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January 3, 2017

Mr. Hasan Ahmed
Environmental Engineer
New York State Department of Environmental Conservation
Division of Environmental Remediation
47-40 21st Street
Long Island City, New York 11101-5407

Re: SPH Surfactant Enhanced Recovery Work Plan for Operable Unit 3
Sunnyside Yard, Queens, New York

Dear Mr. Ahmed:

Roux Associates, Inc. (Roux Associates) and Remedial Engineering P.C. (herein collectively referred to as Roux Associates), on behalf of the National Railroad Passenger Corporation (Amtrak), have prepared this work plan to describe the proposed implementation of the surfactant enhanced separate-phase petroleum hydrocarbon (SPH) recovery in select areas within Operable Unit 3 (OU-3) of the Sunnyside Yard (Yard) located at 39-29 Honeywell Street, Queens, New York (Site).

The objective of this work plan is to enhance the recovery of SPH in OU-3 using Ivey-sol[®] 106 (Ivey-sol), a proprietary surfactant from Ivey International, Inc. (Ivey). Observations and evaluations from the surfactant field pilot study that was performed between October 26, 2015 and February 17, 2016 were used to design the proposed surfactant injection program, as discussed below. The injections will supplement the source area excavation that took place between May 9, 2016 and July 22, 2016 and will focus recovery efforts around any SPH greater than 0.1 foot in thickness. A map presenting the current SPH plume configuration in OU-3 is presented in Figure 1. Surfactants will be utilized in coordination with SPH recovery using either the existing DPVE system or a vacuum truck.

This work plan discusses the pertinent background information, the proposed surfactant enhanced SPH recovery implementation and associated performance monitoring.

Background

On October 26, 2015 a field pilot study was implemented to test the field application of surfactant to enhance recovery of low mobility SPH in OU-3. The field pilot study was conducted in accordance with the September 14, 2015 "Revised Surfactant Field Pilot Study Work Plan for Operable Unit 3," which was prepared by Roux Associates and approved by the New York State Department of Environmental Conservation (NYSDEC) in a letter dated October 5, 2015. The results of the pilot study were presented to the NYSDEC on June 22, 2016 in the document titled "Operable Unit 3 Surfactant Field Pilot Study Report", prepared by Roux Associates. In summary, the results of the pilot study demonstrated that surfactant enhanced SPH recovery was successful in OU-3 and would be a viable option to complement the vacuum enhanced recovery technology. This work plan was designed using procedures and methods similar to those followed during the field pilot study, as detailed in the following section below.

From May through July 2016 a focused soil excavation was conducted within the thickest part of the SPH plume in OU-3. Following the source area excavation and in accordance with the NYSDEC approved Monitoring Plan dated August 17, 2016, SPH monitoring was conducted in areas within the SPH excavation footprint and the surrounding areas. Seven new monitoring wells (OW-20 through OW-26) were installed within the SPH source excavation area from October 17 through October 20, 2016. Existing monitoring wells OW-1, OW-3, OW-4, OW-8, OW-9, MW-77, converted DPVE wells DP-17A and DP-35B, and newly installed monitoring wells OW-20 through OW-26 were gauged weekly for one month. This monitoring confirmed that the source area excavation was highly successful in remediating the majority of the SPH plume. As shown in Figure 1, only three isolated and limited areas remain where SPH is observed at thicknesses equal to or greater than 0.1 foot. This work plan is being submitted to complete recovery of the SPH within these small localized areas. In the event continued SPH monitoring determines additional monitoring wells exhibit SPH thicknesses equal to or greater than 0.1 foot, surfactant enhanced SPH recovery will be implemented as part of the scope of this work plan.

Surfactant Enhanced SPH Recovery Implementation

The surfactant injections will be focused around treating areas with SPH observed at thicknesses of 0.1 foot or greater during post-injection monitoring. As shown on Figure 1, the anticipated treatment areas include the field pilot test areas and areas between the North Runner track and the Yard Maintenance track. As described below, this plan includes utilizing temporary Geoprobe® points to inject surfactant into the subsurface, as shown in Figure 1. During the pilot study, the push-pull injection method proved to be a successful alternative and will again be implemented at MW-93. Note that if an injection point is not accessible with the Geoprobe®, or if surfactant cannot be successfully injected into the subsurface at a particular Geoprobe® location, we will evaluate utilizing an extraction well for both injection and recovery (push-pull injection method). Following injection, select existing DPVE wells, an existing monitoring well that will be converted to a DPVE well, and three proposed new DPVE wells will be utilized as extraction points for the surfactant and recovered SPH. Depending in Site conditions, the onsite DPVE system, a vacuum truck, or a combination of the two will be utilized to recover surfactant and SPH.

Surfactant Injection

Where accessible, a Geoprobe® will be used to facilitate injections of the surfactant solution by direct push and/or the installation of temporary 1-inch PVC injection points. Proposed Geoprobe® injection point locations are shown in Figure 1. A low Ivey-sol® to potable water ratio (i.e., 10:200 v/v or similar) will be injected using a Geoprobe® at a low pressure rate no greater than 12 gallons per minute (gpm), as determined by the pilot study results. Select existing wells or proposed wells along track areas at locations inaccessible for the Geoprobe® will be utilized for the push-pull gravity injection method.

To assess the performance of the surfactant, a monitoring program will be established. The following actions will be performed to obtain performance monitoring data:

- SPH and groundwater levels at each injection and extraction well will be gauged and recorded at 0 (i.e., baseline), 24 and 48 hours after an injection event;
- Field test to qualitatively show the presence or absence of surfactant will be performed at 0, 24, and 48 hours after an injection event; and

- A groundwater sample will be collected from the extraction well for diesel range organics (DRO) analysis at 0, 24, and 48 hours after an injection event.

After the final gauging and sample collection activities have been completed, extraction methods will be used to recover the surfactant/SPH/groundwater mixture, as described in the following section.

Surfactant and SPH Extraction

To facilitate the surfactant and SPH recovery, existing DPVE wells DP-2A, DP-3A and MW-93 and monitoring well OW-20 will be utilized as extraction points following surfactant injection (note monitoring well OW-20 will be converted to a DPVE well, as described below). Additionally, three proposed DPVE wells will be installed within the SPH footprint between the North Runner track and the SPH source excavation geomembrane barrier. The DPVE wells will be constructed of 4-inch diameter Schedule 40 polyvinyl chloride (PVC) fitted and screened from approximately 2 to 10 ft bls. The proposed DPVE wells and monitoring well OW-20 will be manifolded together to a common header using 2-inch diameter Schedule 80 PVC underground pipe. Each well will be equipped with a 1-inch diameter drop tube extending to approximately 1-foot off the bottom of the well. A union connection will be provided on the drop tube at the top of the DPVE well to allow for the adjustment of the drop tube depth. The locations of the proposed and existing DPVE wells and OW-20 are shown on Figure 1.

The DPVE system will likely be used to facilitate extraction. If determined to be appropriate and more cost effective, a vacuum truck may be used in place of the DPVE system. Under this scenario, the vacuum truck will be equipped with a pressure/vacuum pump that is capable of drawing a minimum of 20 inches of mercury vacuum at 300 cubic feet per minute. A 1-inch diameter PVC drop tube will be inserted into the extraction well and connected to the vacuum truck with a 2-inch diameter cam-lock hose connection. The vacuum truck hose will have a flow regulation valve to adjust the vacuum.

As determined by the Field Pilot Study Results, up to 70 injection volumes are proposed to be recovered. A field test to qualitatively show the presence of surfactant will be performed several times during the extraction event. Once it is determined that no surfactant is present, a groundwater sample will be collected from the extraction well for DRO analysis to confirm all surfactant and miscible SPH has been extracted.

The proposed implementation duration will be approximately 2 weeks followed by eight weeks of SPH and groundwater monitoring. SPH and groundwater levels at each injection and extraction well will be gauged and recorded weekly. This should allow enough time to demonstrate the minimum extent to which the SPH has been extracted.

Data Evaluation and Reporting

The baseline and performance monitoring data will be used to evaluate the effects of the surfactant injection on SPH recovery. The concentrations of DRO in the groundwater samples will be used to determine the increase in SPH solubility. This data, in conjunction with the SPH gauging, will also be used to estimate the additional mass of SPH recovered due to the surfactant. These evaluations and other findings will be documented in a report to the NYSDEC. Laboratory analytical reports will be included as an appendix to the report.

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Schedule

Roux Associates is prepared to implement this plan immediately following NYSDEC approval of this plan. It is estimated that the injections will take up to two weeks to complete. Following injections, there will be a performance monitoring period of eight weeks. Roux Associates will then prepare and submit a final report to the NYSDEC following the conclusion of the performance monitoring period.

Please feel free to call if you have any questions or if we can provide further assistance.

Sincerely,

ROUX ASSOCIATES, INC.



Christina Prete, P.E.
Project Manager

REMEDIAL ENGINEERING, P.C.

CERTIFICATION: I, Charles J. McGuckin, certify that I am currently a NYS registered professional engineer and that this SPH Surfactant Enhanced Recovery Work Plan for Operable Unit 3 was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Charles J. McGuckin, P.E.
NYS Professional Engineer #069509

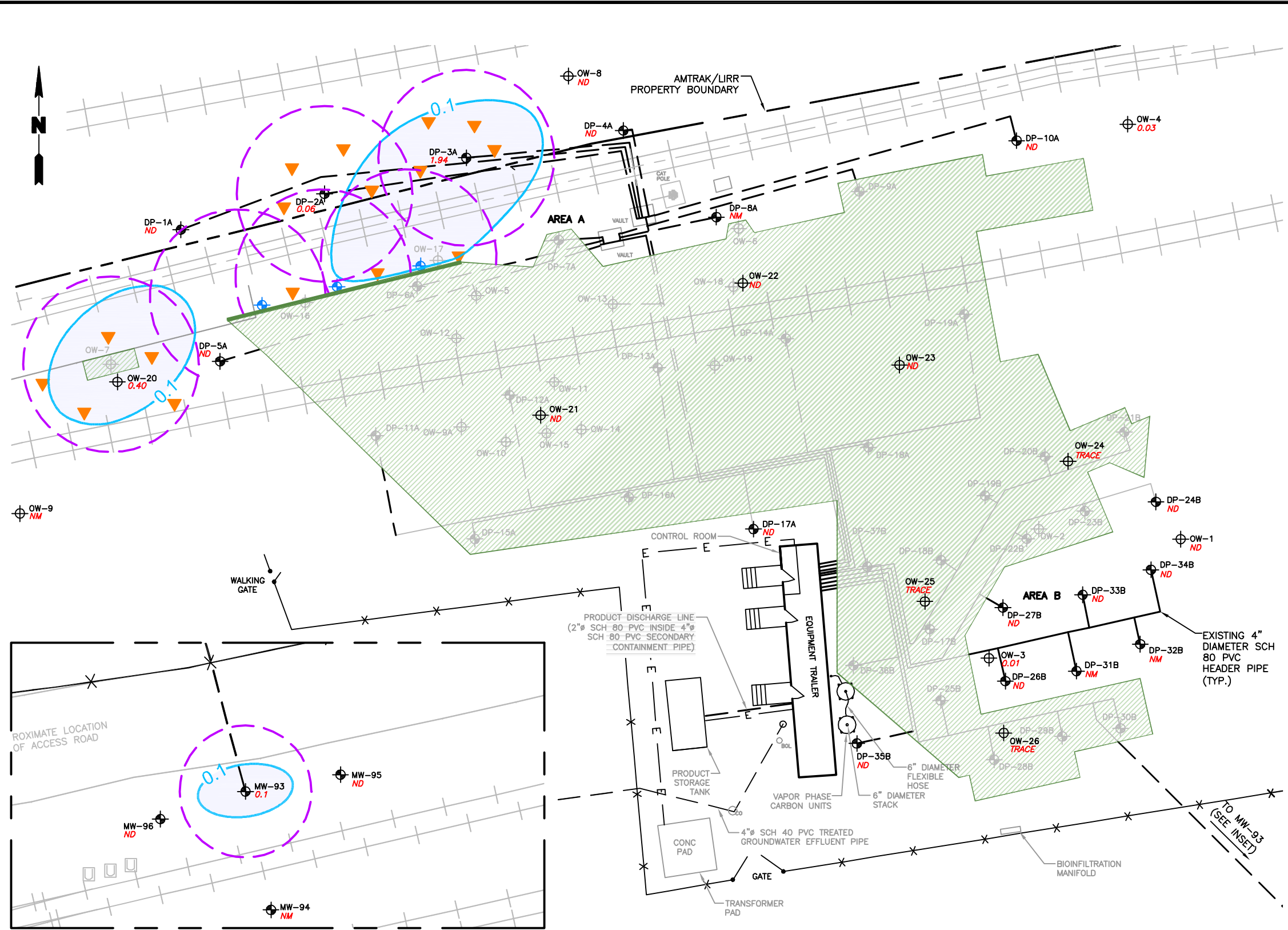
January 3, 2017
Date



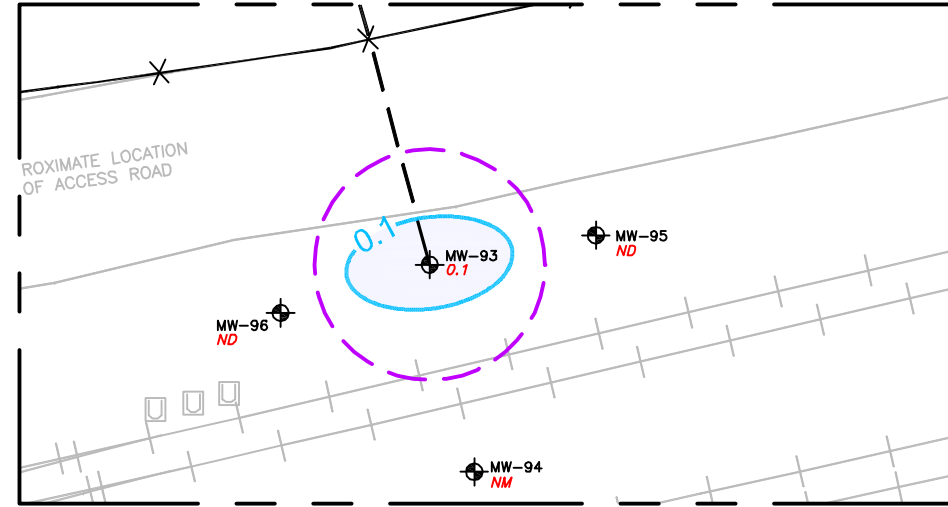
Attachment

cc: Jane O'Connell, NYSDEC
Richard Mohlenhoff, P.E., Amtrak
Craig Caldwell, Amtrak
Robert Kovacs, Roux Associates, Inc.

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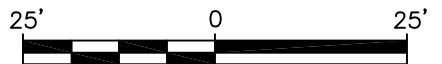


LEGEND	
	EXISTING RAILROAD TRACK
	LOCATION OF EXISTING CATENARY POLE AND GUY WIRE
	LOCATION OF PROPOSED HIGH VACUUM EXTRACTION WELL
	LOCATION AND DESIGNATION OF EXISTING HIGH VACUUM EXTRACTION WELL
	SPH THICKNESS (IN FEET) MEASURED ON NOVEMBER 23, 2016
	LOCATION AND DESIGNATION OF EXISTING OBSERVATION WELL
	LOCATION AND DESIGNATION OF ABANDONED HIGH VACUUM EXTRACTION WELL
	LOCATION AND DESIGNATION OF ABANDONED OBSERVATION WELL
	LOCATION OF PROPOSED SURFACTANT INJECTION VIA GEOPROBE AND/OR TEMPORARY INJECTION POINT
	EXISTING BELOW GRADE PIPING
	EXISTING ABOVEGROUND PIPING
	EXISTING CHAIN-LINK FENCE
	EXISTING BURIED ELECTRIC SERVICE
	EXISTING CLEAN OUT
	EXISTING BOLLARD
	APPROXIMATE SPH THICKNESS CONTOURS
	RAWP ADDENDUM EXCAVATION AREA
	LOCATION OF 60 MIL. HDPE LINER
	LOCATION OF PROPOSED SURFACTANT ENHANCED RECOVERY



INSET
SCALE: 1" = 25'

- NOTE**
1. THIS DRAWING DOES NOT INCLUDE ALL SUBSURFACE STRUCTURES AND UTILITIES (I.E., FORMER FOUNDATIONS, PIPES, ETC.).
 2. SPH - SEPARATE-PHASE HYDROCARBON
 3. DPVE WELLS IN AREA A SHOW A PROPOSED ROI OF 20 FT. DPVE WELLS IN AREA B SHOW A PROPOSED ROI OF 15 FT.



Title: PROPOSED CONCEPTUAL LAYOUT OF SURFACTANT ENHANCED SPH RECOVERY			
SPH SURFACTANT ENHANCED RECOVERY WORK PLAN FOR OPERABLE UNIT 3			
Prepared For: AMTRAK SUNNYSIDE YARD QUEENS, NEW YORK			
Remedial REMEDIAL ENGINEERING, P.C. ENVIRONMENTAL ENGINEERS	Compiled by: C.P.	Date: 22DEC16	FIGURE 1
	Prepared by: G.M.	Scale: AS SHOWN	
	Project Mgr: C.P.	Project: 0055.0045Y020	
	File: 0055.0045Y445.01.DWG		