Alternatives Analysis Report and
Remedial Action Work Plan
Former Allegany Bitumens Belmont Asphalt Plant
Brownfield Cleanup Program Site # C902019
5392 State Route 19
Amity, Allegany County, New York

Prepared for:

New York State Department of
Environmental Conservation
270 Michigan Avenue
Buffalo, New York 14203-2999

Prepared on behalf of:

Blades Holding Company, Inc.
P.O. Box 12
Arkport, New York 14807

Prepared by:

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September 2012

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September 27, 2012
File: 190500593

Anthony L. Lopes, P.E.
Environmental Engineer II
New York State Department of Environmental Conservation
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Buffalo, NY 14203-2999

RE: Alternatives Analysis Report and
Remedial Action Work Plan
Brownfield Cleanup Program Site # C902019
Former Allegany Bitumens Belmont Asphalt Plant
5392 State Route 19, Amity, New York

Dear Tony:

On behalf of Blades Holding Company, Inc., Stantec Consulting Services Inc., has prepared this revised Remedial Alternatives Analysis Report and Remedial Action Work Plan for the former Allegany Bitumens Belmont Asphalt Plant, located at 5392 State Route 19 in the Town of Amity, Allegany County, New York. This document supersedes the draft report provided to you on June 11, 2012. The report presents the results of Stantec's evaluation of potential remedial actions for soil and groundwater impacts at the site identified in the Remedial Investigation, and takes into account the Interim Remedial Measures (IRMs) implemented at the site in 2011-2012. This revised version reflects recent discussions between the Department, Blades Holding Company and Stantec regarding final remedial activities and site development preparation.

Should you have any questions or require further information, please do not hesitate to call.

Sincerely,

STANTEC CONSULTING SERVICES INC.

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cc: N. Freeman (NYSDOH)

CERTIFICATIONS

Remedial Alternatives Analysis Report

I, Peter Nielsen, certify that I am currently a New York State-registered professional engineer and that this Alternatives Analysis Report 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) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications."

Signature Date 9/27/12

STATE OF NEW YORK · PETER NIELSEN · No. 061499-1 · LICENSED PROFESSIONAL ENGINEER

Remedial Action Work Plan

I, Peter Nielsen, certify that I am currently a New York State-registered professional engineer and that this Remedial Action Work Plan was prepared in accordance with applicable statutes and regulations and in substantial conformance with the NYSDEC Division of Environmental Remediation (DER) Technical Guidance for Site Investigation and Remediation (DER-10).

Signature Date 9/27/12

STATE OF NEW YORK · PETER NIELSEN · No. 061499-1 · LICENSED PROFESSIONAL ENGINEER

Executive Summary

Introduction and Purpose

In accordance with the New York State Department of Environmental Conservation's (NYSDEC) draft *Brownfield Cleanup Program Guide* (May 2004) and *DER-10, Technical Guidance for Site Investigation and Remediation*, (May 2010) Stantec Consulting Services Inc. (Stantec) has prepared this Alternatives Analysis Report (AAR) and Remedial Action Work Plan (RAWP) for the Former Allegany Bitumens Asphalt Plant Site (Site) located in the town of Amity, Allegany County, New York. The Site is owned by Blades Holding Company, Inc. (Blades), which has entered into an agreement as a Participant for the site with NYSDEC under the Brownfield Cleanup Program (BCP). The Brownfield Cleanup Agreement between Blades and NYSDEC was executed in October 2010 and amended in May 2012 (see section 1.2.1 for discussion).

This AAR/RAWP includes the following elements:

- A brief summary of Site history and investigative activities performed;
- A summary of contaminants identified during the Remedial Investigation (RI);
- A description of Interim Remedial Measures (IRMs) performed;
- Remedial Action Goals and the proposed BCP Cleanup Track for cleanup of the Site;
- Evaluation of remedial technology alternatives with regard to effectiveness, practicality of implementation, cost effectiveness and other factors. The analysis was based on conditions as they existed before implementation of the IRMs but the recommendations take into account the IRMs already completed to address RAOCs-1, 2, and 3;
- Recommendations for preferred remedies; and
- A Remedial Action Work Plan summarizing final remedial actions and additional preparation of the site for potential sale not already performed as part of the IRMs.

More detailed discussions of the items included in this Executive Summary are contained in the body of this report.

Site History

The site was the location of an asphalt plant that was operational between circa 1960 and 2005. The buildings and stationary asphalt manufacturing equipment remained in place for several years. Between 2010 and the present, environmental investigation and interim remedial measures were performed at the site, with the goal of preparing the site for sale and re-development. All site buildings and asphalt plant-related equipment were demolished and/or removed during 2011 and 2012.

Site Environmental Investigations

A Phase I Environmental Site Assessment (ESA) was completed by Stantec in December 2009. Documented Trichloroethene (TCE) usage in, and storage at, the laboratory building was considered to be a "recognized environmental condition" and further investigation was recommended to evaluate the potential for a historic TCE release to have occurred.

Stantec conducted a Phase II ESA in December 2009. Soil and groundwater samples confirmed the presence of TCE and related chlorinated volatile organic compounds (CVOCs) in both media at levels above NYSDEC's soil cleanup objectives (SCOs) and groundwater standards in the vicinity of the former laboratory building.

Based on the results of the Phase II ESA, Blades negotiated a Brownfield Cleanup Agreement with the Department. As required by the Brownfield Program, a remedial investigation (RI) was performed at the site in accordance with an RI Work Plan approved by the Department. The RI investigation included subsurface explorations and soil and groundwater sampling and analysis in the laboratory area as well as other areas of the site. The primary findings of the RI (as summarized in the RI report submitted separately) were as follows:

- Laboratory Building Area

  CVOC impacts were further characterized and delineated in subsurface soil and shallow groundwater in the vicinity of the laboratory building. Exceedences of SCOs were reported for chlorinated VOCs in subsurface soil samples to the east and southeast of the laboratory building. The area of groundwater impacts extended beyond the limits of the soil impacts, and extended slightly beyond the northern property line.

- West of the Asphalt Storage Tanks (Test Pit TP-14 area)

  Low-level detections of petroleum VOCs were found in shallow soils in two test borings. Although the laboratory detections of contaminant compounds were below SCOs, elevated PID readings and significant "nuisance" petroleum odors were observed; accordingly, remedial action was also deemed warranted for this area. Groundwater samples from monitoring wells installed closest to this area did not indicate impacts.

- Asphalt Tank Area

  Petroleum impacts were identified in shallow soil in the vicinity of the asphalt tanks. Low-level petroleum VOC detections below SCOs were observed immediately west of the asphalt tanks, where asphalt materials and soil with an oily appearance were observed at shallow depths. Due to significant "nuisance" petroleum odors and the presence of oil staining, this area was deemed to require remedial action. Groundwater impacts were not observed.

- North and East Perimeter Berms

  Portions of the perimeter soil berms or slopes along the east and north property lines were found to contain waste asphalt and asphalt/fill soil mixtures, as well as miscellaneous debris consisting of a variety of large and small pieces of wood, metal, plastic and rubber objects. The asphalt materials typically consists of a standard mix of clean sand and gravel aggregate materials and liquid asphalt that was not suitable for sale at the time of manufacture as it was identified to be "off-spec". This material is essentially the same as solidified asphalt pavement that is placed in commerce for public uses or is generated during construction or demolition activities involving asphalt pavement. A "lobe" of waste asphalt is present near the center of the eastern berm and extends westward toward the interior of the site.

Analysis of sixteen soil samples from test pits excavated in the berms did not detect Contaminants of Concern (COCs) at levels in excess of SCOs, with one exception: benzo(a)pyrene was detected in a sample from TP-10 at 4.1 part per million (ppm), versus the Restricted Use Commercial SCO of 1 ppm.

The historic placement of these fill materials on the eastern berm had encroached beyond the original Site property line. As discussed in the body of this report, Blades has purchased an adjacent piece of property containing these materials and has added it to the BCA Site. NYSDEC approved the request to amend the BCA to reflect the modified Site property limits on May 30, 2012.

- Remainder of Site

  Sampling and logging were conducted across the site from the ground surface to as deep at 40 ft bgs. The majority of the sampling and logging was concentrated in the upper 16 ft. Materials observed in sampling and logging outside the RAOCs exhibited a lack of visual or olfactory indications of contamination and this was supported by a lack of elevated PID readings. The stockpiled on-site aggregate (sand and gravel) brought to the site as clean raw material product from NYSDOT-approved sources. No indications of contamination were observed in any of these several test pits and test borings performed in these materials.

  None of the results from all of the field logging, sampling and analysis that have occurred to date indicate that the soil from 0 to 15 feet bgs outside of the RAOCs (for which RAOC-1,2 and 3 have now been remediated) has contaminant levels above the Commercial SCOs.

Interim Remedial Measures

Based on the RI findings, Blades performed Interim Remedial Measures (IRMs) to: 1) provide a timely response to the findings of the RI; 2) minimize the potential for further spread of contaminants; and 3) expedite preparation of the site for potential sale and re-development. An IRM Work Plan (IRM WP) was submitted to and approved by NYSDEC. The IRM WP designated the first three impacted areas described above to be Remedial Areas of Concern (RAOCs), as follows:

- RAOC-1: Former Laboratory Area;
- RAOC-2: Test Pit TP-14 Area; and
- ROAC-3: Asphalt Tank Area.

The fourth area (North and East Perimeter Berms) was not designated to be an RAOC at that time. IRMs were not proposed for this area due to the lack of threat to human health or the environment; instead, it was proposed to consider the need for remedial action for the berms separately. This portion of the site was ultimately designated RAOC-4. Given the absence of impacts elsewhere across the site, no other RAOCs were identified.

The IRMs for RAOCs 1 through 3 were performed between November 2011 and April 2012, with additional activities continuing into May 2012. Field modifications to the IRMWP-proposed activities were approved by NYSDEC. The following summarizes the measures taken:

RAOC-1 - Former Laboratory Building Area

Chlorinated VOC-impacted soil was excavated from the source area and disposed offsite. Confirmatory soil samples indicated that the excavation sufficiently removed impacted soil, i.e. no exceedences of applicable SCOs were observed in the analyzed samples.

Water was pumped from the excavation and treated with a granular activated carbon system and discharged onsite. Analyses of the system effluent indicated that the treatment sufficiently removed VOCs from the water prior to discharge. VOCs were not detected in the effluent samples, with one exception: Carbon Disulfide was detected in one sample at a concentration below the NYSDEC groundwater standard.

To further address residual groundwater impacts, enhanced reductive dechlorination (ERD) was implemented in the form of the application of sodium lactate solution into the source-area excavation prior to backfill. A solution of lactate and fresh water was spread evenly with a hose and mixed with the water remaining at the bottom of the excavation. The base of the excavation was then backfilled to a level above the water table with clean, coarse aggregate material.

Subsequent to backfill of the source-area excavation, a series of trenches were excavated within the groundwater plume footprint beyond the source area to facilitate application of additional sodium lactate solution. The trenches were excavated to approximately two feet below the top of the water table. Due to the variable ground surface elevation along the length of the trench, the trench depth ranged from approximately 2 to 11 ft bgs. Unless sufficient groundwater had already flowed into the trench, fresh water was placed in the trench bottom and lactate material was added to and mixed with the water prior to backfill. All of the RAOC-1 excavations were backfilled to match surrounding grade with clean onsite soils.

Periodic groundwater monitoring was commenced in March 2012. The source-area total VOC concentration of 41 micrograms per liter (µg/L; equivalent to parts per billion) in March 2012 was significantly lower than the pre-remediation VOC concentrations of 3,947-12,401 µg/L total VOC concentrations reported in source-area wells in January 2011.The source-area total VOC concentration was 36 parts per billion (PPB) during the June 2012 sampling event.

VOC levels in groundwater outside the source area were generally found at levels near or below NYSDEC groundwater standards. However, downgradient monitoring well MW-8 exhibited a slight increase in total VOCs, mostly due to an increase in the concentration cis-1,2-DCE, a “daughter” product of the breakdown of TCE. This is likely indicative of the onset of ERD of TCE downgradient of the source area. The June 2012 results in this well did not indicate significant change. Other wells exhibited relatively steady results with only minor VOC level variations upward or downward.

Additional quarterly monitoring of groundwater will be performed during the remainder of 2012.

RAOC-2 – Test Pit TP-14 (West of Asphalt Tank Area)

Petroleum-impacted soil was excavated from RAOC-2 and disposed offsite. Confirmatory soil samples indicated that the excavation removed impacted soil, i.e. no exceedances of SCOs were observed in the analyzed samples, with the exception of acetone, which is attributed to lab contamination.

RAOC-3 - Asphalt Tank Area

During excavation of the impacted soil in RAOC-3, it became evident that two distinct areas of impacted soil existed: a western portion (RAOC-3A) and an eastern portion (RAOC-3B and 3C). Impacts in the western portion included those originally observed at TP-14. Elevated PID readings, staining and petroleum product odors were observed at depths ranging down to approximately 4.5 ft bgs in RAOC-3A. Groundwater was not encountered within this excavation.

As excavation advanced in RAOC-3B, the water table was encountered at approximately 5 ft bgs and apparent petroleum product was observed within a deposit of coarse gravel and cobbles at depths from approximately 5 ft to 8 ft bgs. As the gravel was excavated, a floating layer of light non-aqueous phase liquid (LNAPL) developed on the water surface in the excavation.

IRM activities ceased at that time due in part to the onset of winter weather and because access to the southwestern portion of the excavation was restricted by the presence of the asphalt plant structure and associated concrete slabs and foundation piers. The asphalt plant was subsequently removed in March 2012 and additional excavation was then completed in the southwestern portion (designated RAOC-3C) in April 2012.

Impacted soil excavated from all three sub-areas of RAOC-3 was disposed of offsite. With the exception of one detection of acetone, which is a common laboratory artifact, results from confirmatory soil samples from the RAOC-3 excavations were below SCOs.

Sorbent pads and booms were used to absorb the LNAPL on the water accumulated in the excavation at RAOC-3B and RAOC-3C. A vacuum system was also used to remove product periodically from the surface of the water table; the water/product were containerized. Laboratory analysis of the LNAPL identified the material as motor (lube) oil. The water that accumulated in the excavation underlying the LNAPL was sampled for VOCs, SVOCs and metals and it did not exhibit contaminants at concentrations in excess of NYSDEC's groundwater standards. Water and LNAPL were pumped from the RAOC-3B and RAOC-3C excavations. The water and product were transported offsite to a permitted treatment facility for treatment/disposal.

Geochemical conditions of a water sample from the RAOC-3B excavation indicated that placement of gypsum in the base of the excavation at the water table would create favorable conditions for anaerobic degradation of remaining petroleum residue by indigenous sulfate-reducing bacteria. Accordingly, granular agricultural-grade gypsum were added to the RAOC-3B and RAOC-3C excavations prior to backfill. The base of the excavations in RAOC-3B/3C were then backfilled with onsite aggregate; the remainder was backfilled with previously-excavated, non-impacted onsite overburden material or onsite aggregate, as approved by NYSDEC.

RAOC-3B/3C groundwater monitoring commenced with a sampling event in March 2012. Only one VOC was detected and it was found at a concentration below the groundwater standard and no target SVOC compounds were detected. No sheen was present in the monitoring well and no target VOCs or SVOCs were detected during the June 2012 sampling event. The results indicate anaerobic, reducing groundwater conditions, with increased sulfate levels exist; these data are indicative of favorable conditions for continued successful breakdown of residual petroleum hydrocarbons. Additional quarterly monitoring for RAOC-3B/3C is scheduled.

Additional Activities

Additional activities were conducted in response to conditions encountered during demolition and dismantling of site structures and buildings. Environmental conditions encountered which warranted action, and the actions taken include:

- The floor slab and bottom course of the masonry block walls of the oil storage shed were oil-stained. No impacts were observed in soil beneath the building. The impacted concrete slab and block materials were segregated and disposed of offsite at a permitted landfill;

- Surface soil beneath a discarded asphalt heater was observed to be oil stained. The soil was excavated and disposed offsite. Excavated soil was disposed offsite. A small amount of water was pumped from the excavation when oil was observed to accumulate on the water surface. The water was sampled and disposed of at the Wellsville wastewater treatment plant.

- Sampling of the maintenance garage septic system indicated petroleum-related VOCs were present at low levels in sludge contained in the underground septic tank, but no contaminants of concern were detected in a water sample from the adjacent dry well. The VOC concentrations in the sludge were low enough to allow for disposal of the waste at the Wellsville wastewater treatment plant. No impacts to the surrounding soil were observed or indicated by field screening for VOCs.

Alternatives Analysis

Based on the findings of the RI and the conditions as they existed prior to the implementation of the IRMs, an Alternatives Analysis was performed to evaluate potential remedial options. The recommendations from the Alternatives Analysis, however, took into account the IRMs already performed for RAOCs 1 through 3.

A preliminary screening was performed for numerous remedial technologies on the basis of technical feasibility, pertinence to the environmental conditions and remedial action objectives, cost effectiveness, required time to implement, etc. Several technologies were eliminated from further consideration in the preliminary screening, and several remedial options were retained; these included the in-situ and ex-situ methods utilized during the IRM program. The retained technologies were further scrutinized based on the nine criteria included in the NYSDEC guidance for performing an Alternative Analysis. Two of the retained alternatives, in-situ chemical oxidation and placement of a clean soil cover over impacted soil, were eliminated on the basis of several criteria. The other technologies were retained as the recommended alternatives. These alternatives were implemented during the IRM program described in more detail herein.

Remedial Action Work Plan

A Remedial Action Work Plan (RAWP) is included as Section 8 of this document. No further remedial actions are recommended since the only indication of contamination above applicable standards was a single SVOC compound in one of sixteen soil samples from RAOC-4. In addition, screening and laboratory analysis of samples in non-RAOC areas across the rest of the site also did not exhibit exceedence levels of COCs. Any exceedences found in RAOCs 1 through 3 were addressed by the IRM program.

Institutional Controls

Although an IRM program has been completed for RAOCs 1 through 3 and surface debris removal has been completed for RAOC-4, it is possible some minor residual contamination may remain at the site after remediation has been completed. Accordingly, Institutional Controls will be put in place. This will include filing of an Environmental Easement (EE) for the property with Allegany County Clerk. The EE will include by reference a Site Management Plan (SMP) which will provide guidance for:

- Continuing the ongoing groundwater monitoring program to confirm the success of the interim remedial measures;
- Planning and executing future site activities such as excavation, grading, drilling, construction of buildings or utilities, etc. that could encounter impacted soil or groundwater;
- Monitoring and screening soils and groundwater for potential COCs;
- Handling, characterizing, and disposing of impacted media, if encountered;
- Restricting use of on-site groundwater, as appropriate; and
- Addressing potential soil vapor intrusion in future structures that might be constructed on the Site.

Alternatives Analysis Report and
Remedial Action Work Plan
Former Allegany Bitumens Belmont Asphalt Plant

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1.0 INTRODUCTION

1.1 Purpose and Organization of Report

In accordance with the New York State Department of Environmental Conservation's (NYSDEC) draft *Brownfield Cleanup Program Guide* (May 2004) and *DER-10, Technical Guidance for Site Investigation and Remediation*, (May 2010) Stantec Consulting Services Inc. (Stantec) has prepared this Alternatives Analysis Report (AAR) and Remedial Action Work Plan (RAWP) for the Former Allegany Bitumens Asphalt Plant Site (Site) located in the town of Amity, Allegany County, New York. The Site is owned by Blades Holding Company, Inc. (Blades), which has entered into an agreement as a Participant for the site with NYSDEC under the Brownfield Cleanup Program (BCP). The Brownfield Cleanup Agreement (BCA) was executed by the NYSDEC on October 12, 2010 (Site # C902019 and Index # C902019-09-10) and amended on May 30, 2012, as described in section 1.2.1.

This AAR/RAWP includes the following elements:

- Provides a brief summary of Site history and investigative activities performed;
- Summarizes contaminants identified and interim remedial measures performed;
- Proposes Remedial Action Goals for the Site;
- Evaluates multiple remedial technology alternatives with regard to effectiveness, practicality of implementation, cost effectiveness and other factors;
- Recommends final site actions; and
- Discusses plans for Institutional Controls and potential future Engineering Controls.

1.2 Site Description and History

1.2.1 Site Description

The Site is a 5.48-acre parcel located at 5392 State Route 19 in the Town of Amity, Allegany County, New York (see Figure 1). The property (Tax Parcel No. 171-1-60) was formerly occupied by an asphalt plant, which ceased operations in 2005. Decommissioning, demolition and removal of plant facilities and structures was performed in stages during the period between October 2011 through May 2012. Redevelopment of the Site is anticipated to involve commercial or industrial usage.

When the Site was originally accepted into the BCP, the property was approximately 4.9 acres in size. Subsequent to the Remedial Investigation, an additional 40-ft wide "strip" of land was identified for addition on the eastern edge of the Site property. This was intended to include the area where historical fill placement had encroached beyond the original asphalt plant property's eastern boundary onto the adjacent property. Blades negotiated purchase of this property in February 2012 and NYSDEC approved the addition of this the additional 0.5424 acres to the

BCP-defined Site limits as a minor modification to the Brownfield Cleanup Agreement on May 30, 2012.

According to a Site-specific topographic survey, the subject property elevation ranges from approximately 1,380 feet above mean sea level (amsl) along Route 19 to approximately 1,356 ft amsl on the eastern property line, just to the west of Tuckers Creek (Figure 2). Surface water drainage from the former asphalt manufacturing area is towards a basin adjacent to the former feeder hoppers for the former asphalt plant aggregate conveyor, and this basin acts as a detention pond. An embankment up to 15 feet high along the northern and eastern property lines limits runoff to the creek from the remaining, gravel-surfaced areas of the Site.

The Site is located in the Genesee River valley approximately 1,200 feet west of the river. The majority of the Site is elevated approximately 15 feet above the valley floor, and is separated from the current flood plain of the river by a levee and railroad embankment located approximately 750 feet east of the property.

1.2.2 Site History

This section provides a brief summary of the history of the Site. A more detailed account of the historical operations at the Site can be found in the *Remedial Investigation Report and Interim Remedial Measures Construction Completion Report, Former Allegany Bitumens Belmont Asphalt Plant, Brownfield Cleanup Program Site #C902019, 5392 State Route 19, Amity, Allegany County, New York (RI/IRMCCR),* dated May 2012 and prepared by Stantec.

The Site was used for agricultural purposes or was undeveloped prior to 1960. In March 1960, A.L. Blades and Sons, Inc. acquired the property and then conveyed the property to its affiliate Allegany Bitumens, Inc. An asphalt plant was constructed circa 1960 and operated by Allegany Bitumens, which was merged into A.L. Blades and Sons, Inc. in 1995; operations continued until A.L. Blades and Sons shut down the asphalt plant in 2005. Between 2005 and 2011, the facility remained unoccupied, with buildings and the stationary asphalt manufacturing equipment largely still in place. In late 2011, portions of the facility were demolished to facilitate IRMs (further discussed below). Demolition and equipment removal was completed in 2012 in preparation for environmental cleanup and potential sale of the property.

While active, the asphalt plant operations included the following elements:

- Hot mix asphalt batch plant, including several large aboveground asphalt tanks, an asphalt heater, drum mixer, dryer, dust collector, and scale house;
- Maintenance shop – Various maintenance activities were performed on plant equipment. Oil-based products were utilized;
- Aggregate stockpiles – crushed stone and gravel products in varying grain size mixtures were stored and used to manufacture asphalt products;
- Laboratory building - This facility tested asphalt products and used trichloroethene (TCE)-based solvent in the process; and
- Offices.

The plant's primary product was asphalt for paving(also referred to as asphalt pavement or asphalt concrete), which is a mixture of liquid asphalt and imported clean crushed stone aggregate. Over the course of the plant's history, waste ("off-spec") loads of asphalt concrete that were not suitable for sale were occasionally placed on the site and as such this material is present at some locations on the property. For purposes of this report, the term "asphalt" is used to describe the off-spec waste asphalt/aggregate mixtures rejected for commercial paving purposes and placed on the site. The term is not intended to refer to liquid asphalt.

At the time of preparation of this report, all of the buildings and equipment related to the former operation had been demolished and removed from the site.

2.0 SUMMARY OF SITE INVESTIGATIONS

This section briefly summarizes the pre-BCA investigations performed and project milestones in the BPC process leading up to this Alternatives Analysis Report and Remedial Work Plan (AAR/RAWP). A more detailed description of these investigations can be found in the Remedial Investigation Report.

2.1 Pre-BCA Phase I & II ESAs

A Phase I Environmental Site Assessment (ESA) associated with real estate due diligence was completed by Stantec in December 2009 which identified a recognized environmental condition (REC) at the Site. Given the known usage of TCE in the laboratory building, apparent historic storage of TCE on an asphalt pad outside the building, and the presence of a septic system that served that building, the potential for a historic TCE release to the environment was considered to be a REC. Further investigations were recommended.

Stantec conducted a Phase II ESA in December 2009. Four soil test borings and four temporary groundwater monitoring wells were installed to collect soil and groundwater samples in the vicinity of the former laboratory building, storage pad and septic system. Results indicated the presence of TCE and related VOCs in an area northeast of the laboratory building in shallow soil and groundwater at levels above NYSDEC's soil cleanup objectives (SCOs) and groundwater standards. Indications of soil contamination were encountered at depths of 5 to 10 feet below ground surface (bgs) and TCE was detected in soil samples from these borings at concentrations of up to 37.5 parts per million (ppm). The water table was encountered at depths of approximately 9 to 10 feet below ground surface, and TCE was detected in groundwater samples at concentrations up to 2.1 ppm.

2.2 BCP Agreement

Based on the results of the Phase II ESA, Stantec (on behalf of Blades) prepared and submitted an application in July 2010 to NYSDEC to enter the Site into the BCP. The Department accepted the application and executed the BCA on October 12, 2010.

2.3 Remedial Investigation (RI)

Concurrent with the review and approval for the BCP application Stantec also prepared a Remedial Investigation Work Plan (RIWP) detailing the intended investigation scope and methodology. The RIWP was submitted in July 2010, and based on NYSDEC comments, a revised RIWP was submitted in October 2010. The Department accepted the RIWP on October 19, 2010.

Based on requirements of DER-10 and the BCP, and specific concerns expressed by NYSDEC, the scope of the RI was expanded to include not only the former Laboratory Building area, but several other portions of the site as well. The primary elements of the RI included (further detail on investigation activities and methodology is provided in the RI report):

- Soil test borings;
- Groundwater monitoring well installation;
- Soil and groundwater sampling;
- Hydrogeological testing;
- Test pit excavation;
- Passive soil gas investigation;
- Laboratory analyses of soil and groundwater;
- Human Health and Ecological Risk Assessment; and
- Hazardous material survey.

The findings of the RI are summarized in the RI/IRM Construction Completion Report (CCR) which has been submitted under separate cover. The following is a summary of the primary findings of the RI (see Figure 3 for locations of these features):

A. Laboratory Building Area

- Chlorinated VOC (CVOC) impacts were further characterized and delineated in subsurface soil and shallow groundwater in the vicinity of the laboratory building. Exceedances of Part 375 Protection of Groundwater (POGW) SCOs were reported for chlorinated VOCs in subsurface soil samples from three monitoring wells and two soil borings just to the east and southeast of the laboratory building. TCE concentrations in soil in the laboratory source area ranged up to 35 ppm, and decreased significantly within a relatively short distance of the source area. The area with impacted soil was estimated to be approximately 55 ft. in the north-south direction and 30 ft. in the east-west direction. Based on PID readings and soil sampling results, the estimated depth of the contaminated soil interval in the source area was approximately 4 to 15 ft bgs.

- The area of groundwater impact extended beyond the limits of impacted soil. CVOC concentrations varied in the two sampling rounds performed; the highest total CVOC concentrations observed ranged up to 12.4 parts per million (ppm). A monitoring well installed in the source area to a significantly greater depth than the other wells did not show VOC presence in groundwater.

  Groundwater flow is essentially radially away from the source area toward the north, northeast, east and southeast, and groundwater impacts appeared to extend slightly beyond the northern property line.

B. West of the asphalt storage tanks (Test Pit TP-14 area).

- Low-level detections of petroleum VOCs were found in shallow (< 3 ft bgs) soils in borings B/MW-27 and B-31. Although the laboratory detections of contaminant compounds were below SCOs, elevated PID readings and significant “nuisance” petroleum odors were observed.

- No petroleum-related compounds were reported in the nearest groundwater monitoring wells.

C. Asphalt Tank Area

- Petroleum impacts were identified in near-surface and subsurface soil in the vicinity of the asphalt tanks. Low-level petroleum VOC detections below the 6 NYCRR Part 375 Commercial and Industrial SCOs were observed in one test pit located immediately west of the asphalt tanks, where asphalt materials and soil with an oily appearance were observed at shallow depths. No impacts above SCOs were reported in soil and groundwater samples from this portion of the site, however due to significant “nuisance” petroleum odors and the presence of oil staining, this area was deemed to require remedial action.

- No petroleum-related compounds were reported in the groundwater wells in the vicinity of the asphalt tanks.

D. North and East Perimeter Berms

- The majority of the length of the north and east property lines contains soil berms or slopes that extend up to approximately 15 ft above the surrounding grade. In general, the berms currently have a significant vegetative cover consisting of a mixture of weeds, dense brush and/or trees ranging from saplings to mature trees up to 36 inches or more in diameter. The vegetation root system and topsoil development has effectively stabilized the surface soils in most of the berm footprints. A variable mixture of waste asphalt and miscellaneous debris was found on and within certain portions of the berms. In addition, the fill placement on the eastern berm was determined to have encroached beyond the original Site property line. As discussed above in Section 1.2.1, Blades subsequently purchased this piece of property and the BCA for the Site was modified to reflect the expanded property limits.

  Sixteen test pits were excavated during the RI in and near the berms (test pits TP-5 through TP-12, and TP-16 through TP-23, as shown on Figure 4). A mixture of soil types and fill materials were observed in several of the test pits. Analysis for a wide range of analytes in sixteen RI soil samples from the berm test pits did not indicate the presence of Contaminants of Concern (COCs) in any samples at levels in excess of SCOs, with one exception: benzo(a)pyrene was detected in a sample from TP-10 at 4.1 ppm, versus the SCO (Restricted Use – Commercial) of 1 ppm. Although miscellaneous debris was observed to be present at the surface on some portions of the berms, none of these materials appeared to contain petroleum products or hazardous materials.

E. Remainder of the Site

Surface and subsurface soil sampling performed during the RI demonstrated that the areas outside the identified RAOCs did not contain contamination. Sampling and logging were conducted across the site from the ground surface to as deep at 40 ft bgs. The majority of the sampling and logging was concentrated in the upper 16 ft. Materials observed in sampling and logging outside the RAOCs exhibited a lack of visual or olfactory indications of contamination and this was supported by a lack of elevated PID readings.

The stockpiled on-site aggregate (sand and gravel) brought to the site as clean raw material product from NYSDOT-approved sources. No indications of contamination were observed in any of the several test pits and test borings performed in these materials.

As is demonstrated by the analytical summary tables, none of the analytical results from the soil samples taken outside the RAOCs had exceedences of Commercial SCOs with the exception of exceedences for certain common naturally occurring metals (aluminum, calcium, iron, and magnesium), which are not considered site related or of concern.

In addition, IRM confirmatory soil samples obtained in RAOCs 1 through 3 were also demonstrated through laboratory analysis not to contain COCs at levels above applicable standards.

In summary, none of the results from all of the field work and sampling that have occurred to date indicate that the soil from 0 to 15 feet bgs outside of the RAOCs has contaminant levels above the Commercial SCOs.

3.0 INTERIM REMEDIAL MEASURES

3.1 Introduction

The results of the RI indicated chlorinated VOC contamination in soil and groundwater in the laboratory building area (RAOC-1), at levels in excess of NYSDEC cleanup criteria. In addition, petroleum-impacted shallow soil was found in two areas: one adjacent to the former asphalt tanks (RAOC-3), and one to the west of the tank area (RAOC-2). Accordingly, a program of Interim Remedial Measures (IRMs) was proposed by the Participant to NYSDEC to provide a timely response to the findings of the RI, and minimize the potential for further spread of contaminants.

An Interim Remedial Measures Work Plan (IRMWP) describing the proposed IRMs was initially submitted to NYSDEC on September 12, 2011. The public comment period on the IRMWP ended on October 19, 2011. NYSDEC comments on the IRMWP were provided to Blades and Stantec during the period October 12 through October 21, 2011 and a final revised document was submitted on October 24, 2011. NYSDEC formally approved the IRMWP on October 26, 2011.

3.2 Proposed IRMs

Based on the RI investigation results, the IRMWP designated three Remedial Areas of Concern (RAOCs), and proposed the following remedial measures for each (see locations, Figure 3):

1) RAOC-1 - Former Laboratory Building Area
    - Demolition of Laboratory Building to facilitate completion of subsequent IRM activities;
    - Septic tank and leach field removal;
    - Source-area impacted soil removal and offsite disposal;
    - Removal and containerization of groundwater entering the excavation, and onsite treatment/discharge;
    - Placement of sodium lactate material in the excavation prior to backfill, to facilitate in-situ remediation of remaining CVOCs in source-area soil and groundwater through enhanced reductive dechlorination (ERD). Bench-scale testing was performed prior to the IRM program to demonstrate the effectiveness of this method;
    - Excavation of a series of trenches within the footprint of impacted groundwater that remained outside the source area excavation, and placement of additional sodium lactate material at the water table in these trenches;
    - Backfill of the excavation with clean onsite soil and aggregate material, and backfill of the trench with excavated material; and
    - Post-IRM quarterly groundwater monitoring to demonstrate the effectiveness of the ERD.

2) RAOC-2 - Vicinity of test borings B/MW-27 and B-31 (West of asphalt storage tanks)
   - Excavation and offsite disposal of impacted shallow soil; and
   - Backfill with clean onsite aggregate material.

3) RAOC-3 - Vicinity of Test Pit TP-14 (Asphalt Tank area)
   - Removal of the aboveground asphalt tanks;
   - Demolition of the concrete cradle structure beneath the asphalt tanks;
   - Removal of the asphalt plant works and partial demolition of concrete slabs and support piers within the footprint of the impacted area;
   - Excavation and offsite disposal of impacted soil;
   - Placement of agricultural-grade gypsum in the excavation to facilitate bioremediation; and
   - Backfill with clean onsite aggregate material and clean stockpiled soils.

The miscellaneous debris on the north and east perimeter berms identified in the RI did not represent a threat to human health or the environment thus, with the exception of the removal and disposal of the surficial debris, no IRMs were proposed or performed for these areas. The IRMWP indicated that potential remedial actions for these perimeter berms (ultimately designated RAOC-4), if warranted would be addressed in this AAR/RAWP.

3.3 IRM Implementation

3.3.1 Site Preparation

During the RI, a Hazardous Materials Survey was performed at the site. Suspect materials identified in the Hazardous Material Survey were removed and disposed offsite in accordance with applicable regulations. In addition, a pre-demolition survey involving sampling and analysis of suspect asbestos-containing building materials (ACBM) was completed for the following structures:

- Scale house;
- Laboratory building;
- Control tower;
- Pipe wrap adjacent to empty liquid asphalt storage tanks;
- Boiler located north of the maintenance garage;
- Oil storage shed; and
- Maintenance garage.

ACBMs identified include floor tile and underlying mastic and window caulk in the scale house, and roofing shingles in the control tower. ACBMs identified in the survey were removed and disposed offsite by a certified ACBM contractor prior to building demolition.

The laboratory building and scale house were demolished on October 20 and 21, 2011 to facilitate excavation of RAOC-1 (discussed in detail below). The steel asphalt tanks located in RAOC-3 were removed from the site on November 10, 2011 to provide access for excavation in that area. The asphalt plant works were removed during the week of March 25, 2012, and the oil storage shed, maintenance garage, aggregate hoppers and a sheet pile wall associated with the former asphalt plant were removed during the period April 25 through May 2, 2012.

Silt fence and straw bales were installed as erosion and control measures. Surficial asphalt pavement present in portions of RAOCs 1 through 3 was stripped and temporarily stockpiled onsite. The asphalt was ultimately trucked off-site to the K.S. LaForge Excavating Inc. facility in Wellsville, New York for recycling, as approved by the NYSDEC.

3.3.2 IRM Field Program

The implementation of the RAOC-specific IRMs was performed during the period November 7 through April 10, 2012. The work was performed by TREC Environmental, Inc. of Spencerport, New York. Additional activities related to building demolition and site debris cleanup were performed by KS LaForge Excavating, Inc. (LaForge) during the period April 25 through May 17, 2012. In addition, post-IRM quarterly groundwater monitoring was initiated in March 2012.

Detailed summaries of specific IRM activities, modifications, approvals, and results have been provided to NYSDEC in the monthly progress reports. In addition, the IRMCCR being submitted under separate cover provides more detailed documentation of the IRM program.

Stantec performed the following activities during the program:

- Documented activities and observations;
- Performed air monitoring in accordance with the Community Air Monitoring Program (CAMP);
- Performed instrument screening of excavated soil and obtained confirmatory soil samples in the remedial excavations;
- Performed sampling of excavation water, typically when it was containerized in frac tanks, and of the containerized excavation water that was treated onsite prior to discharge;
- Provided periodic summaries of field activities and laboratory analytical results to NYSDEC during the program;
- Obtained waste manifest documentation at the site for regulated wastes transported offsite for disposal; and
- Mapped location coordinates for excavation limits, exploration and soil sample locations and selected site features using a GPS unit with sub-meter accuracy.

The following is a summary of the implementation of the IRMs for RAOCs 1 through 3. Figure 5 shows the approximate final limits of and features related to each RAOC.

Immediately following the planned IRM activities in April 2012, Stantec also observed building demolition to assess the potential for adverse soil or groundwater impacts to exist beneath the demolished structures. During these activities petroleum-impacted soil was encountered beneath an abandoned oil-fired heater near the north property line. In addition, a septic tank and dry well associated with the restroom of the former maintenance shop building were found to contain petroleum-impacted sludge and/or water. These environmental conditions were addressed at the time of the IRM program; details are provided below.

3.3.2.1 RAOC-1 - Former Laboratory Building Area

IRM implementation for this area was performed in substantive conformance with the IRMWP (see proposed tasks listed in Section 2.2.2 above). The laboratory building and the adjacent scale house and scales were demolished and removed prior to implementing the IRM program. Prior to beginning excavation, approximately the western 20 linear ft of the northern property line berm soil was excavated and stockpiled for later use as backfill. This was done because the western limit of the berm encroached onto the area of planned excavation.

In addition, the septic tank that serviced the lab building was excavated and removed; liquid and sludge contained in the tank was sampled and disposed properly.

Approximately 1,635 tons of chlorinated VOC-impacted soil was excavated from the source area and disposed offsite. The excavation limits are shown on Figure 5. The mapped excavation extended up to approximately eight ft below the water table. Excavation sidewall and bottom confirmatory samples indicated that the excavation sufficiently removed impacted soil, i.e. no exceedences of POGW, Commercial, or Industrial Use SCOs were observed in the analyzed samples.

Approximately 36,300 gallons of water was pumped from the excavation into two frac tanks. The stored water was treated onsite with a two-drum granular activated carbon system and discharged onsite, as approved in advance by NYSDEC. Samples obtained before the commencement of discharge of the pre- and post-carbon tank effluent indicated the treatment sufficiently removed VOCs from the water prior to discharge. VOCs were not detected in the effluent samples, with one exception: Carbon Disulfide was detected in one sample at a concentration below the NYSDEC groundwater standard.

As described in the IRMWP, approximately 110 gal. of 60% sodium lactate solution was mixed with fresh water and was spread evenly with a hose and mixed with the water remaining at the bottom of the excavation. The base of the excavation was then backfilled to a level above the water table with clean, coarse onsite aggregate material (previously tested for contaminants and approved by NYSDEC as a backfill source). The remainder of the excavation to approximately one foot below ground surface was backfilled with previously-excavated soil from RAOC-1, including soil from the western extent of the north property line berm that was approved by NYSDEC for use as backfill and which had been excavated to facilitate access to the source area. Approximately the top one foot of the excavation was backfilled with the clean, course aggregate material. Areas that were disturbed during RAOC-1 excavation activities on the neighboring property to the north will be covered with topsoil and seeded; this work will be performed as part of the proposed activities described below in the RAWP.

Subsequent to backfill of the source area excavation, the trench designed for placement of sodium lactate to further address the remaining impacted groundwater plume was excavated. The actual location of the trench was modified from the originally-proposed single, arc-shaped trench configuration to a series of trenches to account for the final footprint of the source area excavation, and to minimize the degree of excavation required through the north property line soil berm and the steep slope north of the property line. NYSDEC indicated that these modifications were acceptable provided the remedial goals were still met. The trenches were excavated to approximately two feet below the top of the water table. Due to the variable ground surface elevation along the length of the trench, the trench depth ranged from approximately 2 to 11 ft bgs. Unless sufficient groundwater had already flowed into the trench, fresh water was placed in the trench bottom and lactate material was added to and mixed with the water prior to backfill.

Periodic groundwater monitoring was commenced in March 2012. The source-area total VOC concentration of 41 micrograms per liter (µg/L; equivalent to parts per billion) in March 2012 was significantly lower than the pre-remediation VOC concentrations of 3,947-12,401 µg/L total VOC concentrations reported in source-area wells in January 2011.The source-area total VOC concentration was 36 parts per billion (PPB) during the June 2012 sampling event.

VOC levels in groundwater outside the source area were generally found at levels near or below NYSDEC groundwater standards. However, downgradient monitoring well MW-8 exhibited a slight increase in total VOCs, mostly due to an increase in the concentration cis-1,2-DCE, a “daughter” product of the breakdown of TCE. This is likely indicative of the onset of ERD of TCE downgradient of the source area. The June 2012 results in this well did not indicate significant change. Other wells exhibited relatively steady results with only minor VOC level variations upward or downward.

Additional quarterly monitoring will be performed during the remainder of 2012.

3.3.2.2 <u>RAOC-2 - Vicinity of test borings B/MW-27 and B-31 (West of Asphalt Tank Area).</u>

IRM implementation for this area was performed in substantive conformance with the IRMWP. Approximately 75 tons of soil were excavated from RAOC-2 and stockpiled for later offsite disposal. The mapped excavation limits are shown on Figure 5. The excavation extended to approximately two ft below grade and did not encounter groundwater.

Excavation sidewall and bottom confirmatory samples indicated that the excavation sufficiently removed impacted soil, i.e. no exceedences of Commercial or Industrial Use SCOs were observed in the analyzed samples. Two of the sidewall samples had slight exceedences of the POGW SCO for acetone (67 and 63 µg/kg vs. SCO of 50 µg/kg). In previous groundwater sampling, including at nearby MW-27 and MW-23, there were no exceedences of groundwater standards for acetone. Acetone is a common laboratory artifact, thus the presence of acetone in a soil sample at a level slightly above the POGW SCO is not of concern.

3.3.2.3 <u>RAOC-3 - Vicinity of Test Pit TP-14 (Asphalt Tank Area).</u>

The linear concrete cradle structures located beneath the former asphalt tanks were demolished and the concrete was stockpiled onsite for later removal and offsite crushing/recycling with approval from NYSDEC. Approximately 135 tons of concrete were removed from this area.

Surficial soils in RAOC-3 that did not appear impacted were temporarily stockpiled on site, sampled, and when approved by NYSDEC, later reused as backfill. Impacted soil excavated from RAOC-3 was also temporarily stockpiled separately for later offsite disposal.

During excavation of the impacted soil in RAOC-3, it became evident that two distinct areas of impacted soil existed: a western portion (RAOC-3A), and an eastern portion (RAOC-3B & 3C) (see Figure 5). Impacts at RAOC-3A included those originally observed at TP-14. Elevated PID readings, staining and petroleum product odors were observed at depths ranging down to approximately 4.5 ft bgs. Groundwater was not encountered within the excavation depth at RAOC-3A.

Excavation was then advanced at RAOC-3B, where apparent petroleum product was observed on the water table within a deposit of coarse gravel and cobbles generally encountered at a depth of 5 ft bgs. Impacted gravel appeared to extend downward to depths up to approximately 8 ft bgs. As the gravel was excavated, a floating layer of light non-aqueous phase liquid (LNAPL) developed on the water surface in the excavation. Sorbent pads and booms were used to absorb the LNAPL on the water accumulated in the excavation. A vacuum system was also used to remove product periodically from the surface of the water table; the removed water/product were containerized in 55-gallon drums.

Samples of the LNAPL were collected for analysis of Total Petroleum Hydrocarbon (TPH) products by NYSDOH Method 310.13; the material was identified as apparent motor (lube) oil. PCBs were not detected in the sample. The water that accumulated in the excavation underlying the LNAPL was sampled for VOCs, SVOCs and metals and it did not exhibit contaminant compounds at concentrations in excess of NYSDEC's groundwater standards.

Excavation at RAOC-3B was temporarily halted in December 2011 while a direct-push boring drilling program was conducted to more thoroughly delineate the apparent extent of the petroleum product. Sixteen borings (B-49 to B-64; see Figure 5) were completed. Evidence of petroleum product was observed in several borings. Five apparently "clean" soil samples were submitted for analysis to confirm the limits of the impact.

Because the impacted soil appeared to extend beneath the northern end of the asphalt plant works, the excavation work for ROAC-3B was not completed in one phase of work. The excavation was temporarily halted in December 2011 (per NYSDEC approval) pending removal of the asphalt plant equipment to facilitate access to the remaining impacted soil. The plant was removed in March 2012 and the remaining impacted area (RAOC-3C) (see Figure 5) was excavated and backfilled in early April 2012. A portion of the concrete slab that had underlain the asphalt plant was removed to facilitate access to the southernmost impacted soil.

All portions of the RAOC-3 excavation together totaled approximately 3,400 square feet in area with approximately 490 ft of sidewall. Approximately 1,200 tons of soil were excavated from RAOC-3 and disposed offsite. Excavation sidewall and bottom confirmatory samples indicated that the excavation sufficiently removed impacted soil. With the exception of one detection of acetone, results from all bottom and sidewall confirmatory samples collected in the RAOC-3 excavation were below Part 375 POGW and Commercial SCOs. Acetone is a common laboratory artifact and the acetone detection was above POGW SCOs, but well below Commercial and Industrial SCOs. It should also be noted this sample was collected in an area where additional excavation was conducted in the spring of 2012.

A total of approximately 11,000 gallons (9,500 gal. in December and 1,500 gal. in April) of water were pumped from the eastern excavation into frac tanks to facilitate excavation below the water and to remove additional LNAPL. This water was disposed offsite in accordance with applicable regulations.

Analyses of water samples from the excavation were also performed for evaluation of potential bioremediation options for the petroleum product residue. The results indicated that placement of gypsum in the base of the excavation at the water table would create favorable conditions for anaerobic degradation of remaining petroleum residue by sulfate-reducing bacteria. The use of agricultural gypsum to provide favorable conditions was approved by NYSDEC. Approximately 28 tons (22 tons in the initial excavation and 6 tons in the April 2012 excavation) of granular agricultural-grade gypsum were added to the excavation (and thoroughly mixed with the soil and accumulated water) prior to backfill, along with 100 lbs. of "10:10:10" fertilizer. The excavations were then backfilled with onsite aggregate material and stockpiled non-impacted soil to bring them up to the surrounding grade.

Two quarterly rounds of post-remediation groundwater sampling have been performed for ROAC-3. COCs were not present at levels above groundwater standards or guidance values during the March 2012 sampling event, and no COCs were present above detection limits during the June 2012 sampling event. This indicates that elimination of the contaminant source soils, groundwater removal and supplemental, in-situ groundwater treatment have effectively remediated RAOC-3.

3.3.2.4 Additional Activities

Stantec observed the demolition and/or dismantling of buildings, structures and equipment, and the removal of surficial debris by LaForge on April 25 through May 4, 2012. This included:

- Dismantling, demolition and/or removal of the control tower, maintenance garage, oil storage shed, a discarded boiler (previously used to maintain heat in the plant liquid asphalt piping) and sheet piling. During invasive work, such as removal of sheet piling, the Community Air Monitoring Program (CAMP) was implemented. Soil exposed during these activities was visually examined and periodically screened with a PID. Except as noted below, no elevated PID readings or evidence of contamination (i.e. odors, staining, etc.) were noted.

- The removal of the concrete pad and support columns beneath the former asphalt plant was largely completed from April 25 to May 1, 2012. It was not possible to remove the below-grade portions of one concrete footer and three associated sub-slab columns under the asphalt plant because of their size and high rebar density. One above-grade support column was oil stained from the conveyor belt operation. The stained concrete was segregated from the other unstained concrete. The stained concrete was staged on and covered with plastic sheeting. Minor soil staining was observed around the stained column. The soil was excavated and staged on and under plastic sheeting. This material was disposed offsite in accordance with applicable regulations and with NYSDEC approval.

- The oil storage shed was demolished on April 25, 2012. The concrete floor slab and the bottom course of the masonry block walls were oil stained. The stained material was staged on and covered with plastic sheeting. Small amounts of oil-stained lumber were also included with the staged concrete. No soil staining was observed under the slab.

  Pursuant to a conversation with a Casella representative, concrete samples were analyzed for TCLP VOCs, TCLP SVOCs, TCLP metals and TCLP herbicides (BA-OSF1-S). Results indicate that the concrete rubble was non-hazardous and suitable for landfill disposal. This material was disposed offsite in accordance with applicable regulations.

- Sheet piling located adjacent to the former storage hoppers was removed from April 25 to May 2, 2012. Stantec observed the removal and periodically screened the exposed soil with a PID. No staining or positive PID readings were observed.

- Surficial debris was removed from various locations across the site (primarily concentrated in the berm areas) on May 2 and 3, 2012. The debris included concrete, asphalt, scrap metal, lumber, etc. Soil exposed during clean-up was visually examined and screened by Stantec. No odors, staining or elevated PID readings were observed. These materials were disposed offsite in accordance with applicable regulations.

Maintenance Garage Septic System

A septic tank and an associated dry well previously located west of the maintenance building were uncovered during building demolition activities. The septic system served a bathroom in the southwest corner of the former maintenance building. There were no obvious indications of floor drain or asphalt plant discharges to it.

The septic tank was essentially full of sludge, and the dry well contained three to four inches of water and sediment/sludge. The sludge in the septic tank and the water in the dry well were sampled and analyzed. Based on the results, these wastes were disposed at the Wellsville Wastewater Treatment Plant (WWTP) in accordance with applicable regulations and with NYSDEC approval.

Heater Area Excavation

A discarded asphalt tank heater was removed from the area immediately north of the maintenance garage/oil storage building during the Site debris cleanup activities. Stained soil was observed directly beneath the heater. NYSDEC was informed and a plan was put in place to remove the impacted soil and disposed of it offsite. The heater location was not given an RAOC-designation since remedial response was performed almost immediately after discovery.

When the soil was excavated, a petroleum odor was noted. Groundwater was encountered at approximately 3.5 ft. bgs and an oily sheen was observed on the groundwater where it was encountered in the excavation.

Excavation then continued above the water table laterally toward the west and north until visual staining and PID readings were minimal. During excavation, a sample (BA-Boiler-1-S) of the most impacted soil (based on visual observation, odor and a PID reading of 372 ppm) was collected and subsequently analyzed for TCL VOCs + TICs (Method 8260) and TCL SVOCs + TICs (Method 8270). In addition, an approximately three-inch-thick layer of unsolidified asphalt with a petroleum odor and PID reading of about 70 ppm was encountered at a depth of a few inches in the east-central portion of the excavation. This material was not suitable for sale at the time of manufacture as it was identified to be “off-spec”. Nevertheless, it is essentially the same as solidified asphalt pavement that is placed in commerce for public uses or is generated during construction or demolition activities involving asphalt pavement.

In order to access the western portion of the impacted area, approximately 5 cy of berm material (non-impacted sand and gravel fill) was relocated to an area immediately east of the excavation on May 3, 2010 (see Figure 6). The relocated berm material exhibited no odors, staining or elevated PID readings.

Approximately 200 gallons of accumulated water were pumped from the eastern end of the excavation into a poly storage tank. A relatively limited area of impacted material was then excavated until natural soil (brown clayey silt) exhibiting no significant odors, staining or PID readings was encountered both vertically and laterally to the east. Additional groundwater entered the excavation and a limited amount of oil accumulated on the surface of the water; the oil was observed to be leaching from a small pocket or layer of unsolidified asphalt. A water sample (BA-Boiler-W) was collected from the excavation and subsequently analyzed for TCL VOCs + TICs (Method 8260) and TCL SVOCs + TICs (Method 8270).

Kevin Glaser of NYSDEC visited the site periodically from May 2 to May 4 and observed the conditions first-hand. In discussions with Mr. Glaser it was agreed that the pockets and layers of asphalt materials that remained in the excavation did not need to be removed.

The final excavation measured approximately 410 square feet with roughly 105 linear feet of sidewall. Four sidewall confirmatory soil samples (BA-Boiler-ES2-S through BA-Boiler-ES5-S) were collected (see Figure 6). A bottom sample was obtained from the central portion of the excavated area. At this location the bottom was deepened slightly to a point below the water table (to approximately 5 ft bgs) where natural silt deposits were encountered. No evidence of oil product or sheen was observed nor were there elevated PID readings in this area. A sample of this soil was collected as a bottom confirmatory sample (BA-Boiler-EB1-S) for TCL VOCs + TICs (Method 8260) and TCL SVOCs + TICs (Method 8270) analyses.

The sample of the impacted material that exhibited the highest PID reading (372 ppm) contained several VOC and SVOC compounds; however none were present at concentrations in excess of POGW, Commercial and Industrial SCOs. The excavation bottom and sidewall soil samples also did not contain contaminant concentrations in excess of the POGW, Commercial and Industrial SCOs. No VOCs or SVOCs were detected in the groundwater sample.

The excavated impacted soil was disposed offsite in accordance with applicable regulations.

Based on the analytical results, visual observations and PID screening, the excavation appears to have satisfactorily addressed the impacted area. On that basis, no further remediation or groundwater monitoring is warranted for the heater staging area. Supporting information, including analytical data are included in the RI/IRM CCR.

3.3.3 North and East Soil Berms

As discussed above, varying amounts of waste asphalt and miscellaneous debris are intermittently present on and in the soil berms along the north and east property boundaries. The asphalt materials typically consist of a standard mix of clean sand and gravel aggregate materials. In certain discrete areas a limited amount of non-solidified asphalt (described above) was also encountered.

As discussed in Section 2.3 above, 16 test pits were excavated along or in the immediate vicinity of the berms during the RI, and 16 soil samples were submitted for analysis for a variety of parameters, with an emphasis on VOCs and SVOCs. Locations of the test pits are shown on Figure 4.

Asphalt materials were observed in 12 of the 16 test pits excavated on the berms. The asphalt is frequently mixed with fill soil (typically sands and gravels) as pieces ranging from sand- or gravel-sized up to boulder-sized; in some cases it exists as a buried layer. Several piles of waste asphalt are also present on the ground surface, mostly along the eastern side of the site. In test pit TP-8, located near the northeast corner of the Site (Figure 4) a 6-in-thick layer of “non-solidified” asphalt was encountered at a depth of approximately 4 ft. A limited amount of similar material was also encountered in the excavation performed near the abandoned heater discussed above. This material is similar in consistency to commercially-available “cold-patch” asphalt, which is formulated such that it does not require high temperatures to remain “flowable.” The material observed in these two excavations was limited in thickness and extent, and was not simply a liquid asphalt material, but contained aggregate materials as well. Upon excavation, the material deformed in a manner similar to fresh cold patch, indicating it had not yet fully solidified like the majority of the asphalt present on the site. The occurrence of this material is limited based on the fact that it was observed in only these two locations and was not present in the remaining 21 test pits, 78 test borings, or the three large RAOC excavations.

The material did not elicit a positive response on a PID and no VOC or SVOC groundwater impacts were observed in the heater excavation or in well MW-14 located in close proximity to and downgradient from TP-8.

The soil material encountered in the eastern test pit berms was typically a mixture of sand and gravel (apparent aggregate mixtures), and the northern berm fill soil were more typically a mixture of silt, clay, sand and gravel, underlain by a native silt and clay deposit.

Miscellaneous debris was encountered in one test pit (TP-8) on the northern berm and five test pits (TP-12, -17, -18, -22 and -23) on the eastern berm. Test pit TP-17 is located along the eastern property boundary on the northern side of the site. The remaining four test pits are located on the “lobe” of fill material (primarily asphalt and gravel mixtures) that extends westward toward the center of the site from the eastern berm (Figure 4).

As discussed in the RI report, only one of the sixteen berm test pit soil samples analyzed during the RI exhibited a detection of any COC above the NYSDEC SCO levels: benzo(a)pyrene was detected in a sample from test pit TP-10 at 4.1 ppm, versus the Commercial SCO of 1 ppm and the Industrial SCO of 1.1 ppm.

Groundwater samples obtained from four monitoring wells installed during the RI within or near the RAOC-4 area (MW-6, -9, -13 and -14) did not exhibit VOC or SVOC presence. In addition, a sample of the water that accumulated in the heater excavation (located within the northern berm limits) did not contain VOCs or SVOCs at or above the detection limits. These results indicate the presence of asphalt and debris in the berms has not had an adverse impact on groundwater quality. In addition, no visible indication of impact to Tucker’s Creek was observed during several inspections of the creek performed during different seasons.

The majority of the berms and the eastern slope are covered with a mixture of vegetation. The vegetation is generally a mix of dense brush, saplings and vines with numerous mature trees up to approximately 3 ft. in diameter. A representation of the vegetative cover and surface conditions observed is provided on Figure 4. While limited amounts of asphalt exist in the soils on the slope leading down to the creek, the existing developed topsoil and vegetative cover and root systems have served to stabilize the soil and protect the slope. No evidence of active erosion was observed, and asphalt was not observed to be entering the creek.

In summary, no significant soil or groundwater impacts were observed in the berm areas, nor was any indication of impact to surface water observed. Asphalt is a chemically- and physically-stable material that does not readily impart chemical constituents to the environment. It's use in construction of roadways, and for parking surfaces and driveways for industrial, commercial and residential applications are indicative of a lack of significant potential for adverse impact to human health, wildlife or the environment. In fact, asphalt is often used on environmental remediation sites as a cap to contain contaminant materials.

In spite of the lack of significant environmental impact, the berms were designated as RAOC-4 to recognize that the presence of debris and asphalt should be taken into consideration during any future site development activities that might disturb these areas.

Although the berms do not warrant environmental remediation, surface debris removal was performed. The debris materials were removed subsequent to the IRM program, as discussed in further detail below.

4.0 REMEDIAL GOALS AND OBJECTIVES

4.1 Contemplated Use of Site

The Site is located in the Town of Amity on a state highway approximately one-half mile north of the limits of the Village of Belmont. The property is not zoned because the Town does not assign zoning classifications to lands outside the Village limits. It is anticipated that future use of the Site will be commercial or industrial; this would be consistent with the decades-long historical Site use and the currently mixed land use in the surrounding area. Although the lack of zoning suggests the potential for non-commercial or non-industrial site usage might occur in the future, such usage would be precluded by the Environmental Easement and the Site Management Plan.

4.2 Remedial Goal and Remedial Action Objectives

The general remedial goal for sites in the NYS Brownfield Cleanup Program is to eliminate or mitigate significant threats to the public and the environment posed by the contaminants present at a site through the proper application of scientific and engineering principles. Accordingly, the identified sources of contamination at the site (RAOCs 1 through 3) have been or will be eliminated or mitigated to a condition acceptable to the NYSDEC under the BCP using appropriate remedial technologies and administrative controls.

Based on the information presented in the preceding sections, the remedial action objectives (RAOs) for the site include:

Soil

- Prevent ingestion, inhalation, or contact with Site contaminants of concern (COCs) that exceed Standards, Criteria and Guidance (SCGs, as discussed below in Section 4.3) in RAOCs-1 and 3, and any other impacted areas potentially identified on the site;
- Prevent ingestion, inhalation, or contact with “nuisance characteristic” soils in RAOCs-2 and -3; and
- Prevent exposure to post-remediation residual contamination using institutional controls as needed.

Groundwater

- Prevent ingestion, inhalation, or contact with COCs that exceed SCGs in RAOC-1 and ROAC-3.
- Prevent exposure to post-remediation residual COCs via institutional controls, including execution of a NYSDEC Environmental Easement and Site Management Plan limiting future use of on-site groundwater to non-potable uses unless appropriate treatment of the water is utilized.

4.3 Soil & Groundwater Cleanup Objectives and BCP Cleanup Track

4.3.1 Soil & Groundwater Cleanup Objectives

This section describes the Standards, Criteria and Guidance (SCGs) used for comparison of COC concentration results for sampled/analyzed media at the site.

The applicable SCGs used for evaluation of the site investigation results include water quality standards and guidance values published by the NYSDEC Division of Water and soil cleanup objectives (SCOs) published by the NYSDEC Division of Environmental Remediation.

The SCGs were provided by:

- Technical Guidance for Site Investigation and Remediation, NYSDEC, Division of Environmental Remediation (DER-10), May 2010.
- Technical and Operational Guidance Series (TOGS) 1.1.1, Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, NYSDEC, October 1993, Reissued June 1998 (with addenda dated April 2000 and June 2004.)
- 6 NYCRR Part 375-6 Soil Cleanup Objectives (SCO), Protection of Ground Water (POGW), and Restricted Commercial/Industrial Use; NYSDEC, Division of Environmental Remediation, 14 December 2006.

Note that pursuant to 6 NYCRR 375-6.5, the POGW SCOs are considered not to be applicable for the Site at this time because:

- The groundwater standard contravention was the result of an on-site source which was addressed by the IRM program;
- Although contaminated groundwater at the site was determined to be migrating off-site, the IRM also included in-situ treatment that is expected to reduce groundwater contaminant concentrations to acceptable levels; and
- An institutional control in the form of environmental easement will be put in place which will include appropriate restrictions for future on-site groundwater use.

4.3.2 Brownfield Cleanup Track

Blades proposes to complete the Site remediation under a BCP Track 2 cleanup scenario, which allows for restricted site use and generic soil cleanup objectives. A Track 2 cleanup requires, among other things, the following:

- *The remedial program shall achieve the lowest of the three applicable contaminant-specific soil cleanup objectives for soils to a depth of 15 ft*.

  As discussed above in Section 2.3, none of the analytical results from the soil samples taken outside the RAOCs had exceedances of Restricted-Commercial SCOs with the exception of certain common, naturally occurring metals (aluminum, calcium, iron, and magnesium), which are not considered site related or of concern.

In addition, IRM excavation confirmatory soil samples obtained in RAOCs 1 through 3 were also demonstrated through laboratory analysis not to contain COCs at levels above applicable standards.

In summary, none of the results from all of the field work and sampling that have occurred to date indicate that the soil from 0 to 15 feet bgs has contaminant levels above the Commercial SCOs. One minor exception is the detection of a single SVOC compound in one berm area test pit soil sample. This has been discussed elsewhere in this report and is not considered to represent a significant concern.

- *Contaminant presence in offsite groundwater does not exceed standards*.

  Accordingly, the proposal for a Track 2 cleanup is based on the assumption that the remediation performed in RAOC-1, which included source-area impacted soil removal, source area impacted-groundwater removal and supplemental bioremediation of remaining groundwater, will be successful in achieving groundwater standards in the downgradient, offsite monitoring wells. In the event this does not occur Blades is prepared to undertake a supplemental injection of sodium lactate into groundwater in the RAOC-1 area, depending on results of the supplemental quarterly groundwater monitoring events.

5.0 REMEDIAL ALTERNATIVES ANALYSIS

5.1 Introduction

This section summarizes the alternatives evaluated for the remediation of Site conditions identified during the investigation as they existed prior to the implementation of the IRMs. The recommendations from this evaluation, however, take into account the IRM program executed during the Fall 2011 through Spring 2012, which included:

- Source-area soil excavation (RAOCs 1, 2 and 3);
- Removal and ex-situ treatment or offsite disposal of excavation groundwater (ROACs 1 and 3). This also included petroleum LNAPL present in RAOC-3;
- Post-excavation in-situ groundwater treatment (RAOCs 1 and 3);
- Post-treatment groundwater quality monitoring; and
- Additional activities involving shallow impacted soil excavation at the Heater storage location and demolition and offsite disposal of oil-impacted concrete from the walls and floor slab of the oil storage building.

These IRMs have eliminated contaminant source soils in RAOCs 1, 2 and 3 and the Heater Area, and are expected to reduce residual source-area groundwater contamination (RAOCs 1 and 3) and groundwater impacts where present outside the source area, i.e. the RAOC-1 plume.

Table 1 (Remedial Alternatives Analysis Matrix) presents the remedial technologies and process options considered in the development of the IRM Work Plan previously submitted and the Remedial Action Work Plan – for issues not addressed in the IRM program – contained herein. These options included the following potential processes and technologies:

- *No Action/Monitored Natural Attenuation (MNA)*; No direct remedial actions would be performed, however due to confirmed offsite groundwater impacts, a long-term groundwater monitoring program would be needed. In addition, a fence surrounding the site would be required to prevent access and potential exposure to the public and wildlife.
- *In-Situ Treatment:* In-situ treatment technologies for contaminated soil and groundwater include such processes as in-situ chemical oxidation, air sparging, enhanced in-situ bioremediation, thermal desorption, and soil vapor extraction.
- *Ex-Situ Treatment:* Ex-situ treatment technologies for contaminated soils include excavation, on-site treatment and replacement of treated soils, low-temperature thermal desorption, ex-situ vapor extraction, biopiles, land farming and off-site disposal.

Ex-situ treatment for contaminated groundwater includes such processes as groundwater removal with on-site treatment (using granular activated carbon [GAC] adsorption or air stripping) and discharge, or off-site transport and discharge to a Publicly-Owned Treatment Works (POTW) or licensed treatment/storage/disposal (TSD) facility for treatment.

- *Engineering Controls (ECs):* ECs such as covering impacted soil with clean soil were considered.

- *Institutional Controls (ICs)*: ICs were also included as potential elements of the remedial options considered. ICs for the prevention of direct human contact with contaminated soil and groundwater include actions such as:

  - A NYSDEC-enforced Environmental Easement which would limit land use at the Site to commercial or industrial use and include appropriate restrictions on groundwater use; and
  - Development of a Site Management Plan (SMP) for potential future activities that could disturb the subsurface within areas of known or potential residual impact.

5.2 Preliminary Screening of Remediation Methods, Technologies & Approaches

A number of on-site remedial technologies and approaches were pre-screened on the basis of feasibility, pertinence to the environmental conditions and remedial action objectives for the RAOCs, and cost effectiveness. Remedial methods, technologies and approaches considered in this pre-screening process were included on the basis of Stantec's past experience with remedial work involving similar site characteristics and contaminants, and on the basis of information obtained from the review of resources such as *Presumptive/Proven Remedial Technologies for New York State's Remedial Programs*, NYSDEC Division of Environmental Remediation (DER-15), 27 February 2007.

It should be noted that technologies that have been documented to be generally slow in producing results were not considered desirable. This was because a primary goal of entering the site into the BCP was to return the property, which had been inactive for several years, to a condition that would foster redevelopment as rapidly as possible.

Both proven and innovative technologies were considered. Since the site had multiple RAOCs, more than one impacted media and more than one contaminant "class," combinations of technologies were considered to form a single remedial approach.

Several methodologies were also eliminated from further consideration due to the following inadequacies or limitations:

- Unlikely to address site issues and attain remedial action objectives;
- Incompatible with site contaminants;
- Precluded by site conditions or pre-empted by the IRMs already performed at the Site;
- Previously not fully demonstrated, unreliable, or have performed poorly;

- Inappropriate based on engineering judgment; or
- Excessively costly without adding significant technical advantages.

The following table lists the methods, technologies and approaches that were excluded from the more detailed evaluation of alternatives based on the above criteria:

Discarded Method, Technology, or Approach	Description/Justification
Air Sparging & Soil Vapor Extraction	• Enhanced aerobic biodegradation using sparging in groundwater (although combined with soil vapor extraction in the vadose zone) is not appropriate for the chlorinated solvent-related contaminants (RAOC-1) nor for the presence of oil product (RAOC-3).
Groundwater Pump-and-Treat	• The process generally requires long time periods for completion; • Systems are energy-intensive; • High capital and operating costs; • Not applicable to vadose zone; and • Can impact groundwater flow regime at distance from the site.
Dual-Phase or Multi-Phase Extraction/Treatment	• Dual-Phase systems extract and treat vapor and aqueous streams; • The process can require long time periods for completion; • Systems are energy-intensive; and • High capital and operating costs.
Horizontal Flow Barrier - Sheet Pile Wall or Slurry Trench combined with Iron Reactive flow gates	• Contaminants react with iron filings in a reactive gate; • This method is generally appropriate for much larger contaminant masses in groundwater where the excessively high overall cost of this approach can be justified. • Does not address source.
In-Situ Conductive Heating	• Involves the heating of unsaturated soils to 212° F to 500° F (followed by soil vapor extraction) and is typically a treatment applicable only to the vadose zone – does not address impacts below the water table – therefore, area to be treated must be dewatered in order to be effective; and • Also typically applied to larger sites due to the high overall costs.

Discarded Method, Technology, or Approach	Description/Justification
In-Situ, Surfactant-Enhanced Aquifer Flushing	• Involves simultaneous injection of an aqueous surfactant solution into a contaminated zone and downgradient groundwater extraction/treatment (and potentially re-injection); and • This approach is generally cost-prohibitive and has a high potential for exacerbating the spread of contaminants.
Iron Reactive Wall	• Likely to require significant disturbance to offsite, downgradient property, including low-lying wet area; and • High overall cost of approach versus a relatively limited area of groundwater impact. • Would need to be combined with another remedial method to address source-area soil impacts.
Phytoremediation	• Proposed commercial redevelopment of site precludes applicability of this technology.
Chemical Treatment/Soil Mixing	• In-situ chemical treatment is accomplished by applying amendments to the subsurface via soil-mixing methods using large diameter augers. Effective treatment requires sufficient contact and residence time between the COC and the chemical reagent; • Not desirable based on limited soil volumes; and • Not feasible for free oil product in coarse gravel layer in RAOC-3.
Soil Vapor Extraction and Thermal Desorption Soil Heating	• Does not address overburden groundwater impacts; and • High capital and operating costs (electricity).
Steam Enhanced Extraction (SEE)	• In-situ remediation method consisting of a combination of shallow soil vapor extraction, shallow steam injection and shallow groundwater extraction. • Typically only cost effective for large-scale sites (10^4-10^5 C.Y. of impacted soil).

6.0 EVALUATION OF REMEDIAL ALTERNATIVES

6.1 Retained Alternatives

Six remediation alternatives were not excluded in the preliminary screening. These are evaluated in more detail based upon the screening criteria set forth in NYSDEC's DER-10 document.

Those six alternatives considered further are summarized in the following table. For some of the RAOCs, a combination of methodologies was considered, based on the observed conditions. As noted above, this evaluation of alternatives addresses conditions as they existed before the implementation of the IRMs. The retained alternatives discussed below are based on the results of the evaluation, however they take into account the IRMs that were completed.

Evaluated Method, Technology, or Approach	Description
No Action / Monitored Natural Attenuation (MNA)	VOCs are organic molecules that are capable of being degraded in place by naturally-occurring processes such as biodegradation, dispersion, dilution, sorption, volatilization, and chemical or biological destruction. This alternative utilizes periodic sampling and analysis of groundwater to monitor the drop in contaminant levels in groundwater with time, and the resultant areal extent of impact with time. Given the miscellaneous debris and berms or shallow soil in other areas that would not be addressed, restriction of access to the site in the form of a fence would be required. Generally only applied to groundwater.
Soil:	
Source Area Contaminated Soil Removal / Offsite Disposal	This alternative includes removal of the source-area soil with the greatest COC impact, disposal at a permitted landfill, and replacement of the excavated soil with clean soil backfill.
Engineering Controls: Clean Soil Cover for Impacted Soil	Soil with contaminants is allowed to remain buried on site, if covered with a minimum of one ft. of clean soil or other clean fill materials, such as aggregate, to minimize the potential for inadvertent future exposures.

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Evaluated Method, Technology, or Approach	Description
Groundwater:	
In-situ Chemical Oxidation (ISCO) of Impacted Groundwater	This a destructive technology involving the injection of chemical reagents into contaminated groundwater. Oxidation converts the contaminants into non-hazardous or less toxic compounds that are more stable and/or inert. The oxidizing agents most commonly used are ozone, hydrogen peroxide, sodium persulfate, and permanganate.
In-situ Treatment of Impacted Groundwater (Bioremediation)	This alternative includes the direct application of a substrate that serves as an electron donor and accelerates naturally-occurring contaminant degradation in groundwater by indigenous bacteria. This method can include, among others: a) Enhanced Reductive Dechlorination (ERD) of chlorinated VOCs (using food-grade sodium lactate or other suitable material); and b) breakdown of petroleum-related VOCs and SVOCs by sulfate-reducing bacteria aided by a sulfate-rich additive (e.g. agricultural-grade gypsum).
Groundwater Extraction and Onsite/Ex-situ treatment or offsite disposal.	Groundwater entering a source-area excavation is removed to a storage tank, the water can then be treated on site via a portable treatment system (typically air stripping or granular activated carbon) that removes VOCs and is then discharged on site. Alternatively the water can be treated/disposed of offsite.

6.2 Potential Alternatives for Individual RAOCs

6.2.1 Potential Remedial Alternatives for RAOC-1 - Former Laboratory Building Area (CVOC-Impacted Soil and Groundwater)

6.2.1.1 Alternative 1.1: No Action

The No Action response is considered as a remedial technology to provide a baseline effort for comparison to other technologies. This alternative involves no remedial action(s), however because offsite groundwater impacts were identified long-term groundwater quality monitoring has been included. This monitoring would be focused on determining what degree of contaminant attenuation in groundwater is occurring through natural processes. Site access would need to be restricted, thus a fence surrounding the site would be required.

6.2.1.2 Alternative 1.2: Soil Removal & Offsite Disposal

Alternative 1.2 consists of removal and offsite disposal of the source-area CVOC-impacted soil. Soils impacted with contaminants at concentrations above cleanup objectives (assumed to be non-hazardous) would be excavated and disposed off-site at a permitted facility. Excavation would extend to the maximum depth below the water practicable given the site geologic and hydrogeologic conditions.

Although this alternative does not directly address groundwater impacts, this alternative should be combined with other groundwater technologies and follow-up groundwater quality monitoring focused on determining what degree of contaminant attenuation in groundwater is occurring through natural biological processes following source removal.

6.2.1.3 Alternative 1.3: In-Situ Chemical Oxidation (ISCO) of Groundwater

Alternative 1.3 would consist of in-place remediation of groundwater in RAOC-1. This would be performed in conjunction with source area soil removal as described in Alternative 1.2 above. The ISCO would involve injection of a chemical oxidizer throughout the area of impacted groundwater, which should result in the eventual breakdown of COCs to harmless chemical bi-products such as carbon dioxide and water.

Follow-up groundwater monitoring would be required to document the effectiveness of the remedial action. Supplemental injection of a chemical oxidizer could be performed if needed to achieve remedial objectives.

6.2.1.4 Alternative 1.4: In-Situ Bioremediation of Groundwater (Enhanced Reductive Dechlorination)

Alternative 1.4 consists of treatment of groundwater in-situ by enhancing naturally-occurring breakdown of halogenated VOCs by indigenous bacteria such as dehalococcoides. Contaminant degradation is dependent on the presence of the appropriate nutrients and energy sources. The biochemical transformation of contaminants is the result of enzymes produced by the microorganisms that act as catalysts for the degradation reactions.

In reductive dechlorination, the chlorinated VOC (e.g. TCE) serves as an electron acceptor (or weak oxidizing agent) that is reduced by electrochemical reactions with other chemicals in the groundwater that serve as electron donors. Therefore an additional carbon source is required for the reaction to proceed.

Bench-scale testing is required to confirm that a population of bacteria capable of reducing the chlorinated VOCs exists, and that groundwater conditions are favorable to warrant the provision of enhancements to the process.

Follow-up groundwater quality monitoring would be required to document the effectiveness of this remedial method. Supplemental injection of a carbon donor could be performed if needed to achieve remedial objectives.

6.2.1.5 Alternative 1.5: Ex-Situ Treatment of Groundwater

Alternative 1.5 consists of removal of groundwater and on-site ex-situ treatment. This applies to groundwater removed from an excavation, but does not include pumping and treating of groundwater from wells (pump-and-treat was eliminated from further consideration in the preliminary alternative screening process). Thus this alternative would need to be combined with another to fully address groundwater impacts in RAOC-1. VOC-impacted groundwater would be extracted from the excavation, temporarily stored on site in tanks, and then treated onsite using air-stripping or granular activated carbon.

6.2.2 Potential Remedial Alternatives for RAOC-2: B27/B31 Area (Petroleum-Impacted Soil)

Impacts at RAOC-2 were limited to shallow soil; no groundwater impact was identified.

6.2.2.1 Alternative 2.1: No Action

The No Action response is considered as a remedial technology to provide a baseline effort for comparison to other technologies. No remedial actions would be taken for this area, and no future monitoring or sampling would be performed.

6.2.2.2 Alternative 2.2: Soil Removal & Offsite Disposal

Alternative 2.2 consists of removal of the petroleum-impacted soil exhibiting nuisance characteristics (staining, odors, positive PID readings), and off-site disposal as non-hazardous waste at a permitted facility. The excavation would be backfilled with clean soil. Excavation would not extend into the water table; only vadose-zone soil was found to be impacted and no impact to groundwater was identified for RAOC-2 during the RI.

6.2.3 Potential Remedial Alternatives for RAOC 3: Former Asphalt Tanks Area (Petroleum-Impacted Soil and Groundwater)

The RI initially identified petroleum impacts to shallow soil only; however during IRM excavation activities, groundwater impacts (oil product in a saturated gravel layer) were found.

6.2.3.1 Alternative 3.1: No Action

The No Action response is considered as a remedial technology to provide a baseline effort for comparison to other technologies. No remedial actions would be taken for this area, and no future monitoring or sampling would be performed.

6.2.3.2 Alternative 3.2: Soil Removal & Offsite Disposal

Alternative 3.2 consists of removal and offsite disposal of the source-area petroleum-impacted soil. Soils impacted with contaminants at concentrations above cleanup objectives (assumed to be non-hazardous) would be excavated and disposed off-site at a permitted facility. No groundwater impacts were observed for this area during the Remedial Investigation, thus excavation was anticipated to be above the water table. However, petroleum-impacted groundwater containing LNAPL was also encountered during the IRM activities. Accordingly, remedial actions for groundwater were necessary for RAOC-3.

6.2.3.3 Alternative 3.3: Ex-Situ Treatment of Groundwater

Alternative 3.3 consists of removal of groundwater and ex-situ treatment. This applies to groundwater and LNAPL removed from an excavation, but does not include pumping and treating of groundwater from wells, which was eliminated in the preliminary alternative screening process. Petroleum-impacted groundwater would be extracted and temporarily stored on site in tanks; the water and LNAPL could be transported offsite for treatment/disposal.

Follow-up groundwater monitoring would be required to document the effectiveness of this remedial method.

6.2.3.4 Alternative 3.4: In-Situ Treatment of Groundwater

Alternative 3.4 consists of in-situ treatment of groundwater by enhancing naturally-occurring breakdown of petroleum hydrocarbons by indigenous sulfate-reducing bacteria. Contaminant degradation is dependent on the presence of the appropriate nutrients and energy sources. Analytical results from an excavation water sample from RAOC-3 indicated that placement of gypsum (chemical formula $CaSO_4 \cdot 2H_20$) in the base of the excavation at the water table would create favorable conditions for anaerobic degradation of remaining petroleum residue by sulfate-reducing bacteria.

Follow-up groundwater quality monitoring would be required to document the effectiveness of this remedial method.

6.2.4 Potential Remedial Alternatives for RAOC-4: Perimeter Berms (Asphalt and Debris)

Impacts at RAOC-4 were minimal and consist of intermittent areas along the east and north property lines containing waste asphalt materials and miscellaneous debris, both at the surface and in subsurface soils. No significant soil impacts were identified by laboratory analysis of sixteen soil samples. No groundwater impacts were identified in RAOC-4 and no impacts to Tucker’s Creek were observed.

6.2.4.1 Alternative 4.1: No Action

The No Action response is considered as a remedial technology to provide a baseline effort for comparison to other technologies. No remedial actions would be taken for this area, and no future monitoring or sampling would be performed.

6.2.4.2 Alternative 4.3: Asphalt/Soil Removal & Offsite Disposal

Alternative 4.3 would consist of removal and offsite disposal of the waste asphalt material, asphalt/soil mixtures and soils containing buried miscellaneous debris. The materials would be removed to a permitted disposal facility.

6.2.4.3 Alternative 4.4: Covering Asphalt/Soil Mixtures

Alternative 4.4 would consist of managing the asphalt, asphalt-containing soils and miscellaneous debris on site by re-grading and re-configuring these materials into more uniform berms along the east and north property lines. Debris currently existing on the surface would be removed from the site and disposed as solid waste at a permitted disposal facility. Large pieces of debris encountered in subsurface soils during re-grading would also be disposed offsite, with the exception of minor amounts of inert materials that would be considered “de minimis” quantities. The re-constructed berms could then be covered with 6-in of clean soil material. The source of the cover materials could be from the clean, onsite aggregate stockpile or from an offsite location. The cover material could then be supplemented with six inches of topsoil which would be seeded with appropriate vegetation for stabilization.

6.3 Comparative Analysis of Alternatives

This section provides a final evaluation of each of the retained alternatives, for each of the four Site RAOCs as the conditions existed prior to the implementation of the IRM program. The alternatives are discussed in light of the nine evaluation criteria contained in DER-10 and described above in Section 6.0. Refer to the Remedial Alternatives Analysis Matrix (Table 1) for further detail on each alternative in terms of each the nine criteria, as well as numerical scores for each alternative/criteria. Details on the estimated costs for each alternative are included in Appendix A.

6.3.1 RAOC-1

Alternative 1.1 (No Action) is not considered viable primarily because it does not protect human health and the environment, it does not comply with SCGs, it would involve excessive long-term monitoring costs, and it would be a barrier to site re-development. Based on the identified contaminants, natural processes would likely not be capable of breaking down the contaminants to levels where exposure threats were reduced to acceptable levels within a reasonable time frame.

Alternative 1.2 (Source Area Soil Removal) scores high as an alternative for several criteria. Notably, it would: provide immediate positive impact by eliminating the most contaminated material; achieve SCGs for the source area relatively rapidly; have high implementability; have long-term effectiveness and permanence; and be likely to receive community acceptance due to its positive aspects. Although the capital costs are significant, the OM&M costs are relatively low and the overall cost-effectiveness is good.

Alternative 1.3 (ISCO in Groundwater): This alternative would likely need to be combined with source-area soil removal. Although this alternative scores high in some criteria for groundwater VOC remediation (compliance with SCGs, reduction in contaminant toxicity and volume, long-term effectiveness) the overall score of 69 indicates it is less desirable than other alternatives for groundwater. The primary drawbacks for this alternative are: 1) lower implementability due to the highly-specialized equipment and contractor requirements, 2) very high overall capital costs, 3) utilizes strong oxidizing chemicals in the process, 4) may have possible negative impacts to naturally-occurring dechlorination; and 5) may require multiple applications of the reagent.

Alternative 1.4 (ERD in Groundwater): This alternative would be combined with source-area soil removal and partial groundwater removal/ex-situ treatment (see below). This alternative also scores high in most criteria for groundwater VOC remediation and had an overall score of 88 out of 100. The most positive aspects include: 1) capitalizes on naturally-occurring dechlorination by indigenous bacteria, 2) will have good long-term effectiveness/permanence; 3) implementability is high – utilizes harmless food-grade additive (lactate) and uses relatively low-cost, low-tech application method of placing additive in excavations, 4) reduces toxicity and volume of contaminants; 5) is cost effective, and 6) should have high degree of community acceptance.

Potential negative aspects include 1) the possibility of short-term increases in levels of TCE “daughter products” during the initial reductive dechlorination phase (expected to be temporary) and 2) a second application of additive may be required.

Alternative 1.5 (Ex-situ Treatment of Groundwater): This alternative is intended to partially address groundwater impacts by removing and treating (or disposing offsite) groundwater from a source area excavation only. Groundwater would be readily available for withdrawal by pumping from an excavation.

Ex-situ treatment of the CVOC-impacted groundwater in RAOC-1 could be accomplished with a portable air stripping unit, or a portable carbon absorption system, and the treated effluent discharged slowly to the ground surface on site.

This alternative achieves high scores with essentially every one of the nine evaluation criteria, making it a favorable alternative for RAOC-1, especially if combined with another technology to address remediation of the non-source-area groundwater plume.

6.3.2 RAOC-2

Alternative 2.1 (No Action) is not considered viable primarily because it does not protect human health and the environment, it does not comply with SCGs, it does not reduce toxicity, mobility or volume of contaminants, it would likely not gain community acceptance, it would force the need for engineering and institutional controls and it would be a barrier to site re-development.

Alternative 2.2 (Soil Removal & Offsite Disposal): As with RAOC-1, excavation and offsite disposal of impacted soil scores high as an alternative for several criteria. It would: provide immediate positive impact by eliminating the contaminated material; rapidly achieve SCGs for RAOC-2; have high implementability; have long-term effectiveness and permanence; and be likely to receive community acceptance due to its positive aspects. In addition capital costs are reasonable, and there would be no OM&M costs or reliance on engineering or institutional controls.

6.3.3 RAOC-3

Alternative 3.1 (No Action) is not considered viable primarily because it does not protect human health and the environment, it does not comply with SCGs, it does not reduce toxicity, mobility or volume of contaminants, it would not gain community acceptance, it would force the need for extensive engineering and institutional controls and it would be a barrier to site re-development.

Alternative 3.2 (Soil Removal & Offsite Disposal) scores high as an alternative for several criteria. Notably, it would: provide immediate positive impact by eliminating the most contaminated material; rapidly achieve SCGs for the source area; have high implementability; have long-term effectiveness and permanence; and be likely to receive community acceptance due to its positive aspects. Although the capital costs are significant, the OM&M costs are relatively low and the overall cost-effectiveness is good.

Alternative 3.3 (Ex-situ Treatment of Groundwater): Ex-situ treatment of groundwater is favorable for the RAOC-3B/3C source area since significant petroleum LNAPL was present on the groundwater table and such conditions are not conducive to in-situ treatment. However, ex-situ treatment would best be accomplished by transporting the water to an offsite treatment facility due to the technical difficulty in treating LNAPL on site. Thus this alternative (specifically, removal of the groundwater from the RAOC-3B/3C source-area excavation, temporary storage in tanks and offsite treatment) scores high for most evaluation criteria.

Alternative 3.4 (In-Situ Treatment of Groundwater): This alternative is applicable to RAOC-3B/3C as a supplemental alternative to provide a final “polishing” of groundwater to address any minor amounts of residual petroleum that may remain after excavation. Analysis of the groundwater for geochemical parameters indicated conditions were favorable for bioremediation by sulfate-reducing bacteria. Accordingly, application of gypsum (a sulfate source) to the source area excavation prior to backfill to stimulate the natural bacterial action is very favorable, especially with respect to: protection of human health and the environment; achievement of SCGs; long-term effectiveness/ permanence; implementability; and cost effectiveness. This would also likely achieve a high degree of community acceptance.

6.3.4 RAOC-4

Alternative 4.1 (No Action) is considered viable due to the lack of exceedences of Restricted Use-Commercial SCOs in 15 of the 16 RAOC-4 soil samples analyzed and only a single compound exceedence in the 16th sample. This single exceedence is not considered significant enough to warrant remedial action, thus No Action is considered to be the preferred alternative.

Alternative 4.3 (Asphalt/Soil Removal & Offsite Disposal): Since sampling performed in RAOC-4 generally did not indicate COC levels in excess of SCGs, utilization of this alternative would constitute an excessive and unnecessary response for commercial or industrial site use and it will not be retained for further consideration.

Alternative 4.4 (Clean Soil Cover for Asphalt/Soil Mixtures): This alternative is a form of engineering control typically used for soils that are significantly impacted with COCs to allow them to remain onsite, while minimizing potential environmental impact and reducing the potential for exposure.

This alternative is also considered to be excessive because no significant soil contamination was identified for RAOC-4 that would warrant such action.

7.0 AAR CONCLUSION: RECOMMENDED REMEDIES

7.1 Impacted Areas

Four distinct RAOCs have been identified at the Former Allegany Bitumens Belmont Asphalt Plant site. RAOCs 1 through 3 had COC presence at levels that warranted remedial action and IRM activities were conducted in each of those RAOCs. Impacted media in RAOCs 1 through 3 included both near-surface and subsurface soil zones, and groundwater which was encountered in RAOC-1 (6 to 9 ft bgs) and RAOC-3 (4 to 5 ft bgs). One soil sample location in RAOC-4 contained one petroleum-related SVOC at a concentration above the Commercial Use SCO; however, this is not considered to warrant soil remediation.

The impacted media and COCs in each of the RAOCs are summarized in the following table:

RAOC	Impacted Media	Contaminants of Concern	Remarks
1	Soil, Groundwater	Chlorinated VOCs	Primarily TCE.
2	Soil	Petroleum VOCs	Nuisance odors, staining in shallow soil.
3	Soil, Groundwater	Petroleum VOCs & SVOCs	Nuisance odors, staining in shallow soil. Petroleum (motor oil) product discovered in gravel layer and on water table during IRMs.
4	Soil	None	Surface and subsurface asphalt and debris.

A limited area of shallow petroleum-impacted soil was also encountered and remediated during IRM activities at the storage location of a discarded oil-fired heater; this location was not given an RAOC-designation since remedial response was performed almost immediately following discovery with NYSDEC approval.

7.2 Recommended Remedies

Based on the depth and areal extent of impacted media, the identified COCs and concentrations, and Site geologic and hydrogeologic conditions, the recommended remedial alternatives chosen to address the RAOCs are listed below.

1) Soil in RAOC-1, RAOC-2, RAOC-3, Heater Location: Excavation and off-site disposal of source-area CVOC-impacted soils in RAOC 1; and excavation and offsite disposal of shallow petroleum-impacted soils in RAOC-2, RAOC-3 and the heater location. *These remedial actions were completed during the IRM program*.
2) Groundwater in RAOC-1 Excavation: Removal and onsite, ex-situ treatment and on-site discharge of impacted RAOC-1 source-area groundwater. *This remedial action was completed during the IRM program.*
3) Groundwater and LNAPL in RAOC-3 Excavation: Removal and offsite treatment/disposal of recovered petroleum product (LNAPL) and impacted groundwater

from the RAOC-3 excavation. *This remedial action was completed during the IRM program.*

4) Groundwater in vicinity of RAOC-1: In-situ treatment of chlorinated CVOC-impacted groundwater in RAOC-1 via application of a bio-augmentation additive (sodium lactate) to the open source-area excavation and "plume footprint" trench excavations to enhance natural attenuation through reductive dechlorination of CVOCs. *This remedial action was completed during the IRM program.*

5) Groundwater in vicinity of RAOC-3: In-situ treatment of petroleum-impacted groundwater in RAOC-3 via application of a bio-augmentation additive (granular gypsum) to the open excavation to promote anaerobic breakdown of petroleum-related compounds by naturally-occurring, sulfate-reducing bacteria. *This remedial action was completed during the IRM program.*

6) RAOC-4: The No Action alternative was chosen for RAOC-4, based on the RI findings and as discussed above. Surface debris removal and offsite disposal was performed in conjunction with the IRM program.

7) Groundwater in vicinity of RAOC-1 and RAOC-3: Conducting post-excavation groundwater monitoring in RAOC-1 and RAOC-3 to confirm that the enhanced bioremediation is occurring. *This remedial action was implemented during the IRM program and quarterly monitoring will continue throughout 2012.*

In addition, Institutional Controls will be implemented in the form of a NYSDEC Environmental Easement for the Site that will be filed with the Allegany County Clerk. The Easement will incorporate an Environmental Site Management Plan (SMP) to provide guidance for potential future Site redevelopment and use.

7.3 Remedial Actions Completed to Date (IRMs)

As mentioned above and discussed in detail in Section 3, a program of Interim Remedial Measures was implemented between November 2011 and April 2012 for RAOCs 1 through 3. These IRMs were deemed appropriate and necessary to: 1) provide timely response to the findings of the RI; 2) minimize the potential for further spread of contaminants; and 3) expedite redevelopment of the Site, which has not been used for several years. The IRMs for RAOCs-1 through 3 were completed in accordance with the *Interim Remedial Measures Work Plan, Former Allegany Bitumens Belmont Asphalt Plant, Brownfield Cleanup Program Site #C902019, 5392 State Route 1, Amity, Allegany County, New York*," draft dated September 12, 2011 and final dated October 24, 2011, prepared and submitted by Stantec on behalf of Blades, and approved by NYSDEC on October 26, 2011. Note that additional activities were also performed in April and May, 2012 for the Heater area impacted soil and the maintenance building septic system. These actions were performed immediately upon discovery using methodologies described in the IRM Work Plan.

Although no significant impacts were identified in RAOC-4, surface debris removal was performed immediately subsequent to the IRM program, in conjunction with demolition and removal of remaining site structures and asphalt plant equipment. The removed debris materials were disposed offsite as solid waste at a NYSDEC-permitted landfill.

Table 2 summarizes the remedial actions taken to date, and demonstrates that combinations of remedial alternatives were undertaken in most cases. Tasks 1 through 6 above have been completed as elements of, or in conjunction with, the IRM program for RAOCs 1 through 3. Task 7 (monitoring) is partially complete and additional quarterly sampling is planned in 2012.

RAOC-4 was not included in the IRM work plan or during program implementation since no significant contaminant presence was identified in soil during the RI and therefore no threat to human health or the environment was identified in the berm areas.

Monthly progress reports submitted to NYSDEC throughout the IRM process summarized the activities performed, disposal of wastes generated during the program, results of soil and groundwater sampling performed, and other pertinent data. A comprehensive report summarizing the Remedial Investigation and details on the implementation of the IRM program was submitted to NYSDEC under separate cover. A Final Engineering report to be submitted in the future will provide a final summary of the work performed.

8.0 REMEDIAL ACTION WORK PLAN

8.1 Site Groundwater Monitoring Program

As discussed above, quarterly groundwater monitoring is underway for RAOCs 1 and 3. Results to date for RAOC-1 indicate substantial improvement of the source-area wells when compared to pre-IRM contaminant levels. However the results in some of the RAOC-1 wells have shown mixed results with some wells showing decreases and others showing slight increases in VOC concentrations. This includes an increase in total VOCs in the offsite, downgradient well MW-8, where post-IRM concentrations of cis 1,2-DCE have increased to approximately 9.6 parts per billion (ppb). TCE levels in MW-8 have also shown a slight increase to approximately 6.5 ppb. Regardless, these concentrations are only slightly elevated above the groundwater standards for these compounds of 5 ppb.

Two additional quarterly sampling events will be performed in 2012. At that time, the cumulative results will be reviewed with NYSDEC to assess the need for further monitoring or additional application of sodium lactate to enhance the bioremediation effort.

Monitoring results for RAOC-3 have not indicated the presence of COCs at levels above groundwater standards during the first sampling event or above detection limits during the second event. Two additional quarterly sampling events will be performed for monitoring well MW-65, and if the results continue to indicate the lack of COCs no further sampling will be performed.

8.2 RAOC-4

As indicated above, no significant impacts were identified in the berm area soils or groundwater; thus no remedial actions were deemed necessary for this RAOC. This section provides a description of observed conditions and a discussion of the previously-completed remedial action taken for this RAOC.

8.3 Institutional Controls

8.3.1 Site Management Plan (SMP)

Although an IRM program has been completed for RAOCs 1 through 3 and debris removal has been completed for RAOC-4, some residual contamination may remain at the site after remediation has been completed. In order to minimize the potential for future intrusive site activities to exacerbate the spread of contamination or create potential exposure to impacted soil or groundwater, a Site Management Plan (SMP) will be developed. The SMP will incorporate documentation of conditions for all four RAOCs as well as the remainder of the site. The SMP document will provide guidance for:

- Continuing the ongoing groundwater monitoring program to confirm the success of the interim remedial measures;

- Planning and executing future site activities such as excavation, grading, drilling, construction of buildings or utilities, etc. that could encounter impacted soil or groundwater;
- Monitoring and screening soils and groundwater for potential COCs;
- Handling, characterizing, and disposing of impacted media, if encountered;
- Restricting use of on-site groundwater as appropriate;
- Addressing potential soil vapor intrusion in future structures that might be constructed on the site.

The SMP will be submitted to NYSDEC for review/approval.

8.3.2 Environmental Easement

An Environmental Easement will be granted to the Department restricting use of the Site to commercial or industrial uses and it will include a restriction preventing use of groundwater underlying the site without treatment rendering it safe for the intended use. The Environmental Easement will include and incorporate the SMP by reference.

The Easement will be filed with the Allegany County Clerk's office.

9.0 SITE REDEVELOPMENT PREPARATION ACTIVITIES

As discussed above, the remaining buildings and equipment have been dismantled or demolished and removed from the property. This includes the former asphalt plant works, cold material hoppers and conveyor and sheet pile wall, all of which were located in the north-center portion of the site.   The water supply well will be retained for future potential use.

In preparation for site redevelopment, Stantec developed a site grading plan whereby the excess previously-imported aggregate material that comprises the broad, elevated central portion of the Site will be redistributed as appropriate to develop more uniform sitewide contours. The grading activity will be limited to the central portion of the Site and will not involve the berm areas.

As part of site redevelopment preparation, Blades may place topsoil in limited areas to facilitate establishment of vegetation for the purpose of improving the aesthetics of the property. Pursuant to discussions with the adjoining property owner (Hanchetts) topsoil will be placed on the offsite area adjoining RAOC-1 that was disturbed by the source-area and trench excavation. Topsoil and seeding, will include the following elements:

- Imported topsoil material will be tested for contaminant compounds in accordance with DER-10 requirements or a modified list of analytes as approved by NYSDEC;
- Topsoiled areas will be seeded with plant species that create favorable wildlife habitat (e.g. birdsfoot trefoil). The actual species may vary depending on the time of year of the planting and the specific physical conditions of the area to be seeded (slope, drainage, etc); and
- Mulching or other erosion control measures will be employed as needed.

Figure 7 depicts the proposed final site grades. Figure 8 provides Notes and Details related to the final site grading.

The Health and Safety Plan and Community Air Monitoring Plans included in Appendices B and C, respectively will be utilized during all intrusive site activities.

TABLES

Table 1
Remedial Alternative Analysis Matrix

		Remedial Alternative	Description of Alternative	1 - Protection of Human Health and the Environment		2 - Standards, Criteria, & Guidance (SCG)		3 - Short-term Impacts		4 - Long-term Effectiveness & Permanence		5 - Reduction of Toxicity, Mobility, or Volume	
				Score	Discussion	Score	Discussion	Score	Discussion	Score	Discussion	Score	Discussion
			Scoring System:	0 = Least protective 10 = Most protective		0 = Least likely to meet SCGs 10 = Most likely to meet SCGs		0 = Most short term impact 10 = Least short-term impact		0 = Least effective & permanent 10 = Most effective & permanent		0 = Least reduction 10 = Most reduction	
	A	**No Action / Monitored Natural Attenuation (MNA)**	**- Assume 30 years of quarterly groundwater monitoring**	1	- Immediate risks associated with additional off-Site migration if VOCs are not mitigated in the short term. - Potential on-site exposure risks related to future site development and use of the site by trespassers or wildlife.	1	- Compliance with SCGs will not be achieved for an extended period of time, assuming natural mechanisms are in place to degrade contaminants; - Will depend heavily on engineering and institutional controls.	7	- Hinders or precludes successful site re-development. - Does not address or monitor in areas of impacted soil above water table. - Ongoing potential for direct exposure to berm materials.	2	- Wastes and treated residuals will remain on-Site following implementation of MNA, but long-term reduction is expected. - Natural processes that induce attenuation of contaminant impacts to the subsurface are dependent upon several factors such as subsurface conditions, amount of contaminant present and presence of free product (NAPL). Given this uncertainty, exposure risks outlined in criteria 1 are most likely to persist for an undetermined period of time; - Monitoring alone will not mitigate exposure risks but will provide some quantification; - High degree of uncertainty associated with meeting remedial action objectives in the future. - Requires Institutional Controls to protect from exposure to residual contamination.	2	- Mobility of contaminants not reduced, and may increase with time. - Volume very slowly reduced through natural degradation. - Toxicity would show temporary increase as Vinyl Chloride and other VOC daughter product concentrations in groundwater will temporarily rise due to natural degradation of TCE. - Petroleum LNAPL unlikely to be significantly reduced.
SOIL	B	**Source Area Soil Removal and Offsite Disposal.**	**Excavate/dispose Chlorinated VOC-contaminated source-area soil (RAOC-1).** - **Excavate/dispose Petroleum-contaminated source-area soil (RAOC-2).** - **Excavate/dispose Petroleum-contaminated source-area soil (RAOC-3).**	8	- Immediate positive impact through removal of contaminant source.	9	- High degree of compliance with SCGs by replacing excavated soil with clean backfill soil.	6	- Short term impacts include truck traffic (dump trucks for soil); potential for exposure due dust generation and vapor release from soil and groundwater.	9	- High degree of long-term effectiveness and permanence, since contaminants are physically removed from the ground and from the site.	9	- High degree of reduction of toxicity, mobility and volume, due to immediate physical removal of source area contaminants.
SOIL	C	**Engineering Controls: Covering Impacted Soil With Clean Soil**	**- Place one-ft-thick cover of clean soil (onsite or imported) over selected areas of potential impacted soil. Cover would include sufficient topsoil to support vegetation.** **- Seed cover with appropriate vegetative cover.** **- Maintain/repair cover as necessary.**	8	- Clean cover eliminates contact with potentially-impacted soils; - Especially efective for PAHs, which are generally not mobile in the environment.	8	- Can result in potenitaly impacted soil being in compliance with SCGs.	7	- Short term impacts include: potential for dust generation during site grading & burial; minor truck traffic to import clean topsoil; and minor disturbance to existing vegetation.	7	- Long-term effectiveness since potential PAH compounds will slowly break down over time; - Reasonable degree of permanence since potenial impacted soil would be covered reducing likelihood of future disturbance. - Requires Institutional Controls to protect from exposure to potential residual contamination.	7	- Reduction of mobility is high since material will be covered in place. - Relatively low reduction in volume (removal of debris); - Reduction in toxicity over time through natural degradation of potential PAHs.
GROUNDWATER	D	**In-situ Chemical Oxidation (ISCO) of Impacted Groundwater**	**Introducing strong chemical oxidizers directly into groundwater to break down chemical contaminants in place.**	6	- Likely short-term increase in TCE daughter-product VOCs, followed by rapid overall reduction of residual contaminant levels. - Oxidizing chemicals used in process (typically permanganate, hydrogen peroxide, persulfate or ozone) have exposure risks to workers and can be mildly harmful to the environment. - Not effective on LNAPL (SVOCs)	7	- Compliance with SCGs anticipated within relatively moderate time frame, following multiple application events.	6	- Short-term impacts may include increase in Vinyl Chloride or other TCE "daughter" products; - Possible negatives impacts to natural attenuation processes that may already be occurring.	7	- Anticipated to effectively remove remaining residual VOCs in both soil and groundwater to levels below SCGs, with little to no long-term "rebound" effect. - Generally achieves cleanup to low contaminant concentration levels. - Typically requires multiple applications.	8	Anticipated to be effective in reducing toxicity, mobility and volume of contaminant mass via breakdown of contaminant compounds to harmless byproducts through chemical oxidation, following multiple applications.
GROUNDWATER	E	**Ex-situ Treatment/disposal of Source-area Groundwater.**	**Removal of source-area groundwater from excavation;** **On-site treatment and discharge; or offsite treatment.**	8	Protective of health and the environment (if combined with source-area soil removal): combines removal and destruction of contaminants from subsurface.	9	Generally achieves "non-detect" levels of VOC contaminants prior to discharge.	7	- Temporary storage in frac tanks; - Truck trips for tank mob/demob; - Temporary pumping system; - Water discharged slowly with no impacts.	8	- Applies to source area groundwater; not entire plume - High degree of permanence; - Removal of the most contaminated zone (source area) of groundwater when combined with source-area soil removal;	8	- High degree of reduction in toxicity and volume of contaminants by removal of large amounts of source-area groundwater, when combined with source-area soils removal; - Little change to mobility of contaminants left in place.
GROUNDWATER	F	**In-situ Biological Treatment of Impacted Groundwater.**	**- Placement of electron donor material such as sodium lactate solution (for ERD of CVOCs) into source-area excavation and ground water plume area.** - **- Placement of gypsum in Petroleum source area for enhanced breakdown of petroleum compounds via sulfate-reducing bacteria.** - **- 1 yr of. quarterly and 2 yrs. of semi-annual groundwater quality monitoring for each RAOC.**	9	- Lactate and gypsum are harmless in the environment. - Likely short-term increase in TCE daughter-product VOCs, followed by rapid overall reduction of residual contaminant levels.	9	- Compliance with SCGs anticipated within relatively short time frame.	9	- Short-term ERD impacts may include a temporary increase in Vinyl Chloride or other TCE "daughter" products;	9	- Anticipated to effectively remove remaining residual VOCs in groundwater to levels below SCGs, with little to no long-term "rebound" effect. - Generally achieves cleanup to low contaminant concentration levels	8	Anticipated to be effective in reducing toxicity, mobility and volume of contaminant mass via breakdown of contaminant compounds to harmless byproducts through biodegradation.

Notes:
1 See text for more detailed discussion of criteria.

Table 1
Remedial Alternative Analysis Matrix

		Remedial Alternative	Description of Alternative	6 - Implementability		7a - Cost Effectiveness - Capital			7b - Cost Effectiveness - OM&M			8 - Community Acceptance (see CPP)		9 - Land Use		Overall (sum of all scores)		
				Score	Discussion	Score	Opinion of Probable Costs (OPC)[2]	Discussion	Score	Opinion of Probable Costs (OPC)[2]	Discussion	Score	Discussion	Score	Discussion	Total Score	Total Opinion of Probable Cost	Conclusions and recommendations
			Scoring System:	0 = Least implementable 10 = Most implementable		0 = Least cost effective 10 = Most cost effective			0 = Least cost effective 10 = Most cost effective			0 = Least accepted 10 = Most accepted		0 = Worst based on 15 criteria [1] 10 = Best based on 15 criteria [1]		0 = Worst overall 100 = Best overall		
	A	**No Action / Monitored Natural Attenuation (MNA)**	**- Assume 30 years of quarterly groundwater monitoring**	9	- Successful implementation depends largely on presence of natural organisms and processes that are degrading contaminants, and enforcement of institutional and engineering controls (i.e. fencing) to limit exposure to berm materials. - If natural degradation phenomena are observed, implementation would be straightforward, using existing monitoring well network or newly-installed monitoring wells.	7	$75,000	- Low capital costs consisting of supplemental monitoring well installation and maintenance of institutional /engineering controls (fence around Site).	2	$815,000	- Highest OM&M costs of all alternatives, due to the 30-year duration of monitoring program. And maintenence of institutional/ engineering (fence) controls.	1	- Community acceptance for MNA is anticipated to be low due to the lack of control of off-Site contaminant migration. - To be completed following review of public comments		- Historic, present and anticipated land use is commercial/industrial. - Engineering (fence) and Institutional controls, which are not currently in place, will be required at the Site under this alternative for an undetermined period of time. - Residential property to the north is downgradient with respect to groundwater flow.	**32**	**$890,000**	- Very costly alternative; - Least favorable alternative overall due to poor performance with the 'protection of human health and the environment', 'SCG', 'long-term effectiveness and permanence' and 'reduction of toxicity, mobility or volume' criteria. - Poor remedial 'value' : costs of this alternative approach versus that of an aggressive remedial program that is more likely to comply with regulatory agency requirements.
SOIL	B	**Source Area Soil Removal and Offsite Disposal.**	**Excavate/dispose Chlorinated VOC-contaminated source-area soil (RAOC-1).** - **Excavate/dispose Petroleum-contaminated source-area soil (RAOC-2).** - **Excavate/dispose Petroleum-contaminated source-area soil (RAOC-3).**	8	- High implementability - no specialty contractor or highly-technical equipment required. - Year-round implementation feasible.	6	$265,000	- Relatively moderate cost compared to in-situ methodology.	8	$53,000	- Reasonable OM&M costs due to relatively short monitoring period (assume ± 1 year).	9	- Anticipated to be high due to relatively quick and permanent nature of the method. - To be completed following review of public comments	9	- Historic, present and anticipated land use is commercial/industrial.	**81**	**$318,000**	Best alternative of those considered for chlorinated VOC- and Petroleum-impacted soil: High scores in all categories. Anticipated to be used in conjunction with a supplemental groundwater remedial method.
SOIL	C	**Engineering Controls: Covering Impacted Soil With Clean Soil**	**- Place one-ft-thick cover of clean soil (onsite or imported) over selected areas of potential impacted soil. Cover would include sufficient topsoil to support vegetation.** **- Seed cover with appropriate vegetative cover.** **- Maintain/repair cover as necessary.**	7	- High implementability - no specialty contractor, technical equipment/methods required. Utilizes on site soil and readily-obtainable imported topsoil for final cover material. - Year-round implementation feasible, but non-winter months preferable.	8	$135,000	Signifcantly lower cost than offsite disposal, high effectiveness.	9	$26,300	- Low OM&M costs, related primarily to periodic inspection and reporting. - Possible minor maintenance costs related to potential occasional cover material repair. - Assume 10 years of inspections (1 year of quarterly, 9 years of annual)	5	- Anticipated to be moderate due to low potential impacts and rapid implementation, but does not remove potental source. - To be completed following review of public comments	7	- Historic, present and anticipated land use is commercial/industrial. - Residential properties to the north are downgradient to groundwater flow.	**73**	**$161,300**	Favorable alternative for areas of potential impacted soil.
GROUNDWATER	D	**In-situ Chemical Oxidation (ISCO) of Impacted Groundwater**	**Introducing strong chemical oxidizers directly into groundwater to break down chemical contaminants in place.**	4	- Chemox additives are readily available. - Thorough groundwater chemistry understanding is critical and bench-scale testing would be required. - Requires specialized equipment, chemicals and experienced contractors. - Existing well network already in place in areas of concern, and supplemental wells would have to be installed; this would facilitate rapid implementation. - Typically requires multiple application events.	6	$650,000	- Capital cost associated with multiple applications of Chemox additives and installation of new monitoring wells is high.	7	$182,000	- OM&M activities include:Bench-scale testing and analyses; Baseline groundwater sampling/analysis; quarterly post-injection groundwater sampling and analysis; results reporting. - Cost assumes the likely need for supplemental application(s) of oxidizer chemical.	7	- The anticipated improvement of groundwater quality likely makes this alternative acceptable; - To be completed following review of public comments - Use of chemical is a negative aspect.	9	- Historic, present and anticipated land use is commercial/industrial. - Residential properties to the north are downgradient to groundwater flow.	**67**	**$832,000**	Very costly alternative; lower score than other groundwater alternatives that should achieve similar results.
GROUNDWATER	E	**Ex-situ Treatment/disposal of Source-area Groundwater.**	**Removal of source-area groundwater from excavation;** **On-site treatment and discharge; or offsite treatment.**	9	High degree of implementability: ready access to equipment and materials required (excavation, pumps and water storage equipment); - Carbon treatment system would require shipment back to manufacturer for 'regeneration.'	10	$47,000	Capital costs include short-term expenses: pump and tank rental, fuel, carbon treatment system, lab analyses and labor.	8	$0	O&M costs include post-remedial groundwater monitoring & reporting (See Alternative F for monitoring costs).	9	- Likely to be high due to positive scores on most categories; - To be completed following review of public comments	9	- Historic, present and anticipated land use is commercial/industrial. - Residential properties to the north are downgradient to groundwater flow.	**85**	**$47,000**	- Very favorable groundwater alternative (for source-area portion of impact) due to good overall performance; no low-scoring criteria.
GROUNDWATER	F	**In-situ Biological Treatment of Impacted Groundwater.**	**- Placement of electron donor material such as sodium lactate solution (for ERD of CVOCs) into source-area excavation and ground-water plume area.** **- 1 yr. of Quarterly groundwater quality monitoring.** - **- Placement of gypsum in Petroleum source area for enhanced breakdown of petroleum compounds via sulfate-reducing bacteria.** **- 1 yr of. Quarterly groundwater**	9	- Bench-scale test indicated site groundwater conditions favor effective ERD implementation for COVCs; - Bench-scale test indicated site groundwater conditions favor effective Petroleum breakdown by sulfate-reducing bacteria (with enhancement); - Existing well network already in place in areas of concern, some supplemental wells are required.	9	$14,000	- Capital cost associated with placement of lactate or gypsum materials is very low for open excavations. - Also includes installation of new monitoring wells.	8	$55,000	- OM&M activities include: Baseline groundwater sampling/analysis; Bench-scale testing; quarterly post-injection groundwater sampling and analysis; results reporting. - potential need for placement of supplemental lactate material.	9	- The anticipated rapid improvement of groundwater quality likely makes this alternative acceptable; - More rapid closure of site likely makes this alternative acceptable. - To be completed following review of public comments	9	- Historic, present and anticipated land use at the Site is commercial/ industrial; - Institutional controls, which are not currently in place, would be lessened due to greater compliance with SCGs; - Residential properties to the north are downgradient to groundwater flow.	**88**	**$69,000**	- Very favorable groundwater alternative due to good overall performance; no low-scoring criteria.

Notes:
1 See text for more detailed discussion of criteria.

Former Allegany Bitumens Belmont Asphalt Plant
Alternative Analysis Report

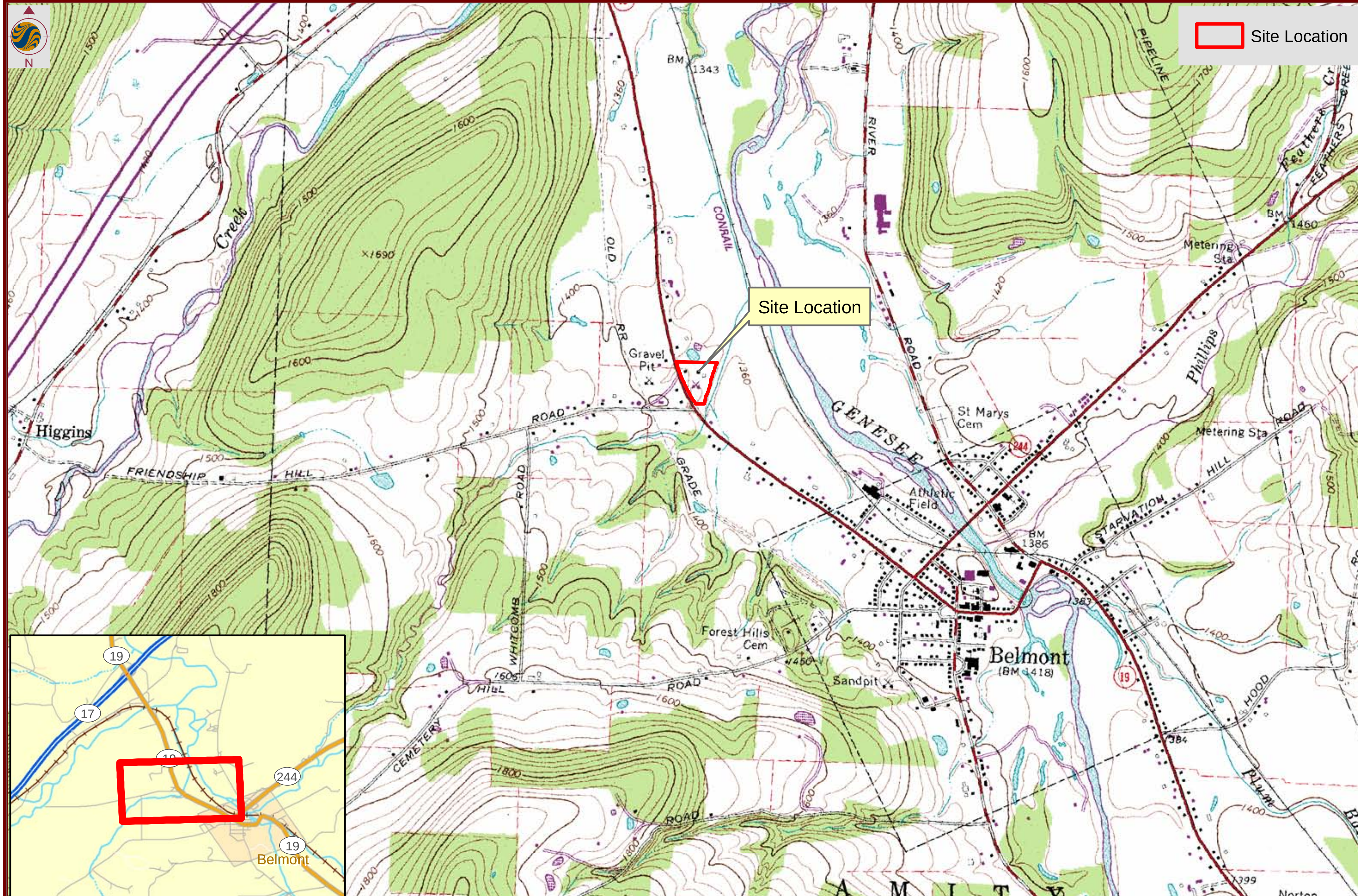
Table 2
Summary of Completed Remedial Actions

Remedial Area of Concern	Impacted Media		Completed Remedial Action (IRMs) (see note 1)				
	Soil	Ground-water	Source Area Soil Removal	Groundwater Extraction and Ex-situ Treatment	In Situ Groundwater Treatment	Groundwater Quality Monitoring	Debris Removal & Disposal
RAOC-1 (Former Lab Bldg.)	x	x	x	x	x	x	
RAOC-2 (Borings B-27 & B31 Area)	x		x				
RAOC-3 (Former Asphalt Tank Area)	x	x	x	x	x	x	
RAOC-4 (Berms)	- -	- -					x

Notes:
1. IRMs = Interim Remedial Measures completed during September 2011 - January 2011, and April 2012.

FIGURES

This map may contain data from a variety of sources. This map is not intended to replace a survey by a Licensed Surveyor. Stantec does not certify the accuracy of the data. This map is for reference only and should not be used for construction.



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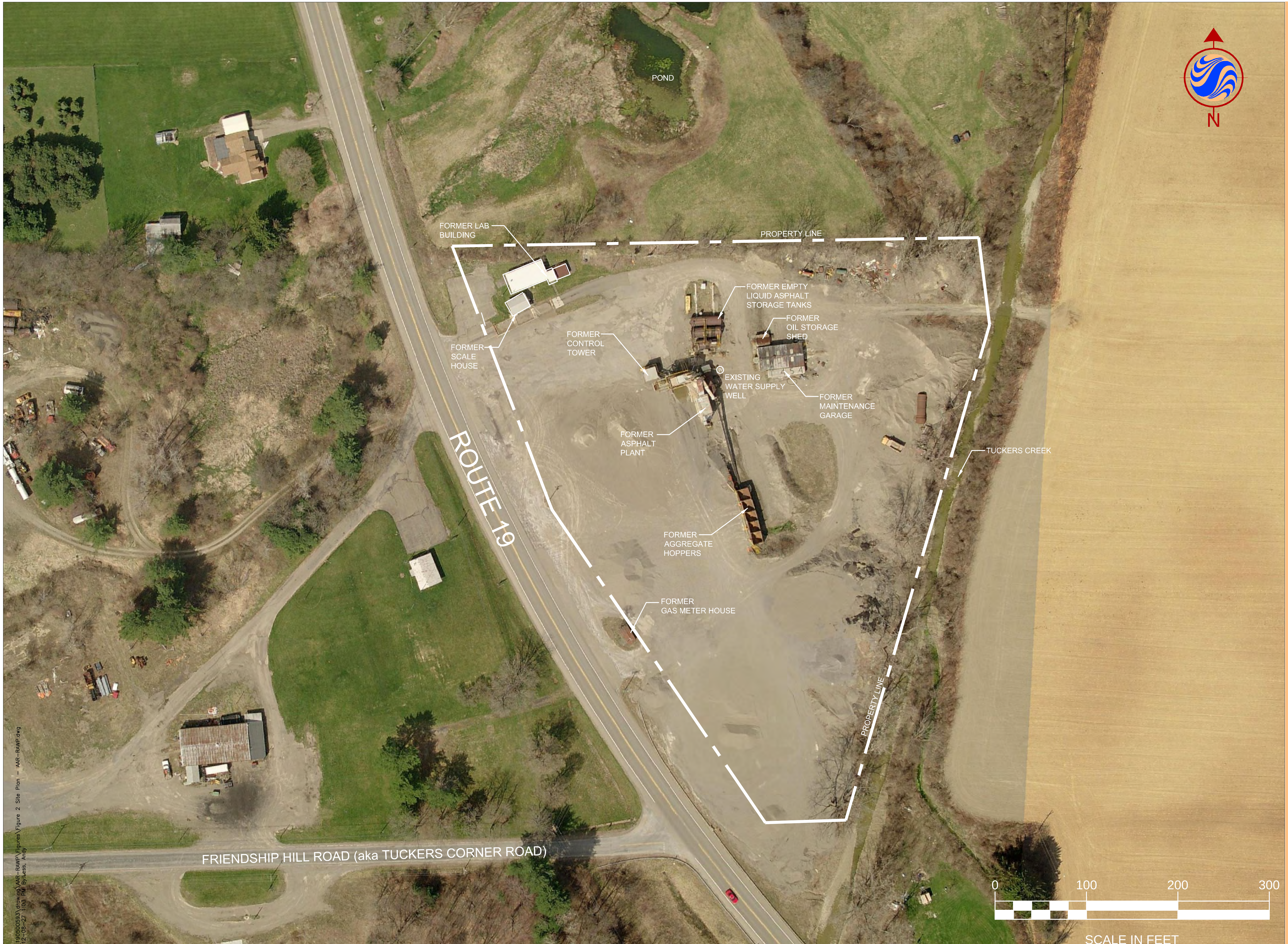
1 inch = 2,000 feet

0 1,000 2,000 4,000 Feet

Allegany Bitumens Belmont Asphalt Plant Site

FIGURE 1 : Site Location Map Showing USGS Topographic Information



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Consultants

Legend

Notes

1. MAP REFERENCE : INFORMATION ON THIS MAP IS REFERENCED FROM MAP ENTITLED "PLAN OF LANDS OWNED BY: ALLEGANY BITUMENS, INC , SITUATE IN THE TOWN OF AMITY, COUNTY OF ALLEGANY, STATE OF NEW YORK, AND BEING A PORTION OF GREAT LOT # 18, TOWNSHIP #3, RANGE #2 OF THE ROBERT MORRIS RESERVE.

2. AERIAL MAPPING OBTAINED FROM PICTOMETRY ONLINE 1.10.1 PICTOMETRY INTERNATIONAL CORP DATED 04–19–2006.

3. ALL SITE STRUCTURES AND EQUIPMENT HAVE NOW BEEN DEMOLISHED AND / OR REMOVED.

Issued	By	Appd.	YY.MM.DD
AAR/RAWP	RJM	MPS	12.06
IRM WORK PLAN	RJM	MPS	11.08
RI REPORT	SRS	MPS	11.07

File Name: Figure 2 Site Plan – AAR–RAWP

Permit-Seal

Project/ Client

ALLEGANY BITUMENS
BELMONT ASPHALT PLANT

ALTERNATIVE ANALYSIS REPORT /
REMEDIAL ACTION WORK PLAN

BLADES HOLDING COMPANY, INC.

Title

SITE PLAN

Project No. 190500593

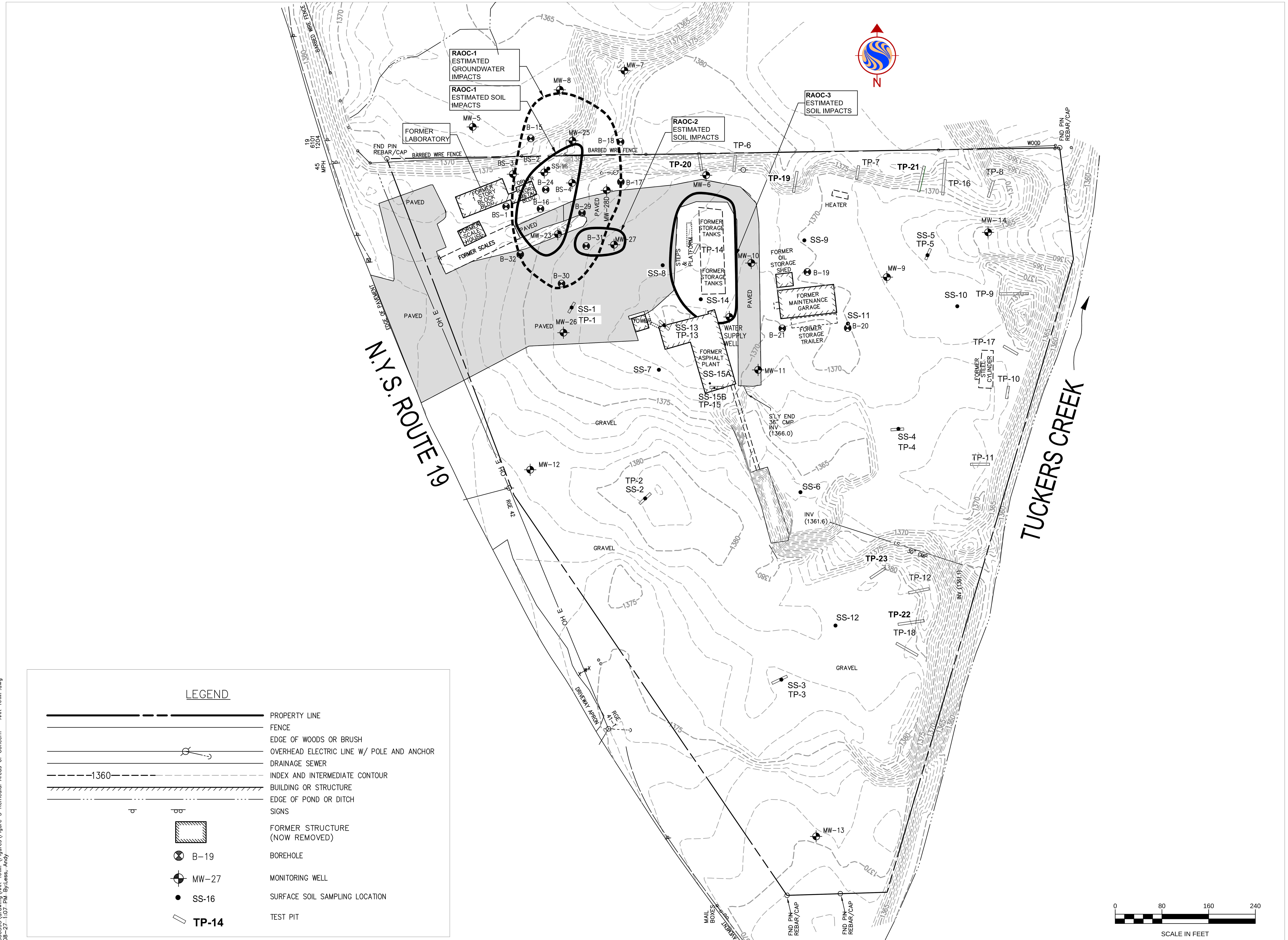
Scale AS SHOWN

Drawing No. Figure 2

Sheet of

Revision

ORIGINAL SHEET – 22 X 34



U:\190500593\drawing\AAR-RAWP\Figures\Figure 3 Remedial Areas of Concern – AAR-RAWP.dwg
2012-08-27 1:07 PM By: Less, Andy

ORIGINAL SHEET – 22 X 34

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Legend

ESTIMATED LIMIT OF SOIL IMPACT
ESTIMATED LIMIT OF GROUNDWATER IMPACT
RAOC REMEDIAL AREA OF CONCERN

Notes

1. RAOC LIMITS ARE SHOWN AS ESTIMATED IN INTERIM REMEDIAL MEASURE WORK PLAN.
2. SEE FIGURE 4 FOR RAOC-4 LIMITS.

Revision	By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD
AAR/RAWP	RJM	MPS	12.06
FOR REVIEW	RJM	MPS	11.02.08

File Name: Figure 3 Remedial Areas of Concern – AAR-RAWP.dwg — Dwn. Chkd. Dsgn. YY.MM.DD

Permit-Seal

Project/ Client

ALLEGANY BITUMENS
BELMONT ASPHALT PLANT

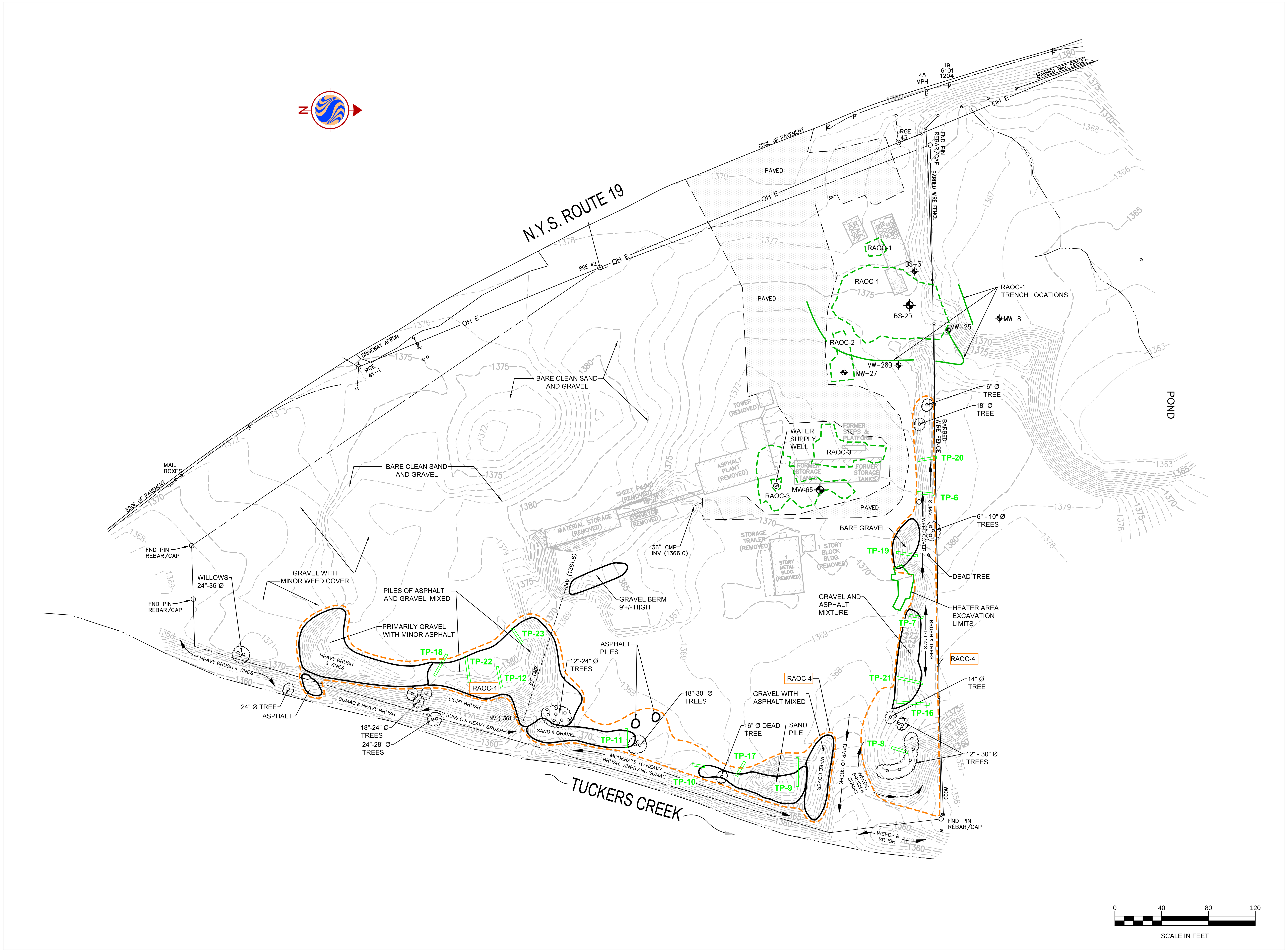
ALTERNATIVE ANALYSIS REPORT /
REMEDIAL ACTION WORK PLAN

BLADES HOLDING COMPANY, INC.

Title

GENERALIZED SITE PLAN WITH ESTIMATED RAOC-1 THROUGH RAOC-3 LIMITS

Project No.	Scale	
190500593	AS SHOWN	
Drawing No.	Sheet	Revision
Figure 3	1 of 1	0



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Notes

1. SITE BOUNDARY INCLUDES ADDITIONAL PARCEL ADDED TO EASTERN SIDE OF SITE.
2. ALL BUILDINGS HAVE BEEN DEMOLISHED AND REMOVED.

Revision	By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD
AAR / RAWP	RJM	MPS	12.06

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Project/ Client

ALLEGANY BITUMENS
BELMONT ASPHALT PLANT

ALTERNATIVE ANALYSIS REPORT / REMEDIAL ACTION WORK PLAN

BLADES HOLDING COMPANY, INC.

Title

RAOC - 4 : SOIL BERMS

Project No. 190500593 | Scale 1"=40'

Drawing No. Figure 4 | Sheet of | Revision

This map may contain data from a variety of sources. This map is not intended to replace a survey by a Licensed Surveyor. Stantec does not certify the accuracy of the data. This map is for reference only and should not be used for construction.

Features as Performed During IRM

- Excav. Bottom/Sidewall Confirm. Samp. Loc.
- Preliminary Screening Samples
- Dry Well
- Boring and Sampling Location
- Boring Location
- Confirmatory Test Pits
- Approximate Slab Limits
- Boring for IRM Benchscale Testing
- Boring for IRM Waste Sampling
- Former Septic Tank
- Erosion Control Fences
- Excavation Limits - Spring 2012
- Excavation Limits - Fall-Winter 2011

Well Locations

- Monitoring Well
- Abandoned Monitoring Well Location
- Water Supply Well

Site Features

- Approximate Property Boundary
- Former Asphalt Storage Tank Cradles

GENERAL NOTES:

1. "RAOC" - INDICATES REMEDIAL AREA OF CONCERN IDENTIFIED DURING BROWNFIELD INTERIM REMEDIAL MEASURES.

2. FEATURES & SAMPLING LOCATIONS SURVEYED WITH A TRIMBLE GEOXT 6000 GPS UNIT. LOCATIONS ARE APPROXIMATE TO THE EXTENT DICTATED BY THE UNIT'S MARGIN OF ERROR.

3. BACKGROUND PHOTO IMAGE SHOWS EQUIPMENT AND STRUCTURES THAT HAVE NOW BEEN DEMOLISHED AND REMOVED.

Geographic Information Systems

Cartographic Design By: Andy Less

Date: 8/27/2012

Path: U:\190500593\drawing\AAR-RAWP\Figures\Fig 5-Excavation Limits-AAR-RAWP

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1 inch = 20 feet

0 20 40 80 Feet

Figure 5: RAOC-1 through RAOC-3 and Heater Area IRM Excavation Limits
Alternatives Analysis Report / Remedial Action Work Plan
Former Allegany Bitumens Belmont Asphalt Plant Site

Geographic Information Systems

Cartographic Design By: Andy Less

Date: 8/27/2012

Path: U:\190500593\drawing\AAR-RAWP\Figures\Fig 6 Heater Remmedial Area - AAR

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1 inch = 10 feet

0 5 10 20 Feet

Figure 6 : Heater Remedial Area

Alternative Analysis Report / Remedial Action Work Plan

Former Allegany Bitumens Belmont Asphalt Plant Site

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Notes

SURVEY NOTES:

1. THE HORIZONTAL DATUM SHOWN HEREON IS REFERENCED TO THE NEW YORK STATE PLANE COORDINATE SYSTEM, WESTERN ZONE, TRANSVERSE MERCATOR PROJECTION, NAD83(CORS96) BY GPS OBSERVATIONS.
2. THE VERTICAL DATUM SHOWN HEREON IS REFERENCED TO THE NORTH AMERICAN DATUM OF 1988 BY GPS OBSERVATIONS.
3. PROPERTY LINES SHOWN HEREON ARE TAKEN FROM A SURVEY MAP PREPARED BY B&R SURVEYING, P.L.L.C, ENTITLED "PLAN OF LANDS OWNED BY ALLEGANY BITUMENS, INC." NOVEMBER 16, 2009 AND HAVING JOB NUMBER 09-067.& FUTURE PROPERTY ACQUISITION.

Revision	By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD
1. ISSUED FOR REVIEW	MDF	TMP	12.06.04

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ALLEGANY BITUMENS
BELMONT ASPHALT PLANT

ALTERNATIVE ANALYSIS REPORT / REMEDIAL ACTION WORK PLAN

BLADES HOLDING COMPANY, INC.

Title

PROPOSED FINAL SITE GRADING PLAN

Project No. 190500593
Scale 1" = 40'

Drawing No. FIG. 7
Sheet 1 of 2
Revision 0

NOTE TO CONTRACTOR:
1. SEE SHEET C 501 FOR ADDITIONAL NOTES AND DETAILS
2. MAINTAIN EROSION AND SEDIMENTATION CONTROL FEATURES UNTIL STABILIZED.
3. SEE C 501 FOR ADDITIONAL NOTES AND DETAILS.

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ORIGINAL SHEET – 22 X 34

ENVIRONMENTAL NOTES:

1. WORK TO BE PERFORMED PURSUANT TO A NYSDEC BROWNFIELD CLEANUP AGREEMENT (BCA) AND THE NYSDEC APPROVED REMEDIAL WORK PLAN (RWP). ALL PROVISIONS OF THE NYSDEC APPROVED RWP WILL NEED TO BE FOLLOWED INCLUDING, BUT NOT LIMITED TO, HEALTH AND SAFETY, COMMUNITY AIR MONITORING PLAN, PROPER DISPOSAL AND DOCUMENTATION OF ALL WASTES TAKEN OFF SITE, AND PLACEMENT IMPORTED CLEAN TOPSOIL IN DESIGNATED AREAS.

2. ALL IMPORTED SOIL SHALL BE TESTED AND CERTIFIED CLEAN PURSUANT TO THE REQUIREMENTS OF NYSDEC DER-10 DOCUMENT.

3. CONTRACTOR SHALL PROVIDE A MINIMUM OF SEVEN (7) DAYS ADVANCE NOTICE TO OWNER PRIOR TO START OF CONSTRUCTION.

4. ALL WORK MUST BE COMPLETED WITHIN 30 DAYS OF COMMENCEMENT.

5. PROPER DOCUMENTATION OF ALL IMPORTED AND EXPORTED MATERIALS (i.e. WEIGH TICKETS, BILLS OF LADING, MANIFESTS, ETC.) MUST BE PROVIDED TO THE OWNER OR THEIR REPRESENTATIVE WITHIN SEVEN (7) DAYS OF THE COMPLETION OF WORK.

6. LARGE (GREATER THAN TWO (2) FEET IN DIAMETER) SURFACE DEBRIS AND LARGE SUB-SURFACE DEBRIS (i.e. ASPHALT, MUNICIPAL SOLID WASTE, STEEL, ETC.) SHALL BE SEGREGATED AND PROPERLY DISPOSED OFF-SITE.

GENERAL NOTES:

1. THE INTENT OF THE PLAN IS TO BALANCE CUT AND FILL TO THE EXTENT PRACTICAL. IMPORTED FILL SHALL BE LIMITED TO CLEAN TOPSOIL. SURPLUS MATERIAL RESULTING FROM ADDITIONAL SITE GRADING SHALL BE USED TO FLATTEN BERM SLOPES AND/OR LENGTHEN BERMS. CONTRACTOR TO NOTIFY OWNER'S REPRESENTATIVE 48 HOURS PRIOR TO INCREASING OR DECREASING THE SIZE OF THE BERMS.

2. SITE WORK TO INCLUDE CLOSURE IN PLACE OF THE EXISTING 30" CMP LOCATED IN THE CENTRAL EASTERN AREA OF THE PROPERTY AND REMOVAL AND DISPOSAL OF THE EXISTING 36" CMP LOCATED IN THE CENTRAL AREA OF THE PROPERTY.

3. ALL DEBRIS AND SOILS DERIVED FROM THE CONTRACTOR'S OPERATIONS FOUND IN THE ACCESS ROADWAYS OR CAUSING NUISANCE TO OPERATIONS SHALL BE CLEANED AND REMOVED ON A DAILY BASIS OR WHEN NOTIFIED BY THE OWNER OR OWNER'S REPRESENTATIVE.

4. THE CONTRACTOR SHALL LOCATE, MARK, SAFEGUARD AND PRESERVE ALL SURVEY CONTROL MONUMENTS AND R.O.W. MONUMENTS IN THE AREAS OF CONSTRUCTION.

5. CAUTION - NOTICE TO CONTRACTOR: THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES AND, WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. THE CONTRACTOR SHALL MAKE EXPLORATION EXCAVATIONS TO LOCATE EXISTING UNDERGROUND UTILITIES SUFFICIENTLY AHEAD OF CONSTRUCTION TO PERMIT REVISIONS AS REQUIRED TO MEET EXISTING CONDITIONS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.

6. THE DRAWINGS ARE INTENDED TO REQUIRE AND TO INCLUDE ALL LABOR, MATERIAL AND EQUIPMENT PROPER FOR THE WORK.

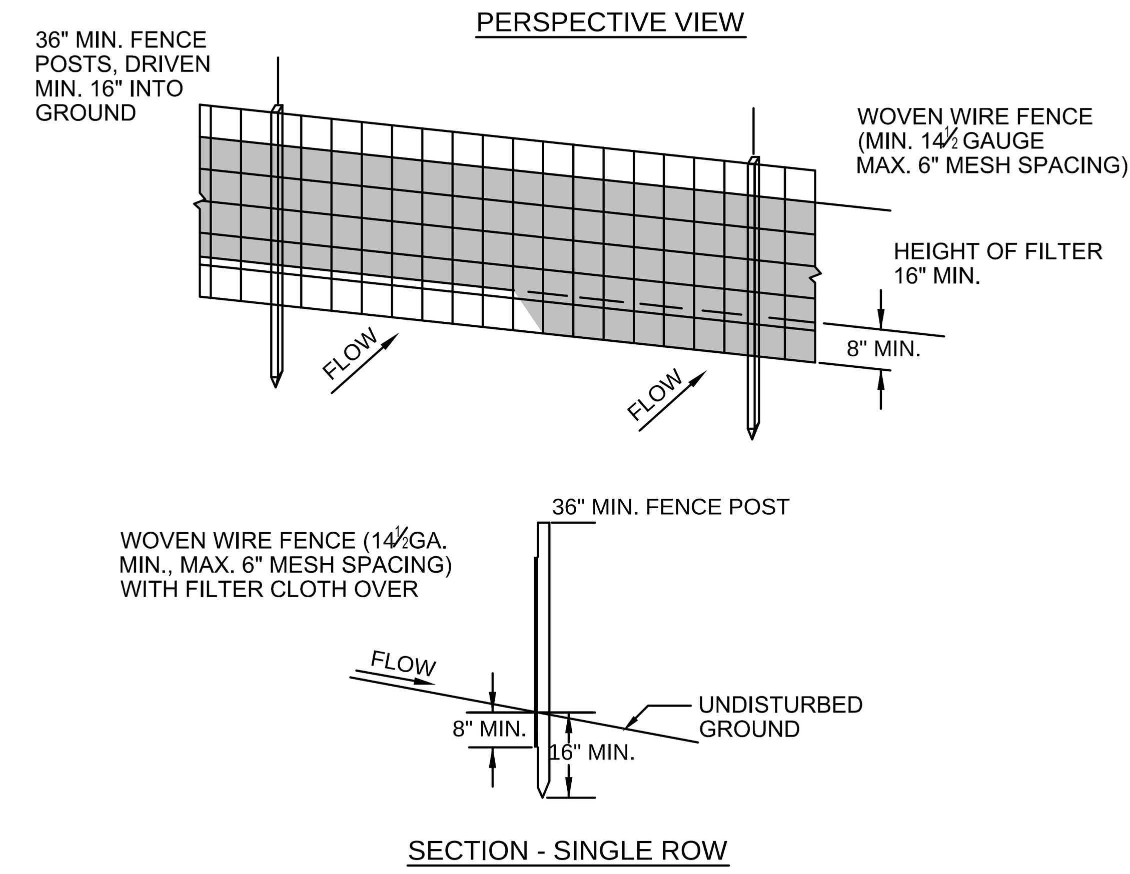
7. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND SAFETY PROCEDURES. THE OWNER/ENGINEER SHALL NOT BE RESPONSIBLE FOR THE ACTS OR OMISSIONS OF THE CONTRACTOR OR THEIR AGENTS, EMPLOYEES OR ANY OTHER PERSONS PERFORMING ANY OF THE WORK.

8. OBSERVE ALL OSHA AND OTHER APPLICABLE SAFETY REQUIREMENTS INCLUDING THE USE OF SAFETY GLASSES, HARD HATS AND PROTECTION OF AREA WHEN WORKING OVERHEAD. THE CONTRACTOR SHALL ASSUME RESPONSIBILITY FOR CONSTRUCTION SAFETY AT ALL TIMES.

9. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPAIR ANY DAMAGE DONE TO EXISTING FEATURES AS A RESULT OF THIS WORK. DAMAGED ITEMS SHALL BE REPLACED IN KIND AND AT NO ADDITIONAL COST TO THE OWNER/OWNER'S REPRESENTATIVE.

10. SPECIFIC ATTENTION MUST BE GIVEN TO PROTECT, PRESERVE AND MAINTAIN THE EXISTING WATER SUPPLY WELL AND EXISTING MONITORING WELLS.

11. CONTRACTOR TO PRESERVE EXISTING VEGETATION TO THE EXTENT PRACTICAL AT ALL TIMES DURING CONSTRUCTION. ALL EXISTING VEGETATION THAT IS REMOVED AS PART OF CONSTRUCTION ACTIVITIES SHALL BE DISPOSED OF TO A FACILITY APPROVED BY THE OWNER OR OWNER'S REPRESENTATIVE.



CONSTRUCTION NOTES FOR FABRICATED FENCE

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE WITH WIRE TIES OR STAPLES
2. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER, THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED
4. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE
   POSTS: STEEL EITHER T OR U TYPE OR 2" HARDWOOD
   FENCE: WOVEN WIRE, 14 GA. 6" MAX. MESH OPENING FILTER
   CLOTH: FILTER X, MIRAFI 100X, OR APPROVED
   EQUAL PREFABRICATED UNIT: ENVIROFENCE, OR APPROVED EQUAL

1 / C 501 SILT FENCE
N.T.S.

EROSION CONTROL NOTES:

1. ALL SITE WORK SHALL CONFORM TO THE CLEARING, STRIPPING AND EROSION CONTROL REQUIREMENTS OF THE NYSDEC.

2. CONTRACTOR TO PROVIDE, INSTALL AND MAINTAIN ALL REQUIRED EROSION CONTROL MEASURES THROUGHOUT CONSTRUCTION.

3. ALL EROSION CONTROL SHALL BE IN ACCORDANCE WITH THE NEW YORK STATE MANUAL FOR URBAN EROSION AND SEDIMENT CONTROL.

4. EROSION CONTROL DEVICES TO BE ESTABLISHED PRIOR TO COMMENCING EARTHWORK, EROSION CONTROL DEVICES TO BE MAINTAINED BY THE CONTRACTOR UNTIL UPSTREAM GROUNDCOVER HAS BEEN STABILIZED AND REMOVAL IS APPROVED BY THE OWNER'S REPRESENTATIVE.

5. CONTRACTOR SHALL TAKE THE NECESSARY MEASURES TO COMPLY WITH THE BCA/RWP COMMUNITY AIR MONITORING PLAN, INCLUDING WATER SPRINKLING, TO PROVIDE DUST CONTROL DURING CONSTRUCTION.

6. SEDIMENT BARRIERS (SILT FENCE, STRAW BALES OR APPROVED EQUAL) SHALL BE INSTALLED PRIOR TO ANY GRADING WORK ALONG THE LIMITS OF DISTURBANCE AND SHALL BE MAINTAINED FOR THE DURATION OF THE WORK. NO SEDIMENT FROM THE SITE SHALL BE PERMITTED TO WASH ONTO ADJACENT PROPERTIES, WATERWAYS OR ROADS.

7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF ALL TEMPORARY EROSION CONTROL FEATURES THROUGHOUT THE DURATION OF CONSTRUCTION. CONTRACTOR SHALL REMOVE AND DISPOSE EXISTING SILT FENCE ON THE PROPERTY OR RE-USE TO MEET PROPOSED PLAN REQUIREMENTS IF THE FENCE IS IN SUITABLE CONDITION TO MEET THE REQUIREMENTS AND CONDITIONS WITHIN.

   A. ALL SEDIMENT SHALL BE REMOVED FROM BEHIND SILT FENCE WHEN IT ACCUMULATES TO A MAXIMUM HEIGHT OF 6" DEEP AT THE FENCE UNLESS OTHERWISE DIRECTED.

   B. SEDIMENT COLLECTED BY EROSION CONTROL MEASURES SHALL BE DISPOSED OF BY SPREADING ON-SITE OR HAULED AWAY IF DETERMINED TO BE UNSUITABLE FOR FILL.

   C. CONTRACTOR SHALL REMOVE AND DISPOSE OF THE SILT FENCE AND SEDIMENT UPON FINAL COMPLETION OF THE WORK.

LANDSCAPING NOTES:

1. TOPSOIL: CONSIST OF FERTILE, NATURAL AGRICULTURAL SOIL SUBSTANTIALLY FREE OF SUBSOIL AND FREE FROM STUMPS, ROOTS, BRUSH, STONE, CLAY LUMPS OR SIMILAR OBJECTS LARGER THAN TWO INCHES IN THE GREATEST DIAMETER.

3. STEEP SLOPE SEED MIX:

SEED MIX B: STEEP SLOPES
(Rate: 6 lbs. per 1,000 SF)
65% KENTUCKY 31 TALL FESCUE
10% RED TOP
25% EMPIRE BIRDSFOOT TREFOIL
(w/4 x Inoculant, if Hydroseeding)

4. APPLY STARTER FERTILIZER 18-24-12 WITH 50% SLOW RELEASE NITROGEN AT THE RATE OF 6 LBS. PER 1,000 SF. MULCH WITH STRAW AT A RATE OF 75 LB./1,000 SF IMMEDIATELY FOLLOWING SEEDING OPERATIONS. IF HYDROSEEDING, APPLY WOOD FIBER CELLULOSE MULCH AT A RATE OF 1,200 LBS. PER ACRE. IN AREAS WITH SLOPES, USE A NON-ASPHALTIC TACKING EMULSION AT MANUFACTURER'S RECOMMENDED RATES (TO ANCHOR SEED AND MULCH. WATER ALL SEEDED AREAS THOROUGHLY AND IMMEDIATELY WITH A FINE MIST UNTIL SOIL IS SOAKED TO A DEPTH OF THREE INCHES.

5. MAINTENANCE AND ACCEPTANCE:

A. ALL SEEDED AREAS SHALL BE WATERED AND MAINTAINED UNTIL A HEALTHY, DENSE, MOWABLE STAND OF GRASS IS ESTABLISHED. TURN OVER TO OWNER AFTER TWO MOWINGS.

B. RE-SEED LAWNS IN UNHEALTHY CONDITION FOR THE FIRST YEAR AFTER INITIAL HYDROSEEDING.

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1. ISSUED FOR REVIEW	MDF	TMP	12.06.04

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Project/ Client

ALLEGANY BITUMENS
BELMONT ASPHALT PLANT

ALTERNATIVE ANALYSIS REPORT / REMEDIAL ACTION WORK PLAN

BLADES HOLDING COMPANY, INC.

Title

NOTES AND DETAILS

Project No.	Scale
190500593	

Drawing No.	Sheet	Revision
FIG. 8	2 of 2	0

APPENDIX A

Alternatives Analysis –
Estimated Cost Details

Remedial Alternatives Cost Summary

		Remedial Alternative	Description of Alternative	Capital	OM&M	Total
	A	No Action / Monitored Natural Attenuation (MNA)	- Assume 30 years of annual groundwater monitoring	$46,600	$815,000	**$861,600**
SOIL	B	Source Area Soil Removal and Offsite Disposal.	Excavate/dispose Chlorinated VOC- and Petroleum-contaminated source-area soils.	$265,000	$53,000	**$318,000**
SOIL	C	Engineering Controls: Capping Impacted Soil With Clean Soil	- Place one-ft-thick cover of clean soil over sleected areas of known shallow soil contamination. Cover would include sufficient topsoil to support vegetation. - Seed cover with appropriate vegetative cover. - Maintain/repair cover as necessary.	$135,000	$26,300	**$161,300**
GROUNDWATER	D	In-situ Chemical Oxidation (ISCO) of Impacted Groundwater	Introducing strong chemical oxidizers directly into groundwater to break down chemical contaminants in place.	$625,000	$182,000	**$807,000**
GROUNDWATER	E	Ex-situ Treatment/Disposal of Source-area Groundwater.	Removal of source-area groundwater from excavation; On-site treatment and discharge; or offsite treatment.	$47,000	$0	**$47,000**
GROUNDWATER	F	In-situ Biological Treatment of Impacted Groundwater.	- Placement of electron donor material such as sodium lactate solution (for ERD of CVOCs) into source-area excavation and ground-water plume area. - Placement of gypsum in Petroleum source area for enhanced breakdown of petroleum compounds via sulfate-reducing bacteria. - Quarterly groundwater quality monitoring.	$17,400	$55,000	**$72,400**

Notes:
1. See attached cost summary sheets for more detailed breakdown of costs for each alternative.
2. Groundwater monitoring included for each individual altermnative. Combining alternatives will result in reduced monitoring costs.

Former Allegany Bitumens Asphalt Plant
Brownfield Cleanup Program
Alternatives Analysis Report

Remedial Alternative Cost Estimate Detail

Alternative A: No Action (Monitored Natural Attenuation)

		Cost Totals
I. Capital Costs		
Assumptions:		
- Fence entire site; install 'No Trespassing' signage.		
- Install eight 2-in. diameter monitoring wells.		
Costs:		
- Fence Installation (~ 2,000 LF x $12.50 per LF)		$25,000
- Well Installation (8 wells x $2,700 per well)		$21,600
	Capital Costs Subtotal	***$46,600***

II. Operation, Monitoring and Maintenance (OM&M)

Assumptions:		
- 30 year monitoring period; quarterly sampling of eight wells		
- Analyses include VOCs, SVOCs, MNA parameters, field parameters		
- low-flow sampling methodology		
- quarterly report preparation		
- Periodic fence repair required		
Costs:		
- Fence Maintenance and Repair (5 repair events x $3,000 per event)		$15,000
- Sampling Events: 120 events x 6,000/event		$800,000
	OM&M Costs Subtotal	***$815,000***
	Remedial Alternative A. Total	***$861,600***

Former Allegany Bitumens Asphalt Plant
Brownfield Cleanup Program
Alternatives Analysis Report

Remedial Alternative Cost Estimate Detail

Alternative B: Source Area Soil Removal / Offsite Disposal

		Cost Totals
I. Capital Costs		
Assumptions:		
- RAOC-1, RAOC-2, RAOC-3		
- 2,900 +/- tons of impacted soil (CVOCs or Petroleum)		
- Non-hazardous material		
- backfill with clean soil		
- Used in conjunction with other groundwater remediation technologies		
Costs:		
- Contractor Costs		$160,000
- Oversight and Reporting Costs		$90,000
- Laboratory Costs		$15,000
	Capital Costs Subtotal	***$265,000***
II. Operation, Monitoring and Maintenance (OM&M)		
Assumptions:		
- One year of quarterly groundwater monitoring (RAOC-1 and RAOC-3) for 8 wells; followed by two years of semi-annual sampling.		
- Analyses include VOCs, SVOCs, MNA parameters, field parameters.		
- low-flow sampling methodology		
- quarterly/semi-annual report preparation		
Costs:		
- Inspection, sampling and reporting costs (8 events x $6,000 per event)		$48,000
- Laboratory Costs		$5,000
	OM&M Costs Subtotal	***$53,000***
	Remedial Alternative B. Total	***$318,000***

Former Allegany Bitumens Asphalt Plant
Brownfield Cleanup Program
Alternatives Analysis Report

Remedial Alternative Cost Estimate Detail

Alternative C: Placement of a Clean Soil Cover

	Cost Totals
I. Capital Costs	
Assumptions:	
- Cover employed in perimter berm areas	
- Cover placed over an area of approx. 24,000 sq ft.	
- Cover to consist of 6-in of clean on-site soil and 6-in of imported topsoil.	
- Up to approx. 5,000 cy of berm soil regraded prior to placing cover	
- Hydroseed and establish vegetative cover	
- Erosion and sedimentation control (ESC) measures required	
Costs:	
- ESC/Regrading/6" clean soil placed	$39,424
- Import/place 6" topsoil (approx. 450 cy x $17 per cy)	$7,260
- Seed/mulch (24,000 sq ft)	$52,140
- Oversight and reporting costs	$36,176
Capital Costs Subtotal	***$135,000***
II. Operation, Monitoring and Maintenance (OM&M)	
Assumptions:	
- Quarterly Inspections for 1 year, annual inpections for 9 years	
- Quarterly/Annual Reporting	
- Periodic cover repair/seeding/mulching required	
Costs:	
- Periodic Inspections and reporting (13 events x $1,500 per event)	$19,500
- Periodic Maintenance	$6,800
OM&M Costs Subtotal	***$26,300***
Remedial Alternative C. Total	***$161,300***

Former Allegany Bitumens Asphalt Plant
Brownfield Cleanup Program
Alternatives Analysis Report

Remedial Alternative Cost Estimate Detail

Alternative D: InSitu Chemical Oxidation in Groundwater

	Cost Totals
I. Capital Costs	
Assumptions:	
- Application of Permanganate or other appropriate oxidizer in RAOC-1	
- Combined with source-area soil removal	
- Installation of eight monitoring wells	
- Need for supplemental oxidizer application is likely	
Costs:	
- Contractor costs	$440,000
- Oversight and reporting costs	$160,000
- Laboratory Costs	$25,000
Capital Costs Subtotal	***$625,000***

II. Operation, Monitoring and Maintenance (OM&M)

Assumptions:	
- Bench-scale testing and baseline GW sampling needed to determine appropriate chemical applications	
- Quarterly monitoring for one year, followed by 2 years of semi-annual monitoring	
- Analyses include VOCs, SVOCs, MNA parameters, field parameters.	
- low-flow sampling methodology	
- quarterly/semi-annual report preparation	
Costs:	
- Baseline sampling and bench testing	$80,000
- Sampling and reporting costs (8 events x $6,000 per event)	$48,000
- Laboratory Costs	$54,000
OM&M Costs Subtotal	***$182,000***

Remedial Alternative D. Total ***$807,000***

Remedial Alternative Cost Estimate Detail

Alternative E: Groundwater Ex-Situ Treatment/Disposal

Cost Totals

I. Capital Costs

Assumptions:
- Source-area groundwater pumped to on-site storage tanks
- CVOC-impacted water (approx. 37,000 gal.) treated on site with Granular Activated Carbon
- Petroleum-imacted water (approx. 10,500 gal.) disposed offsite

Costs:

- Tank Rental	$14,000
- Pumping Equipment and GAC System	$5,800
- Onsite Treatment/discharge	$4,500
- Vacuum Truck & Offsite Disposal	$11,000
- Oversight, obtain approval to discharge	$10,100
- Laboratory Costs	$1,600
Capital Costs Subtotal	***$47,000***

II. Operation, Monitoring and Maintenance (OM&M)

Assumptions:
- OM&M Not Applicable

Costs:

- None	$0
OM&M Costs Subtotal	***$0***

Remedial Alternative E. Total $47,000

Remedial Alternative Cost Estimate Detail

Alternative F: Groundwater In-Situ Bioremediation

	Cost Totals
I. Capital Costs	
Assumptions:	
- Combined with source-area soil removal	
- Enhanced Reductive Dechlorination (using sodium lactate) for CVOCs in RAOC-1	
- Lactate placed in source-area excavation and plume-area trenches	
- Sulfate Reducing Bacteria (using agricultural Gypsum) for Petroleum COCs in RAOC-3	
- Installation of 2 new monitoring wells	
Costs:	
- Sodium Lactate material (~ 1,800 lbs. x 1.26 per lb. plus shipping)	$3,000
- Tank/pump/mixing equipment	$500
- Gypsum material (~ 28 Ton x $59 per ton, plus shipping)	$3,000
- Material Application	$1,500
- Well installation (2 wells x $2,700)	$5,400
- Oversight & Reporting	$4,000
Capital Costs Subtotal	***$17,400***
II. Operation, Monitoring and Maintenance (OM&M)	
Assumptions:	
- ERD Bench testing required	
- 1 year of quarterly monitoring, 2 years of semi-annual monitoring	
- Low-flow sampling methodology	
Costs:	
- ERD Bench Testing Implementation	$6,000
- ERD Laboratory Costs	$1,000
- Groundwater Monitoring (8 sampling events x $6,000 per event)	$48,000
OM&M Costs Subtotal	***$55,000***
Remedial Alternative F. Total	***$72,400***

APPENDIX B

Health and Safety Plan

APPENDIX B

HEALTH AND SAFETY PLAN
REMEDIAL ACTION WORK PLAN
FORMER ALLEGANY BITUMENS BELMONT ASPHALT PLANT
5392 STATE ROUTE 19
TOWN OF AMITY, ALLEGANY COUNTY, NEW YORK

August 2012

Prepared for:

NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION
270 MICHIGAN AVENUE
BUFFALO, NEW YORK 14203

Prepared on Behalf of:

BLADES HOLDING COMPANY, INC.
P.O. BOX 12
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Prepared by:

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Stantec

TABLE OF CONTENTS

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1.0 INTRODUCTION

The following Health and Safety Plan (HASP) describes personal safety protection standards and procedures to be followed by Stantec staff during planned Remedial Action activities at the Former Allegany Bitumens Belmont Asphalt Plant site located in the Town of Amity, Allegany County, New York (Figure 1). This work will potentially include:

- oversight of
  - soil excavation and grading; and
  - potential transportation off-site of excavated materials.
- subsurface soil sampling from excavations (if impacted material is encountered);

This HASP establishes mandatory safety procedures and personal protection standards pursuant to the Occupational Safety and Health Administration (OSHA) regulations 29 Code of Federal Regulations (CFR) 1910.120. The HASP applies to all Stantec personnel conducting any site work, as defined in 29 CFR 1910.120(a). All personnel involved in the mentioned activities must familiarize themselves with this HASP, comply with its requirements and have completed the required health and safety training and medical surveillance program participation pursuant to 29 CFR 1910.120 prior to beginning any work on site.

THIS HASP IS FOR THE EXPRESS USE OF STANTEC EMPLOYEES. ALL OTHER CONTRACTORS TO BE WORKING IN THE EXCLUSION AREAS ARE REQUIRED BY LAW TO DEVELOP THEIR OWN HASP, AS WELL TO MEET ALL PERTINENT ASPECTS OF OSHA REGULATIONS. STANTEC RESERVES THE RIGHT TO STOP ANY SITE WORK WHICH IS DEEMED TO POSE A HEALTH AND SAFETY THREAT TO ITS STAFF.

1.1 Background

This project is being performed as part of a Brownfield Cleanup Program. The objective of the proposed project is to implement interim remedial measures to address contamination identified during prior investigations.

Site Background

The Former Allegany Bitumens Belmont Asphalt Plant is a 4.9± acre parcel located at 5392 State Route 19 in the Town of Amity, Allegany County, New York. A hot-mix asphalt plant started operations at this location in approximately 1960. From about 1960 to 1995, Allegany Bitumens, Inc. operated the site. Allegany Bitumens was merged into Blades in 1995. Blades operated the site from 1995 till 2005, when operation at the site ceased. The operations at the asphalt plant included quality control testing at an on-site laboratory.

The subject property is currently improved with a non-operational asphalt plant, control tower, truck scale, scale house, office and laboratory building, oil storage buildings, maintenance shop and maintenance garage. A gravel-surfaced aggregate stockpile area is located south of the asphalt manufacturing plant structures. Paved parking and staging areas are provided adjacent to the asphalt plant and the laboratory and maintenance shop buildings.

Land use in the surrounding area is dominated by agricultural uses. The northern limits of the Village of Belmont are located approximately one-half mile southeast of the property. Undeveloped wooded property is located to the southwest of the property along Tucker's Creek and its small tributaries.

Phase I and II Environmental Site Assessments were performed at the site in 2009. A Remedial Investigation (RI) was performed at the site in 2010-2011. These investigations revealed the presence of volatile organic compounds (VOCs) in soil and groundwater at levels exceeding applicable NYSDEC cleanup objectives and standards or guidance values.

1.2 Site-Specific Chemicals of Concern

VOCs

The primary volatile compounds of concern that are documented to be present in the soil and groundwater at the Former Allegany Bitumens Belmont Asphalt Plant Site are listed in Table 1. Material Safety Data Sheets (MSDSs) for these compounds are presented in Appendix A. The air monitoring action levels will be based on one-half of the current Threshold Limit Valve (TLV) or Permissible Exposure Limit (PEL) for 1,1-dichloroethene (1,1-DCE) with a margin of safety built into the action levels to account for the non-specificity of the field monitoring instruments. Exposure limits for less hazardous compounds will be satisfied by meeting the more stringent exposure limits for 1,1-DCE. Table 1 summarizes health and safety data for the volatile compounds of primary concern.

PAHs in Asphalt

The past use of the site for storage and production of asphalt products indicate it is likely that polycyclic aromatic hydrocarbons (PAHs), which are semi-volatile organic compounds that are components of asphalt, may be present in soil, sediment, groundwater or surface water. Because the potential for encountering liquid asphalt at the site is low, and because the solubility of PAHs in water is low, the primary risk for exposure to PAHs at the site is likely to be from ingestion or inhalation of soil particles contaminated with PAHs.

The Department of Health and Human Services (DHHS) has determined that some PAHs may be carcinogens. Some people who have breathed or touched mixtures of PAHs and other chemicals for long periods of time have developed cancer. Some PAHs have caused cancer in laboratory animals when they breathed air containing them (lung cancer), ingested them in food (stomach cancer), or had them applied to their skin (skin cancer).

The Occupational Safety and Health Administration (OSHA) has set a limit of 0.2 milligrams of PAHs per cubic meter of air (0.2 mg/m3). Therefore, adherence to the provisions specified in the Community Air Monitoring Plan for the project (CAMP, Appendix C of the RI Work Plan to which this HASP is attached) for monitoring and suppression of fugitive dust during drilling, test pitting, and other intrusive sampling or interim remedial activities, with the conservative action level of 150 micrograms per cubic meter for airborne dust, will achieve compliance with exposure limits for PAHs.

Table 1
Health and Safety Data for Volatile Contaminants of Concern

Compound	PEL/ TWA	Physical Description	Odor Threshold	Route of Exposure	Symptoms	Target Organs
1,1-Dichloroethane (1,1-DCA)	100 ppm	Colorless, oily liquid with a chloroform-like odor.	255 ppm	inhalation, ingestion, skin and/or eye contact	irritation skin; central nervous system depression; liver, kidney, lung damage	Skin, liver, kidneys, lungs, central nervous system
1,1-Dichloroethene (1,1-DCE)	1 ppm	Colorless liquid or gas (above 89°F) with a mild, sweet, chloroform-like odor.	35.5 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation eyes, skin, throat; dizziness, headache, nausea, dyspnea (breathing difficulty); liver, kidney disturbance; pneumonitis; [potential occupational carcinogen]	Eyes, skin, respiratory system, central nervous system, liver, kidneys
cis- 1,2-Dichloroethene (cis-1,2-DCE)	200 ppm	Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acrid, chloroform-like odor.	19.1 ppm	inhalation, ingestion, skin and/or eye contact	Irritation eyes, respiratory system; central nervous system depression	Eyes, respiratory system, central nervous system
Tetrachloroethene (PCE)	100 ppm	Colorless liquid with a mild chloroform-like odor.	6.17 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]	Eyes, skin, respiratory system, liver, kidneys, central nervous system
1,1,1-trichloroethane (1,1,1-TCA)	350 ppm	Colorless liquid with a mild, chloroform-like odor.	22.4 ppm	inhalation, ingestion, skin and/or eye contact	irritation eyes, skin; headache, lassitude (weakness, exhaustion), central nervous system depression, poor equilibrium; dermatitis; cardiac arrhythmias; liver damage	Eyes, skin, central nervous system, cardiovascular system, liver
Trichloroethylene (TCE)	100 ppm	Colorless liquid with a chloroform-like odor.	1.36 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]	Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system

Notes:

PEL - permissible exposure limits
TWA - time weighted average, 8-hour workday
mg/m^3 - milligrams per cubic meter.
ppm - parts per million, in air

2.0 STANTEC PERSONNEL ORGANIZATION

The following Stantec personnel will be involved in health and safety operations at the Former Allegany Bitumens Belmont Asphalt Plant Site:

2.1 Project Manager

Mr. Michael Storonsky, Senior Associate, is the Project Manager. Mr. Storonsky is responsible for ensuring that all Stantec procedures and methods are carried out, and that all Stantec personnel abide by the provisions of this Health and Safety Plan.

2.2 Site Safety Officer/Field Team Leader

The field team leader (FTL) and Site Safety Officer (SSO) will report directly to the Project Manager and will be responsible for the implementation of this HASP as well as daily calibration of Stantec's safety monitoring instruments. The FTL/SSO will keep a log book of all calibration data and instrument readings for the Site. The FTL/SSO will be determined at the time when the field work is scheduled.

2.3 Health and Safety Coordinator

Ms. Erin McCormick will be the Health and Safety Coordinator. Ms. McCormick will be responsible for overall coordination of Health and Safety issues on the project.

2.4 Daily Meetings

All Stantec personnel and contractors working within the exclusion zone will be required to read this document and sign off on the daily safety meeting form presented in Appendix B.

3.0 MEDICAL SURVEILLANCE REQUIREMENTS

3.1 Introduction

A. Hazardous waste site workers can often experience high levels of physical and chemical stress. Their daily tasks may expose them to toxic chemicals, physical hazards, biologic hazards, or radiation. They may develop heat stress while wearing protective equipment or working under temperature extremes, or face life-threatening emergencies such as explosions and fires. Therefore, a medical program is essential to: assess and monitor worker's health and fitness both prior to employment and during the course of the work; provide emergency and other treatment as needed; and keep accurate records for future reference. In addition, OSHA requires a medical evaluation for employees that may be required to work on hazardous waste sites and/or wear a respirator (29 CFR Part 1910.120 and 1910.134), and certain OSHA standards include specific medical surveillance requirements (e.g., 29 CFR Part 1926.62, Part 1910.95 and Parts 1910.1001 through 1910.1045).

3.2 Medical Examinations

A. All Stantec personnel working in areas of the site where site-related contaminants may be present shall have been examined by a licensed physician as prescribed in 29 CFR Part 1910.120, and determined to be medically fit to perform their duties for work conditions which require respirators. Employees will be provided with medical examinations as outlined below:

- Pre-job physical examination
- Annually thereafter if contract duration exceeds 1 year;
- Termination of employment;
- Upon reassignment in accordance with CFR 29 Part 1910.120(e)(3)(i)(C);
- If the employee develops signs or symptoms of illness related to workplace exposures;
- If the physician determines examinations need to be conducted more often than once a year; and
- When an employee develops a lost time injury or illness during the Contract period.

B. Examinations will be performed by, or under the supervision of a licensed physician, preferably one knowledgeable in occupational medicine, and will be provided without cost to the employee, without loss of pay and at a reasonable time and place. Medical surveillance protocols and examination and test results shall be reviewed by the Occupational Physician.

4.0 ON-SITE HAZARDS

4.1 Chemical Hazards

The primary potential chemical hazards on-site are expected to be exposure to the VOCs detailed in Table 1. Material safety data sheets for the documented VOCs are presented in Appendix A.

The soil and groundwater contaminants are volatile; therefore, any activity at the site which causes physical disturbance of the soil can potentially allow the release of contaminants into the air. For volatiles, this can include release of organic vapors into the air. Such an occurrence may be recognized by noticeable chemical odors. Field personnel should be aware of the odor threshold for these chemicals and their relation to the action levels and Permissible Exposure Limits.

Symptoms of overexposure to primary compounds of concern are detailed in Table 1. To prevent exposure to these chemicals, dermal contact will be minimized by using disposable surgical gloves with work gloves (as appropriate) when handling soil, groundwater equipment or samples. Real time, breathing zone levels of total VOCs will be monitored using a portable photoionization detector (PID). If ambient levels exceed action levels, all site activities will be performed using level C personal protection until ambient concentrations dissipate. Where levels exceed 50 ppm, work will cease and the project manager will be notified immediately. Intrusive work may also be halted where required by action levels detailed in the Community Air Monitoring Plan (CAMP), Appendix D of the RI Work Plan.

In addition, depending on seasonal conditions, disturbance of the site soils may cause the particulate contaminants to become airborne as dust. Therefore, particulates will be monitored as discussed in Section 6.1 and dust-suppression methods used where appropriate as discussed in Section 6.2, or in the CAMP.

Finally, aeration of the groundwater may cause volatilization of chemicals into the air, particularly VOCs. Table 2 summarizes first aid instructions for exposure pathways for the compounds of concern.

Table 2
Exposure Pathways and First Aid Response for Contaminants of Concern

Substance	Exposure Pathways	First-Aid Instructions
VOCs listed in Table 1	Eye	irrigate immediately
	Dermal	soap wash promptly (soap flush immediately for 1,1-DCE)
	Inhalation	respiratory support
	Ingestion	medical attention immediately

4.2 Physical Hazards

Hazards typically encountered at construction sites with drilling and excavation activities will be a concern at this site. These hazards include slippery ground surfaces, holes, and operation of heavy machinery and equipment. Field team members will wear the basic safety apparel such as steel-toed shoes, hard hat and safety glasses during all appropriate activities.

Under no circumstances will Stantec personnel approach the borehole during active drilling operation. All field personnel working around the rig will be shown the location and operation of kill switches, which are to be tested daily. Stantec personnel will not enter excavations.

Multi-purpose fire extinguishers, functional and within annual inspection period, will be staged and readily accessible for use.

The use of electrical equipment in any established exclusion zones will be limited to areas verified as containing non-explosive atmospheres (<10% LEL) prior to operation, unless the equipment has been previously demonstrated or designed to be FM or UL rated as intrinsically safe. Care will be taken to avoid an ignition source while working in the presence of vapors.

The driller and excavating contractor shall make all necessary contacts with utilities and/or underground utility locator hotlines prior to drilling or excavating, and shall meet OSHA requirements for distances between the drilling rig and overhead utilities. No drilling work will be carried out where the drill rig chassis has not been stabilized and the rig is not to be moved between locations with its boom in a vertical position.

4.2.1 Noise

The use of heavy machinery/equipment and operation may result in noise exposures, which require hearing protection. Exposure to noise can result in temporary hearing losses, interference with speech communication, interference with complicated tasks or permanent hearing loss due to repeated exposure to noise.

During the investigative activities, all Stantec field team members will use hearing protection when sound levels are in excess of 90 dB TWA.

4.2.2 Heat and Cold Stress Exposure

Heat is a potential threat to the health and safety of site personnel. The Site Safety Officer under the direction of the Project Manager will determine the schedule of work and rest. These schedules will be employed as necessary so that personnel do not suffer adverse effects from heat. Table 3 summarizes exposure symptoms and first aid instructions for heat stress. Non-caffeinated, thirst replenishment liquids will be available on-site.

Cold stress is also a potential threat to the health and safety of site personnel. Symptoms of cold stress include, shivering, blanching of the extremities, numbness or burning sensations, blue, purple or gray discoloration of hands and feet, frostbite, hypothermia, and loss of consciousness. Cold stress can be prevented by acclimatizing one's self to the cold, increasing fluid intake, avoiding caffeine and alcohol, maintaining proper salt and electrolyte intake, eating a well-balanced diet, wearing proper clothing, building heated enclosures to work in, and taking regular breaks to warm up. If any of the above symptoms are encountered the person should be removed from the cold area. Depending on the severity of the cold stress, 911 should be contacted and first aid administered. No fluids should be given to an unconscious person.

Table 3
Exposure Symptoms and First Aid for Heat Exposure

Hazard	Exposure Symptoms	First-Aid Instructions
Heat Stress	Fatigue, sweating, irritability	rest; take fluids
	Dizziness, disorientation, perspiration ceases, loss of consciousness	remove from hot area, activate 911, administer first aid, no fluids to be administered to unconscious victim.

4.2.3 Roadway Hazards

Field activities are planned to take place near active roadways. Where such work zones are established, personnel shall assure that protective measures including signage, cones, and shielding through use of vehicles parked at workmen perimeter, are in place. All contractors shall be responsible for meeting signage requirements of DOT. Fluorescent safety vests shall be worn by all personnel during activities in or adjacent to roadways and driveways.

4.2.4 Electrical Work

Site work involving electrical installation or energized equipment must be performed by a qualified electrician. All electrical work will be performed in accordance with the OSHA electrical safety requirements found in 29 CFR 1926.400 through 1926.449. Workers are not permitted to work near electrical power circuits unless the worker is protected against electric shock by de-energizing and grounding the circuit or by guarding or barricading the circuit and providing proper personal protective equipment. All electrical installations must comply with NEC regulations. All electrical wiring and equipment used must be listed by a nationally recognized testing laboratory.

All electrical circuits and equipment must be grounded in accordance with the NEC regulations. The path to ground from circuits, equipment, and enclosures will be permanent and continuous. Ground fault circuit interrupters (GFCIs) are required on all 120-volt, single phase, 15- and 20-amp outlets in work areas that are not part of the permanent wiring of the building or structure. A GFCI is required when using an extension cord. GFCIs must be tested regularly with a GFCI tester.

Heavy-duty extension cords will be used; flat-type extension cords are not allowed. All extension cords must be the three-wire type, and designed for hard/extra hard usage. Electrical wire or cords passing through work areas must be protected from water and damage. Worn, frayed, or damaged cords and cables will not be used. Walkways and work spaces will be kept clear of cords and cables to prevent a tripping hazard. Extension cords and cables may not be secured with staples, hung from nails, or otherwise temporarily secured. Cords or cables passing through holes in covers, outlet boxes, etc., will be protected by bushings or fittings.

All lamps used in temporary lighting will be protected from accidental contact and breakage. Metal shell and paper-lined lamp holders are not permitted. Fixtures, lamp holders, lamps, receptacles, etc. are not permitted to have live parts. Workers must not have wet hands while plugging/unplugging energized equipment. Plugs and receptacles will be kept out of water (unless they are approved for submersion).

4.2.5 Lock-Out/Tag-Out

Before a worker sets up, services, or repairs a system where unexpected energizing (or release of stored energy) could occur and cause injury or electrocution, the circuits energizing the parts must be locked-out and tagged. Only authorized personnel will perform lock-out/tag-out procedures. All workers affected by the lock-out/tag-out will be notified prior to, and upon completion of, the lock-out/tag-out procedure.

Lock-out/tag-out devices must be capable of withstanding the environment to which they are exposed. Locks will be attached in such a way as to prevent other personnel from operating the equipment, circuit, or control, or from removing the lock unless they resort to excessive force. Tags will identify the worker who attached the device, and contain information, which warns against the hazardous condition that will result from the system's unauthorized start-up. Tags must be legible and understood by all affected workers and incidental personnel. The procedures for attaching and removing lock-out/tag-out devices include the steps outlined in the following table.

If maintenance work is required, the electrical supply to the equipment must be disconnected. Turning off the MAIN breaker using the disconnect switch will disconnect all power to the system. Once the disconnect switch has been turned off, the switch will be locked-out using the steps outlined below.

STEP	LOCK-OUT/TAG-OUT PROCEDURES
1	Disconnect the circuits and/or equipment to be worked on from all electrical energy sources.
2	Ensure that the system is completely isolated so that it cannot be operated at that shut-off point or at any other location.
3	Release stored electrical energy.
4	Block or relieve stored non-electrical energy.
5	Place a lock on each shut-off or disconnect point necessary to isolate all potential energy sources. Place the lock in such a manner that it will maintain the shut-off/disconnect in the off position.
6	Place a tag on each shut-off or disconnect point. The tag must contain a statement prohibiting the unauthorized re-start or re-connect of the energy source and the removal of the tag, and the identity of the individual performing the tag and lock-out.
7	Workers who will be working on the system must place their own lock and tag on <u>each</u> lock-out point.
8	A qualified person must verify the system cannot be re-started or re-connected, and de-energizing of the system has been accomplished.

Once the service or repairs have been made on the system:	
1	A qualified person will conduct an inspection of the work area, to verify that all tools, jumpers, shorts, grounds, etc., have been removed so that the system can then be safely re-energized.
2	All workers stand clear of the system.
3	Each lock and tag will be removed by the worker who attached it. If the worker has left the site, then the lock and tag may be removed by a qualified person under the following circumstances:
	a. The qualified person ensures the worker who placed the lock and tag has left the site; and
	b. The qualified person ensures the worker is aware the lock and tag has been removed before the worker resumes work on-site.

4.2.6 Ladders

One-third of worker deaths in construction result from falls. Many falls occur because ladders are not placed or used safely. Ladder use will comply with OSHA 1926.1053 through 1926.1060, including the following safety requirements.

STEP	PROPER LADDER USE PROCEDURE
1	Choose the right ladder for the task--the proper type and size, with a sufficient rating for the task.
2	Check the condition of the ladder before climbing. • Do not use a ladder with broken, loose, or cracked rails or rungs. • Do not use a ladder with oil, grease, or dirt on its rungs. • The ladder should have safety feet.
3	Place the ladder on firm footing, with a four-to-one pitch.
4	Support the ladder by: • Tying it off; • Using ladder outrigger stabilizers; or • Have another worker hold the ladder at the bottom. If another worker holds the ladder, they must: • Wear a hard hat; • Hold the ladder with both hands; • Brace the ladder with their feet; and • Not look up.
5	Keep the areas around the top and bottom of the ladder clear.
6	Extend the top of the ladder at least 36 inches (3 feet) above the landing.
7	Climb the ladder carefully - facing it - and use both hands. • Use a tool belt and hand-line to carry material to the top or bottom of the ladder. • Wear shoes in good repair with clean soles.
8	Inspect the ladder every day, prior to use, for the following problems: • Rail or rung damage • Broken feet • Rope or pulley damage • Rung lock defects or damage • Excessive dirt, oil, or grease If the ladder fails inspection, it must be removed from service and tagged with a "Do Not Use" sign.

Ladders with non-conductive side rails must be used when working near electrical conductors, equipment, or other sources. Ladders will not be used horizontally for platforms, runways, or scaffolds.

4.2.7 Hand and Power Tools

All hand and power tools will be maintained in a safe condition and in good repair. Hand and power tools will be used in accordance with 29 CFR 1926, Subpart I (1926.300 through 1926.307). Neither Stantec or its subcontractors will issue unsafe tools, and workers are not permitted to bring unsafe tools on-site. All tools will be used, inspected, and maintained in accordance with the manufacturer's instructions. Throwing tools or dropping tools to lower levels is prohibited. Hand and power tools will be inspected, tested, and determined to be in safe operating condition prior to each use. Periodic safety inspections of all tools will be conducted to assure that the tools are in good condition, all guards are in place, and the tools are being properly maintained. Any tool that fails an inspection will be immediately removed from service and tagged with a "Do Not Use" sign.

Workers using hand and power tools, who are exposed to falling, flying, abrasive, or splashing hazards will be required to wear personal protective equipment (PPE). Eye protection must always be worn when working on-site. Additional eye and face protection, such as safety goggles or face shields, may also be required when working with specific hand and power tools. Workers, when on-site, will wear hard hats. Additional hearing protection may be required when working with certain power tools. Workers using tools, which may subject their hands to an injury, such as cuts, abrasions, punctures, or burns, will wear protective gloves. Loose or frayed clothing, dangling jewelry, or loose long hair will not be worn when working with power tools.

Electric power-operated tools will be double insulated or grounded, and equipped with an on/off switch. Guards must be provided to protect the operator and other nearby workers from hazards such as in-going nip points, rotating parts, flying chips, and sparks. All reciprocating, rotating and moving parts of tools will be guarded if contact is possible. Removing machine guards is prohibited.

Abrasive wheels will only be used on equipment provided with safety guards. Safety guards must be strong enough to withstand the effect of a bursting wheel. Abrasive wheels will not be operated in excess of their rated speed. Work or tool rests will not be adjusted while the wheel is in motion. All abrasive wheels will be closely inspected and ring tested before each use, and any cracked or damaged wheels will be removed immediately and destroyed.

Circular saws must be equipped with guards that completely enclose the cutting edges and have anti-kickback devices. All planer and joiner blades must be fully guarded. The use of cracked, bent, or otherwise defective parts is prohibited. Chain saws must have an automatic chain brake or kickback device. The worker operating the chain saw will hold it with both hands during cutting operations. A chain saw must never be used to cut above the operator's shoulder height. Chain saws will not be re-fueled while running or hot. Power saws will not be left unattended.

Only qualified workers will operate pneumatic tools, powder-actuated tools, and abrasive blasting tools.

4.2.8 Manual Lifting

Back injuries are among the leading occupational injuries reported by industrial workers. Back injuries such as pulls and disc impairments can be reduced by using proper manual lifting techniques. Leg muscles are stronger than back muscles, so workers should lift with their legs and not with their back. Proper manual lifting techniques include the following steps:

STEP	PROPER MANUAL LIFTING PROCEDURE
1	Plan the lift before lifting the load. Take into consideration the weight, size, and shape of the load.
2	Preview the intended path of travel and the destination to ensure there are no tripping hazards along the path.
3	Wear heavy-duty work gloves to protect hands and fingers from rough edges, sharp corners, and metal straps. Also, keep hands away from potential pinch points between the load and other objects.
4	Get the load close to your ankles, and spread your feet apart. Keep your back straight and do not bend your back too far; instead bend at your knees.
5	Feel the weight; test it.
6	Lift the load smoothly, and let your legs do the lifting. If you must pivot, do not swing just the load; instead, move your feet and body with the load.

If the load is too heavy, then do not lift it alone. Lifting is always easier when performed with another person. Assistance should always be used when it is available.

4.2.9 Weather-Related Hazards

Weather-related hazards include the potential for heat or cold stress, electrical storms, treacherous weather-related working conditions, or limited visibility. These hazards correlate with the season in which site activities occur. Outside work will be suspended during electrical storms. In the event of other adverse weather conditions, the Site Safety Officer will determine if work can continue without endangering the health and safety of site personnel.

5.0 SITE WORK ZONES

The following work zones will be physically delineated by Stantec during the investigation activities.

5.1 Control Zones

Control boundaries will be established within the areas of site activities. Examples of boundary zones include the exclusion and decontamination zone. All boundaries will be dynamic, and will be determined by the planned activities for the day. The Field Team Leader will record the names of any visitors to the site.

5.2 Exclusion Zone

The controlled portion of the site will be delineated to identify the exclusion zone, wherein a higher level of personal protective equipment may be required for entry during intrusive activities. The limits of the exclusion zone will be designated at each work location appropriately. A decontamination zone will be located immediately outside the entrance to the exclusion zone. All personnel leaving the exclusion zone will be required to adhere to proper decontamination procedures.

A "super exclusion" zone will be established around the borehole which will not be entered by Stantec personnel at any time during any active drilling, slambar, cathead, silica sand dumping, or other related activities. The drilling contractor will be directed to stop such activity when Stantec site team members have a need to enter this zone.

5.3 Decontamination Zone

The decontamination zone will be located immediately outside the entrance to the exclusion zone on its apparent upwind side, if feasible, and will be delineated with caution tape and traffic cones as needed. This zone will contain the necessary decontamination materials for personnel decontamination. Decontamination procedures are outlined in Section 8.0 of this plan.

6.0 SITE MONITORING/ACTION LEVELS

6.1 Site Monitoring

Field activities associated with drilling, excavation, and sampling may create potentially hazardous conditions due to the migration of contaminants into the breathing zone. These substances may be in the form of mists, vapors, dusts, or fumes that can enter the body through ingestion, inhalation, absorption, and direct dermal contact. Monitoring for VOCs and particulates will be performed to ensure appropriate personal protective measures are employed during site activities.

A separate Community Air Monitoring Plan (CAMP) has also been developed (Appendix C of the Work Plan) to protect the surrounding neighborhood.

Although the concentrations of anticipated contaminants in soil/groundwater should not present an explosive hazard, explosive environments or conditions may be encountered unexpectedly during the course of this project. Monitoring for explosivity in the atmosphere will be routinely conducted during site activities as a precautionary measure to ensure site personnel are not subjected to any dangerous conditions.

The following describes the conditions that will be monitored for during the investigation activities. All background and site readings will be logged, and all instrument calibrations, etc., will be logged.

Organic Vapor Concentrations - Organic vapors will be monitored continuously in the breathing zone in the work area with a portable photoionization detector (PID), such as a miniRAE Model 2000 with a 10.2 eV lamp. The instrument will be calibrated daily or as per the manufacturer’s recommendations. PID readings will be used as the criteria for upgrading or downgrading protective equipment and for implementing additional precautions or procedures.

Split spoons or other soil sampling devices will be monitored using the PID at the time they are opened, with appropriate PPE to be used where soils exhibit measurable volatile organic compound levels.

Explosivity - Explosivity will be monitored continuously during active drilling operations. Measurements obtained from this monitoring instrument will also be used as criteria for implementation of work stoppage or site evacuation. A combination combustible gas/oxygen (CGO_2) instrument, calibrated per manufacturer's recommendations, will be used.

Particulates - Should subsurface conditions be observed to be dry, Stantec will perform particulate monitoring with a MIE PDM-3 Miniram aerosol monitor, within the work area to monitor personal exposures to particulates and to compare work area readings with downwind and upwind readings. The first readings of the day will be obtained prior to the commencement of work to obtain a daily background reading, and the instrument will be zeroed daily and calibrated to manufacturer's specifications. Readings will be recorded every 30 minutes thereafter. If the work area particulate levels exceed the background levels by more than 0.15 mg/m^3, the Contractor will be instructed to implement dust suppression measures.

6.2 Action Levels

During the course of any activity, as long as PID readings in the breathing zone are less than 5 ppm above background, Level D protection will be considered adequate. Level C protection will be required when VOC concentrations in ambient air in the work zone exceed 5 ppm total VOCs above background but remain below 50 ppm total VOCs.

If concentrations in the work zone exceed 50 ppm for a period of 5 minutes or longer, work will immediately be terminated by the Site Safety Officer. Options to allow continued drilling would then be discussed amongst all parties. Supplied-air respiratory protection is generally required for drilling to resume under these conditions. If Level B protection is not used, work may resume in Level C once monitoring concentrations have decreased below 50 ppm and conditions outlined in the CAMP are met.

If the monitoring of fugitive particulate levels within the work area exceeds 0.15 mg/m^3 above background, then the drilling Contractor will be directed to implement fugitive dust control measures which may include use of engineering controls such as water spray at the borehole.

7.0 PERSONAL PROTECTIVE EQUIPMENT

Based on an evaluation of the hazards at the site, personal protective equipment (PPE) will be required for all personnel and visitors entering the drilling exclusion zone(s). It is anticipated that all Stantec oversight work will be performed in Level D. All contractors will be responsible for selection and implementation of PPE for their personnel.

7.1 Protective Clothing/Respiratory Protection:

Protective equipment for each level of protection is as follows:

If PID readings are above 50 ppm, requiring an upgrade to Level B, site work will be halted pending review of conditions and options by Stantec and other involved parties.

When PID readings range between 5 and 50 ppm, upgrade to Level C:

<u>Level C</u>

- Full face, air purifying respirator with organic/HEPA cartridge;
- Disposable chemical resistant one-piece suit (Tyvek or Saranex, as appropriate);
- Inner and outer chemical resistant gloves;
- Hard hat;
- Steel-toed boots; and
- Disposable booties.

When PID readings range between background and 5 ppm use Level D:

<u>Level D</u>

- Safety glasses;

- Steel-toed boots;
- Protective cotton, latex or leather gloves depending on site duties;
- Hard hat; and
- Tyvek coverall (optional).

8.0 DECONTAMINATION

8.1 Personnel Decontamination

For complete decontamination, all personnel will observe the following procedures upon leaving the exclusion zone:

1. Remove outer boots and outer gloves and place in disposal drum.

2. If using a respirator, remove respirator, dispose of cartridges if necessary, and set aside for later cleaning.

3. Remove disposable chemical resistant suits and dispose of in drum.

4. Remove and dispose of inner gloves.

Decontamination solutions shall be supplied at the decontamination zone. The wash solution will consist of water and detergent such as Alconox or trisodium phosphate (TSP), and the rinse solution will consist of clean water.

Contaminated wash solutions shall be collected in drums for disposal. All other disposable health and safety equipment will be decontaminated and disposed of as non-hazardous waste.

8.2 Equipment Decontamination

If equipment is used during field activities, it will be properly washed or steam-cleaned prior to exiting the decontamination zone. Pre- or post-use rinsing using solvents will be done wearing appropriate PPE.

Monitoring instruments will be either wrapped in poly sheeting or carried by personnel not involved in handling contaminated materials, to reduce the need for decontamination. All instruments will be wet-wiped prior to removal from the work zone.

9.0 EMERGENCY PROCEDURES

The Site Safety Officer will coordinate emergency procedures and will be responsible for initiating emergency response activities. Emergency communications at the site will be conducted verbally and by means of an air or vehicle horn. All personnel will be informed of the location of the cellular telephone and horn. Three blasts on the air or vehicle horn will be used to signal distress.

9.1 List of Emergency Contacts

Ambulance: 911
Hospital: Jones Memorial Hospital, Wellsville, NY: (585) 593-1100
Fire Department: 911
Police: 911
Poison Control Center: (585) 222-1222
RG&E Utility Emergency: 911 or (800) 743-1702

9.2 Directions to Hospital

A map presenting directions to the hospital is included in the back of the document (Figure 2). The route shall be reviewed at the initial site safety meeting on site.

9.3 Accident Investigation and Reporting

A. All accidents requiring first aid, which occur incidental to activities onsite, will be investigated. The investigation format will be as follows:

- interviews with witnesses,
- pictures, if applicable, and
- necessary actions to alleviate the problem.

B. In the event that an accident or some other incident such as an explosion or exposure to toxic chemicals occurs during the course of the project, the Project Health and Safety Officer will be telephoned as soon as possible and receive a written notification within 24 hours. The report will include the following items:

- Name of injured;
- Name and title of person(s) reporting;
- Date and time of accident/incident;
- Location of accident/incident, building number, facility name;
- Brief summary of accident/incident giving pertinent details including type of operation ongoing at the time of the accident/incident;
- Cause of accident/incident;
- Casualties (fatalities, disabling injuries), hospitalizations;
- Details of any existing chemical hazard or contamination;
- Estimated property damage, if applicable;
- Nature of damage; effect on contract schedule;
- Action taken to insure safety and security; and
- Other damage or injuries sustained (public or private).

Where reportable injuries, hospitalizations or fatalities occur amongst Stantec personnel, the necessary document required by OSHA will be submitted within timeframes allowed by law.

The accident report form is illustrated in Table 4.

TABLE 4
ACCIDENT REPORT

Project_Allegany Bitumens Belmont Asphalt Plant Site__ Date of Occurrence______________________

Location __5392 State Route 19, Amity, NY, 14813_________________________________

____

Type of Occurrence: (check all that Apply)

☐Disabling Injury ☐Other Injury
☐Property Damage ☐Equip. Failure
☐Chemical Exposure ☐Fire
☐Explosion ☐Vehicle Accident
☐Other (explain)____
____

Witnesses to Accident/Injury:

_______________________ _________________
_______________________ _________________
_______________________ _________________

Injuries:
Name of Injured ____

What was being done at the time of the accident/injury?

____
____

What corrective actions will be taken to prevent recurrence? ___________________________
____
____

SIGNATURES

Health and Safety Officer ____________________ Date ___________________________

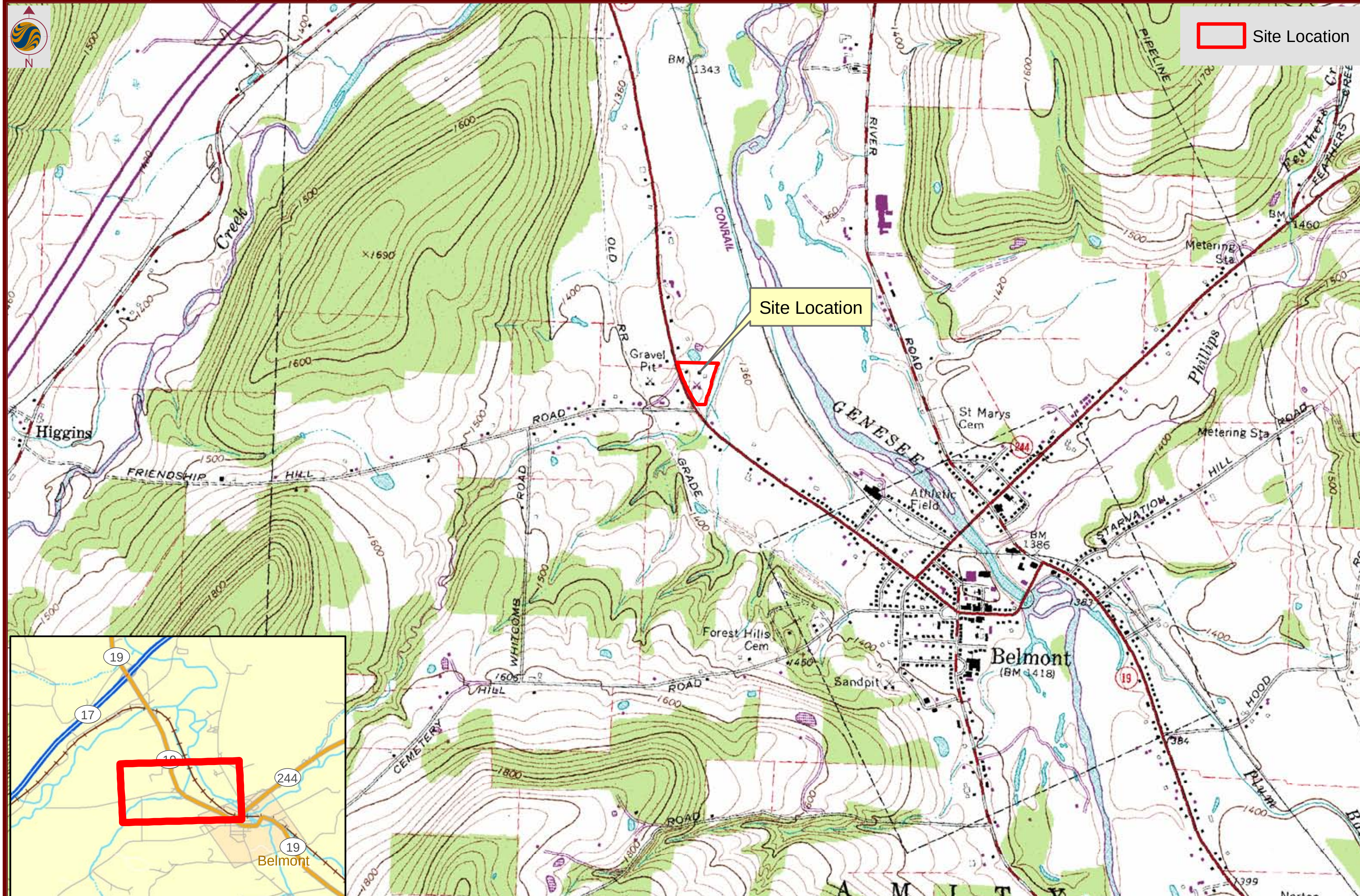
Project Manager __________________________ Date ___________________________

Reviewer ________________________________ Date ___________________________

Comments by reviewer ____
____
____

FIGURES

This map may contain data from a variety of sources. This map is not intended to replace a survey by a Licensed Surveyor.
Stantec does not certify the accuracy of the data. This map is for reference only and should not be used for construction.



Geographic Information Systems

Map Source : NYSGIS Clearinghouse Web Site

Cartographic Design By: Andrew Less

June 29,2011
U:\190500593\drawing\RI Report Figures\Figure 1_Site Location Map.mxd

Stantec

Stantec Consulting
61 Commercial Street
Rochester, NY 14614
Phone 585.475.1440 Fax 585.272.1814
www.stantec.com

1 inch = 2,000 feet

0 1,000 2,000 4,000 Feet

Allegany Bitumens Belmont Asphalt Plant Site

FIGURE 1 : Site Location Map Showing USGS Topographic Information

FIGURE 2

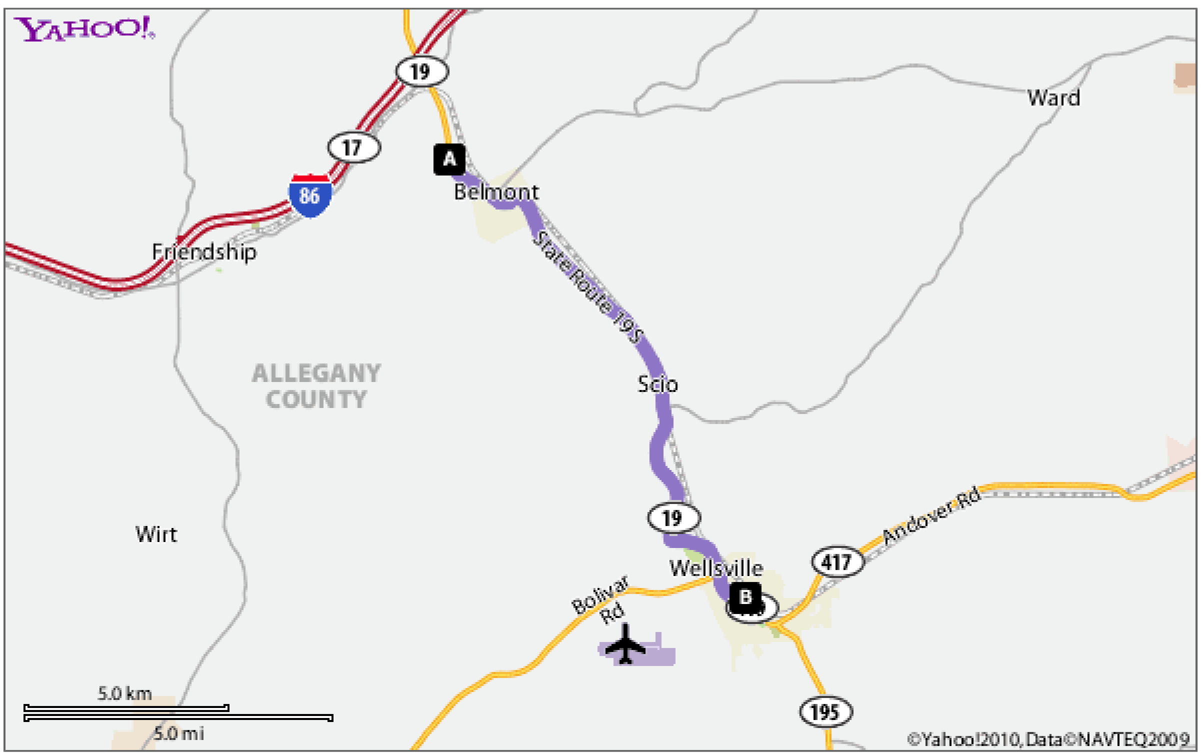
Directions and Map from the Site to Jones Memorial Hospital, Wellsville, NY

Directions to 191 N Main St, Wellsville, NY 14895-1150

Total Time: 19 mins, Total Distance: 11.03 mi

		Distance
A	1. **Start at 5392 RT-19, AMITY going toward TUCKERS CORNER RD**	go **0.74** mi
	2. Continue on **RT-19**	go **10.09** mi
	3. Turn L on **W MADISON ST**	go **75** ft
	4. Turn L on **PARK AVE**	go **0.12** mi
	5. Continue on **W PEARL ST**	go **197** ft
	6. Turn L on **N MAIN ST**	go **125** ft
B	7. **Arrive at 191 N MAIN ST, WELLSVILLE, on the** L	

Time: 19 mins, Distance: 11.03 mi



When using any driving directions or map, it's a good idea to do a reality check and make sure the road still exists, watch out for construction, and follow all traffic safety precautions. This is only to be used as an aid in planning.

Figure 2 - Directions and Map from the site to Jones Memorial Hospital, Wellsville, NY

APPENDIX A
MATERIAL SAFETY DATA SHEETS

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September 2005

NIOSH Publication Number 2005-149

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Enter search terms separated by spaces.

1,1-Dichloroethane

Synonyms & Trade Names Asymmetrical dichloroethane; Ethylidene chloride; 1,1-Ethylidene dichloride

CAS No. 75-34-3	**RTECS No.** KI0175000	**DOT ID & Guide** 2362 130
Formula $CHCl_2CH_3$	**Conversion** 1 ppm = 4.05 mg/m^3	**IDLH** 3000 ppm See: 75343

Exposure Limits

NIOSH REL : TWA 100 ppm (400 mg/m^3) See Appendix C (Chloroethanes)

OSHA PEL : TWA 100 ppm (400 mg/m^3)

Measurement Methods
NIOSH 1003 ;
OSHA 7
See: NMAM or OSHA Methods

Physical Description Colorless, oily liquid with a chloroform-like odor.

MW: 99.0	**BP:** 135°F	**FRZ:** -143°F	**Sol:** 0.6%	**VP:** 182 mmHg	**IP:** 11.06 eV
Sp.Gr: 1.18	**Fl.P:** 2°F	**UEL:** 11.4%	**LEL:** 5.4%		

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities Strong oxidizers, strong caustics

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms irritation skin; central nervous system depression; liver, kidney, lung damage

Target Organs Skin, liver, kidneys, lungs, central nervous system

Personal Protection/Sanitation (See protection codes)
Skin: Prevent skin contact
Eyes: Prevent eye contact

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap flush promptly

Wash skin: When contaminated **Remove:** When wet (flammable) **Change:** No recommendation	**Breathing:** Respiratory support **Swallow:** Medical attention immediately

Respirator Recommendations

NIOSH/OSHA

Up to 1000 ppm:
(APF = 10) Any supplied-air respirator

Up to 2500 ppm:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode

Up to 3000 ppm:
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister
Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection

See also: INTRODUCTION See ICSC CARD: 0249

Page last reviewed: February 3, 2009
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Content source: National Institute for Occupational Safety and Health (NIOSH) Education and Information Division

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Vinylidene chloride

Synonyms & Trade Names 1,1-DCE; 1,1-Dichloroethene; 1,1-Dichloroethylene; VDC; Vinylidene chloride monomer; Vinylidene dichloride

CAS No. 75-35-4	**RTECS No.** KV9275000	**DOT ID & Guide** 1303 130P (inhibited)
Formula $CH_2=CCl_2$	**Conversion**	**IDLH** Ca [N.D.] See: IDLH INDEX
Exposure Limits **NIOSH REL** : Ca See Appendix A **OSHA PEL** †: none		**Measurement Methods** **NIOSH** 1015 ; **OSHA** 19 See: NMAM or OSHA Methods

Physical Description Colorless liquid or gas (above 89°F) with a mild, sweet, chloroform-like odor.

MW: 96.9	**BP:** 89°F	**FRZ:** -189°F	**Sol:** 0.04%	**VP:** 500 mmHg	**IP:** 10.00 eV
Sp.Gr: 1.21	**Fl.P:** -2°F	**UEL:** 15.5%	**LEL:** 6.5%		

Class IA Flammable Liquid: Fl.P. below 73°F and BP below 100°F.

Incompatibilities & Reactivities Aluminum, sunlight, air, copper, heat [Note: Polymerization may occur if exposed to oxidizers, chlorosulfonic acid, nitric acid, or oleum. Inhibitors such as the monomethyl ether of hydroquinone are added to prevent polymerization.]

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, throat; dizziness, headache, nausea, dyspnea (breathing difficulty); liver, kidney disturbance; pneumonitis; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys	
Cancer Site [in animals: liver & kidney tumors]	
Personal Protection/Sanitation (See protection codes) **Skin:** Prevent skin contact **Eyes:** Prevent eye contact **Wash skin:** When contaminated **Remove:** When wet (flammable) **Change:** No recommendation **Provide:** Eyewash, Quick drench	**First Aid** (See procedures) **Eye:** Irrigate immediately **Skin:** Soap flush immediately **Breathing:** Respiratory support **Swallow:** Medical attention immediately

Respirator Recommendations

NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister
Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection

See also: INTRODUCTION See ICSC CARD: 0083

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NIOSH Pocket Guide to Chemical Hazards

1,2-Dichloroethylene

CAS

540-59-0

RTECS

KV9360000

DOT ID & Guide

1150 130P

ClCH=CHCl

Synonyms & Trade Names

Acetylene dichloride, cis-Acetylene dichloride, trans-Acetylene dichloride, sym-Dichloroethylene

Exposure Limits

NIOSH REL: TWA 200 ppm (790 mg/m^3)

OSHA PEL: TWA 200 ppm (790 mg/m^3)

IDLH

1000 ppm See: 540590

Conversion

1 ppm = 3.97 mg/m^3

Physical Description

Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acrid, chloroform-like odor.

MW: 97.0	BP: 118-140°F	FRZ: -57 to -115°F	Sol: 0.4%
VP: 180-265 mmHg	IP: 9.65 eV		Sp.Gr(77°F): 1.27
Fl.P: 36-39°F	UEL: 12.8%	LEL: 5.6%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities

Strong oxidizers, strong alkalis, potassium hydroxide, copper [Note: Usually contains inhibitors to prevent polymerization.]

Measurement Methods

NIOSH 1003; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation

(See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid

(See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations

NIOSH/OSHA
Up to 2000 ppm:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode£
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£
(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes

inhalation, ingestion, skin and/or eye contact

Symptoms

Irritation eyes, respiratory system; central nervous system depression

Target Organs

Eyes, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0436

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Tetrachloroethylene

Synonyms & Trade Names

Perchlorethylene, Perchloroethylene, Perk, Tetrachlorethylene

CAS No.	RTECS No.	DOT ID & Guide
127-18-4	KX3850000	1897 160

Formula	Conversion	IDLH
$Cl_2C{=}CCl_2$	1 ppm = 6.78 mg/m3	Ca [150 ppm] See: 127184

Exposure Limits

NIOSH REL

: Ca Minimize workplace exposure concentrations. See Appendix A

OSHA PEL

†: TWA 100 ppm
C 200 ppm (for 5 minutes in any 3-hour period), with a maximum peak of 300 ppm

Measurement Methods

NIOSH 1003 ;
OSHA 1001
See: NMAM or OSHA Methods

Physical Description

Colorless liquid with a mild, chloroform-like odor.

MW:	BP:	FRZ:	Sol:	VP:	IP:
165.8	250°F	-2°F	0.02%	14 mmHg	9.32 eV

Sp.Gr:	Fl.P:	UEL:	LEL:
1.62	NA	NA	NA

Noncombustible Liquid, but decomposes in a fire to hydrogen chloride and phosgene.

Incompatibilities & Reactivities

Strong oxidizers; chemically-active metals such as lithium, beryllium & barium; caustic soda; sodium hydroxide; potash

Exposure Routes

inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms

irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]

Target Organs

Eyes, skin, respiratory system, liver, kidneys, central nervous system

Cancer Site

[in animals: liver tumors]

Personal Protection/Sanitation

(See protection codes)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation
Provide: Eyewash, Quick drench

First Aid

(See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations

NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister
Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection

See also: INTRODUCTION See ICSC CARD: 0076 See MEDICAL TESTS: 0179

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Methyl chloroform

Synonyms & Trade Names Chlorothene; 1,1,1-Trichloroethane; 1,1,1-Trichloroethane (stabilized)

CAS No. 71-55-6	**RTECS No.** KJ2975000	**DOT ID & Guide** 2831 160
Formula CH_3CCl_3	**Conversion** 1 ppm = 5.46 mg/m^3	**IDLH** 700 ppm See: 71556

Exposure Limits
NIOSH REL : C 350 ppm (1900 mg/m^3) [15-minute] See Appendix C (Chloroethanes)
OSHA PEL †: TWA 350 ppm (1900 mg/m^3)

Measurement Methods
NIOSH 1003
See: NMAM or OSHA Methods

Physical Description Colorless liquid with a mild, chloroform-like odor.

MW: 133.4	**BP:** 165°F	**FRZ:** -23°F	**Sol:** 0.4%	**VP:** 100 mmHg	**IP:** 11.00 eV
Sp.Gr: 1.34	**Fl.P:** ?	**UEL:** 12.5%	**LEL:** 7.5%		

Combustible Liquid, but burns with difficulty.

Incompatibilities & Reactivities Strong caustics; strong oxidizers; chemically-active metals such as zinc, aluminum, magnesium powders, sodium & potassium; water [Note: Reacts slowly with water to form hydrochloric acid.]

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin; headache, lassitude (weakness, exhaustion), central nervous system depression, poor equilibrium; dermatitis; cardiac arrhythmias; liver damage

Target Organs Eyes, skin, central nervous system, cardiovascular system, liver

Personal Protection/Sanitation (See protection codes)
Skin: Prevent skin contact

First Aid (See procedures)
Eye: Irrigate immediately

Eyes: Prevent eye contact **Wash skin:** When contaminated **Remove:** When wet or contaminated **Change:** No recommendation	**Skin:** Soap wash promptly **Breathing:** Respiratory support **Swallow:** Medical attention immediately

Respirator Recommendations

NIOSH/OSHA

Up to 700 ppm:
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister
Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection

See also: INTRODUCTION See ICSC CARD: 0079 See MEDICAL TESTS: 0141

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NIOSH Pocket Guide to Chemical Hazards

Trichloroethylene

$ClCH=CCl_2$

CAS

79-01-6

RTECS

KX4550000

Synonyms & Trade Names

Ethylene trichloride, TCE, Trichloroethene, Trilene

DOT ID & Guide

1710 160

Exposure Limits

NIOSH REL: Ca See Appendix A See Appendix C

OSHA PEL†: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 2 hours)

IDLH

Ca [1000 ppm] See: 79016

Conversion

1 ppm = 5.37 mg/m^3

Physical Description

Colorless liquid (unless dyed blue) with a chloroform-like odor.

MW: 131.4	BP: 189°F	FRZ: -99°F	Sol(77°F): 0.1%
VP: 58 mmHg	IP: 9.45 eV		Sp.Gr: 1.46
Fl.P: ?	UEL(77°F): 10.5%	LEL(77°F): 8%	

Combustible Liquid, but burns with difficulty.

Incompatibilities & Reactivities

Strong caustics & alkalis; chemically-active metals (such as barium, lithium, sodium, magnesium, titanium & beryllium)

Measurement Methods

NIOSH 1022, 3800; OSHA 1001

See: NMAM or OSHA Methods

Personal Protection & Sanitation

(See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation
Provide: Eyewash, Quick drench

First Aid

(See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations

NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes

inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms

Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]

Target Organs

Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system

Cancer Site

[in animals: liver & kidney cancer]

See also: INTRODUCTION See ICSC CARD: 0081 See MEDICAL TESTS: 0236

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APPENDIX B
ON-SITE SAFETY MEETING FORMS

ON-SITE SAFETY MEETING

Project: Allegany Bitumens Belmont Asphalt Plant Site
Date:________________ Time:________________ Job No.: 190500593

Address: 5392 State Route 19, Amity, NY, 14813

Scope of Work:____________________

Weather Temp:________________ Wind direction/speed: ____________

Sky Conditions:______________________ Humidity:__________

Weather Conditions affecting work: ____________

Safety Topics Discussed

Protective Clothing/Equipment: Level D (steel toe boots, hard hat with overhead hazards, etc.)

Chemical Hazards:________

Physical Hazardous: Slip/trip/fall; weather/heat/cold; overhead hazards during drilling rig and excavator Operation; and noise during drilling

Personnel/Equipment Decontamination: Alconox solution and water rinse or high pressure wash

Personnel/Job Functions: ____________

Emergency Procedures: Emergency will be signaled verbally or with air or vehicle horn. Appropriate authorities will be contacted and after event, accident reporting procedures will be followed, as appropriate.

Special Equipment: ____________

Other: ____________

Emergency Phone Numbers/Addresses

Ambulance: 911
Hospital: Jones Memorial Hospital (585) 593-1100
Police: 911
Fire Department: 911

On-Site Safety Meeting
ATTENDEES

Name Printed	Signature	Job Function
____________________	____________________	____________________
____________________	____________________	____________________
____________________	____________________	____________________
____________________	____________________	____________________

Meeting Conducted By: ________________________ ________________________

Name Printed Signature

Site Safety Officer ________________________ ________________________

Team Leader ________________________ ________________________

APPENDIX C

Community Air Monitoring Plan

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

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Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

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Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.