting potential to leach lead to groundwater;
 - Pavement (or similar hard surfaces) over non-vegetated areas;
 - Permanent buildings or similar structures;
- Mitigation measures, as necessary, to address potential for intrusion of methane into future indoor air space within the East Parcel and in the northern corner of the West Parcel;
- Mitigation measures, as necessary, to address potential intrusion of volatile organic vapors into future indoor air space within the East and West Parcels;
- Installation of additional monitoring wells, where necessary, and post-IRM groundwater monitoring to document that remedial action objectives are being achieved on-site and off-site;
- Institutional controls implemented during and/or following Site development, including

but not necessarily limited to:

- A soil management plan and associated Site-specific health and safety plan for potential future ground intrusive activities that may breach the demarcation barrier or extend beneath future permanent buildings/structures. The soil management plan will also address the handling and re-use of excavated soil or fill during Site development (e.g., on-site reuse of soil from excavation of building foundations and utility trenches), and reuse of the concrete millings as a subsurface fill material on-site;
- Requirement that any historic fill excavated during underground utility construction be replaced by clean backfill (meeting TAGM 4046 generic cleanup guidance or applicable BCP Soil Cleanup Objectives for the intended use);
- Requirement for post-construction monitoring and/or sampling as necessary to evaluate the potential for soil vapor intrusion prior to building occupancy;
- Performance specifications for maintenance of the Site-wide barrier cap system;
- Requirement for periodic inspection and evaluation by a qualified individual to confirm that EC/ICs are in-place and reliable; and
- Requirement that Site groundwater not be used.

The sampling, and if needed mitigation to address potential vapor intrusion, will be performed in a manner consistent with the Final NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York.

The Site-wide remedial actions (IC/ECs), to be put in place as a part of this IRM, will be completed by incorporating these requirements into an environmental easement.

5.0: IRM REMEDIAL GOALS:

The following are the goals of this IRM:

- Remove, to the extent practicable, the grossly contaminated soil present at the Site;
- Eliminate, to the extent practicable, the potential for off-site migration of residual contamination;
- Eliminate, to the extent practicable, the potential for exposure to soils and historic fill materials that exceed TAGM 4046 or applicable BCP Soil Cleanup Objectives values;
- Eliminate, to the extent practicable, the potential for exposure to residual contamination in groundwater;
- Eliminate, to the extent practicable, the potential for intrusion of volatile organic compound (VOC) soil vapors and methane into indoor air spaces in future buildings.

To determine whether the soil, groundwater, sediments, surface water, and soil vapor contain contamination at levels of concern, data from the investigation were compared to the

following Standards, Criteria and Guidance (SCGs):

- Groundwater SCGs are based on the Department's "Ambient Water Quality Standards and Guidance Values" and Part 5 of the New York State Sanitary Code.
- Soil SCGs are based on the Department's Cleanup Objectives ("Technical and Administrative Guidance Memorandum [TAGM] 4046; Determination of Soil Cleanup Objectives and Cleanup Levels." and 6 NYCRR Subpart 375-6 - Remedial Program Soil Cleanup Objectives).
- If it is determined to be necessary, indoor air samples will be collected from future buildings at the site prior to occupancy. Concentrations of VOCs in air will be evaluated using the air guidelines provided in the NYSDOH guidance document titled "Guidance for Evaluating Soil Vapor Intrusion in the State of New York," dated October 2006 (or the most recent version if there is an updated version available).

TAGM 4046/applicable BCP Soil Cleanup Objectives are the overall remedial goals for soil contamination and groundwater standards are the overall goals for groundwater. Achievement of these goals will be accomplished through a combination of remedial components including removal, groundwater treatment, engineering controls and institutional controls, as discussed in the sections above.

Due to the nature and extent of the contamination present at the Site, it is not feasible to remove all of the material that is present at concentrations that exceed TAGM 4046 values or applicable BCP Soil Cleanup Objectives. This is not uncommon at sites similar to this one. As a result, the following is the hierarchy of source removal and control measures which are to be used, starting from the most preferable:

1. Removal and/or treatment - All sources, concentrated solid or semi-solid hazardous substances, dense non-aqueous phase liquid, light non-aqueous phase liquid and/or grossly contaminated media shall be removed and/or treated; provided however, if the removal and/or treatment of all such contamination is not feasible, such contamination shall be removed or treated to the greatest extent feasible.
2. Containment - Any source remaining following removal and/or treatment set forth in this subsection shall be contained; provided however, if full containment is not feasible, such source shall be contained to the greatest extent feasible.
3. Elimination of exposure - Exposure to any source remaining following removal, treatment and/or containment set forth in this subsection shall be eliminated through additional measures.
4. Treatment of source at the point of exposure - Treatment of the exposure resulting from a

source of environmental contamination at the point of exposure, as applicable, including but not limited to wellhead treatment or the management of volatile contamination within buildings.

During the investigation process, it became apparent that there were relatively low level exceedances of TAGM 4046 numbers across the whole Site. Once the overall Site was characterized, the investigation centered on characterizing areas of the Site where concentrated source areas were present. The four concentrated source areas, identified during the investigation process, are discussed in Sections 4.1 through 4.3, above.

The soil cleanup objectives (SCOs) established for the removal of contaminated soil at PAOC 47 and the 10,000 gallon UST are TAGM 4046 concentrations or applicable BCP Soil Cleanup Objectives. It is feasible to remove the volume of contaminated material in these two areas.

During the evaluation of the lead contamination present at PAOC 7 and PAOC 29, it became apparent that, due to the widespread presence of soil with low-level exceedances, it was not going to be feasible to remove contaminated material down to TAGM 4046 SCOs. Based on the minimal impact to groundwater at the Site and the fact that there was a significant volume of soil containing lead at elevated concentrations (above TAGM 4046 SCOs), the hierarchy of removal/source control measures was used to develop a remedy that is both feasible to implement and protective.

Alternatives for the removal of lead contamination to different concentrations were established and cost estimates were developed. The information generated was used to perform a “knee-of-the-curve” evaluation. The knee of curve is the point, on a graph of costs versus contaminant removal, where large increased remediation costs do not justify the relatively small increases in the amount of the contaminant mass/concentrations removed. Figure 13 graphically demonstrate the knee of the curve, based on both contaminant concentration and mass of contaminant removed. Based on this evaluation, the limits of removal discussed in Section 4.1 were established. As shown on Figure 13, and documented in Table 3, the selected IRM corresponds to the removal of 74% of the mass of lead present at concentrations >5000 ppm from all depths at PAOC 7 and PAOC 29.

6.0: PROGRAM STATUS

The NYSDEC and the Participants had originally entered into a Voluntary Cleanup Agreement (VCA); the Participants transitioned from the VCP into the Brownfield Cleanup Program (BCP) and entered into two Brownfield Cleanup Agreements (BCAs) on March 31, 2005 (fully executed on May 12, 2005); one for the East Lot and one for the West Lot (including the off-site area/Hudson River sediment).

The VCA and the BCAs are referenced as follows:

<u>Date</u>	<u>Index No.</u>	<u>Subject of Agreement</u>
12/2/02	A3-0468-0902	VCA for entire Site
3/31/05	A3-05 13-0305	BCA for East Lot
3/31/05	A3-05 14-0305	BCA for West Lot

7.0: HIGHLIGHTS OF COMMUNITY PARTICIPATION

To provide interested citizens around the Site with an opportunity to learn about and comment upon the IRM, an information sheet was sent to persons on the Site contact list. The information sheet also announced the public meeting and comment period. The public meeting was held on March 28, 2007, at 7:00 p.m. at the Sleepy Hollow Village Hall to present the details of the proposed IRM and receive comments from the public. The public was given an opportunity to submit written comments until April 28, 2007.