NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Region 8 Main Office
6274 East Avon-Lima Road, Avon, NY 14414-9516
P: (585) 226-2466 I F: (585) 226-2830
www.dec.ny.gov

<u>Via E-mail</u>

July 18, 2016

Mr. Dennis P. Maguire
770 Rock Beach Road
Rochester, NY 14617

Former Alliance Metal Stamping & Fabrication Facility
Site #c828101
Gates, Monroe

Dear Mr. Maguire

The Department has completed its review of the document titled "Remedial Investigation Report" (RIR) for the Former Alliance Metal Stamping & Fabrication (FAMSF) Facility, dated October 2014, and revised December 2015. The Remedial Investigation (RI) has fully investigated and characterized the nature and extent of contamination on the brownfield site and has provided a qualitative exposure assessment of the contamination at and migrating from the site. The RI has documented historic on-site use, disposal/release, and remediation of soil sources of contaminants (including 1, 1, 1-TCA) which are consistent with the present contaminants of concern (COCs) in groundwater and soil vapor at the site. Based on the contamination present at the site, as documented in the final RI Report, the Department has determined that remediation is needed for the protection of public health and the environment.

With the following modifications and clarifications, the Department has determined that the RIR is acceptable for the sole purpose of developing the remedial Alternatives Analysis for the site:

1. Section 2.4.1 Overview of Previous Investigations – The Department does not endorse or reject any statements regarding the adjacent ITT property likely being the primary source of groundwater contamination at the AMSF site because regardless of the source of the contamination, remediation and mitigation of potential exposures related to contamination at the BCP site is still required.
2. Section 2.5.13 OU1 – Northwest Corner – The Department does not endorse or reject any statements regarding surface spills and the source of groundwater contamination at MW-7. However notes that where VOC contaminants were detected in subsurface soils in the Northwest Corner, concentrations were well below NYSDEC soil cleanup objectives for **Unrestricted Site Use and the Protection of Groundwater**.

3. Section 2.5.13 OU1 – Northwest Corner – The Department requires the preparation of soil data figures and tables (validated) for OU1 for future remedial documents.
4. In Section 4.1.1, the Department does not endorse or reject any statements regarding the source of soil vapor contamination. That said, it should be noted that this section fails to consider former on-site degreasing operations, storage and handling of COCs, spills, and releases to floor drains as other potential sources. Also, despite the Volunteer's interpretation of the source, remediation and mitigation of potential exposures related to soil vapor contamination at the BCP site is still required.
5. In Section 4.2.5, the Department does not endorse or reject statements concerning groundwater contaminant distribution at the site. Again, it should be noted that this section fails to acknowledge former on-site degreasing operations, storage and handling of COCs, spills, and releases to floor drains as other potential sources. Also, aside from the Volunteer's interpretation of the source, remediation and mitigation of potential exposures related to groundwater contamination at the BCP site is still required.
6. In Section 4.2.6, the Department does not endorse or reject the assertion that data from Appendix M supports statements related to the relationship between 1, 1, 1 TCA contamination and groundwater elevation for the northwestern portion of the site. Regardless of the source of the contamination, remediation and mitigation of potential exposures related to groundwater contamination at the BCP site is still required.
7. In Section 4.2.8, the Department does not endorse or reject statements regarding levels of contaminant distribution in the rock matrix and notes that Standards, Criteria & Guidance (SCG) values do not exist to compare/evaluate rock matrix data for remedy selection.
8. Section 4.3.2 must identify two sampling locations which exceed the 2015 NYSDOH Indoor Air Guidance Value of 2 ug/m3 for TCE. The alternatives analysis must address what actions will be implemented to reduce exposures in two identified areas.
9. Section 4.3.4 Soil – The discussion of surface soil sampling results should be expanded in the alternatives analysis and included in the Qualitative Human Health Exposure Assessment.
10. Section 4.4.1.1.2 – Interpretation of RI results AOC-1 Vapor Degreaser – The Department does not endorse or reject the Volunteer's interpretation of the source of 1,1,1-TCA groundwater contamination outside AOC-1. It does note that the RI groundwater data from MW-23, 25, and 30 delineates a discrete area of groundwater contamination (including 1,1,1 TCA) with origin near MW-20 and 21 inside AOC-1. Also, notwithstanding the Volunteer's interpretation, remediation and mitigation of potential exposures related to groundwater contamination at the BCP site is still required.
11. Section 4.4.5.2 – Interpretation of RI results AOC-5 – The Department does not endorse or reject the Volunteer's interpretation of the source of groundwater contamination in AOC-5. The RI groundwater data from MW-4, 26, 31 & 33 does, however, delineate a discrete area of groundwater contamination with origin near

MW-9s. Moreover, this section fails to acknowledge other potential sources from former waste handling operations and contaminated soils including 1,1,1 TCA (remediation not to current standard) in this area. Lastly, aside from the Volunteer's interpretation, the remediation and mitigation of potential exposures related to groundwater contamination at the BCP site is still required.

12. Section 4.4.6.2 – Interpretation of RI results AOC-6 – The Department does not endorse or reject the Volunteer's interpretation of groundwater contamination in AOC-6 as remediation and mitigation of potential exposures related to this contamination at the BCP site is still required.
13. Section 4.4.10 – Interpretation of RI results AOC-10 – The Department does not endorse or reject the Volunteer's interpretation of the source of groundwater contamination in AOC-10 (south). It does note that the report section fails to acknowledge potential sources from former waste handling operations and contaminated soils (remediation not to current standard) in this area. Aside from the Volunteer's interpretation, the remediation and mitigation of potential exposures related to groundwater contamination at the BCP site is still required.
14. Section 4.4.13.2 – Interpretation of RI results and Conceptual Model of OU-1 – The Department does not endorse or reject the Volunteer's interpretation of continuity of the 1,1,1-TCA plume extending to MW-9s. RI groundwater data from MW-4, 26, 31 & 33 does, however, delineate a discrete area of groundwater contamination with origin near MW-9s. This section also fails to acknowledge other potential sources from former waste handling operations and contaminated soils including 1,1,1 TCA (remediation not to current standard) in this area. Aside from the Volunteer's interpretation, the remediation and mitigation of potential exposures related to groundwater contamination at the BCP site is still required.
15. Figures 11A & 11B – Future remedial documents, tables, and figures must identify all SVI sampling locations (Stantec/ITT) that require NYSDOH SVI Matrix recommended actions.
16. Section 4.3.4 - Future remedial documents, tables, and figures must include validated remedial investigation results collected by ITT at this site.
17. Based on the documentation of contamination present at the site in the final RI Report and the Department's determination of the need for remediation, a remedial alternatives analysis must be prepared that proposes remedial alternatives that addresses all contamination present at the site and alternatives to address all contaminant migration from the site.
18. The RI report suggests that the contaminated groundwater plume is the source for soil vapor intrusion into the on-site building. Therefore, the Department does not accept EPA's attenuation factor of 0.001 to predict indoor air concentrations from shallow soil gas into buildings located off-site. The documented contaminated groundwater plume that is moving off-site and the potential for soil vapor intrusion to occur in off-site structures will have to be addressed in the remedial alternatives analysis. The Qualitative Human Health Exposure Assessment should state that there is a potential for off-site exposures related to soil vapor intrusion.

With the understanding that the above noted comments, modifications and additions will be addressed, the document is hereby accepted. This letter shall be attached to the final document and a copy is required to be kept in the document repository. Also, to reiterate, the Department does not endorse or reject any statements in the RIR related to or concerning responsibility for contamination at the site and the RIR is accepted solely for development of an Alternatives Analysis.

As a reminder, all final documents and reports are to be in electronic format on compact computer discs (CDs). The disk should contain an Adobe® Acrobat® Portable Document Format (PDF) file and must be searchable. In addition, all data submitted to the DER must be in the DEC-approved Electronic Data Deliverable (EDD). Moreover, new data must be submitted on a continuous basis immediately after data validation occurs but in no event more than 90 days after the data has been submitted to the remedial party or its consultant(s). In other words, data is not to be held and submitted with the related reports.

If Maguire Family Properties, Inc. chooses not to address the comments, modifications and additions, you are required to notify this office within 15 days after receipt of this letter. In this event I suggest a meeting be scheduled to discuss your concerns prior to the end of this 15 day period.

We look forward to working together to complete this remedial investigation and move on to the alternatives analysis. If you have questions or concerns on this matter, please contact me.

Please contact me at (585) 226-5480 if you have any questions regarding this letter.

Sincerely,

Digitally signed by Timothy A. Schneider
DN: cn=Timothy A. Schneider, o=NYSDEC, ou=DER, email=timothy.schneider@dec.ny.gov, c=US
Date: 2016.07.18 11:58:04 -04'00'

Timothy Schneider, P.E.
Environmental Engineer 2

B. Schilling	D. Loew	J. Kenney	J. Deming
P. Sylvestri	T. Wells	M. Cruden	

Remedial Investigation Report
Brownfield Cleanup Program Site #C828101

Former Alliance Metal Stamping & Fabrication Facility
12 Pixley Industrial Parkway
Town of Gates, Monroe County, New York

Prepared for:
New York State Department of Environmental Conservation
6724 East Avon-Lima Road
Avon, New York 14414-9519

Prepared on behalf of:
Maguire Family Properties, Inc.
770 Rock Beach Road
Rochester, NY 14617

Prepared by:
Stantec Consulting Services Inc.
61 Commercial Street, Suite 100
Rochester, New York 14614

December 2015

CERTIFICATIONS

I, Peter Nielsen of Stantec Consulting Services Inc., certify that I am currently a NYS registered professional engineer and that this Remedial Investigation 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.

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

12/18/15

Signature   Date

Executive Summary

This report documents the activities, methods and results of a Remedial Investigation (RI) of the Former Alliance Metal Stamping & Fabrication (AMSF) Facility Site. The Site is located at 12 Pixley Industrial Parkway in the Town of Gates, Monroe County, New York. The Site Location is shown on Figure 1.

Maguire Family Properties, Inc. (Maguire), the current owner of the Former AMSF Site, implemented the RI as a Volunteer under New York State's Brownfield Cleanup Program (the BCP). Maguire submitted an application to admit the Site to the BCP to the New York State Department of Environmental Conservation (NYSDEC) in June 2011. The Site was accepted into the BCP in July 2011 and was assigned BCP site identification number C828101.

Site History and Previous Environmental Investigations

The Site is occupied by the former AMSF industrial facility. The facility was reportedly constructed in 1967 on previously-undeveloped agricultural land, and may have been operated as a warehouse until manufacturing operations were initiated in the early 1970s. Manufacturing operations were decommissioned in 1994, and since 1995 the property has been owned and operated by Maguire Family Properties, which leases individual spaces in the facility to several light manufacturing and commercial tenants.

An assessment of the environmental history of the AMSF Site and investigation of environmental conditions in exterior areas outside the facility building were performed between 1991 and 1994 prior to the sale of the Site to Maguire Family Properties. The 1991 to 1994 assessment and investigations were performed by GeoServices, Ltd on behalf of Gleason Corporation, the parent company for the Alliance Metal Stamping & Fabrication operation. The results of the sampling activities performed identified groundwater contamination by 1,1,1-trichloroethane (1,1,1-TCA), a chlorinated volatile organic compound (VOC) commonly used as a solvent in industrial degreasing operations, with the highest levels of contamination found at a well located at the northwest corner of the Site. Contamination of groundwater by much lower concentrations of tetrachloroethylene, a chlorinated VOC commonly used as a degreasing or dry-cleaning solvent (also known as tetrachloroethene or perchloroethylene, and commonly abbreviated as PERC or PCE), was identified in groundwater along the southern boundary of the Site. The investigations also identified four occurrences of soil contamination at the Site, and these were addressed by Gleason in 1994 with remedial actions to remove the contaminated soil. Results of the investigations and remedial activities, which had not been conducted under NYSDEC oversight, were provided to NYSDEC at the time, and copies of the GeoServices reports from the 1990s were presented to NYSDEC again with the June 2011 BCP Application for the Site.

The west boundary of the AMSF Site adjoins 30 Pixley Industrial Parkway, the site of the Former ITT Rochester Form Machine Facility, an inactive hazardous waste site (NYSDEC Site # 828112). The ITT site and the adjoining downgradient properties, including a portion of the AMSF Site, have been the subject of a separate remedial investigation implemented by ITT and overseen by NYSDEC. The focus of the ITT site investigation was contamination by 1,1,1-TCA and related

VOCs related to past releases from degreasing operations at the ITT site. The data from the RI of the ITT site indicate that bedrock, groundwater and soil vapor in areas of the AMSF Site which are downgradient of the ITT site have been impacted by chlorinated solvent contamination, with 1,1,1-TCA being the principal contaminant.

In April 2009, assessment of the potential for soil-vapor intrusion in the AMSF building performed as part of the ITT site RI indicated that concentrations of PCE, a chlorinated ethene, were higher in sub-slab vapor beneath the northeastern portion of the AMSF building than elsewhere on the AMSF or ITT sites. Historical records for the AMSF Site were identified which indicated that a degreaser had been located in that part of the AMSF facility during at least part of the period of AMSF operations. The need for further investigation of the subsurface conditions in the area of the higher PCE concentrations near the former degreaser location was the impetus for Maguire Family Properties to volunteer to undertake a BCP remedial investigation at the AMSF Site.

Scope of the AMSF RI

The scope of the RI was initially established in the Remedial Investigation Work Plan (RIWP) for the AMSF Site (Stantec, January 2012). The RI was conducted in accordance with the RIWP and in accordance with the modifications to the RIWP made by NYSDEC in its letter of February 27, 2012 approving the RIWP.

The RI was initiated in March 2012. A summary of the various field activities conducted during the course of the RI is presented on Table 1.

Initial investigations were conducted in Operable Unit 2 (OU-2), which covered all but the area at the northwest corner of the Site. The northwest portion of the Site, which was a focus of the then-ongoing ITT site RI, was designated as Operable Unit 1. Investigation activities in OU-1 were developed and initiated during the course of the AMSF RI following review of the June 2012 draft report on the ITT site RI and approval of an OU-1 work plan by NYSDEC. The boundaries of OU-1 and OU-2 are shown on Figure 2.

As initial investigative activities were completed during the course of the RI, the scope of the investigation was supplemented as necessary to delineate the extent of contamination identified or assess site features of potential concern identified during the course of the investigations. The scope of each of the supplemental activities was determined in consultation with Maguire Family Properties and NYSDEC. Plans for each addition to or modification of the RI scope were presented to NYSDEC for its review and approval in progress reports or in supplemental work plans.

The work scope specified in the RIWP and subsequent supplemental plans was completed in September 2014. A draft RI report was submitted to NYSDEC in October 2014. NYSDEC determined that the draft report did not substantially address the requirements of the BCA, enumerating its comments in its letter of January 23, 2015.

Several of NYSDEC's January 2015 comments called for additional field work and data collection. A Work Plan for Supplemental Remedial Investigation (Stantec, March 27, 2015) to address those comments was approved by NYSDEC in its letter dated April 21, 2015, with the approval subject to conditions presented in the letter. Supplemental RI activities were initiated in May 2015 and completed in November 2015 in accordance with the March 2015 work plan and NYSDEC's conditions for work plan approval. A list of variances from the approved scope of work is presented in Table 2.

The principal components of the remedial investigation included the following:

- Sampling in eight Areas of Concern (AOCs 1 through 8) in Operable Unit 2 where the possible presence of environmental impacts from specific historical operations (such as the former degreaser operation) was identified based on a review of the history of operations at the Site.

- Sampling in two "Other Areas," also located in OU-2, which were not identified as AOCs until after the RIWP had been approved. One was a former wastewater sump associated with a past welding operation. The second was an area in close proximity to a previous sub-slab soil vapor sampling point which had exhibited contamination when sampled in 2009 and which is currently difficult to access for direct follow-up sampling due to the presence of a tenant's raised gym floor.

- Sampling to assess the potential presence of contaminated soil and groundwater at locations in OU-1 not previously sampled during the GeoServices or ITT investigations.

- Sampling of sub-slab vapor and indoor air in OU-1 to evaluate an expanded suite of potential contaminants not being evaluated by ongoing monitoring conducted in connection with the ITT investigation.

- Video inspection and electronic tracing of facility storm and sanitary sewer lines in OU-1 and AOC 6 to identify and map connections and assess whether undocumented wastewater lines were present.

- Sampling and hydrologic testing to assess general Site-wide conditions (conditions not related to any specific past operation or other specific Site feature) in:

    - sub-slab soil vapor and indoor air (AOC 9),

    - groundwater (AOC 10),

    - and soil (AOC 11) at the Site.

  AOCs 9, 10 and 11 addressed Site-wide and background conditions and conditions in interior and exterior areas of the Site that had not been covered by the previous GeoServices investigations or the ITT site RI.

In all, the tally of investigation activities performed included the following:

- Site inspection and review of available historical architectural and engineering drawings for the Site to review and identify Site features potentially relevant to the remedial investigation.
- Soil vapor sampling for screening purposes (screening to identify and refine target areas for follow-up sampling of soil, sub-slab vapor/indoor air and groundwater) at 46 locations inside the AMSF building.
- Installation of 16 reusable sub-slab vapor sampling points inside the AMSF building.
- Soil vapor intrusion assessment sampling of sub-slab vapor and indoor air at 21 locations.
- Installation and sampling of 4 soil vapor probes along the downgradient Site boundary.
- Screening, logging and sampling of soil at 35 test borings.
- Bedrock coring and installation and development of new shallow-bedrock groundwater monitoring wells at 14 locations.
- Installation of one overburden well.
- Five rounds of Site-wide groundwater level measurements and five rounds of groundwater sampling involving all new wells and selected previously-installed wells (22 Site wells sampled in total).
- Laboratory analysis of 49 soil vapor screening samples, 4 downgradient boundary soil vapor samples, 23 sub-slab vapor samples, 23 indoor air samples, 2 ambient outdoor air samples, 59 soil samples, 78 groundwater samples, 1 sample of wastewater sump residue, and 8 samples of investigation derived waste.
- Three days of surveying to measure the location and elevation of new wells and selected previously-installed wells.
- Video inspection of OU-1 storm sewers using a wheeled robotic camera, and follow-up video inspection and electronic tracing using different equipment to cover storm sewer segments that had been inaccessible to the robotic camera during the initial survey.
- Video inspection and electronic tracing of a wastewater drain line located in AOC 6 to confirm its connection to the sanitary sewer.

- Performance of Community Air Monitoring Plan (CAMP) monitoring of dust and volatile organic compound (VOC) levels in air in areas surrounding investigation locations during drilling and well development activities.

The investigation also involved:

- discharge of investigation-derived wastewater to the municipal sewer system in accordance with permits issued by Monroe County, and off-site disposal of drummed investigation-derived solid waste,

- third-party validation of laboratory analysis data,

- review and evaluation of data collected during previous investigations at the Site, and

- review of recent AMSF Site data collected as part of the ITT site RI.

Summary of Findings

The RI accomplished the goals set for a remedial investigation by the requirements of the BCP. It defined the nature and extent of contamination at the Site, provided the information necessary to perform a qualitative assessment of potential exposures to the Site contamination, and provided the information needed to develop an analysis of potential remedial alternatives for the Site.

The results of the RI indicate the following:

- Occurrences of soil contamination by chlorinated VOCs were identified in the Former Degreaser Area (AOC 1) and the Former Paint Shop (AOC 6). For AOC 1 and AOC 6, the chlorinated VOCs were found to exceed NYSDEC's protection of groundwater soil cleanup objectives (POGW SCOs) in one sample of 15 samples from AOC 1 and one sample of four samples from AOC 6. The detected contaminant concentrations in the samples exceeding SCOs were less than two times their respective POGW SCOs, and ranged from 0.4 to 2.2 milligrams per kilogram (mg/kg). None of the concentrations detected exceeded SCOs for protection of public health at commercial use sites. The soil data and the supporting evidence from the field screening of test boring soil samples, soil vapor screening, sub-slab vapor and groundwater monitoring performed in both areas indicate that each occurrence is of limited lateral and vertical extent.

- Exceedances of the groundwater protection SCO for the volatile compound 1,4-dioxane were detected in soil samples from one boring in the Former Degreaser Area (AOC 1), one boring in the Former Paint Shop (AOC 6) and at two boring locations in the Former Waste Storage Areas (AOC 5B). Concentrations detected in these samples ranged from 0.14 mg/kg (just above the SCO of 0.1 mg/kg) to 3.6 mg/kg.

- Zinc was detected in one soil sample from the Former Paint Shop (AOC 6) at a concentration that exceeded NYSDEC's SCO for protection of ecological resources, but the concentration (229 mg/kg) did not exceed human health or groundwater protection SCOs.

- An occurrence of poly-nuclear aromatic hydrocarbon compounds (PAHs) and nickel was detected in one of the three surface soil samples collected to characterize Site-wide soil conditions. The concentrations of five PAHs exceeded SCOs; however, the detected concentrations of those five PAHs (830 to 1,800 micrograms per kilogram (µg/kg) are not unusual for surface soil in an urban or industrial area. Furthermore, because the sample was collected at a location adjacent to the facility parking lot, the PAH detections are presumed to reflect conditions related to pavement constituents and/or parking lot run-off. The nickel concentration (34 mg/kg) exceeded the SCO for protection of ecological resources but not human health or groundwater protection SCOs.

- Occurrences of soil contamination above SCOs were not detected in the other areas investigated. Exceedances of SCOs for aluminum, iron, magnesium and calcium detected in several samples are due to background conditions and do not represent environmental contamination.

- TCA, PCE and related daughter products (chlorinated ethane and ethene compounds produced by the environmental breakdown of 1,1,1-TCA and PCE) were found in sub-slab vapor beneath the AMSF building at all 21 locations sampled during the RI soil-vapor intrusion assessment program. Other VOCs were also detected in the sub-slab vapor samples. With the exception of ethylbenzene and xylene at the AMSF-05 and AMSF-06 locations in OU-1, these other VOCs were generally found to be present at concentrations that were one to two orders of magnitude lower than concentrations of TCA, PCE or related daughter products. At 17 of the locations sampled, concentrations of PCE, trichloroethene (TCE) and/or methylene chloride (also known as dichloromethane) were detected in indoor air samples.

  At 19 of the 21 locations sampled during the RI, the analytical results for the sub-slab vapor and indoor air sample pair exceeded guidance values established by the New York State Department of Health (NYSDOH) to indicate whether mitigation or monitoring actions may be needed to address the potential for intrusion of contaminated soil vapor into buildings.

  None of the concentrations detected in the 21 indoor air samples represented exceedances of NYSDOH indoor air quality guidelines that were in effect in 2013 at the time the samples were collected. In August 2015, NYSDOH lowered the air guideline concentration for TCE from 5 micrograms per cubic meter (µg/m3) to 2 µg/m3. TCE concentrations detected at two of the AOC 1 locations sampled in April 2013 (2.58

μg/m3 at AM- SVIA4 and 2.26 μg/m3 at AM- SVIA6) exceed the new guideline. A duplicate of the AM- SVIA4 sample, in which TCE was not detected above a concentration of 1 μg/m3, did not exceed the new guideline.

- Sampling of soil vapor along the eastern boundary of the Site detected PCE (concentrations of 1.8 to 33 μg/m) at three of the four locations sampled, and TCE (5.9 μg/m3) at one of those locations. Other chlorinated VOCs potentially associated with the groundwater contamination identified at the Site were not detected. Comparison of the results to NYSDOH indoor air guidelines using a generally accepted attenuation factor for predicting potential indoor air concentrations indicate that conditions at the downgradient boundary do not represent a potential risk of vapor intrusion in the buildings on adjacent properties to the east.

- Previous investigations have indicated that 1,1,1-TCA, PCE and related chlorinated ethanes and chlorinated ethenes were present in Site groundwater at concentrations that exceed NYSDEC's Technical and Operational Guidance Series Memorandum 1.1.1 (TOGS) groundwater quality standards. In the previous investigations, the exceedances of groundwater standards were found at well locations on the north, west and south sides of the Site and in shallow-, intermediate- and deep-bedrock monitoring zones. The expanded network of shallow-bedrock wells installed during the RI in the AMSF building and along the downgradient, eastern side of the Site provided the information needed to establish the nature and extent of the groundwater contamination at the Site. RI results confirmed that concentrations of 1,1,1-TCA and related daughter products are highest in the OU-1 area, with contamination extending beneath the building to the eastern side of the Site. Contamination by PCE and its daughter products is present at lower concentrations, with the highest levels found in the area of the former degreaser in AOC 1.

- The only occurrence of an exceedance of a groundwater quality standard for potential contaminants other than VOCs was a detection of 82 μg/L of lead in the June 2013 sample collected from AOC 6 / AOC 7 monitoring well AMSF-MW-26. The lead concentration in the September 2013 sample from that well was, however, below the TOGS standard of 25 μg/L. Exceedances of groundwater standards and guidance values for iron, magnesium, selenium and sodium that were detected at several other locations are due to background conditions present naturally in groundwater in the area.

- With one exception, semi-volatile organic compounds (SVOCs, which include PAHs) and pesticides and PCBs were not detected in Site groundwater samples. The one exception was a single detection of a concentration of 3.8 μg/L of caprolactam, an SVOC for which there is no applicable groundwater standard.

This report presents a description of the nature and extent of contamination at the Site and a qualitative assessment of the potential for exposure to the occurrences of contamination identified at the Site. An Alternatives Analysis evaluating remedial options for addressing the conditions indicated by the findings will be performed as the next step in the BCP remedial investigation program for the AMSF Site.

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1.0 Introduction

Stantec Consulting Services Inc. (Stantec) has prepared this report on the Remedial Investigation of the Former Alliance Metal Stamping & Fabrication (AMSF) Facility Site located at 12 Pixley Industrial Parkway in the Town of Gates, Monroe County, New York. A map showing the Site location is presented on Figure 1.

Maguire Family Properties, Inc. (Maguire), the current owner of the Former AMSF Site, implemented the RI as a Volunteer under New York State's Brownfield Cleanup Program (the BCP). Maguire submitted an application to admit the Site to the BCP to the New York State Department of Environmental Conservation (NYSDEC) in June 2011. The Site was accepted into the BCP by NYSDEC in July 2011 and the Remedial Investigation (RI) was completed pursuant to a Brownfield Cleanup Agreement (BCA) for the Site between Maguire and NYSDEC. The Site is designated by NYSDEC as Brownfield Cleanup Program (BCP) Site #C828101.

1.1 GOALS AND OBJECTIVES

The objectives for the RI were as follows:

- Define the nature and extent of contamination related to on-Site Areas of Concern (AOCs) in all media at or emanating from the Site by generating new data and relying on data from previous investigations;
- Generate sufficient data to evaluate the actual and potential threats to human health and the environment from on-Site AOCs; and
- Generate sufficient data to evaluate remedial action alternatives for on-Site AOCs.

The information developed by the RI will allow for the selection of remedial measures that will attain environmental conditions which are protective of commercial or industrial use of the Site and are protective of public health, the environment, and fish and wildlife resources in on- and off-Site areas affected by contamination from on-Site AOCs and its migration, if necessary.

1.2 SCOPE OF WORK

The scope of the RI was initially established in the Remedial Investigation Work Plan (RIWP) for the AMSF Site (Stantec, January 2012). The RIWP was approved with modifications by NYSDEC on February 27, 2012.

The RI was initiated in March 2012. Initial investigations were conducted in Operable Unit 2 (OU-2), which covered the southwest quadrant and east half of the Site. At the time the RI for the AMSF Site was initiated, the remaining northwest corner of the AMSF Site (Operable Unit 1, OU-1) was a focus of a separate remedial investigation being implemented on behalf of ITT Corporation concerning the Former ITT Rochester Form Machine Facility site (NYSDEC Inactive Hazardous Waste Site #8-28-112) which borders the AMSF Site to the west. After a draft report on the ITT site RI was made available for review, the scope of the AMSF RI was supplemented as necessary to complete the delineation of the nature and extent of contamination in OU-1.

The scope of the investigation was modified during the course of the RI as necessary to delineate the extent of contamination identified by initial phases of the work and to assess Site features which had not been specifically addressed in the RIWP but which came to light during the initial phases of the work.

The scope of each of the supplemental OU-1 and OU-2 investigation activities was determined in consultation with Maguire Family Properties and NYSDEC, with specific plans presented for NYSDEC's review and approval in RI progress reports or, when appropriate, in a supplemental work plan. Supplemental work plans prepared during the RI are listed in the references section of this report.

The work scopes specified in the RIWP and various subsequent supplemental plans were completed in September 2014 in accordance with NYSDEC approvals. A draft RI report was submitted to NYSDEC in October 2014.

NYSDEC determined that the draft report did not substantially address the requirements of the BCA. NYSDEC presented its comments in its letter of January 23, 2015, and called for additional field work and data collection. A Work Plan for Supplemental Remedial Investigation (Stantec, March 27, 2015) was prepared to address those comments. NYSDEC approved the supplemental work plan subject to conditions presented in its letter dated April 21, 2015. Supplemental RI activities were initiated in May 2015 and completed in November 2015 in accordance with the March 2015 work plan and NYSDEC's conditions for work plan approval.

A summary of the various field activities conducted during the course of the RI is presented on Table 1. A list of variances from the approved scope of work is presented in Table 2.

The principal components of the remedial investigation included the following:

- Sampling of soil vapor, soil and groundwater in eight Areas of Concern (AOCs 1 through 8) in Operable Unit 2 where the possible presence of environmental impacts from specific historical operations was identified based on a review of the history of operations at the Site. Additional information on the individual AOCs is presented in Section 2 of this report.

- Sampling and hydrogeologic testing to assess general conditions (conditions not related to any specific past operation or other specific Site feature) of sub-slab soil vapor and indoor air (AOC 9), groundwater and downgradient-boundary soil vapor (AOC 10), and soil (AOC 11) at the Site. These AOCs addressed Site-wide and background conditions and conditions in interior and exterior areas of the Site that had not been covered by the previous investigations.

- Sampling in two "Other Areas" in OU-2 that were not identified as AOCs in the RIWP. Additional information on the "Other Areas" is presented in Section 2 of this report.
- Sampling to assess the potential presence of contaminated soil and groundwater at locations in OU-1 not previously sampled during earlier investigations.
- Sampling of sub-slab vapor and indoor air in OU-1 to evaluate an expanded suite of potential contaminants not being evaluated by ongoing monitoring conducted in connection with the ITT investigation.
- Video inspection and electronic tracing of facility storm and sanitary sewer lines in OU-1 and AOC 6 to identify and map connections and assess whether undocumented wastewater lines were present.

In all, the tally of investigation activities performed included the following:

- Site inspection and review of available historical architectural and engineering drawings for the Site (activities performed to identify Site features potentially relevant to the remedial investigation).
- Soil vapor sampling for screening purposes at 46 locations inside the AMSF building.
- Installation of 16 reusable sub-slab vapor sampling points inside the AMSF building.
- Soil vapor intrusion assessment sampling of sub-slab vapor and indoor air at 21 locations.
- Installation and sampling of 4 soil vapor probes along the downgradient Site boundary.
- Screening, logging and sampling of soil at 35 test borings.
- Bedrock coring and installation and development of new shallow-bedrock groundwater monitoring wells at 14 locations.
- Installation of one overburden well.
- Five rounds of Site-wide groundwater level measurements and five rounds of groundwater sampling involving all new and selected previously installed Site wells (22 wells sampled in total).
- Laboratory analysis of 49 soil vapor screening samples, 4 downgradient boundary soil vapor samples, 23 sub-slab vapor samples, 23 indoor air samples, 2 ambient outdoor air samples, 59 soil samples, 78 groundwater samples, 1 sample of wastewater sump residue, and 8 samples of investigation derived waste.

- Three days of surveying to measure the location and elevation of new wells and selected previously-installed wells.
- Video inspection of OU-1 storm sewers using a wheeled robotic camera, and follow-up video inspection and electronic tracing using different equipment to cover storm sewer segments that had been inaccessible to the robotic camera during the initial survey.
- Video inspection and electronic tracing of a wastewater drain line located in AOC 6 to confirm its connection to the sanitary sewer.
- Monitoring of dust and VOC levels in air in areas surrounding investigation locations during drilling and well development activities in accordance with the project Community Air Monitoring Plan.

The investigation activities included discharge of investigation-derived wastewater to the municipal sewer system in accordance with permits issued by Monroe County, and off-site disposal of drummed investigation-derived solid waste. Third-party validation of laboratory analysis data was also conducted.

Finally, the RI involved review and evaluation of data collected during previous investigations at the Site and a review of recent AMSF Site data collected as part of the ITT site RI.

1.3 REPORT CONTENTS AND ORGANIZATION

Section 1 describes the purpose, objectives, and scope of the RI. Section 2 presents a description of the Site and its setting and a summary of the background information and results of previous investigations that were the basis for the design of the RI. Section 3 describes the field investigations and laboratory analysis activities performed during the RI. Section 4 describes the results of the RI sampling, monitoring and analytical activities. Section 5 describes the results of the third party validation of project RI analytical data. Section 6 presents qualitative assessments of the human health and ecological risks posed by the Site conditions as observed during the RI. Section 7 provides a summary of the findings, conclusions, and recommendations of the RI. References are listed in Section 8.

Figures including a Site location map and Site plans showing investigation areas, sampling and monitoring locations, and summaries of selected investigation data are presented following the report text. Tables summarizing sampling activities and the results of field screening and laboratory analysis of Site samples are presented following the figures. Several appendices presenting logs and records of field activities and results, laboratory analysis reports, laboratory data validation reports, records documenting discharge and disposal of investigation-derived waste (IDW), and other supporting documents are presented at the end of the report. Lists of report figures, tables and appendices are presented in the Table of Contents.

2.0 Background Information

2.1 SITE LOCATION, DESCRIPTION, AND SETTING

The AMSF facility consists of a ±120,000 square-foot, one-story industrial building with no basement and slab-on-grade construction. The property, which is approximately 7 acres in size, is identified as Monroe County Tax Parcel No. 119.17-1-2, located in the Town of Gates (see Figures 1 and 2).

The Site is relatively level and slopes gently to the south. Ground surface elevations range from approximately 573 feet above mean sea level (ft. amsl) at the northern Site boundary to 560 ft. amsl along Pixley Industrial Parkway on the south side of the Site.

Municipal storm sewers are not available for stormwater management in the area of the Site. Stormwater at the Site and on the surrounding properties is managed using surface drainage ditches and stormwater recharge wells which discharge to the subsurface. Surface water run-off from developed areas of the Site and surrounding properties is generally directed to a network of catch basins and drain lines leading to recharge wells. The recharge wells are vertical wells installed in bedrock to depths ranging from approximately 19 to 149 feet below ground surface (ft bgs). There are five such wells on the AMSF Site as shown on Figure 2.

No surface water bodies, significant natural resources, federal or state wetlands, or critical wildlife habitats of threatened or endangered species are known to be present within ½ mile of the property. NYSDEC has indicated it has no records of rare or state-listed animals or plants, significant natural communities or other significant habitats on or in the immediate vicinity of the property.

2.2 LAND USE

2.2.1 Current Site and Surrounding Land Uses

The Site, which is approximately 7 acres in areal extent, includes a ±120,000 square-foot, one-story industrial building with no basement and slab-on-grade construction. The remainder of the Site is covered by either grass or asphalt, the latter of which is used for parking and/or truck loading docks and ramps.

Current and reasonably-anticipated future use of the Site includes commercial and industrial (light manufacturing) uses. Land uses in the surrounding area include industrial facilities or vacant industrial properties to the east, south and west of the AMSF facility and a multi-screen movie theater and its parking lot on the adjacent property to the north.

The nearest residential neighborhoods are located 1,000 feet to the southeast, 1,500 feet to the south, and 1,500 feet to the west of the Site boundaries.

No schools or federal, state, county, municipal or community parks or recreational areas are known to be present in the immediate vicinity of the property.

The Site is accessible to existing local and regional infrastructure including highways and gas and electric service. Public water supply and municipal sewer services are available at the Site and in the surrounding area. No designated wellhead protection or drinking water aquifer recharge areas are known to be located in proximity to the Site. Groundwater is not known to be used as a drinking water supply at the Site or in the surrounding area. Available information, including a limited survey of adjacent property owners performed during the RI, indicates that no private or public water supply wells are present in the area and that potable water is supplied to the properties in the area of the Site by the Monroe County Water Authority.

2.2.2 Past Uses of the Site

The subject property is the site of the former Alliance Metal Stamping & Fabrication (AMSF) industrial facility. The AMSF facility was reportedly constructed in 1967, before which the property was undeveloped agricultural land. The original Site building may have been operated as a warehouse by the Alcoa Aluminum Corporation prior to its occupancy by AMSF.

Manufacturing operations appear to have begun at the Site in the early 1970s. The facility was purchased by the Alliance Tool Corporation, a subsidiary of the Gleason Corporation, in 1973. Alliance operated the Alliance Metal Stamping & Fabrication facility at the Site until July 1994, then decommissioned and removed the manufacturing equipment and sold the facility to Maguire Family Properties, Inc., in 1995. Manufacturing operations included stamping, forming, grinding, cleaning, painting, phosphating, and deburring of metal piecework and machining and machine-tool building service activities.

Since 1995, the property has been owned and operated by Maguire Family Properties, which has subdivided the building and leased spaces to companies operating a variety of light manufacturing operations and commercial activities.

2.3 GEOLOGIC AND HYDROLOGIC SETTING

Published mapping of overburden geology indicates that overburden deposits at the Site consist of glacio-lacustrine sediments. In RI test borings, overburden deposits were found to consist of an upper layer of from less than 1 to a few feet of fill material underlain by a few to several feet of glacio-lacustrine sediments which are typically underlain by a few to several feet of glacial till.

The depth to the top of bedrock has been logged at depths ranging from 4 to 20.5 feet below ground surface (bgs) in the test borings drilled at the Site during previous and recent investigations. The apparent top of bedrock surface at the Site appears to be an irregular surface that slopes generally north to south from a high of approximately 562 ft. amsl along the northern side of the Site to a low of approximately 552 ft. amsl along the southern Site boundary. A relatively pronounced low is apparent on the east side of the Site at monitoring well AMSF-MW-34, where the top of bedrock elevation of 546.5 ft. amsl is approximately 10 feet below the top of bedrock elevation noted 75 feet to the northwest at monitoring well AMSF-MW-29.

The uppermost bedrock unit at the Site is mapped as the Eramosa Dolostone of the Upper Silurian-aged Lockport Group. The Penfield Dolostone, Decew Dolostone, and the Gates Member of the Rochester Shale underlie the Eramosa.

The data collected during the RI indicate that over most of the Site, the water table occurs at or below the top of bedrock during both high water-table and low water table conditions. However, the data indicate that it is likely that during high water table periods, the water table may rise a few feet into the overburden in the area along the southern edge of the Site and other areas where the top of bedrock surface is low. This appears to be the case at shallow bedrock monitoring well AMSF-MW-34, where wet soils were noted from 15 to 20.5 feet bgs during the drilling of the well boring and where groundwater elevations 6.5 to 7.6 feet above the top of bedrock surface elevation were recorded during monitoring events.

Results of the ITT remedial investigation have indicated that there are three zones of distinctive groundwater flow characteristics in the vicinity of the Site. Within the shallow (uppermost) bedrock groundwater zone, in the upper 25 ft of the Eramosa Dolostone, the permeability is very high and flow is predominantly along fractures and zones of solution cavity development. The high permeability of the shallow bedrock zone across the Site was evident during the RI from the voids and numerous fractures encountered during bedrock drilling and from the fact that a complete loss of drilling water circulation was observed during the drilling of each of the shallow bedrock monitoring wells. No drawdown of the water table was observed during the pumping of groundwater to develop each of the new wells.

Permeability of the underlying intermediate bedrock horizon is reported to also be high, although not as high as the upper Eramosa. Permeability is reported to be lower in deeper bedrock units (as reported in the ITT site RI report).

Reports on previous investigations at the AMSF and ITT sites have indicated that the direction of groundwater flow in the shallow bedrock zone at the Site is generally to the north or northeast. However, results of the groundwater level monitoring events performed during this RI indicated a shallow (nearly flat) eastward hydraulic gradient across the northern half of the Site.

2.4 PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

A detailed summary of previous environmental site assessments, investigations and remedial activities performed at the AMSF Site was presented in Attachment F of the June 2011 BCP Application. BCP Application Attachment F included copies of reports documenting the previously completed environmental studies and remedial actions and available summaries of data from the then ongoing ITT RI. That information, which was the basis for the design of the RIWP for the AMSF Site, is not repeated in detail in this report. However, an overview of the history of investigation and remedial activities at the Site is presented below in Section 2.4.1, previous remedial actions are summarized in Section 2.4.2 and specific information on the results of previous investigation in the AOCs identified at the AMSF Site is presented in Section 2.5.

The Former ITT Rochester Form Machine Facility and the adjoining downgradient properties, including the AMSF Site, were the subject of the remedial investigation implemented by ITT. The ITT RI investigations were concluded in 2012, and a draft report was issued by O'Brien & Gere Engineers, Inc., (O'Brien & Gere) in June 2012. A revised draft RI report was issued in April 2014 (O'Brien & Gere, April 11, 2014).

Beginning in 2011, ITT has also been conducting an interim program of annual vapor-intrusion assessment at the AMSF Site to monitor the impacts of the contamination identified in the RI, and in June 2013 performed a periodic groundwater monitoring event that included sampling of 14 wells on the AMSF Site. Results of that monitoring have been reported by O'Brien & Gere in separate submissions to NYSDEC.

Because the duration and scope of the investigations of the Former ITT Rochester Form Machine Facility site has been extensive, it is not feasible to present in this report a comprehensive summary of either the activities performed on the AMSF Site or the data which was collected on or is otherwise relevant to environmental conditions on the AMSF Site. Furthermore, an evaluation of the broad-ranging conclusions presented in the ITT RI report concerning the source, fate and transport of the contamination at the AMSF Site is beyond the scope of the RI for the AMSF Site. Instead, the ITT investigations are covered in the overview below, and data from the ITT investigations that are relevant to the evaluation of the nature and extent of contamination from on-Site sources at the AMSF Site are referenced where appropriate in the remaining sections of this report.

2.4.1 Overview of Previous Investigations

An assessment of the environmental history of the AMSF Site and investigation of environmental conditions in exterior areas outside the facility building were performed between 1991 and 1994 prior to the sale of the Site to Maguire Family Properties in 1995. The 1991 to 1994 assessment and investigations were performed by GeoServices, Ltd on behalf of Gleason Corporation, the parent company for the Alliance Metal Stamping & Fabrication operation. Those investigations involved soil vapor, soil, and groundwater sampling and analysis. Monitoring wells AMSF-MW-1S, -1D, -3S, -3D, -4, -5D, -7, -8S, -8D, -9S, and -10, which were used as part of the monitoring well network for the RI covered in this report, were installed at the Site during the GeoServices investigations. (Monitoring wells locations are shown on Figure 8.)

The results of the sampling activities conducted by GeoServices identified contamination by 1,1,1-trichloroethane (1,1,1-TCA) in groundwater at the Site, with the highest levels found at monitoring well AMSF-MW-7, located at the northwest corner of the Site. Contamination of groundwater by much lower concentrations of tetrachloroethylene (also known as perchloroethylene, commonly abbreviated either as PERC or PCE) was identified in groundwater along the southern boundary of the Site. The GeoServices investigations also identified four occurrences of soil contamination at the Site, and these were addressed by Gleason in 1994 with remedial actions to remove the contaminated soil. Results were provided to NYSDEC at the time, and copies of the GeoServices reports from the 1990s were again presented to NYSDEC with the June 2011 BCP Application for the Site.

The findings of the investigative and remedial activities conducted at the Site in the 1990s were reported to and acknowledged by NYSDEC at the time. However, it is noted that these activities were not conducted, and the associated reports were not prepared, under NYSDEC oversight.

Investigations of the presence of contamination from releases of 1,1,1-TCA and other chlorinated volatile organic compounds (VOCs) at the Former ITT Rochester Form Machine Facility were initiated after the GeoServices investigation findings were reported to NYSDEC. As part of those investigations, sampling of groundwater at the wells AMSF-MW-1S through -10 began in1998. Beginning in 2004, extensive sampling of soil, bedrock, groundwater, sub-slab soil vapor, and indoor air has been performed at the AMSF Site as part of the ITT site RI, and monitoring wells AMSF-MW-11S, -12S, -13S, -15I and -16I were added to the monitoring well network at the Site beginning in 2005.

The data from the investigations of the ITT site demonstrated that releases of 1,1,1-TCA and related VOCs occurred on the ITT site. Bedrock, groundwater and soil vapor in areas of the AMSF Site which are hydraulically downgradient of the ITT site are contaminated with the same VOCs, and the data indicate that the past releases on the ITT site are likely to have been the primary source of the contamination by those compounds which is now present on the AMSF Site.

In April 2009, as part of the ITT site RI, assessment of the potential for soil-vapor intrusion in the AMSF building indicated that concentrations of PCE were significantly higher in sub-slab vapor beneath the northeastern portion of the AMSF building than elsewhere on the AMSF or ITT sites. Historical records for the AMSF Site were identified which indicated that a degreaser had been located in that part of the AMSF facility during at least part of the period of Alliance's manufacturing operations. The need for further investigation of the conditions in and around the former degreaser location was the impetus for Maguire Family Properties to volunteer to undertake a BCP remedial investigation at the AMSF Site.

2.4.2 Overview of Previous Remedial Actions

2.4.2.1 Removal of Underground Storage Tanks

Two underground petroleum storage tanks were located on the south side of the AMSF building, including a 1,500 or 2,000 gallon fuel oil or gasoline tank installed in 1966 and removed in 1988 and a 10,000 gallon fuel oil tank installed in 1975 and removed in 1989. Tank removal reports indicate that petroleum contamination was not encountered during the tank removals.

Two 285-gallon underground tanks used as secondary containment systems for paint storage rooms and paint mixing and waste storage areas were located adjacent to the building in the former paint shop area (AOC 6). These tanks were also reportedly removed in 1989. Tank removal reports indicate that contamination was not encountered at one of the locations but that soil contamination was encountered at the second ("Tank 2", located in the drum storage area on the west side of the building). Contaminated soil excavation and removal for off-site disposal was performed at the second location, and post excavation results indicated residual contamination was not present. The reported locations of the two former paint-storage area USTs are shown on Figure 2.

2.4.2.2 1994 Remedial Activities

Remedial actions were performed by Gleason in 1994 to remove small volumes of soil at four locations where contamination of shallow soil had been identified by the GeoServices investigations conducted from 1991 to 1994. The four 1994 soil removal areas (Areas A, B, E and F) are shown on Figure 2. Post-excavation sampling of remaining soil did not detect the presence of residual contamination. (Note: As documented in more detail in subsequent sections of this report, aspects of the soil removal activities were performed using methods that are not consistent with current NYSDEC guidance.)

As part of the investigations performed in AOC 5B during the recent RI, further soil sampling was performed adjacent to Area A, where VOC contamination of soil by xylene and other VOCs had been detected during the GeoServices investigations. Soil sampling adjacent to Area B, where contamination by 1,1,1-TCA and other VOCs had been detected, was performed during the RI as part of the AOC 2 investigation. Results of the test borings at both locations are presented in Section 4.

2.5 REMEDIAL INVESTIGATION AREAS OF CONCERN

The AOCs that have been identified at the AMSF Site are described below. The locations of the AOCs are shown on Figure 2.

2.5.1 AOC 1 – Former Degreaser Area

Sub-slab vapor sample AMSF-19, collected in April 2009 as part of the ITT site RI, contained a concentration of 1,400,000 µg/m3 of the chlorinated degreasing solvent PCE. That concentration was significantly higher than had been detected elsewhere on the AMSF or ITT sites. Historical records for the AMSF Site were identified which indicated that a degreaser had been located at building column G-8, approximately 30 to 40 feet north of the location of the AMSF-9 sample location. Available information indicates that the degreaser had been installed in the 1970s prior to the construction of the northern section of the facility. A 1979 design drawing for the northern addition indicates a planned sewer connection for a drain from the degreaser at column location G-7. Records indicate that operation of the degreaser was discontinued in 1988. Further details on the operation or decommissioning of the degreaser were not found.

The RI program for AOC 1 included an initial phase of soil vapor screening, the results of which were used to select locations for follow-up soil sampling at 9 test borings. Installation and sampling of shallow-bedrock monitoring wells was performed at three of the test boring locations, and SVI assessment sampling of sub-slab soil vapor and indoor air at 6 locations in the area surrounding the former degreaser and AMSF-19 locations was also performed. Finally, a shallow-bedrock monitoring well was installed to the east of AOC 1 during the supplemental RI activities performed in 2015 to allow for assessment of groundwater conditions at the property line downgradient of AOC 1.

The sampling locations in or related to AOC 1 include the following:

- soil vapor screening points DG-1 through DG-18,
- soil sample test borings DG-TB-1 through DG-TB -5, SW-TB-1, and AMSF-MW-20 through AMSF-MW-22,
- SVI assessment sub-slab-vapor and indoor-air sampling locations AM-SVI4 through AM-SVIA9, and
- former degreaser area monitoring wells AMSF-MW-20, -21 and -22 and downgradient wells AMSF-MW-29 and -34 located in the area to the east of AOC 1.

Soil vapor screening locations at the Site are shown on Figures 3A and B. Locations of test borings at which RI soil sampling was performed are shown on Figure 4. SVI assessment locations are shown on Figure 6, and monitoring well locations at the Site are shown on Figure 8.

Separate figures are presented which show on a single plan the soil sampling, SVI assessment, and groundwater sampling locations related to each individual AOC. For AOC 1, that figure is Figure 14-1. (Equivalent figures for each of the other AOCs and for OU-1 are presented on Figures 14-2 through 14-13.) Figure 14-1 summarizes all validated analytical results for AOC 1 samples and presents a comparison of the AOC 1 results to applicable NYSDEC and NYSDOH standards or guidance values. AOC 1 results are discussed in Section 4.4.1 of the report.

2.5.2 AOC 2 – Former Drainage Swale

Ground surface topographic contours shown on a 1979 design drawing for the construction of the northern section of the facility building indicate that prior to construction of the addition a drainage swale had been located adjacent and parallel to the north wall of the original building. The swale drained toward the west to the northwest corner of the building where it turned to the south-southwest and continued until it connected to a swale located along Pixley Industrial Parkway. The swale is also visible in a 1976 aerial photograph of the Site. The eastern end of the pre-1979 swale is located close to the location of AOC 1 and the former “drain from degreaser” described above.

In 1979, the swale was covered by the northern building addition and the paved parking area on the west side of the building. A new south-flowing drainage swale was developed along the western property line.

Background Information

The western/southern section of the former drainage swale is located west of the AMSF building. In 1991 and 1992, GeoServices conducted sampling in the area through which the western/southern section of the former drainage swale runs. The GeoServices investigation began with a soil-vapor screening program which was followed by several phase of soil sampling to assess the nature and extent of contamination at and in the area surrounding sample location B, where soil vapor sampling had indicated the presence of VOCs in soil vapor at concentrations above those at most of the other locations investigated at the Site. The B sample location and other soil sample locations along and surrounding the swale alignment in this part of the Site are shown on Figure 14-2. As shown on Figure 14-2, the B location was within a few feet of the trace of the former drainage swale.

As reported by GeoServices in its reports on the investigations performed at the Site in the 1990s, the soil vapor sampling and soil sample field screening performed by GeoServices involved screening-level analysis of samples using a photoionization detector (PID) equipped with a 10.6 electronVolt (eV) lamp. The screening would have detected the presence of contamination by most VOCs, including most volatile 'compounds of concern' (COCs) likely to have been present in materials used in previous Site operations. However, the screening would not have been effective in detecting the degreasing solvent 1,1,1-TCA and its breakdown product 1,1-dichloroethane (1,1-DCA), since each of those compounds has an ionization potential above 10.6 eV.

At the B sample location, 140 ppm of total VOCs had been detected in soil vapor during the initial phase of the GeoServices investigation. Screening (using a 10.6 eV PID) of other soil vapor samples collected along or on either side of the former swale trace in this part of the Site indicated total VOC levels of 20.6 ppm or less.

The initial follow–up of the B location soil vapor result involved sampling of shallow soil at the B location in November 1991. A discrete sample (not a composite sample) collected at a depth of 18 to 23 inches was submitted for laboratory analysis of VOCs by EPA GC/MS method 8240. The following compounds were detected in the "SS-B" soil sample:

- 1,1,1-TCA – 1.3 mg/kg
- 1,1,2-TCA – 0.01 mg/kg
- 1,1-DCA – 0.13 mg/kg
- 1,1-Dichloroethylene (DCE) – 0.18 mg/kg
- PCE – 0.17 mg/kg
- TCE – 0.02 mg/kg
- 1,2-DCE – 0.008 mg/kg

The result for 1,1,1-TCA exceeded the now current NYSDEC SCO (0.68 mg/kg) for protection of groundwater (POGW). The concentration of the other contaminants detected did not exceed now current SCOs.

In 1992, follow-up soil sampling was performed in the surrounding area at test borings SB-1 through SB-10 and SB-19, located as shown on Figure 14-2. At each boring, continuous soil sampling was performed to the top of bedrock, each 2-foot sample was screened for the presence of VOCs using a 10.6 eV PID, and two samples were selected for laboratory analysis of VOCs by EPA Method 8100, a gas chromatography (GC) method. Concentrations of up to a maximum of 0.13 mg/kg of 1,1,1-TCA and/or PCE were detected in at least one of the samples from each test boring except SB-1 (at which no contamination was indicated). None of the concentrations detected exceeded now current SCOs; however, it is noted that the use of the GC method 8100, rather than a GC/MS method, is not consistent with now current NYSDEC guidance, which call for GC/MS analytical methods to be used for site investigation.

In the eleven 1992 test borings, depths to the top of bedrock ranged from 7 to 10.5 feet. Saturated soils, indicating the possible presence of the water table at the base of the overburden, were reportedly noted in samples from the interval at the top of bedrock in some of the borings.

In 1993, GeoServices performed a supplemental B location test boring, collecting samples from 2 to 4 feet and 4 to 6 feet for laboratory analysis of halogenated VOCs by EPA GC method 8010. No contaminants were detected in the shallower sample, but 1,1,1-TCA 1,1,2-TCA and PCE were each detected in the 4-6 ft. sample at concentrations of 0.02 mg/kg each (all below applicable current SCOs). (Note: mg/kg is equivalent to parts per million, ppm.)

In 1994, a soil removal excavation was performed at the B location. A 10-ft. square area was excavated to a depth of 24 inches, and screening of soil using a 10.6 eV PID was performed during the excavation to determine the extent of contamination. When PID readings indicated that contaminated material had been removed, a composite soil sample was collected from the soil at the bottom of the excavation. EPA GC method 8010 analysis of halogenated VOCs in the composite sample detected 0.006 ppm 1,1,1-TCA and 0.003 ppm 1,1-DCA.

It is noted that by relying on field screening with a 10.6.eV PID (rather than an 11.7 eV PID), collection of a composite sample (rather than a grab sample or samples), and use of a GC method for VOC analysis of the sample (Method 8010 rather than a GC/MS method such as Method 8240 or 8260), the approach used in 1994 for determining the limits of and characterizing conditions following the completion of the Area B remedial excavation is inconsistent with now current NYSDEC guidance on post-excavation documentation sampling.

During the recently completed RI, seven soil vapor screening points (SW-1 through -5, -7 and -8) were installed along the reported alignment of the former swale, and five soil test borings and one monitoring well (SW-TB-1 through -4 and AMSF-MW-23) were installed to (1) assess the potential presence of VOCs in soil related to possible historic release(s) of degreasing solvent compounds to the former swale and (2) investigate other potential general impacts from former surface runoff along the path of the former swale. SVI assessment sampling points SVIA-5 and -6 and AMSF-22 are likewise all located in close proximity to the former swale alignment.

An eighth soil vapor screening point had been planned for the AOC 2 program at the location where the western/southern section of the trace of the former swale intersects the footprint of the 1994 Area B soil removal excavation. Soil-vapor sampling was attempted at two locations in this area, but in both cases the hole drilled to permit vapor sampling filled with water very rapidly after it was drilled. To address the data gap presented by this condition, this location was selected for one of the AOC 2 test borings (SW-TB-4) to allow for soil sampling in the absence of soil vapor data. Soil sampling at SW-TB-4 also served the supplemental purpose of further characterizing the potential presence of residual contamination at depths below the bottom of the 1994 excavation at Area B. Overburden well AMSF-MW-24 was installed at the SW-TB-4 location to evaluate overburden groundwater conditions in this area.

A results summary for AOC 2 soil, groundwater, and SVI assessment samples is presented on Figure 14-2. AOC 2 results are discussed in Section 4.4.2.

2.5.3 AOC 3 – East Side Sanitary Sewer

The 1979 design drawings for the northern building addition referenced above indicate that the "existing drain from degreaser above floor" leading north from the degreasing operation area was to be connected to a new sanitary sewer line following installation as part of the facility expansion. If contaminated condensate from the degreaser operation was discharged through the "drain from degreaser" to the sanitary sewer after its installation, this would represent potential sources of release along the sewer.

An upstream section of the same sanitary sewer is reportedly connected to floor drains in the northeastern portion of the facility. PCE contamination was detected in 2009 sub-slab vapor sample location AMSF-20, located adjacent to the upstream section of the sewer line approximately 120 feet north of the reported location of the former degreaser operation. Investigation in the area of previous sample location AMSF-20 therefore was warranted to determine whether the PCE detected in soil vapor at AMSF-20 is related to releases from the sewer rather than a broad area of impact from a source in the former degreaser area.

Thirteen soil vapor screening points (SEW-1 through -13, located as shown on Figures 3a and 3b) and one test boring (SEW-TB-1, located as shown on Figure 4) were installed to assess the potential presence of VOCs in soil related to possible historic release of degreasing-related materials into the sewer. SVI assessment sampling point SVIA-5 is located along the sewer alignment just east of (just downstream along the sewer from) the former "drain from degreaser" location described above.

An additional soil sampling point was intended for the AOC3 program, which the boring for AOC1 monitoring well AMSF-MW-21 was intended to provide. However, drilling access to an appropriate location adjacent to the sewer line was not feasible, and therefore the AMSF-MW-21 boring and well was moved to a location approximately 15 feet north of the sewer alignment. This location does, however, provide for assessment of groundwater conditions in the area and therefore an indirect means of assessing whether the sewer had been a source of significant releases of solvent.

A results summary for AOC 3 soil, groundwater, and SVI assessment samples is presented on Figure 14-3. AOC 3 results are discussed in Section 4.4.3.

2.5.4 AOC 4 – Former Press Pit Foundation

In November 1994, oil was found to be in contact with underlying soil at a sump in a press pit located in the south center of the AMSF building. The press pit and sump were cleaned and decommissioned, and in 1995 two soil test borings were installed adjacent to the location of the sump. Samples from the borings submitted for analysis of total petroleum hydrocarbons (TPH) detected up to 7.73 parts per million (ppm) TPH. No further investigation was performed at the time, nor was any remediation undertaken.

One soil test boring/ shallow-bedrock groundwater monitoring well (AMSF-MW-25) was installed during the RI adjacent to where standing oil had been observed in previous investigations to investigate the extent of contamination associated with the former press pit and characterize subsurface soil conditions in that area. SVI assessment sampling performed at SVIA-15, approximately 8 feet to the southwest of the former press pit, served to characterize the potential presence of VOC impacts from former press pit operations.

A results summary for AOC 2 soil and SVI assessment samples is presented on Figure 14-4. AOC 4 results are discussed in Section 4.4.4.

2.5.5 AOC 5 – Former Waste Storage Areas

Historical drawings of the Site indicate three areas that were used for material storage, including storage of wastes. The former waste storage areas include the following:

- AOC 5A - the former outdoor area adjacent to the southwest corner of the original building, reportedly used as a storage area before it was partially covered by the 1975 building addition constructed west of the D column line.

  Previous investigation of AOC 5A was limited to soil vapor sampling performed in 1992 in the outdoor portion of the area along the south wall of the building. No significant VOC contamination was indicated by the sampling. The soil vapor samples were reportedly screened with a photoionization detector (PID) equipped with a 10.6 electronVolt (eV) lamp. The screening would have detected contamination by most VOCs, including most volatile compounds of concern (COCs, hazardous compounds detected in previous sampling at the Site or likely to have been present in materials used in Site operations). However, as noted above, the screening performed in 1992 would not have been effective in detecting 1,1,1-TCA or 1,1-DCA, both of which have an ionization potential above 10.6 eV. Test boring 5A-TB-1 was installed in this area to assess the potential impact of the past waste storage activity.

- AOC 5B - a storage shed located along the western wall of the 1975 addition, reportedly used until being replaced by the Building Addition # 3 with approximately the same dimensions.

Test borings 5B-TB-1 and -2 and SVI assessment sampling point SVIA-3 were installed in the footprint of the former Area 5B waste storage shed.

- AOC 5C - a fenced-in outdoor waste storage area located immediately south of the former AOC 5B storage shed.

  AOC 5C was reportedly used for outdoor container storage. An underground storage tank (UST) that served as a secondary spill containment system for a paint mixing and waste storage room located inside the facility just to the east of AOC 5C was also reportedly located in this area.

  The tank and a small amount of VOC-impacted soil beneath the tank were removed in 1989. Samples of the soil removed and post-excavation soil remaining at the bottom of the tank removal excavation were analyzed for the following:

  - VOCs by EPA Method 8240
  - Phenols and PAHs by EPA Method 8270
  - RCRA metals by EP Toxicity Methods (post-excavation sample only)

  Benzo(k)fluoranthene (at a concentration of 1.56 parts per million, ppm), several other PAHs (at lower concentrations), toluene (6.58 ppm), and ethyl benzene (1.57 ppm) were detected in the sample of excavated soil, but no contaminant compounds were detected in the post-excavation sample. Closure of the tank was approved by NYSDEC.

  Potential impacts to soils in this area were further investigated in 1991 by GeoServices, Ltd. Soil vapor samples were collected at 10 locations inside the fenced storage area and screened using a PID with a 10.6 eV lamp. (As noted above, screening using a PID with a 10.6 eV lamp would not have been effective in detecting 1,1,1-TCA or 1,1-DCA, both of which have an ionization potential above 10.6 eV, but would have detected other potential VOCs of concern.) PID readings ranged from 5 to 22 ppm at 9 of the locations. At the 10th location, in the northeast corner of AOC 5C, a reading of 1459 ppm was recorded. In November 1991, a soil sample (sample "A") was collected at a depth of 18 to 24 inches at the location of the high soil vapor reading in the northeast corner of AOC 5C, and VOC analysis indicated the presence of xylene (7.5 ppm), ethyl benzene (1.1 ppm), toluene (0.8 ppm) and 1,2-Dichloroethylene (DCE, 0.04 ppm). A total petroleum hydrocarbons (TPH) analysis was also performed on the "A" sample, and TPH was not detected.

  A second soil sample (sample "I", also from 18 to 24 inches in depth) was collected in November 1991 in the southeast corner of AOC 5C. That sample was analyzed for VOCs, SVOCs and TPH. No contaminants were detected in the "I" sample.

  In 1994, a soil removal excavation was performed at the A location. A 10-ft. square area centered on the "A" location was excavated to a depth of approximately 30 inches, and screening of soil using a PID was performed during the excavation to determine the extent of contamination. When PID readings indicated that contaminated material had been removed, a composite soil sample was collected from the soil at the bottom of the excavation. Method 8010 analysis of VOCs in the composite sample detected 0.05 ppm PCE and 0.002 ppm 1,2-DCE.

It is noted that by relying on field screening with a 10.6.eV PID (rather than an 11.7 eV PID), collection of a composite sample (rather than a grab sample or samples), and use of a GC method for VOC analysis of the sample (Method 8100 rather than a GC/MS method such as Method 8260), the approach used in 1994 for determining the limits of, and characterizing conditions following the completion of, the Area A remedial excavation is inconsistent with now current NYSDEC guidance on post-excavation documentation sampling.

During the RI, AOC 5B test boring 5B-TB-2 was installed approximately 8 to 10 feet to the north of 1994 soil removal Area A and serves to further characterize the nature and extent of contamination in this area.

A results summary for AOC 5 soil, groundwater, and SVI assessment samples is presented on Figure 14-5. AOC 5 results are discussed in Section 4.4.5.

2.5.6 AOC 6 – Former Paint Shop

Available records indicate that the former Paint Shop, which was located inside the southwest corner of the facility building, included several spray paint booths, a drying oven, a paint storage room, and a paint mixing and waste storage room. A floor drain in the paint storage room, which was located in the southwest corner of the paint shop, was reportedly connected to a former secondary spill containment UST located south of and just outside the southwest corner of the building. Available documentation of the closure activities associated with this tank indicates that there was not any associated evidence of releases or contamination. A floor drain in the paint mixing and waste storage room, which was located in the northwest corner of the paint shop, was reportedly connected to the former secondary spill containment UST located in AOC 5C.

At the present time, a linear trench drain is present in close proximity to the north wall of the former Paint Shop (see Figure 5). The drain is reported to have been plugged and is no longer operational; it is not known if waste(s) from the Paint Shop operations were directed to the drain.

No previous investigations had been performed that specifically targeted the Paint Shop area; however, previous sub-slab vapor sample AMSF-10 was collected as part of the investigations related to the adjacent ITT site in a room located on the south side of the former Paint Shop that may have been used for paint storage. Very low concentrations of VOCs were detected in sub-slab vapor at that location.

Eight soil vapor screening samples (PS-1 through -8) were collected in the former paint shop area, and the vapor screening was followed by installation of three soil test borings and one monitoring well (PS-TB-1 and -2 and AMSF-MW-26) and SVI assessment locations SVIA-13 and -14 to assess potential impacts from past storage and use of paints, paint thinners and other related materials. During the Supplemental RI activities completed in 2015, video inspection and electronic tracing of the drain pipe for the former paint shop trench drain was performed to confirm that it was connected to the sanitary sewer.

A results summary for AOC 6 soil, groundwater, and SVI assessment samples is presented on Figure 14-6/7. AOC 6 results are discussed in Section 4.4.6.

2.5.7 AOC 7 – Former Plating Area

A former phosphating and chromating operation was reportedly located adjacent to the north side of the former paint shop. The trench drain referenced above is adjacent to the south side of the documented footprint of the former Plating Area.

Prior to the BCP remedial investigation, no previous investigations had been performed that specifically targeted the Plating Area; however, previous sub-slab vapor sample AMSF-16 was collected in relatively close proximity to the area (as part of the investigations related to the adjacent ITT site), and it detected only low-level VOCs.

Two soil test borings (7-TB-1 and -2) and SVI assessment sampling point SVIA-1 were installed to assess potential impacts from past use and storage of chemicals used in phosphating and chromating operations. Because of its close proximity to the former plating area footprint, AOC 6 Paint Shop well AMSF-MW-26 was used by design to characterize the potential for groundwater contamination from former plating operations.

A results summary for AOC 7 soil, groundwater, and SVI assessment samples is presented on Figure 14-6/7. AOC 7 results are discussed in Section 4.4.7.

2.5.8 AOC 8 – Former Spray Wash Area

A former Spray Wash unit was located adjacent to the east side of the former Paint Shop. It used a heated, water-based solution of acidic chemicals, sodium nitrite, and detergent compounds for cleaning of metal parts.

As shown on Figure 2, a north-south-oriented leg of the trench drain discussed above under the descriptions of the former Plating and Paint Shop areas extended along the west side of the Spray Wash unit footprint. The outline of the AOC 8 section of the former trench drain is still visible; however, the trench is filled with concrete to floor grade. It is not known whether waste fluids from the Spray Wash operation may have been directed to the drain.

No previous investigations had been performed that specifically targeted the Spray Wash area. However, as shown on Figure 6, previous sub-slab vapor sample AMSF-17 was collected in relatively close proximity to the Spray Wash area as part of the investigations related to the adjacent ITT site.

Two soil test borings (AMSF-MW-27 and SPW-TB-2), one converted to a new shallow-bedrock groundwater monitoring well, were installed to assess potential impacts from the previous spray washing operations in this area.

A results summary for AOC 8 soil, groundwater, and SVI assessment samples is presented on Figure 14-8. AOC 8 results are discussed in Section 4.4.8.

2.5.9 AOC 9 – Supplemental Vapor Intrusion Assessment

In the period from 2004 to 2011, numerous sub-slab vapor and indoor air samples were collected in the AMSF building as part of the ITT site investigation. The previous sampling included sub-slab vapor sampling at 21 locations (AMSF-01 through AMSF-21) located throughout much of the AMSF building. Some locations were sampled several times, and the most recent sampling had been focused on OU-1. VOCs (primarily chlorinated compounds) were detected in the previous samples at varying concentrations.

The distribution of previous sample points had left some areas of the OU-2 section of the building untested. The AOC 9 SVI assessment program was intended to provide coverage of these areas and to provide data with which the results of previous sampling could be correlated to current conditions.

Ten sub-slab vapor and indoor air sampling pairs specified in the RIWP to further investigate the potential for soil vapor intrusion in the previously untested sections of the building. During the course of the RI, six additional locations were added to the program. All 16 new locations (AM-SVIA-1 through AM-SVIA-1-16) were located in OU-2, some within or close to AOCs 1 through 8 and others in non-AOC sections of the building. Reusable sub-slab sampling implants were installed at the 16 locations to allow for future resampling.

The sampling of the 16 OU-2 locations was performed in April 2013. A discussion of additional SVI assessment program activities performed in OU-1 in December 2013 is presented below in Section 2.5.13.

All 35 SVI assessment sample locations at the Site are shown on Figure 6.

An AOC 9 results summary is presented on Figure 14-9 for the areas of the building that are not covered by the results summaries for other AOCs or OU-1. AOC 9 results are discussed in Section 4.4.9.

2.5.10 AOC 10 – Supplemental Site-Wide Groundwater Characterization

A total of 25 groundwater monitoring wells had been installed on the Site prior to the AMSF RI activities. The wells were installed in connection with Gleason's 1992-1994 environmental site investigations or the remedial investigation of the adjacent ITT site. Of those, several had been damaged, covered or intentionally abandoned, and the 16 wells that remained for use during the RI included the following: AMSF-MW-1S, -1D, -3S, -3D, -4, -5D, -7, -8S, -8D, -9S, and -10, -11S, -12S, -13S, -15I and -16I. Well locations are shown on Figure 8. A summary of the monitoring interval represented by each well is presented in Table 10.

Prior to the RI, the existing well network was limited to the north, west and south portions of the Site, and no wells had been installed inside the building. Accordingly, in 2014 three new shallow bedrock groundwater monitoring wells (AMSF-MW-28, -29, and -30) were installed on the east side of the Site to complement the eight new shallow bedrock wells (wells AMSF-MW-20, -21, -22, -23, -25, -26, -27 and -31) installed inside the building in AOCs 1, 2, 4, 6/7, 8 and "Other Area 1". (Background information on the so-called 'Other Areas' is presented below in Section 2.5.12.)

As noted in Section 2.5.1 above, shallow-bedrock well AMSF-MW-34 was added during the supplemental RI activities performed in 2015 to allow for assessment of groundwater conditions at the eastern property line downgradient of AOC 1.

As indicated in Section 2.5.2 above, overburden well AMSF-MW-24 was installed on the west side of the Site adjacent to the AOC drainage swale alignment and the location of 1994 soil removal Area B after water was found to fill up soil vapor screening probe holes at the SW-6 location. However, no groundwater was observed in this well during the RI.

The supplemental investigation of Site-wide groundwater conditions also included installation and sampling of four soil vapor probes (AOC10-SV-1 through -4) at locations along the east Site boundary (as shown on Figure 7). This component of the program was designed to determine whether any groundwater impacts have the potential to present a risk of soil vapor intrusion in off-site buildings located downgradient or cross-gradient from the Site.

Finally, the AOC 10 component of the RI included an assessment of whether there was evidence of past or ongoing discharges of material other than stormwater to the groundwater recharge wells that are present at the Site (AMSF-RW-1 through -5, which are located as shown on Figure 2).

Available building construction design drawings had indicated that the inflows to the recharge wells included:

- stormwater surface flows captured by each recharge well storm drain;
- stormwater captured by other surface-level storm drains that are connected to the recharge wells;
- stormwater from facility roof drains connected to the recharge wells; and
- high-level overflows from AMSF-RW-4 to AMSF-RW-3 and from AMSF-RW-3 to AMSF-RW-2 during significant precipitation events.

The RI included visual inspection of the catch basins for each of the 5 recharge wells and video inspection of storm sewer lines originating from recharge wells 2 and 3. These activities were performed to determine whether additional drain lines were present or other discrepancies existed in the understanding and mapping of Site storm sewer and recharge well features. Storm sewer video survey locations are shown on Figure 12.

An AOC 10 results summary presented on Figure 14-10 shows groundwater sample results for Site monitoring wells not covered by the results summaries for other AOCs or OU-1. AOC 10 results are discussed in Section 4.4.10.

2.5.11 AOC 11 – Supplemental Site-Wide Soil Characterization

Previous investigations included a significant amount of soil sampling and analysis in areas around the exterior of the facility building. Additional sampling on the south and east sides of the Site was performed during the RI to provide more thorough Site-wide soil characterization. Three test borings (AOC11-TB-1 through -3) were installed in the landscaped areas in the eastern and southern portions of the Site to facilitate additional surface and subsurface soil sampling and analysis. One surface and one subsurface soil sample was collected at each boring location. Subsurface soil sampling for the purposes of Site-wide characterization was also conducted at the borings for the three new AOC10 wells (AMSF-MW-28 through -30) that were installed along the eastern side of the Site.

The locations of the borings from which AOC 11 soil samples were collected are shown on Figure 4. A results summary for AOC 11 soil samples is presented on Figure 14-11. AOC 11 results are discussed in Section 4.4.11.

2.5.12 Other Areas

Two other areas not identified as AOCs in the RIWP were targeted for investigation after the RI was initiated. These two areas are described below.

2.5.12.1 Other Area 1

Other Area 1 is located inside the west side of the building just to the west of the location of building column C-10. It was targeted for investigation primarily because it is approximately 25 feet southwest and potentially upgradient (hydraulically) of previous sub-slab soil vapor sampling point AMSF-16. AMSF-16 had exhibited contamination by 1,1,1-TCA when sampled in 2009 as part of the ITT site investigation. The AMSF-16 location is currently difficult to access for direct follow-up sampling, and sampling at the Other Area 1 location was selected as an alternative to resampling at AMSF-16.

The Other Area 1 location is in a space which was recently occupied by a screw machine manufacturing shop, and assessment of potential release of machining lubricants through the building floor was therefore included in the items to be investigated. Finally, the Other Area 1 location is located in close proximity to the northwest corner of the former plating area, and therefore represented an opportunity to supplement the characterization of conditions in AOC 7.

To provide the information necessary to assess the various conditions and issues associated with Other Area 1, the following investigations were added to the scope of the RI:

- Soil sampling at test boring Other-TB-1
- Installation and sampling of shallow bedrock monitoring well AMSF-MW-31.

- SVI assessment sampling at the SVIA-2 location.

A results summary for Other Area 1 soil, groundwater, and SVI assessment samples is presented on Figure 14-12. Other Area 1 results are discussed in Section 4.4.12.1.

2.5.12.2 Former Spot Welder Wastewater Sump (Other Area 2)

During the walkthrough of the Site conducted at the beginning of the RI, a previously unidentified steel-lined sump was identified near building column H-7N in close proximity to the east side sanitary sewer line. The sump is located on the north side of the column 7 wall opposite the footprint of a former Alliance spot welder operation. It is presumed, on the basis of the location, design, and contents of the former sump, that it served as a baffled settling tank designed to remove solids from the wastewater discharge from the former spot-welder operation.

Each of the sections of the baffled sump structure was found to be partially filled with a material presumed to be the dried residue of waste sludge and solids that had accumulated in the sump. A sample of the residue (AM-SUMP1-RES) was collected on June 27, 2012 for laboratory analysis of Target Analyte List (TAL) metal constituents to determine whether the sump represented a potential source for releases of contaminants in wastewater.

Following receipt of the results of the residue sample analysis, the scope of the RI was expanded to include analysis of groundwater samples from nearby AOC 1 monitoring wells AMSF-MW-20 and -21 for chromium, copper, lead, nickel and zinc. The AOC 1 results summary presented on Figure 14-1 includes a summary of the results of those analyses, and the results are discussed in Section 4.4.12.2 of the report.

2.5.13 Operable Unit 1 – Northwest Corner

A Work Plan for the remedial investigations in OU-1 was prepared in December 2013 in consultation with NYSDEC after the draft RI report for the ITT site, which was prepared by O'Brien & Gere Engineers, Inc. (O'Brien & Gere) and issued in June 2012, had been made available for review. Preparation of the OU-1 Work plan was also timed to allow for evaluation of the preliminary results from the groundwater monitoring activities conducted at the AMSF Site by Stantec and O'Brien & Gere in June 2013.

The following factors were considered in developing the scope of the OU-1 investigations.

During the RI of the ITT site, extensive groundwater quality sampling and hydrologic testing was performed at a network of shallow, intermediate, and deep monitoring wells and stormwater recharge wells located in the outdoor areas of OU-1. The ITT investigation also included characterization of the hydraulic properties of and contaminant distribution in the bedrock matrix in the shallow to deep groundwater monitoring intervals. Installation and sampling of monitoring wells AMSF-MW-23 and -31 during the OU-2 phase of the AMSF RI had added information on groundwater conditions in the Upper Eramosa (shallow bedrock) monitoring interval in indoor areas east and south of OU-1. However, no wells had yet been installed in the indoor portion of OU-1, and a possible data gap existed in the outdoor shallow-bedrock well network to the southeast of monitoring well AMSF-MW-7, between AMSF-MW-7 and AMSF-MW-9S.

Previous investigations of impacts to other media in OU-1 had not included sampling of soil inside the OU-1 section of the AMSF building. However, extensive sampling of soil vapor and soil in the outdoor area between the AMSF building and the adjacent ITT site had been performed. The sampling performed in the OU-1 area west of the AMSF building targeted in particular the areas surrounding stormwater recharge well RW-2 and shallow bedrock groundwater monitoring well AMSF-MW-7. The purpose of this sampling had been to identify whether sources of 1,1,1-TCA and other chlorinated volatile organic compounds (VOCs) were present in the vicinity of these two wells.

Soil vapor and soil sampling were first performed in this area by GeoServices in the 1992 to 1994 time frame. Significant contamination was not detected; however, the PID used by GeoServices for screening of VOCs in soil and soil vapor employed a 10.6 eV lamp with an ionizing energy that, while high enough to detect chlorinated ethenes (including PCE, TCE, 1,2-DCE and vinyl chloride) and most other VOCs, was not high enough to detect 1,1,1-TCA or its daughter product 1,1-DCA. Furthermore, the sampling performed by GeoServices was limited to a depth of 6 feet, whereas the top of bedrock in the area was slightly deeper. Both of those concerns were resolved by results of sampling performed in this area by O'Brien and Gere in September 2004 at ITT RI test borings OBG-SB-29 through -44, which detected occasional traces (less than 0.1 mg/kg) of chlorinated VOCs in the soils in this area. Where VOCs were detected, concentrations were well below NYSDEC SCOs. (Copies of Figure 3-1 and Table 5-1a from the April 2014 IIT site RI report, which present a sample location map and a summary of VOC sample analysis results for the 2004 soil samples, are presented in Appendix K.) Collectively, the data from the previous sampling indicate that surface spills of solvent material in this area of the AMSF Site were not the source of the concentrations of VOCs detected in groundwater at AMSF-MW-7 and RW-2.

Previous OU-1 investigations included repeated periodic sampling of sub-slab soil vapor and indoor air at 11 points (AMSF-01 through -09 and AMSF-22 and -23) located in or immediately adjacent to the indoor portions of OU-1. However, in recent years the SVI assessment monitoring had been limited to a list of 6 specific compounds including 1,1,1-TCA and its two principal daughter products (1,1-dichloroethene, 1,1-DCE, and 1,1-dichloroethane, 1,1-DCA) and PCE and its two principal daughter products (TCE and cis-1,2-DCE). Other VOCs, in particular the PCE/TCE/1,2-DCE daughter product vinyl chloride, had not been analyzed in the recent SVI assessment samples from OU-1.

Given these factors, the field investigation program for OU-1 was developed to include the following elements:

- SVI assessment sampling of sub-slab vapor and indoor air (plus ambient outdoor air) was performed at the 5 locations in the OU-1 section of the AMSF building that are monitored annually under the Interim Remedial Measure (IRM) Interim Site Management Plan (ISMP) for the adjacent ITT site, with analysis for an expanded, comprehensive list of VOCs including vinyl chloride.

- A video survey was performed to identify and inspect stormwater sewer lines, and other pipes (if any), connected to OU-1 stormwater recharge wells RW-2 and -3.

- Soil test borings and shallow bedrock monitoring wells were installed at 2 locations, one inside the OU-1 section of the AMSF building and one at the southwest corner of the OU-1 section of the building in the gap between wells AMSF-MW-7 and AMSF-MW-9S.

A results summary for OU-1 soil, groundwater, and SVI assessment samples is presented on Figure 14-13. OU-1 results are discussed in Section 4.4.13.

3.0 Remedial Investigation Program

This section of the report presents a description of the investigative activities performed, methods used and procedures followed during the RI. Investigation results are described in Section 4.

The RI field program was conducted over the course of numerous field events starting in March 2012 and concluding in November 2015. The locations investigated and dates and purposes of each of the field events are summarized in Table 1. Table 1 includes references to the report figures on which sample locations are shown.

The procedures followed while conducting the RI field program were performed in accordance with NYSDEC's DER-10 and the NYSDEC-approved RIWP. Deviations from, and additions to, the program specified in the RIWP are described below in the relevant sections of the report and/or are summarized in Table 2.

3.1 HISTORICAL INFORMATION REVIEW AND BUILDING WALKTHROUGH

A walkthrough of the facility and interviews with available personnel was performed with NYSDEC on March 20th, 2012 to assess and catalog the location, visible characteristics, use and function, if known, of existing facility features such as floor drains, pits and sumps. The inspection involved an examination of all of the vacant and tenant-occupied spaces inside the facility and a tour of the outdoor areas of the Site. Areas of Concern were reviewed, additional Site features potentially relevant to the remedial investigation were noted, and proposed soil vapor intrusion assessment sample locations and selected test boring locations were reviewed. Site features noted during the inspection included current tenant operations, current manufacturing equipment, floor and roof drains, stormwater catch basins and recharge wells, existing and former sump and pit features, floor conditions (areas of minor accumulations of oily residue, for example), roof penetrations, current plumbing features, current HVAC and electrical equipment, and various other features.

A review of available historical architectural and engineering drawings for the Site was then performed. The purpose of the review was to collect details on the nature and location of former surface drainage features, current and former underground stormwater and sanitary sewer lines, floor drains (including trench drains), roof drains, stormwater catch basins and recharge wells, building foundation features (foundation walls, grade beams and footers), and operation and process features such as former press pit and degreaser locations. The drawings reviewed include those drawings that were presented in Attachments C and I of the June 2011 BCP Application for the Site (no additional site drawings have been obtained by Stantec or our client since the application was submitted). An annotated list of the available architectural and engineering drawings is presented in Appendix A, with notes where applicable on the various foundation, floor slab, underground drain line and process features documented.

Results of the review were used to prepare the Site plan which is presented on Figure 2. Figure 2 reflects information gathered during the March 20th Site inspection, including field verification of most of the floor drain features documented in the available historic drawings and notes on other features observed during the site visit that were not documented on the historical drawings. Examples of the latter include the apparent former spot-welder wastewater sump located near column H-7 and the trench drain features located in the former Alliance paint shop and spray wash areas in the southwest part of the facility.

The following changes to the scope of the RI were made to address features identified during the review of available drawings and conditions identified during the March 20th Site inspection:

- Addition of 8 soil vapor sampling locations in the Former Paint Shop Area (AOC No. 6). Soil vapor sampling in this area was added as a preliminary screening tool to use in selecting locations for AOC No. 6 test borings.

- Elimination of the test boring planned for the former paint storage room at the southwest corner of AOC 6. It was agreed that the results of ITT's previous sub-slab vapor sampling at nearby sample point AMSF-10 indicated an absence of significant VOC impacts in this area.

- Addition of 1 soil vapor point in the Former Degreaser Area (AOC No. 1), and shifting of some of the 16 soil vapor points originally proposed in this AOC. These changes allowed for coverage of the office area located to the east of the Former Degreaser Area.

- Shifting the 10 soil vapor points targeting the Former Drainage Swale (AOC No. 2) to locations closer to the reported alignment of the former swale and, where necessary, away from subgrade features, such as a filled former press pit, that could interfere with collection of valid data.

- Addition of 5 soil vapor points along the East Side Sanitary Sewer (AOC No. 3), and modification of the 8 soil vapor points originally proposed in this AOC. These changes allowed for targeting of specific drain and sump features and lateral connections along the current and former sewer.

- Shifting of the proposed location of the test boring planned for AOC No. 4 to reflect the actual location of the former AOC No. 4 press pit as identified during our March site visit.

- Shifting the one northernmost test boring of the three borings planned for AOC 5A (Former Outdoor Storage Area) to the northwest corner of the space which was occupied at the time by the Lockwood Precision (Lockwood) machining operation. It was agreed that other borings and sub-slab vapor sampling planned for the former plating area (AOC 7) would provide data sufficient to evaluate conditions at the north end of AOC 5A, and the new location (labeled SB-OTHER on attached Figure 2) would provide for broader coverage of conditions related to the Lockwood machining operations. (Lockwood has subsequently vacated the facility.)

- Elimination of the test boring planned for the north end of AOC 5B (Former Storage Shed). It was agreed that a boring was not needed at this location because the results of ITT's previous sub-slab vapor sampling at nearby sample point AMSF-09 indicated an absence of significant VOC impacts in this area.

- Addition of one sub-slab vapor and indoor air (SSV/IA) sample location in the southeast corner of the facility building and minor shifts in the locations in some of the 10 originally proposed SSV/IA locations (AOC 9).

3.2 MOBILIZATION ACTIVITIES

For each phase of field work, pre-field work activities including arranging for access to tenant spaces, preparation of subcontracts with drilling and other service providers, equipment rental, acquisition of necessary supplies, and underground utility clearance were performed as necessary.

3.3 GENERAL SAMPLING AND LABORATORY ANALYSIS CONSIDERATIONS

With the exception of soil vapor screening samples, the sample of residue collected from the former spot-welder operation wastewater sump, and samples collected to characterize investigation-derived waste (IDW), RI samples were submitted for laboratory analytical testing of potential contaminants and other physical parameters to Spectrum Analytical, Inc. (Spectrum) of North Kingstown, Rhode Island. Third-party data usability reviews of the analytical data reports generated by Spectrum were performed by Data Validation Services, Inc. (DVS) of North Creek, New York, an independent third-party data validator, using standard data-usability evaluation criteria. Soil vapor screening and IDW samples were submitted to Paradigm Environmental Services, Inc. of Rochester, New York. Tables 3, 4, 5, 6, and 7 summarize the RI samples collected, including sample dates, sample depths (where applicable), sample analytical parameters, and QA/QC samples.

Sampling of various environmental media was performed as part of the investigative activities described in the following sections. The sampling and field investigation activities described below were performed in accordance with DER-10 and other applicable NYSDEC and New York State Department of Health (NYSDOH) guidance and policies.

Approximately 20% of the soil and groundwater samples obtained were analyzed for a full suite of chemical parameters. For the purposes of this RI Report, "full suite" includes:

- Target Compound List (TCL) VOCs plus 10 tentatively identified compounds (TICs) by EPA SW846 Method 8260B;

- TCL Semi-volatile Organic Compounds (SVOCs) plus 20 TICs by EPA Method 8270C;
- TCL Pesticides and Polychlorinated Biphenyls (PCBs) by EPA Methods 8081B and 8082A; and
- Target Analyte List (TAL) Metals by EPA Methods 6010 or 7000-series.

A limited subset of the "full suite" parameters were analyzed in the remaining soil and groundwater samples. Where metals analysis was specified for samples not designated for "full suite" treatment, the metals analyte list included the 13 Priority Pollutant List (PPL) metals plus aluminum. Tables 4 and 6 summarize the analysis parameters for each soil and groundwater sample.

NYSDEC ASP Category B deliverable packages were used for soil and groundwater analytical data. Validatable data packages were also used for reporting of Method TO-15 analyses of vapor and air samples collected using Summa™ canisters (refer to Sections 3.4, 3.5, and 3.12 below for additional information on the various sampling and analytical activities and data quality levels for soil vapor, sub-slab vapor and air samples). Third-party validation of analytical data was conducted for each soil, water and TO-15 vapor/air sample analytical report package. Data validation results were documented in data usability summary reports (DUSRs).

Category A deliverables were used for reporting analyses of those soil vapor samples that were collected using Tedlar™ bags (see Section 3.4, Soil Vapor Screening), for samples of investigation-derived wastewater, and for the sample of the spot-welder sump residue.

3.4 SOIL VAPOR SCREENING

Soil vapor screening was conducted in AOCs 1, 2, 3 and 6. This sampling program involved the collection of 46 soil vapor samples at interior and exterior locations in the vicinity of potential VOC source areas. Sample locations are shown on Figures 3A and 3B.

The soil vapor sampling program involved a screening-level data quality objective. The sampling and analytical methods do not specifically match the methods described in the NYSDOH guidance document, but were consistent with the language in the guidance that allows for task- and site-specific approaches.

Thirty three of the planned sample holes were drilled on June 26, 2012, and the remaining locations were drilled on June 28, 2012. Drilling activities were observed by representatives of NYSDEC and NYSDOH. At the request of NYSDEC (as an addition to the approved RI work scope), PID readings were taken at three points during the drilling process: 1) from each drill hole at the penetration of the concrete floor slab or asphalt pavement, 2) from each hole at the completion of the sample hole, and 3) from the headspace of a plastic bag used to collect drill cuttings from each hole. Results of the field screening are summarized on Table 11. (The screening was performed using a 10.6 eV PID. As noted above, screening using a PID with a 10.6 eV lamp would not have been effective in detecting 1,1,1-TCA or 1,1-DCA, both of which have an ionization potential above 10.6 eV, but would have detected other potential VOCs of concern.)

At the request of NYSDEC, two locations (SV-AOC1, DG-5N and SV-AOC1, DG-18) were added to the program during the field work in response to conditions encountered in the field. DG-5N was added 6 feet north of the DG-5 location because the footer for a roof support column was encountered beneath the floor slab at DG-5. DG-18 was added 20 feet to the west of DG-17 to delineate the western extent of elevated PID readings encountered at the DG-16 and DG-17 locations.

Vapor sampling was conducted on June 27-29, 2012 and was observed by NYSDEC. At each location, the temporary plug (a plug installed after the sample hole had been drilled) was removed, a pre-cleaned stainless steel screen implant with dedicated tubing was installed, the sample point was screened with both a 10.6 eV and an 11.7 eV PID, and then a sample was collected in a Tedlar bag. Temporary plugs were reinstalled following sample collection. PID screening results are summarized on Table 11.

At the SW-6 location, the sample hole was found to be filled with water. On June 29, 2012 a replacement hole was drilled five feet north of SW-6, but the hole at that location also filled with water as soon as it was completed, so no sample was taken at the SW-6 location.

The soil vapor samples were obtained as follows:

- a small-diameter hole was drilled through the floor slab;
- a narrow probe hole was advanced with a "slam bar" or extended drill bit to a depth of approximately 3 ft. below the slab, into the soil beneath the sub-slab backfill;
- a stainless steel, perforated hollow rod was inserted to the base of the probe hole;
- the rod was sealed at the point of slab penetration with a hydrated bentonite "paste";
- dedicated sample tubing was connected to the probe head;
- the sample probe and connector tubing were purged of residual air;
- the vapor in the sample probe was screened with 10.6 and 11.7 eV PIDs; and
- a Tedlar™ bag sampler was attached to the tubing, the bag was placed in a vacuum box, and the Tedlar™ bag was filled with vapor.

A list of the samples submitted for analysis is presented on Table 3. The samples were submitted to Paradigm for analysis of TCL VOCs using USEPA Method 8260B. Analysis results were reported with Category A deliverables.

An abridged summary of laboratory analysis results for soil vapor screening program samples (abridged to show results for only those analytes which were detected in at least one sample) is presented on Table 11 with the field screening data described above. A comprehensive summary of laboratory analytical results for soil vapor screening program samples, showing results for all target compounds analyzed including those not detected in any samples, is presented in Table 14. Results are discussed in Section 4.8 of the report.

The temporary sample point holes for the soil vapor screening program were sealed with grout following completion of the field sampling activities.

3.5 SAMPLING OF FORMER SPOT-WELDER OPERATION WASTEWATER SUMP RESIDUE

The inactive sump located near column H-7, just to the north of the former location of Alliance's spot welder operation, is presumed to have been a settling sump for the spot welder wastewater discharge. The sump location is shown on Figure 5.

A sample of the dry residue present in the sump was collected on June 27, 2012. The residue sample was submitted to Paradigm for analysis of Target Analyte List metals. Sample analysis results are summarized on Table 20.

Additional discussion of the features and character of the sump structure are presented in Section 4.1.3. Results of sump residue sample analysis are described in Section 4.4.12.2.

3.6 INDOOR AIR, SUB-SLAB VAPOR AND OUTDOOR AMBIENT AIR SAMPLING

3.6.1 OU-2

The soil-vapor intrusion assessment sampling program for OU-2 utilized permanent (reusable) sampling points installed for the purposes of the RI. Sample point installation was performed by GeoLogic NY, Inc. of Homer, New York, and was observed by Stantec personnel. Installation of 16 sub-slab sample points was begun on March 28, 2013 and completed on April 1, 2013.

Sampling was performed using Summa™ canisters, sampling points and sampling protocols as specified in the NYSDOH's Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006). Heating season cold-weather conditions prevailed during the period leading up to and through the end of the SVI assessment sampling activities, and heating systems were running in all areas of the facility during the period leading up to and through the end of the SVI assessment sampling.

SVI assessment sampling canisters were set up indoors on April 3, 2013. Pre-sample leak detection testing of each of the sub-slab sample points was also conducted on April 3, 2013, with all points passing.

Sampling was conducted on April 4, 2013. Sixteen indoor air (IA) and sub-slab vapor (SSV) sample pairs were collected inside the building and one upwind ambient outdoor air (OA) sample was collected on the south side of the building. One duplicate IA sample and one duplicate SSV sample were collected at the AM-SVIA4 location. Sample locations AM-SVIA1 through -16 are shown on Figure 6.

Vapor at each sample location was field-screened for VOC presence using calibrated photoionization detectors (PIDs) with both 10.6 and 11.7 eV lamps due to the variability of ionization potential of 1,1,1-TCA, PCE and TCE, the primary VOC COCs known to exist at the Site.

The sub-slab vapor and indoor and outdoor air samples were collected over an 8-hour period during standard work hours. Sampling, quality assurance/quality control and data interpretation procedures were consistent with NYSDOH and NYSDEC guidelines.

Post-sampling leak detection testing of sub-slab sample points was also completed on April 4, 2013, with all points passing, and NYSDOH indoor air quality questionnaire and building inventory forms were also completed on April 4th for each of the areas sampled. Copies of the questionnaire and inventory forms are presented in Appendix D.

A record of the sample collection times and vacuum gauge monitoring for each of the SVI sampling canisters is presented in Appendix D. Low initial vacuum readings were noted on two of the 35 SVI sampling canisters. The diminished vacuum levels, which were noted in the canisters for the AM-SVIA4-SSV and AM-SVIA6-SSV samples, indicate that it was likely that ambient air had been drawn in to each canister between the time the sample canister set was checked out of the project laboratory and the time that Site sampling began. Because extra canisters were not available, both canisters were nevertheless used to collect Site samples for the locations where they were set up.

The samples were analyzed for TCL VOCs using EPA Method TO-15. Results were reported using NYSDEC ASP Category B deliverable packages. The laboratory data underwent third-party validation which was documented in a data usability summary report (DUSR).

A list of the SVI assessment samples collected is presented in Table 5. Abridged summaries of SVI assessment sample analysis results (abridged to show results for only those analytes which were detected in at least one sample) are presented in Tables 16a, b, and c. Table 16a presents the results for each sub-slab vapor and indoor air sample pair and compares those results to NYSDOH SVI guidance matrices. Table 16b presents results for the ambient outdoor air sample. Table 16c compares the indoor air sample results to NYSDOH indoor air guidelines.

A comprehensive summary of analytical results for SVI assessment samples, showing results for all target compounds analyzed including those not detected in any samples, is presented in Appendix F, Table C. Laboratory analysis reports are presented in Appendix L.

A general discussion of the results of the SVI assessment program sampling is presented in Section 4.3.2. Discussions specific to individual AOCs are presented in Section 4.4.

3.6.2 OU-1

SVI assessment sampling in OU-1 was performed on December 6, 2013. The sampling was performed by O'Brien & Gere and represented the annual SVI monitoring event O'Brien & Gere conducts at the AMSF Site on behalf of ITT. O'Brien & Gere and ITT agreed to expand the analyte list for the event from the standard list of 6 VOCs normally used for the annual monitoring program so that additional data needs of the AMSF RI could be accommodated.

The SVI assessment was conducted at the AMSF-05, -06, -07, -22, and -24 locations shown on Figure 6. Sampling was performed at temporary sample holes drilled by O'Brien & Gere on December 5, 2013. The holes were plugged with permanent grout following completion of the sampling activities on the following day.

Pre-sampling inventory procedures and sampling protocols were performed in accordance with NYSDOH guidance; however, field records for the OU-1 sampling event have not yet been obtained and are therefore not included herein.

Samples were submitted to TestAmerica Laboratories of Burlington, Vermont for analysis of an expanded list of VOCs by EPA Method TO-15. The laboratory data underwent third-party validation which was documented in a data usability summary report (DUSR) presented in Appendix F.

A sample list, abridged summaries of sample analysis results, and a comprehensive summary of lab results are presented with the OU-2 data in Tables 5, Tables 16a-c, and Appendix F - Table C. A copy of a letter report from O'Brien & Gere dated March 19, 2014, which documents the sampling activities and includes a copy of the laboratory report for OU-1 samples, is presented in Appendix K.

Results of SVI assessment sampling in OU-1 are discussed in Section 4.4.13.

3.7 TEST BORING AND MONITORING WELL INSTALLATION

Test boring and monitoring well installation activities were completed in three phases. The first phase, which was conducted from November 7 to November 9, 2012, involved drilling 18 test borings in OU-2. The 18 test boring locations were selected in consultation with NYSDEC on the basis of the results of the soil vapor screening program and other factors relevant to the data objectives of the RI.

Sampling results for the first phase were then evaluated to select locations for the second phase of OU-2 drilling activities. Phase 2 was conducted from April 17 to May 16, 2013. Sixteen additional soil borings were installed in OU-2, 12 of which were converted into monitoring wells (one overburden and 11 shallow bedrock wells).

The last phase of project drilling activities was completed in Operable Unit 1 between April 7 and April 11, 2014 and involved installation of 2 test borings, both of which were converted into shallow-bedrock monitoring wells.

Prior to each drilling mobilization, the drilling contractor, North Star/Geologic, contacted Dig Safely New York to locate publicly owned utilities in these areas.

Test boring locations at which soil sampling was conducted are shown on Figure 4. Monitoring well locations are shown on Figure 8. Test boring and monitoring well installation reports are presented in Appendix B. Hydrogeologic conditions observed during the test boring and well installation program are described in Section 4.2 of the report.

3.7.1 SOIL SAMPLING

Soil borings were advanced using either direct-push methodology ("Geoprobe" or equivalent) with Macrocore® samplers, or, at locations where bedrock monitoring wells were to be installed, with a rotary drill rig using a standard split-spoon sampler. Continuous soil samples were collected at each boring location until refusal at the top of bedrock.

All samples were screened for the presence of volatile organic vapors using two PIDs, one with a 10.6 eV lamp and a second an 11.7 eV lamp. Soil samples were also observed for indications of staining, oils, fill, and other impacts. Subsurface conditions and screening results were logged on test boring forms by an experienced geologist.

Samples were chosen for laboratory analysis based on field observations and PID screening results. Table 4A presents a summary of the field screening results recorded at each test boring and indicates which depth intervals were selected for laboratory analysis from each boring. The soil samples selected for lab analysis are listed on Table 4B along with the analytical parameters for each sample and the QA/QC samples (duplicates and MS/MSDs) collected during the soil sampling program.

Soil cuttings from monitoring well borings were containerized for eventual disposal offsite. Soil cuttings from test borings advanced with direct push methods were containerized in drums for eventual disposal offsite if they were observed to be impacted by contamination. If no contaminant impacts were apparent, the soil cuttings were returned to the borehole from which they had been removed.

An abridged summary of soil sample analysis results (abridged to show results for only those analytes which were detected in at least one sample) is presented in Table 12. A comprehensive summary of analytical results for soil samples, showing results for all target compounds analyzed including those not detected in any samples, is presented in Appendix F,

Table A. Appendix F also presents results of analyses of TICs in soil samples. Laboratory analysis reports are presented in Appendix L.

A general discussion of the results of the RI soil sampling program is presented in Section 4.3.4. Discussions specific to individual AOCs are presented in Section 4.4.

3.7.2 WELL INSTALLATION

One overburden well was constructed (AMSF-MW-24). At this location, the soil boring was advanced to 6.5 ft bgs. The overburden well was constructed using 2-inch diameter, schedule-40 PVC casing with 3-ft of Schedule 40, 0.020-inch slot well screen. A sand pack consisting of sand appropriately-graded for the screen slot size was placed continuously from the bottom of the well bore upwards to a point approximately 8 inches above the well screen. (The depth to the top of the sand pack at MW-24 is approximately 2.5 feet below grade.) The sand pack was capped with a 1-ft thick bentonite seal and the remaining annulus was grouted to within 1.5 ft of the surface. The well was completed with a protective flush mount casing.

Fourteen new shallow bedrock monitoring wells were installed (AMSF-MW-20 to AMSF-MW-23 and AMSF-MW-25 to AMSF-MW-34). At each new bedrock well location, a test boring was advanced with continuous soil sampling through the overburden to the top of bedrock. The soil boring was followed by drilling a rock "socket" and grouting a 4-in diameter steel casing approximately two feet into bedrock. The grout seal was allowed to set for a minimum of 24 hours. Following the setting time, the grout inside the casing was reamed out and a 10- to 13-foot long core was drilled with an HQ core barrel (nominal outside diameter of 3.5-in) to depths ranging from 20.8 to 32.5 ft bgs.

Bedrock drilling was performed using water rotary drilling methods. Loss of drilling water circulation was experienced at each well boring, and at many locations the lost volume of drilling water exceeded 1,000 gallons. Notes on the lost circulation at each location are recorded on the core logging reports presented in Appendix B.

An alternative method of monitoring well installation was proposed for the two shallow bedrock wells to be installed in OU-1 (Stantec, February 18, 2014). However, the alternative method, which was intended as a possible means of reducing water loss and therefore water use during cold months, was not implemented, and the two OU-1 wells were installed using the same bedrock drilling methods and casing installation as the other shallow-bedrock wells installed during the RI.

Shallow bedrock wells were constructed, as per the RIWP, in the completed boring using 2-inch diameter, schedule-40 PVC casing with 10-ft of Schedule 40, 0.020-inch slot well screen. A sand pack consisting of sand appropriately-graded for the screen slot size was placed continuously from the bottom of the well bore upwards to a point approximately 24 inches above the well screen. The sand pack was capped with a 2-ft thick bentonite seal and the remaining annulus was grouted to within approximately 2 ft of the surface. A protective casing was installed, sealed, and mounted in place with concrete at the surface. Locking inner caps were installed on the well riser.

Well construction details for the RI wells can be found in Table 9 and on the well installation reports represented in Appendix B.

3.8 MONITORING WELL DEVELOPMENT

After allowing the bentonite seals to expand for a minimum of 48 hours, the newly installed groundwater monitoring wells were developed to recover any drilling fluids lost during drilling, remove suspended sediments such that turbidity was reduced to the extent practicable, and establish a hydraulic connection between the well and the surrounding formation. The monitoring wells were developed with a portable pump. Water level and PID readings were recorded and turbidity was monitored visually during development. Approximately 110% of the volume of water lost during drilling was removed at each well. All well development water was containerized for waste characterization and eventual discharge to the municipal sewer.

Well development records are presented in Appendix E.

3.9 GROUNDWATER ELEVATION MEASUREMENT

Five water level measurement events were conducted at the Site during the course of the RI. Measurement events were performed on June 17, 2013, September 24, 2013, May 12, 2014, June 25, 2015 and August 17, 2015. For each event, water levels in all accessible wells at the Site, including recharge wells, were measured using an electronic water level indicator. For the two events performed in 2015, water levels were also measured at accessible wells located on the adjacent ITT and Cinemark properties located to the west and north of the AMSF Site.

The water level measurements are recorded on Table 10. Groundwater elevation plans for each event are presented in Figures 9A through 9E (shallow bedrock zone) and 9F through 9J (intermediate bedrock, deep bedrock and recharge wells).

For the June 2013 event, water level measurement data collected by O'Brien & Gere on the adjacent sites are included in the data sets used to prepare the groundwater elevation maps. A copy of O'Brien & Gere's summary of June 2013 water level measurement data is presented in Appendix K.

3.10 GROUNDWATER SAMPLING

Rounds of groundwater sampling were performed immediately following each of the five water level measurement events. During each event, groundwater samples were obtained from selected previously-installed monitoring wells and new wells installed during the RI. The well and analysis parameter list for the first round of groundwater sampling was as specified in the RIWP. In accordance with the RIWP, the well and parameter list for each of the second events was determined in consultation with NYSDEC on the basis of the results of the previous round(s) and other factors relevant to the data objectives of the RI.

The sampling was completed using low-flow methodology. For low flow purging, wells were purged and sampled utilizing EPA Region 2 low stress/low flow methods and a flow through cell. General water quality field parameters (i.e., pH, temperature, specific conductance, oxidation reduction potential, dissolved oxygen and turbidity) were monitored and stabilized during purging.

A list of the groundwater samples collected and the parameters analyzed in each sample is presented in Table 6. Table 8 summarizes the final groundwater field parameter measurements recorded at each well prior to sampling. Groundwater sampling event field records are presented in Appendix E. An abridged summary of groundwater sample analysis results (abridged to show results for only those analytes which were detected in at least one sample) is presented in Table 13. A comprehensive summary of analytical results for groundwater samples, showing results for all target compounds analyzed including those not detected in any samples, is presented in Appendix F, Table B. Appendix F also presents results of analyses of TICs in groundwater samples. Laboratory analysis reports are presented in Appendix L.

A general discussion of the analytical results of the RI groundwater sampling program is presented in Section 4.3.5. Discussions specific to individual AOCs are presented in Section 4.4.

3.11 DOWNGRADIENT BOUNDARY SOIL VAPOR SAMPLING

Four soil vapor probes were installed along the eastern Site boundary. Soil conditions were logged to the end of each boring (approximately 6 ft bgs) as documented on test boring forms presented in Appendix B.

Sampling of soil vapor at two of the downgradient boundary locations was performed on June 18, 2013. Samples were collected at the AOC10-SV-1 and AOC10-SV-4 locations (see Figure 7), but water present in the AOC10-SV-2 and -3 sampling implants prevented collection of samples at those locations. It is assumed that heavy rains during the period leading up to the June sampling event resulted in saturated conditions in the intervals screened by the AOC10-SV-2 and -3 sampling implants. Sampling at the AOC10-SV-2 and -3 was performed on September 27, 2013.

Samples from were collected in accordance with applicable NYSDOH guidance using 6-liter Summa canisters and one-hour sample flow controllers. The samples were analyzed for TCL VOCs using EPA Method TO-15 and results reported using NYSDEC ASP Category B deliverable packages. Data underwent third-party validation and was documented in a data usability summary report (DUSR).

Downgradient boundary soil vapor samples are listed in Table 7. A comprehensive summary of laboratory analytical results for downgradient soil vapor samples, showing results for all target compounds analyzed including those not detected in any samples, is presented in Table 15. A discussion of the results of the downgradient boundary soil vapor sampling is presented in Section 4.3.3.

3.12 STORMWATER AND SANITARY SEWER VIDEO INSPECTION ACTIVITIES

3.12.1 April 2014

A video survey was performed on April 18, 2014 to inspect stormwater sewer lines connected to recharge wells RW-2 and RW-3. The inspection activities were performed in accordance with the procedures specified in the December 2013 work plan for remedial investigations in Operable Unit 1 (OU-1), revised as proposed by Stantec in a letter dated February 18, 2014, and in accordance with NYSDEC's approvals of the work plan and proposed revisions.

Kandey Company, Inc., of West Seneca, New York (Kandey) was contracted to perform the survey, and representatives of Stantec and NYSDEC were on Site to observe the inspection activities and the video output. A compact disc with a copy of the inspection record prepared by Kandey was provided to NYSDEC under separate cover. The inspection record includes annotated video recordings for each segment inspected, annotated still photographs of features observed along each segment, tabular and graphical summaries of pipe dimension and inclination data, and other related information.

The storm sewer lines inspected are shown on attached Figure 12. A printed summary of the survey findings, including photographs of selected features observed during the survey, is presented in Appendix I. Results are discussed in Section 4.1.2.

3.12.2 October 2015

A supplemental sewer video survey event was performed on October 8, 2015 to inspect the storm sewer line for the column E-7 roof drain and the storm sewer line connecting the stormwater catch basin for the Door #14 loading dock (used by the Edge Color Graphics operation) to recharge well RW-2. Equipment limitations had prevented inspection of these lines during the April 2014 inspection activities. Video and electronic tracing of the sanitary sewer line for discharge from the sink drain located at the west end of the former trench drain located in AOC 6 was also performed.

These supplemental activities were performed by RotoRooter Plumbing, Inc., of Rochester, New York. Representatives of Stantec and NYSDEC were on Site to observe the inspection activities and the video output.

The sewer line segments inspected are shown on attached Figure 12, and results are discussed in Section 4.1.2.

3.13 RECHARGE WELL CLEANOUT

Cleanout of sediment and debris blocking recharge wells RW-2 and RW-3 was attempted on August 14, 2015. The cleanout activities were performed in accordance with the work plan for supplemental RI activities. New York Environmental Technologies (NYE-Tech) of Rochester, New

York performed the work using a high-suction vacuum truck. Cleanout activities were monitored by Stantec personnel.

At RW-2, the recharge well in the northwest corner of the Site which is reported to have had a depth of 149 feet (as measured by GeoServices in the early 1990s), approximately 2,000 gallons of water with minor sediment and debris were removed, but the cleanout could not be advanced beyond an obstruction present in the well at a depth of 15 feet below ground surface, the same depth at which the well was blocked before the cleanout activities were initiated.

At RW-3, the 19-ft-deep well located to the east of RW-2, the well was plugged at a depth of 6 feet before cleanout was attempted. Approximately 500 gallons of water with sediment, gravelly debris and several fist-sized pieces of asphalt were removed, and the well was cleaned to a depth of 15.5 ft. Further advance below that depth was prevented by the limitations of the equipment. Rapid recharge of groundwater to the well filled the suction hose with water more quickly than it could be extracted and the ability to lift the water was lost.

The water extracted from each well was segregated in separate totes and drums, and was staged on Site prior to receipt of approval for discharge to the Monroe County sewer. Samples of the water from each well were collected by Stantec on August 14, 2015, and the two samples (WW-RW-2 and WW-RW-3) were submitted to Paradigm for analysis of wastewater parameters as specified in Monroe County Specialty Short Term Discharge Permit ST-288 dated June 25, 2015. Solids removed were containerized in a separate drum, and a sample collected on August 14, 2015 (Sed-RW-3) was submitted to Paradigm for analysis of standard waste-characterization parameters. Results are described in Section 4.1.2.3.

When the water collected from RW-3 was sampled, a thin layer of dark-colored oil was found to be present in the tote containing the majority of the RW-3 water. NYSDEC Region 8 personnel were contacted by telephone and apprised of the finding. A separate sample of the oily water (AMSF-RW3-WWTANK) was collected from the RW-3 wastewater tote on August 17, 2015 and submitted to Paradigm for petroleum fingerprinting analysis by NYSDOH method 310.13, and the results indicated the oil to have a fingerprint equivalent to that of diesel fuel.

On October 8, 2015, video inspection of recharge well RW-2 was performed to evaluate the blockage present in the well at a depth of 15 feet. RotoRooter personnel performed the video survey during the October 2015 sewer line inspection activities. Representatives of Stantec and NYSDEC were on Site to observe the inspection activities and the video output.

Results of the activities related to the cleanout of the two recharge wells are discussed in Section 4.1.2. Waste sample analysis results are summarized in Table 17.

3.14 DECONTAMINATION

Sampling methods and equipment were chosen to maximize the use of dedicated equipment and thereby minimize the need for decontamination. All non-dedicated equipment was decontaminated prior to and following each use. Decontamination of drilling equipment was accomplished with a high-pressure washer. Decontamination of smaller equipment consisted of a wash with Alconox solution and a water rinse. All decontamination water was containerized in 55-gallon drums. Following decontamination, direct contact between sampling equipment and the ground surface was not permitted.

3.15 INVESTIGATION DERIVED WASTE

Investigation-derived waste (IDW) materials were handled, containerized and disposed of in accordance with DER-10 guidance. Waste characterization sample analysis results are summarized on Table 17. Wastewater discharge permit applications and discharge permits, waste profiles, disposal facility approvals and waste manifests for drummed wastes disposed of off-site, and other records documenting the discharge and disposal of IDW materials are presented in Appendix H.

3.16 SAMPLING LOCATION SURVEY

Each newly-installed monitoring well was surveyed for elevation by a licensed surveyor, and in some cases (primarily at outdoor well locations) horizontal location coordinates were also determined. Most of the previously-installed wells on the Site, including the recharge wells, were also surveyed for elevation, and in some cases location coordinates, by a licensed surveyor. With the exception of downgradient soil vapor points, which were surveyed by a licensed surveyor, coordinates for other sampling locations were determined with a handheld GPS unit and, as necessary, by manual swing ties from the building column grid. Well locations and elevations were surveyed relative to the same horizontal coordinate system and elevation datum as that used for ITT remedial investigations.

3.17 FIELD QUALITY CONTROL SAMPLES

Field QA/QC sampling was performed for sampling activities other than collection of waste characterization samples. Field QA/QC samples collected include field duplicates, trip blanks, rinse blanks, equipment blanks, and MS/MSD analyses. Field duplicates and MS/MSD samples were collected at a rate of one per 20 field samples. Trip blanks accompanied each shipment of aqueous samples scheduled for analysis of VOCs and the first three of the soil sample groups collected in November 2012. One rinse blank was collected for each piece of non-dedicated sampling equipment used. It was collected by pouring deionized water over decontaminated equipment. One equipment blank each was submitted for groundwater and soil sampling event.

All QA/QC sample data for soil, water and TO-15 vapor/air samples were reviewed for usability by DVS. Section 5 contains a discussion of the data usability review.

3.18 COMMUNITY AIR MONITORING

Community air monitoring was conducted in accordance with the CAMP appended to the RIWP. Logs of CAMP data are included in Appendix C.

4.0 Remedial Investigation Results

4.1 BUILDING AND FACILITY INFRASTRUCTURE

This section of the report presents observations and findings concerning building and facility infrastructure features that were directly examined or investigated during the RI or are otherwise relevant to the discussion of the nature and extent of contamination at the Site and/or an analysis of remedial alternatives.

4.1.1 Bottom Depth of Building Foundation Elements and Subgrade Structures

Available construction drawings for the Site provide only a limited amount of specific information on the bottom depth of foundation walls, grade beams, or support column footers. In particular, information is lacking concerning the depth of foundation elements for the original section of the building, which is the roughly square, southeast section of the building located between the D column line on the west and the H column line on the east and between the 7 column line on the north and the 17 column line on the south. (Building column line references are shown along the top (north) and right (east) sides of the Site plans presented in Figures 2 through 8, Figure 12, and Figures 14-1 through 14-13.)

Design specifications on some of the foundation plans for other sections of the building indicate a minimum depth of 4 feet below floor grade for footers. Other drawings showing foundation wall sections or grade beam elevations indicate a depth of at least 6 feet below the floor slab grade for the bottom of the foundations. For example, the exterior elevations drawing for the 1979 north building addition (Sattelberg Partnership, Drawing A11, 1979) indicates an approximate depth of 7 feet below floor grade for the grade beam for the north wall of the northwest section of the building in OU-1.

As shown on Figure 2, the floors of the tumbling pit and adjacent sump located southeast of column C4 in the Bright Raven Gymnastics section of the building in OU-1 are 6 feet below floor grade. (Photographs of the construction of the Bright Raven gym pits shown on Figure 2 are presented in Appendix J). Footer extensions for the AOC 4 former press pit located near column F12 were reported to extend to a depth of between 7 and 7.5 feet below floor grade. It is possible that other former press foundations and pit structures, such as those for the former pits located to the east of columns F4 to F7 (as shown on Figure 4), extend to similar depths below floor grade.

Table 19 presents a summary of the depths at which the apparent top of bedrock was encountered in test borings at the Site. The table also summarizes the depth of the bedrock surface below the level of the facility floor slab. As shown on the table, there are several locations on Site where the top of bedrock is within 5 to 8 feet of the facility floor-slab level. An example is the location of shallow bedrock monitoring well AMSF-MW-32, where competent bedrock was encountered at a depth of 7.9 feet below the building floor. As shown on Figure 8, AMSF-MW-32 is located inside the OU-1 section of the building 20 feet northwest of column C4.

The top-of-bedrock elevation data from AMSF-MW-32 indicate that the bottom of fill that would have been placed beneath the floors and footers for the 6-foot deep Bright Raven gym pit and the adjacent sump is likely to have been within several inches of the top of bedrock.

The foundation information and the top of bedrock data are significant because they indicate that there are areas of the Site where the bottom of a foundation or subgrade structure is likely to be in contact with or within a few feet of the top of bedrock. At these locations, the lacustrine silt and clay that occurs in the upper section of the native overburden at the Site would not be an effective barrier to migration of contaminated vapors from groundwater into sub-slab vapor. The backfill that would have been placed around the foundation or subgrade structure when it was constructed would provide a pathway for migration of vapor from bedrock groundwater and the relatively sandy glacial till that typically overlies bedrock into the run-of-bank gravel or other granular fill that underlies the building floor slab, especially in the area of OU-1.

This is a consideration for the evaluation of the potential sources for the contamination present in sub-slab vapor at the Site. For example, as shown on Figure 14-13, sub-slab vapor samples from sample point AMSF-05, which is located in OU-1 less than 20 feet west of the gym pit at column C4, have consistently exhibited relatively high concentrations of 1,1,1-TCA, including the highest 1,1,1-TCA concentration detected in sub-slab vapor at the Site (55,000 $\mu g/m^3$). No indications of the presence of soil contamination were noted during the soil sampling conducted 15 feet to the northeast at the test boring for AMSF-MW-32 (OU-1-TB-MW-1). Contamination by 1,1,1-TCA at concentrations of 340 to 690 µg/L was detected in the three groundwater samples collected from AMSF-MW-32 during the RI.

4.1.2 Piped Connections to the Tumbling Pits Sump

During the inspection of the facility building performed at the outset of the RI, piping was observed to enter the deep sump located southeast of column C4 in the Bright Raven Gymnastics space. Based on information provided by Maguire Family Properties personnel, this piping was installed to connect the sump to the adjacent tumbling pit and tumbling run structures, and was installed to allow for drainage into the sump in the event that water were to accumulate in the subsurface tumbling structures. Facility personnel reported that accumulations of water have never occurred since the sumps and pits were constructed.

4.1.3 Stormwater Sewers and Stormwater Recharge Wells

There are five stormwater recharge wells located on the Site. The five wells (RW-1 through RW-5) are located as shown on Figure 8. Recharge wells are also used for stormwater management at other properties in the surrounding area. A recharge well designated RW-6 is located on the adjacent property to the east (10 Pixley Industrial Parkway) approximately 20 feet east of monitoring well AMSF-MW-34.

Available historical Site maps, evidence from visual inspections of the recharge well catch basins during the RI, and the results of the storm sewer video inspections performed during the RI indicate that the inflows to the five AMSF Site recharge wells include:

- stormwater surface flows captured by each recharge well catch basin;
- stormwater captured by other surface-level storm drains that are connected to the recharge wells;
- stormwater from facility roof drains connected to the recharge wells; and
- high-level overflows from AMSF-RW-4 to AMSF-RW-3 during significant precipitation events.

The results of the video inspection activities also revealed that a former connection for high-level overflows from AMSF-RW-3 to AMSF-RW-2 is no longer present.

4.1.3.1 Storm Sewer Inspection

Video inspections were performed to inspect stormwater sewer lines connected to OU-1 recharge wells RW-2 and RW-3. The storm sewer lines inspected are shown on Figure 12. As indicated on Figure 12, the inspections demonstrated that pipes which connect to the two recharge wells are limited to upstream stormwater lines from building roof drains and outdoor pavement-area catch basins. The inspections found no evidence of current or previous connections to other sources or types of discharge.

The survey findings indicated a difference between the current configuration of the OU-1 storm sewers and the past configuration represented on the Site drawings presented in the RIWP and BCP application documents. It was found that recharge well RW-3 does not have a discharge pipe, and that a stormwater overflow line connecting RW-3 to RW-2 is no longer present. A 6-inch PVC drain line which follows approximately the alignment of the downstream section of the former connection between RW-3 and RW-2 connects RW-2 to the catch basin for the Door #14 loading dock located northwest of building column C1. It is presumed that the storm sewer that originally connected recharge wells 2 and 3, which were installed circa 1979, was abandoned in the early 1990s when the Door #14 loading dock was constructed over the alignment of the former connecting line.

4.1.3.2 Recharge Well Cleanout

It was noted during the April 2014 storm sewer inspection activities that recharge well RW-2 was filled with sediment to a depth of 14.9 feet below grade, and recharge well RW-3 was similarly filled to a depth of 7.2 feet below grade. Cleanout of sediment and debris blocking recharge wells RW-2 and RW-3 was attempted on August 14, 2015.

At RW-2, with a reported as-built depth of 149 feet, minor sediment and debris were removed, but the cleanout could not be advanced beyond an obstruction present in the well at a depth of 15 feet below ground surface, the same depth at which the well was plugged before the cleanout activities were initiated.

At RW-3, the 19-ft-deep well located to the east of RW-2, the well was plugged at a depth of 6 feet before cleanout was initiated. Sediment, gravelly debris and several fist-sized pieces of asphalt were removed, and the well was cleaned to a depth of 15.5 ft. Further advance below that depth was prevented by the limitations of the equipment.

On October 8, 2015, video inspection of recharge well RW-2 was performed to evaluate the blockage present in the well at a depth of 15 feet. The obstruction appeared to be a single large piece of concrete or similar material lodged across the well bore. The obstruction appeared as if it may have been positioned at a joint in, or at the bottom of, the well casing. The well bore was not completely blocked by the material; gaps were visible between the obstruction and the well casing or bore.

4.1.3.3 Characterization of Water and Solids Removed during Recharge Well Cleanout

The water extracted from each well was segregated in separate totes and drums, and samples of the water from each well were analyzed for wastewater parameters required by the Monroe County sewer authority, including VOCs, SVOCs, pesticides, PCBs, petroleum hydrocarbons, and selected metals. When the water collected from RW-3 was sampled, a thin layer of dark-colored oil was found to be present in the tote containing the majority of the RW-3 water. A separate sample of the oily water was submitted for petroleum fingerprinting analysis.

Sample analysis results are presented on Table 17. The following parameters were detected in the samples:

VOCs:

- 1,1,1-TCA: 0.268 parts per million (ppm) in the RW-2 water sample, and 0.020 ppm in the RW-3 water sample
- 1,1-DCA: 0.016 ppm (RW-2) and 0.005 ppm (RW-3)
- 1,1-DCE: 0.004 ppm (RW-2)
- TCE: 0.002 ppm (RW-2)
- Toluene: 0.124 ppm (RW-2) and 0.114 ppm (RW-3)

SVOCs:

- Bis(2-Ethylhexyl)phthalate: 0.008 ppm(RW-2)
- Phenanthrene: 0.010 ppm (RW-3)

<u>Petroleum Hydrocarbons:</u>

- (not detected in the RW-2 water sample)
- 7 to 13 ppm in the RW-3 water sample
- 1030 ppm medium weight petroleum hydrocarbon (as Diesel fuel) in the sample of oily water from RW-3

Concentrations of less than 0.1 ppm of the metals arsenic, chromium, copper, silver and zinc were also detected in one or both of the water samples, and several pesticide compounds were detected in one or both of the water samples at concentrations of less than 0.02 ppm.

A sample of the solids removed was analyzed for total TCL VOCs and total PCBs and for RCRA metals and RCRA VOCs in a TCLP extract of the sample. Results are presented on Table 17. Several VOCs, including 1,1,1-TCA (0.086 ppm) and toluene (0.164 ppm), and the PCB Aroclor 1260 (0.098 ppm) were detected in the total sample. Barium (0.68 ppm) was the only parameter detected in the TCLP extract of the sample.

4.1.3.4 Recharge Well Function

Employees of Edge Color Graphics, the company that has its operation in the northwest corner of the facility building and uses the Door #14 loading dock for its operation, were interviewed on October 8, 2015 and reported that proper functioning of the loading dock storm drain and RW-2 had resumed more than a year ago. Prior to that time, both structures had been prone to flood and were very slow to drain following significant rain events. This condition had been observed by Stantec personnel during Site visits performed in the period prior to the April 2014 storm sewer video survey. The RW-3 and RW-4 catch basins had similarly been observed to be very slow to drain in that time period, and water was found to be present in the RW-3 and RW-4 catch basins at levels above the top of the recharge well casings at the time of the June 25, 2015 water-level monitoring event.

Groundwater elevation measurement data indicate that during the June 2013 and September 2013 measurement events, the water level in the catch basin for RW-2 was above the top of the RW-2 well casing, and that the elevation of the water in the catch basin on those dates was 6 to 8 feet above the elevation of water in nearby shallow-bedrock wells AMSF-MW-1S, -7, -12S, -13S wells and intermediate-bedrock wells AMSF-MW-15i and -16i. These data indicate that RW-2 may not have been functioning as usual for stormwater recharge during 2013. During the May 2014 and two 2015 monitoring events, the water level in RW-2 was below the top of the well casing and more consistent with the elevation of water in nearby monitoring wells, and these data appear to be consistent with a resumption of normal or partial recharge function at the well.

A detailed investigation of the influence of variability in the functioning of the recharge wells on the groundwater flow regime at the Site was not a component of the RI work scope. However, the following assumptions can be postulated:

- During periods when the function of RW-2 was significantly restricted, as it apparently was at times during 2013 and early 2014, some of the stormwater that would otherwise have recharged from the well into the shallow-, intermediate- and/or deeper-bedrock horizons surrounding the well would have flowed out of the catch basin, as it was seen to be doing on occasion during the RI. Minor subsidence of the upper section of the catch basin structure (the ring which supports the grate at the top of the catch basin) and the surrounding pavement, which was first noticed by Stantec personnel in late 2013 or early 2014, is presumably due to erosion of surrounding underlying material, and suggests that some stormwater leaked forcefully out of the catch basin into surrounding fill. Both increased surface runoff along the western edge of the facility parking lot and leakage of stormwater in the subsurface surrounding the catch basin are likely to have increased the amount of recharge to overburden in the area surrounding RW-2 during the times when recharge well function was severely restricted.

- During times of less-severely restricted functioning of the well, blockages of the RW-2 casing and/or open bedrock well bore may restrict to some degree the rate of flow of water into deeper sections of the well during recharge events. Any such restriction could presumably alter the proportion of recharge that would otherwise have flowed into each of the various bedrock horizons penetrated by the well if the obstructions were not present.

4.1.4 Former Spot Welder Wastewater Sump

As indicated in Section 2.5.12, the inactive sump located near column H-7 is presumed to have been a wastewater settling sump for the spot welder operation wastewater discharge.

Sampling of residue present in the sump was performed on June 27, 2012. In the process of obtaining the sample, manual excavation of the residue was conducted to evaluate physical features of the sump. An apparent inlet feature was noted in the southwest corner, and a honeycomb-like pattern was noted on a central baffle. The residue was found to be thickest in the western, upstream section of the sump. Based on the limited inspection that was performed, the sump appeared to be structurally sound, and no indications that releases to the subsurface environment had occurred were apparent. The presence of the waste residue in the sump prevented identification of an outlet (discharge port or pipe) from the sump. However, given its close proximity to the mapped location of an adjacent former sanitary sewer line, it is considered likely that the discharge for the sump would have been connected to the sanitary sewer for the east side of the facility. As reported in more detail in Section 4.4.1.2 of this report, groundwater sampling results for the two monitoring wells closest to this structure (wells AMSF-MW-20 and AMSF-MW-21) did not detect impacts consistent with the chemical characteristics of the residue found in the sump.

4.2 GEOLOGIC AND HYDROLOGIC CONDITIONS

Data from previous and RI test borings indicate that the thickness of overburden deposits at the Site ranges from 4 to 19 feet. The overburden sequence includes a relatively thin (up to 2 feet thick) layer of fill consisting of sand and gravel or disturbed silty clay soil. The fill is underlain by a few to several feet of glacio-lacustrine sediments typically consisting of finely laminated reddish brown to gray brown clayey silt and fine sand with occasional fine gravel. The glacio-lacustrine sediments are typically underlain by a few to several feet of glacial till consisting of silty to gravelly sand.

The uppermost bedrock unit at the Site is mapped as the Eramosa Dolostone of the Upper Silurian-aged Lockport Group. In bedrock cores collected during the RI, the shallow bedrock was found to consist of moderately weathered and fractured medium- to fine-grained, medium- to thin-bedded, light gray to gray stylolitic dolostone with occasional argillaceous partings and with open vugs and cavities that decrease in frequency with depth.

Previous reports have indicated that overburden deposits at and near the Site are not typically saturated. The data collected during the RI indicate that over most of the Site, the water table occurs at or below the top of bedrock during both high water-table and low water table conditions. However, saturated overburden was noted in the interval from 15 feet bgs to the top of bedrock (20.5 feet bgs) during the drilling of the test boring for installation of shallow-bedrock monitoring well AMSF-MW-34 on the east Site boundary, and depths to water measured in the well in June and August 2015 were 12.9 and 14.1 feet bgs. These data indicate that the water table occurs in the overburden at this location, where the top of bedrock surface was significantly deeper than observed elsewhere on Site. A comparison of the elevation of the top-of-bedrock surface to the elevation of the shallow-bedrock potentiometric surface indicated by results of water level monitoring events suggest that during high water table periods, such as those which were measured at the Site in June 2013, the water table may rise a few feet into the overburden deposits in the area along the southern edge of the Site and in other areas of the southern half of the Site where the top of bedrock surface is low.

The one overburden monitoring well that was installed during the RI (AMSF-MW-24) was installed in May 2013 on the west side of the Site in an area where the top of bedrock is relatively shallow. In spite of the fact that water was observed in shallow probe holes installed at this location during the June 2012 RI soil vapor screening program, groundwater was not found to be present in MW-24 each time it was checked during the course of the RI. Water was present in the well during the June 2013 monitoring event, but this appears to have been caused by water entering the well from the flooded roadway box casing when the well was opened. On that occasion, purging of the well for the purposes of sample collection caused the well to go dry, and groundwater did not subsequently collect in the well.

The occurrence of water in the shallow subsurface at the location of AMSF-MW-24 in the absence of groundwater in the underlying overburden appears to be due to a perched condition in the sub-base and/or shallow fill present beneath the parking lot pavement. It is presumed that the relatively permeable sub-base and/or underlying fill (both of which are likely to be more permeable than the underlying low-permeability glacio-lacustrine overburden deposits) are in hydraulic connection with a source of water that is under a head at or above the level of water observed in the soil-vapor probe holes and the roadway box casing at the MW-24 location. This apparent condition could also account for the seepage of water that is frequently observed to be occurring during periods of dry weather from pavement cracks present in the central part of the western parking lot, and for the frequently observed persistence of water in the drainage ditch located at the west edge of the parking lot during periods of dry weather. Potential sources of the water in the sub-base or shallow fill may include infiltration of stormwater at the base of the building walls, leakage from the bottom of a building roof conductor or associated storm sewer or leakage from a water supply pipe.

The shallow bedrock in the area of the Site is reported to be highly permeable. Quantitative permeability testing was not conducted during the RI. However, the high permeability of the shallow bedrock zone was confirmed qualitatively by the complete loss of drilling water circulation during the drilling of each of the shallow bedrock monitoring wells installed during the RI and by the fact that no drawdown of the water table was observed during the pumping of water to develop each of the new wells. Voids of a few to several inches were encountered in the upper section of the bedrock borings at several of the RI well borings, and complete loss of drill water return, which is an indication of a zone of very high permeability, typically occurred when these voids were encountered.

Reports on previous investigations at the AMSF and ITT sites have indicated that the direction of groundwater flow in the shallow bedrock zone at the Site is generally to the north or northeast. However, results of the five groundwater level monitoring events performed using the expanded network of shallow bedrock monitoring points installed during the RI indicated a generally very shallow hydraulic gradient to the east across the northern half of the Site. The easterly trend is significant because it indicates that downgradient flow from source areas located in and adjacent to the northern section of the ITT building caused or contributed to the presence of 1,1,1-TCA contamination in groundwater in OU-1 and adjacent areas (the northwest and west-central portions of the AMSF Site, including the AMSF-MW-33 and AMSF-MW-9S locations) as well as areas further to the east across the central portion of the AMSF Site. More discussion concerning migration of contaminants in the OU-1 area is presented in Section 4.4.13.

4.2.1 Shallow Bedrock Groundwater Flow

Shallow bedrock groundwater elevation contour maps for the Site developed from data collected on June 17, 2013, September 24, 2013, May 12, 2014, June 25, 2015 and August 17, 2015 are presented on Figures 9A through 9E, respectively.

On June 17, 2013, Stantec measured groundwater levels in 21 shallow bedrock groundwater monitoring wells across the Site; on the same day, O'Brien & Gere measured groundwater levels in bedrock groundwater monitoring wells on adjacent properties to the west (ITT BCP Site #C828112) and to the north (Cinemark). A total of 37 groundwater elevations (21 locations on the AMSF Site and 16 locations on adjacent properties) were used to contour the June 2013 shallow bedrock groundwater elevation surface. These wells are screened in the Upper Eramosa. June 2013 groundwater elevations ranged from 556.13 to 558.46 ft. amsl.

On September 24, 2013 and May 12, 2014, Stantec measured groundwater levels in the 21 shallow bedrock wells then present on the AMSF Site. Groundwater levels were not measured on adjacent properties. September 2013 groundwater elevations ranged from 552.16 to 555.35 ft. amsl. May 2014 groundwater elevations ranged from 555.42 to 557.65 ft. amsl.

On June 25, 2015 and August 17, 2015, Stantec measured groundwater levels in the 22 shallow bedrock wells present on the AMSF Site (including newly installed well MW-34) and at 18 shallow bedrock wells located on the adjacent ITT and Cinemark properties. June 2015 shallow bedrock groundwater elevations ranged from 552.96 to 556.05 ft. amsl. August 2015 shallow bedrock groundwater elevations ranged from 554.07 to 556.97 ft. amsl.

As shown on Figures 9a through 9e, the data for the five events indicate that the general direction of the hydraulic gradient in the shallow bedrock zone at the AMSF Site is from west to east. A hydrologic high was consistently observed at AMSF-MW-8S in the southwest corner of the Site, resulting in localized radial flow and steeper horizontal gradients in that area.

Seasonal variation was observed in the elevation of the water table, which decreased approximately 3.8 ft on average from June 2013 to September 2013 and increased approximately 3.0 ft on average from September 2013 to May 2014. The conditions in June 2013 and September 2013 represented the high and low ends, respectively, of the range of water table elevations measured during the RI. The steepness and general direction of the hydraulic gradient in the shallow bedrock zone remained relatively consistent between measurement events.

4.2.2 Deep Bedrock Groundwater Flow

The rest of the monitoring wells on the Site are screened at deeper intervals, including the Lower Eramosa (AMSF-MW-15I and AMSF-MW-16I) and the Upper Penfield (AMSF-MW-1D, AMSF-MW-3D, AMSF-MW-5D, and AMSF-MW-8D). Groundwater elevations measured at these wells are depicted on Figures 9f through 9j. Figure 9f includes groundwater elevations measured in June 2013 by O'Brien & Gere at deeper bedrock wells on adjacent ITT and Cinemark properties to the west and north. The additional wells are screened across the Lower Eramosa (ITT-IBW-20 and ITT-IBW-19), the Lower Penfield and Decew Dolomite (ITT-DBW-2 and ITT-DBW-5), and the Decew Dolomite (ITT-DBW-8). Those five deeper bedrock wells were also measured in the monitoring events performed by Stantec in June and August of 2015 (data presented on Figures 9i and 9j).

The limited number and distribution of monitoring wells screened in each of the deeper bedrock units limits opportunity for interpretation of groundwater flow direction and gradient in those units. The intermediate-bedrock water elevation data indicate a relatively flat potentiometric surface in the Lower Eramosa unit in the area of OU-1 and adjacent offsite areas to the west and north; with a less discernible gradient than the eastward gradient apparent in the overlying shallow bedrock horizon. Between monitoring events, groundwater elevations in the intermediate bedrock wells generally increased or decreased in the same direction and to a similar degree as those observed in the shallow bedrock wells.

The four wells screened within the Upper Penfield do indicate the presence of a horizontal gradient; however, more data would be needed to discern and evaluate flow direction within this zone of flow. As with the shallow and intermediate bedrock data, groundwater elevations in the Upper Penfield generally shifted downward between June and September 2013, and then shifted back upward from September 2013 to May 2014.

4.2.3 Vertical Gradients

There are three pairs of shallow and deep bedrock wells on the Site from which vertical gradients were considered: AMSF-MW-1D/1S, AMSF-MW-3D/3S, and AMSF-MW-8D/8S.

AMSF-MW-1D/1S is located at the northwest corner of the Site. June 2013, September 2013, and May 2014 groundwater elevation data indicate a downward vertical gradient of 0.271 ft/ft, 0.318 ft/ft, and 0.296 ft/ft, respectively, between the Upper Eramosa and the Upper Penfield intervals at this location.

AMSF-MW-8D/8S is located at the southwest corner of the Site. June 2013, September 2013, and May 2014 groundwater elevation data indicate a downward vertical gradient of 0.263 ft/ft, 0.227 ft/ft, and 0.236 ft/ft, respectively, between the Upper Eramosa and the Upper Penfield intervals at this location.

Vertical gradients could only be qualitatively estimated for AMSF-MW-3D/3S, which is located along the southern Site boundary, as well screen information was not available. As with the other two pairs, June 2013, September 2013, and May 2014 groundwater elevation data indicates that there is a vertical downward gradient at this location.

The calculated vertical gradients are between one and two orders of magnitude greater than the horizontal gradients observed in the shallow bedrock groundwater zone. Bedrock anisotropy may limit the vertical groundwater flux, although not at locations where fracture flow is the dominant flow pathway.

4.2.4 Recharge Wells

Water elevations measured at the five on-Site recharge wells during each water-level monitoring event are presented on Figures 9a through 9j. The recharge well measurements were not, however, included in the data sets for the shallow-bedrock zone groundwater elevation contour plans presented on Figures 9a through 9e. When originally installed, recharge wells RW-3, RW-4, and RW-5 were reportedly screened in the shallow-bedrock section of the Eramosa Dolomite, with open (uncased) recharge intervals ranging from 5.5 to 6 feet in length. RW-1 and RW-2, were screened across wide intervals (86 to 130 ft open intervals) and multiple formations (Eramosa Dolomite/Upper Penfield and Eramosa Dolomite to Decew Dolomite, respectively). The possible influence of recent stormwater influx to the wells and the variability in recharge function related to the obstructions present in or cleaned out of RW-3 and RW-2 are other factors that complicate the interpretation of the elevations at the recharge wells relative to each other and to the monitoring wells.

Additional discussion of the influence of the recharge wells on the direction of groundwater flow and contaminant concentrations at the Site is presented in the following two sections.

4.2.5 Relationship between Hydraulic Conditions and Precipitation Events

A series of graphs presented on Figure M-1 in Appendix M show plots of total daily precipitation (in inches) recorded at the Greater Rochester International Airport for the two months preceding and following each of the five groundwater monitoring events. The graphs also show static water levels (converted to elevations) measured at selected wells during the water level monitoring performed on the first day of each event and the static level measured on a following day prior to purging of a well for sampling.

The data presented on Figure M-1 indicate that groundwater levels in shallow bedrock wells across the Site are consistently responsive to recharge events. Water level increases or decreases from day to day are of similar magnitude at the wells examined regardless of location or proximity to a recharge well. The data indicate that there is a high degree of connection across the Site in the zone of very high permeability apparent in the upper section of the shallow bedrock horizon. Table M-1, which is presented in Appendix M, summarizes the evidence of high permeability intervals (apparent voids and lost drilling-water circulation) that was observed during installation of RI shallow bedrock wells.

Data evaluation presented in the ITT site RI report indicates that radial flow of groundwater outward from recharge wells, including AMSF-RW-2, occurs in the bedrock horizons intersected by a recharge well following a strong precipitation event. The radial flow pattern that develops during such a recharge event represents a temporary reversal or deflection, in the immediately surrounding area on the west or southwest side of the Site recharge wells, of the generally eastward or northeastward hydraulic gradient that occurs during non-recharge periods. As the conceptual groundwater system model of the OU-1 area that is posited in the ITT site RI report highlights, the radial flow associated with a recharge event is a mechanism that could drive a measure of contaminant migration in all directions away from RW-2, including to the west in the opposite direction of non-recharge event horizontal gradients. However, the periodic reversal of the gradients in the area west of RW-2 does not amount to the exclusive or primary mechanism for transport of contaminants into the area west of the well. Migration of contaminants from source areas to the southwest of RW-2 under the influence of the eastward hydraulic gradients that occur during non-recharge periods and at all times in areas beyond the immediate vicinity of RW-2 is more likely to have been the primary mechanism for the development of the contaminant distribution at the Site.

4.2.6 Relationship between Groundwater Elevation and Contaminant Concentrations

A series of graphs presented on Figure M-2 in Appendix M show plots of static water levels (converted to elevations) measured at selected wells along with the concentrations of 1,1,1-TCA and PCE detected in the samples collected from each well. The wells evaluated include AMSF-MW-1S, -7, -9S, -13S, -20, -23, -29, -31, -32 and -33. As shown on Figure 4, these wells are distributed across the Site.

The data presented on the Figure M-2 suggest that there is a strong correlation between high 1,1,1-TCA concentration and low water level at wells MW-1S, -7, -9S, -13S, -29, -31and -33. Variability in PCE concentration does not appear to correlate as strongly with water levels in these wells. The 1,1,1-TCA pattern at these wells reflects both the effects of dilution of groundwater by uncontaminated stormwater introduced during recharge events at recharge wells RW-2, RW-3 and RW-5 and the general persistence of the contaminant plume at the Site. The data suggests that stormwater influx broadly suppresses temporarily the contaminant levels that would be present if the recharge wells were not present at the Site.

At MW-20, located at the former degreaser location in AOC 1 and removed to some degree (by distance) from the influences of the recharge wells, the data suggests a correlation between relatively high PCE concentrations and high water levels. 1,1,1-TCA concentrations at MW-20 show a more muted response. The data for this well, with PCE concentrations appearing to increase with increasing water level, may reflect the presence of contaminant absorbed to the bedrock matrix at or just below the top of bedrock. The data is consistent with the indications from the soil vapor and soil data for AOC 1 (described below in Section 4.4.1.1) that a PCE release of limited extent occurred at the former degreaser.

4.2.7 Bedrock Surface Elevation

The bedrock surface elevation contour map presented in Figure 10 was approximated using a natural neighbor interpolation technique and data from 71 locations with top of bedrock information. Depth to top of rock was determined from review of lithological descriptions, where possible, as provided in boring logs. The indicators of bedrock included (1) direct observation and description of bedrock as recorded in logs and/or (2) soil-sampler refusal. For some locations, there was not a clear interface recorded between overburden material and bedrock; instead, gradation from unconsolidated material to weathered bedrock to fresh bedrock was recorded. For example, at MW-5D (GeoServices, November 1991), the transition from overburden to bedrock material was reported to occur between 7 and 11 feet below ground surface (ft bgs). For that location it was therefore assumed that the top of intact bedrock is most likely present within that interval, and a depth to bedrock of 9 ft bgs was used for that location.

Where weathered bedrock intervals were reported, they were presumed to represent the top of bedrock.

The top of bedrock at the Site appears to be an irregular surface that slopes generally north to south from a high of approximately 562 ft. amsl along the northern side of the Site to a low of approximately 552 ft. amsl along the southern Site boundary. The apparent irregularity in the topography of the bedrock surface, which often manifests as differences of two or more feet between the reported top of rock depths at adjacent test borings, may be due to irregular weathering of the bedrock. The abundance of voids encountered during drilling suggest that solution cavity features exposed at or present near the bedrock surface may have made the bedrock surface susceptible to irregular erosion during glaciation. Alternatively, the apparent irregularities may reflect the inherent difficulty of consistently logging the transitions from glacial till to weathered bedrock and from weathered to competent bedrock.

To the extent that actual conditions are reflected by the apparent irregularity shown in the top-of-bedrock elevation contour plan presented in Figure 10, the irregularity of the surface would probably inhibit broad migration of contamination along it even if it was found below the water table.

4.2.8 Bedrock Matrix Contamination

The ITT site RI demonstrated through collection and analysis of bedrock samples that 1,1,1-TCA, 1,1-DCA, PCE, and TCE is adsorbed in the bedrock matrix in the shallow and intermediate bedrock zones at the ITT and AMSF sites, with the highest concentrations found at locations in the northeast corner of the ITT site and the adjacent area in the northwest corner of the AMSF Site. The presence of contaminants adsorbed in the bedrock matrix in this area will likely continue to be a source of groundwater contamination impacting conditions in downgradient areas of the AMSF Site.

4.3 SAMPLE ANALYSIS RESULTS

A generalized discussion of RI sample analysis results is presented in this section of the report. Discussions of the results specifically related to each AOC and OU are presented in Section 4.4 of the report.

Applicable New York State standards and guidance values that have been established for evaluating the presence of contaminant compounds in the various media sampled during the RI are used as the comparison criteria in the following evaluation of sampling results.

New York State does not currently have standards, criteria, or guidance values for soil vapor. NYSDOH Guidance for Evaluation of Soil Vapor Intrusion in the State of New York (October, 2006) suggests comparison to the Health Department's air guideline values. Analytical results for the downgradient soil vapor samples were compared to the air guideline values

4.3.1 Soil Vapor Screening Program Results

There are no applicable NYSDEC or NYSDOH standards or guidance by which to evaluate the soil vapor screening program results. The primary purpose of the soil vapor screening program was to identify target locations in AOCs 1, 2, 3 and 6 for the test boring and monitoring well installation programs that followed. The secondary purpose was to provide supportive data for evaluating the lateral extent of VOC contamination in these areas. Those purposes were achieved and put to use during the RI in the design of the soil boring and well installation programs for AOCs 1, 2, 3 and 6.

4.3.2 Indoor Air, Sub-Slab Vapor, and Outdoor Ambient Air

The SVI assessment sample results indicate that chlorinated VOCs occur in sub-slab vapor beneath the AMSF building at concentrations which exceed the guidance values for no further action established by NYSDOH. In some areas of the building very low concentrations of the same compounds were detected in indoor air samples; however, no exceedances of NYSDOH indoor air quality guidelines were detected.

Sub-slab vapor and indoor air results were compared to the matrices presented in the NYSDOH SVI guidance (October, 2006). Matrix 1 applies to TCE and vinyl chloride. Matrix 2 applies to 1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (cis-1,2-DCE), PCE, and 1,1,1-trichloroethane (1,1,1-TCA). The matrices allow for five different recommended actions:

- No further action;
- Take reasonable and practical actions to identify source(s) and reduce exposures (i.e., concentration in indoor air is likely associated with indoor and/or outdoor sources);
- Monitor;
- Monitor/mitigate; and
- Mitigate.

Any non-detects were evaluated against the matrix guidelines using the analyte reporting limit as the concentration to be evaluated.

Table 16A presents the indoor air and sub-slab vapor sample analysis results for the above-listed compounds and the associated matrix outputs for each sample pair. As indicated on the table, 15 of the 21 locations sampled during the RI had Mitigate as a recommended action output for at least one of the constituents. The one area of the facility in which Mitigate actions were consistently not included in the matrix outputs was the area of offices located to the east and south of the Former Degreaser Area. Figure 6 shows the locations of the three samples in this area (samples AM-SVIA-9, -10, and-11.)

Figures 11A and 11B present graphical summaries of the distribution of 1,1,1-TCA and PCE (respectively) in the samples of sub-slab vapor collected at the AMSF Site from 2004 through the

RI. As Figure 11A indicates, 1,1,1-TCA has been detected over a broad area of the building. PCE concentrations are more narrowly concentrated in the eastern part of the Site in the area surrounding the former location of the degreaser in AOC 1.

4.3.3 Downgradient Boundary Soil Vapor Analysis

Sampling of soil vapor along the eastern boundary of the Site detected PCE (concentrations of 1.8 to 33 micrograms per cubic meter, μg/m^3) at three of the four locations sampled, and TCE (5.9 μg/m^3) at one of those locations. Other chlorinated VOCs potentially associated with the groundwater contamination identified at the Site were not detected.

While there are no standards for soil vapor, the NYSDOH Guidance for Evaluation of Soil Vapor Intrusion in the State of New York (October, 2006) suggests results can be compared to the NYSDOH indoor air guidelines. USEPA guidance (EPA's Vapor Intrusion Database: Evaluation and Characterization of Attenuation Factors for Chlorinated Volatile Organic Compounds and Residential Buildings, EPA 530-R-10-002, March 2012) indicates that applying an attenuation factor of 0.001 to predict potential indoor air concentrations from shallow soil gas concentrations is a conservative (biased towards being protective) approach when evaluating soil vapor. Applying a factor of 0.001 to the concentrations detected in the downgradient boundary soil vapor samples yields potential indoor air concentrations two to three orders of magnitude lower than the NYSDOH indoor air guidelines for PCE, TCE and methylene chloride (30, 2 and 60 μg/m^3, respectively). The results therefore indicate that conditions at the downgradient boundary do not represent a potential risk of vapor intrusion in the buildings on adjacent properties to the east.

4.3.4 Soil

Soil sample analysis results, which are summarized in Table 12, were compared to the following:

- New York State Codes, Rules and Regulations (NYCRR) Part 375 Unrestricted Use Soil Cleanup Objectives (SCOs), restricted use SCOs for protection of public health at commercial use sites (CU), protection of groundwater (POGW), and protection of ecological resources (POER), and
- NYSDEC Commissioner's Policy (CP)-51 Soil Cleanup Guidance SCOs for CU, POGW, and POER.

The results indicate the following:

- Occurrences of soil contamination by chlorinated VOCs were identified in the Former Degreaser Area (AOC 1) and the Former Paint Shop (AOC 6). In AOC 1, a single exceedance of an SCO was detected in the 15 samples collected (PCE at a concentration of 2.2 mg/kg compared to the protection of groundwater SCO of 1.3 mg/kg). In AOC 6, exceedances of POGW SCOs for two chlorinated VOCs (cis-1,2-DCE and 1,1-DCA) were detected in 1 of the 4 samples collected (cis-1,2-DCE at a concentration of 0.49 mg/kg compared to the POGW SCO of 0.25 mg/kg, and 1,1-DCA at a concentration of 0.41 mg/kg compared to the POGW SCO of 0.27 mg/kg). None of the concentrations detected exceeded SCOs for protection of public health at commercial use sites. The soil data and the supporting evidence from the field screening of test boring soil samples, soil vapor screening, sub-slab vapor and groundwater monitoring performed in both areas indicate that each occurrence is of limited lateral and vertical extent.

- Exceedances of the 0.1 mg/kg POGW SCO for the volatile compound 1,4-dioxane were detected in soil samples from one boring each in AOC 1 (2.4 mg/kg detected) and AOC 6 (0.14 mg/kg detected) and at two of the three test boring locations in the Former Waste Storage Areas (AOC 5, 1,4-dioxane concentrations of 0.25 to 3.6 mg/kg).
- Zinc was detected in one soil sample from the Former Paint Shop (AOC 6) at a concentration that exceeded NYSDEC's SCO for protection of ecological resources, but the concentration (229 mg/kg) did not exceed human health or groundwater protection SCOs.
- An occurrence of poly-nuclear aromatic hydrocarbon compounds (PAHs) and nickel was detected in one of the three surface soil samples collected to characterize Site-wide soil conditions. The concentrations of the five PAHs exceeding SCOs (830 to 1,800 µg/kg) are not unusual for surface soil in an urban or industrial area, and because the sample was collected at a location on the east side of the facility adjacent to the facility parking lot, the PAH detections are presumed to reflect conditions related to pavement constituents or parking lot run-off. The nickel concentration (34 mg/kg) exceeded the SCO for protection of ecological resources but not human health or groundwater protection SCOs.
- Occurrences of soil contamination above SCOs were not detected in the other areas investigated. Exceedances of SCOs for aluminum, iron, magnesium and calcium detected in many samples are due to background conditions and do not represent environmental contamination.
- VOCs were not detected in soil at either of the two test borings installed during the RI in OU-1 (one inside the building and one outside at the southeast corner of the OU-1 section of the building).

4.3.5 Groundwater

A summary of RI groundwater sample analysis results is presented in Table 13. Table 18 presents a comparison of the results observed during the RI to those observed during previous investigations.

4.3.5.1 Exceedances of Standards

Groundwater results were compared to Class GA standards and guidance values listed in NYSDEC's Ambient Water Quality Standards and Guidance Values, Division of Water Technical and Operational Guidance Series (TOGS 1.1.1) Memorandum dated October 22, 1993, Reissued June 1998, and addenda dated April 2000 and June 2004.

The results of the RI groundwater sampling program indicate the following:

- In each of the groundwater samples collected during the RI, 1,1,1-TCA and/or PCE and/or one or more of the chlorinated VOCs produced by the environmental breakdown of those compounds was found at a concentration that exceeded a NYSDEC groundwater quality standard.
- The only non-VOC occurrence of an exceedance of a groundwater quality standard (other than exceedances due to background concentrations of some metals in groundwater) was a single detection of lead in the June 2013 sample collected from AOC 6 / AOC 7 monitoring well AMSF-MW-26. The lead concentration in the September 2013 sample from that well was, however, below the TOGS standard of 25 µg/L.
- With one exception, pesticides, PCBs, and semi-volatile organic compounds (SVOCs, which include PAHs) were not detected in Site groundwater samples. The one exception was a single detection of a trace concentration of the SVOC caprolactam, for which there is no applicable groundwater standard.

4.3.5.2 Extent of Contamination

Exceedances of VOC standards were detected in all the groundwater samples collected during the RI, although at shallow bedrock well AMSF-MW-28, located near the southeast corner of the Site, the exceedances were for just one constituent, PCE, and the concentrations detected in the two samples collected there (5.7 ug/L in both samples) barely exceeded the 5 ug/L standard. The other shallow bedrock wells located along the downgradient east side of the Site had exceedances by 1,1,1-TCA that were higher than the PCE concentrations at MW-28; however, the results of the downgradient boundary soil vapor sampling program indicate that offsite migration of contaminants in groundwater is unlikely to represent a risk of exposure on the adjacent properties east of the Site boundary.

Figures 13a and 13b present Site plans showing concentrations of chlorinated ethanes and chlorinated ethenes detected in RI groundwater samples from shallow bedrock wells (Figure 13a) and intermediate and deep bedrock wells (Figure 13b). As indicated on the figures, the highest levels of contamination by 1,1,1-TCA and its daughter products were found in OU-1. The highest levels of contamination by PCE and its daughter products were much lower than those of 1,1,1-TCA and were found in and around AOC 1, the former degreaser area.

Table 18 presents a comparison of the concentrations of chlorinated ethenes and chlorinated ethanes detected in RI groundwater samples from each well to the contaminant concentrations detected at the wells during previous investigations. The comparison indicates that contaminant levels at several locations have declined significantly over time, while at other locations the conditions have been relatively steady. The data suggest that contaminated soil removal activities performed at the ITT site is related to the decline seen at some wells (ITT site shallow bedrock well ITT-SBW-7, for example). It is anticipated that contaminant levels will decline gradually over time as a result of natural attenuation. However, 1,1,1-TCA adsorbed to the bedrock matrix in the northwest part of the AMSF Site is likely to continue to provide a source for exceedances of groundwater quality standards across the Site.

4.4 AREAS OF CONCERN

The results for each AOC are described below. Figures summarizing the validated sample analysis results for each AOC are presented on Figures 14-1 through 14-13.

An index map for the individual 14-series figures is presented on Figure 14. Please note that some of the sampling data has a bearing on the evaluation of the nature and extent of contamination in more than one of the AOCs, and from one figure to another in the Figure 14 series there may be overlap of the sampling locations shown and redundancy in the data presented.

4.4.1 AOC 1 and Other Area 2

4.4.1.1 AOC 1 – Former Degreaser Area

4.4.1.1.1 Exceedances of Applicable Standards and Guidance

Exceedances in AOC 1 samples of applicable SCOs, groundwater standards and guidance values, and soil vapor intrusion guidance values are shown on Figure 14-1.

An exceedance of the POGW SCO for PCE was detected in a soil sample collected at a depth of 10 feet from the test boring installed closest to the reported former location of the AOC 1 degreaser (the test boring for monitoring well AMSF-MW-20, where the PCE concentration detected was 2.2 mg/kg compared to the POGW SCO of 1.3 mg/kg), and an exceedance of the POGW SCO for 1,4-dioxane was detected in a sample collected from the next closest boring to the south (DG-TB-,1 where the 1,4-dioxane concentration detected was 2.4 mg/kg, compared to the POGW SCO of 0.1 mg/kg). No other POGW exceedances were detected in the 15 soil samples collected in AOC 1, and no exceedances of SCOs for protection of public health at commercial use sites were detected.

Exceedances of groundwater standards for PCE, TCE, and 1,1,1-TCA and its daughter products were detected in samples from all three wells located in AOC 1 (AMSF-MW-20, -21 and -22). Concentrations of PCE ranged up to 930 µg/L; concentrations of 1,1,1-TCA ranged up to 420 µg/L. Exceedances of standards were also detected in wells AMSF-MW-29 and -34, which are located to the east and downgradient of AOC 1. Concentrations of PCE and its daughter products were an order of magnitude lower in the downgradient wells than they were in the AOC 1 wells, but the concentrations of 1,1,1-TCA and its daughter products did not diminish in the downgradient direction.

SVI assessment sample results for all the sample locations in AOC 1 and the immediately surrounding area exceeded DOH guidelines suggesting the need for monitoring or mitigation of the potential for soil vapor intrusion by chlorinated ethane and ethene compounds.

In August 2015, NYSDOH lowered the air guideline concentration for TCE from 5 micrograms per cubic meter (µg/m3) to 2 µg/m3. TCE concentrations detected at two of the AOC 1 locations sampled in April 2013 (2.58 µg/m3 at AM- SVIA4 and 2.26 µg/m3 at AM- SVIA6) exceed the new guideline. A duplicate of the AM- SVIA4 sample, in which TCE was not detected above a concentration of 1 µg/m3, did not exceed the new guideline.

4.4.1.1.2 Interpretation of Results and Conceptual Model of AOC 1 Contamination

The evidence from the soil vapor screening program, field screening of test boring soil samples, soil sample analysis, and sub-slab vapor sample analysis together indicate that the soil contamination in AOC 1 is limited to the immediate vicinity of the former degreaser location and is present in deeper rather than shallow soil.

The groundwater sample data suggest that the PCE contaminant plume originating in the former degreaser area is attenuating downgradient as it approaches the eastern Site boundary. The absence of exceedances of SCOs for 1,1,1-TCA in the former degreaser area and the lack of attenuation of 1,1,1-TCA contamination in groundwater downgradient of AOC 1 suggest that the 1,1,1-TCA contamination in AOC 1 groundwater is related to the Site-wide plume of 1,1,1-TCA contamination rather than to a source in the former degreaser area.

4.4.1.2 Other Area 2 – Former Spot Welder Wastewater Sump

Sample analysis results for the sample of the residue present in the former Alliance spot-welder operation wastewater sump are summarized on Table 20. Results indicated that the residue contained chromium and nickel at concentrations of 758 and 209 milligrams per kilogram (mg/kg), respectively. Lead (172 mg/kg), copper (759 mg/kg) and zinc (537 mg/kg) were also present in the residue.

These concentrations are not necessarily indicative of a potential environmental risk. Furthermore, as indicated above in Section 4.1.3, based on the limited inspection that was performed during the sampling of the residue, the sump appeared to be structurally sound, and although a connection to the sanitary sewer could not be confirmed, no indications were apparent that releases to the subsurface environment had occurred. The presence of the waste residue in the sump prevented identification of an outlet (discharge port or pipe) from the sump.

Nevertheless, the presence of the metals detected in the residue indicated that assessment of the potential for past releases of wastewater from the former sump should include analysis of those metals in samples collected from this area. The five metals were therefore added to the parameter list for June 2013 groundwater samples from AOC 1 monitoring wells AMSF-MW-20 and -21, the two monitoring wells closest to the sump (30 feet west-southwest and 25 feet northeast, respectively).

As shown on Figure 14-1, no exceedances of groundwater standards or guidance values were detected. Furthermore, of the four metals detected in either sample (lead was not detected), concentrations detected were at the low end of the range of concentrations observed in other Site wells. The data indicate that the sump was not a source of groundwater contamination by the metals contained in the residue.

4.4.2 AOC 2 – Former Drainage Swale

4.4.2.1 Exceedances of Applicable Standards and Guidance

Exceedances in AOC 2 samples of applicable SCOs, groundwater standards and guidance values, and guidance values for evaluating the potential for soil vapor intrusion are shown on Figure 14-2.

No exceedances of SCOs were detected other than exceedances of SCOs for aluminum, iron, magnesium and calcium, all of which are considered to be related to background conditions.

Exceedances of groundwater standards for PCE and 1,1,1-TCA and its daughter products were detected in all five samples collected from both AMSF-MW-23, located in the center of the eastern/northern section of the former drainage swale, and all five samples collected from both AMSF-MW-9S, located to the east of the western/southern section of the former swale. At MW-23, concentrations of PCE ranged from 36 to 70 μg/L, and concentrations of 1,1,1-TCA ranged from 19 to 58 μg/L. Concentrations of PCE detected at MW-9S ranged from 19 to 77 μg/L, and concentrations of 1,1,1-TCA ranged from 160 to 930 μg/L.

SVI assessment sample results indicated conditions that exceeded guidelines suggesting the need for monitoring or mitigation of the potential for soil vapor intrusion by chlorinated ethane and ethene compounds at all three of the AOC 2 sample locations arrayed along the alignment of the eastern/northern section of the former drainage swale.

4.4.2.2 Interpretation of Results and Conceptual Model of AOC 2 Contamination

Concentrations of PCE were higher than concentrations of 1,1,1-TCA in the AOC 2 sub-slab vapor samples. The PCE contamination in sub-slab vapor may be related to the levels of soil contamination by PCE detected in AOC 2 soil samples collected along the former swale. Alternatively, the sub-slab vapor contamination may be related to the presence of groundwater contamination by PCE in AOC 1. The 1,1,1-TCA and related ethanes present in sub-slab vapor appear to be related to the Site-wide groundwater contaminant plume.

The hydraulic gradient data indicate that the groundwater contamination detected at AMSF-MW-23 is likely to be related to the upgradient contaminant plume present in OU-1 rather than a source in AOC 2.

As described in Section 2.5.2.2, the data collected during the soil vapor and soil sampling performed by GeoServices in the period from 1991 to 1994 in the area of the western/southern section of the former drainage swale was produced using methods that are not in complete accordance with current NYSDEC guidance for site investigation. Furthermore, it involved screening with a 10.6 eV PID, which would have been insensitive to the presence of 1,1,1-TCA and 1,1-DCA. Because it does not include validatable data, the GeoServices data is not included in the RI dataset establishing the nature and extent of contamination at the Site. However, the data from the GeoServices investigations did indicate that an exceedance of the POGW SCO for 1,1,1-TCA was present in shallow soil, later removed, at the "B" sample location approximately 60 feet southwest and potentially upgradient of AMSF-MW-9S. PCE was also detected, at a concentration below SCOs, at that location. The available information suggests therefore that there may have been an on-Site source of groundwater contamination in the area near MW-9S. However, relative to the concentrations of PCE and its daughter products, the roughly 10 times higher concentrations of 1,1,1-TCA and its daughter products detected in groundwater at MW-9S suggest that the contamination at AMSF-MW-9S may be primarily caused by the OU-1 groundwater contaminant plume present in the area to the west and northwest rather than by a separate source of contamination in the area southwest of MW-9S. Further discussion of the continuity of the plume between OU-1 and MW-9S is presented in Section 4.4.13.

4.4.3 AOC 3 – East Side Sanitary Sewer

Exceedances in AOC 3 samples of applicable SCOs, groundwater standards and guidance values, and guidance values for evaluating the potential for soil vapor intrusion are shown on Figure 14-3.

No exceedances of SCOs were detected.

The east side sanitary sewer line runs across the north side of the former degreaser area, and AOC 3 groundwater and SVI exceedances are attributable to conditions related to AOC 1. The data from AOC 2 indicate that the East Side Sanitary Sewer is not a source of contamination at the Site.

4.4.4 AOC 4 – Former Press Pit Foundation

Exceedances in AOC 4 samples of applicable SCOs, groundwater standards and guidance values, and guidance values for evaluating the potential for soil vapor intrusion are shown on Figure 14-4.

No exceedances of SCOs were detected.

Exceedances of groundwater standards for PCE and 1,1,1-TCA were detected in both samples collected from AOC 4 monitoring well AMSF-MW-25. Concentrations of PCE were 80 and 120 µg/L in the two samples; concentrations of 1,1,1-TCA were 15 and 7.5 µg/L. An exceedance of the 5 µg/L standard for 1,1-DCA was also detected (a concentration of 6.3 µg/L) in one of the samples.

The AOC 4 SVI assessment sample AM-SVIA15 exceeded DOH guidelines for PCE, TCE and 1,1,1-TCA.

The sample data indicate that a source of contamination is not present in AOC 4. The groundwater and SVI exceedances in AOC 4 are considered to be related to Site-wide conditions and the presence of groundwater contamination by PCE in AOC 1.

4.4.5 AOC 5 – Former Waste Storage Areas

4.4.5.1 Exceedances of Applicable Standards and Guidance

Exceedances in AOC 5 samples of applicable SCOs, groundwater standards and guidance values, and guidance values for evaluating the potential for soil vapor intrusion are shown on Figure 14-5.

Exceedances of the 0.1 mg/kg POGW SCO for 1,4-dioxane were detected at both of the test borings (5B-TB-1 and 5B-TB-2) drilled in the footprint of the former waste storage shed (AOC 5B) located at the west side of the facility building (concentrations of 0.25 to 3.6 mg/kg). At test boring 5A-TB-1, drilled in AOC 5A (the former outdoor waste storage area on the south side of the building), no SCOS for organic compounds were detected. No other exceedances of SCOs were detected in the three AOC 5 test borings other than exceedances of SCOs for aluminum, which are considered to be related to background conditions. No test borings were drilled within the footprint of AOC 5C, the former outdoor waste storage area on the west side of the building; however, as shown on Figure 14-5, 5B-TB-2 was drilled a few feet to the north of the 1994 soil removal Area A, which is located in AOC 5C just south of the AOC 5B former waste storage shed. A concentration of 3.6 mg/kg of 1,4-dioxane detected in the 3-4 ft. sample from 5B-TB-2 was the only SCO exceedance (other than aluminum) at that location.

Exceedances of groundwater standards for PCE and its daughter products and 1,1,1-TCA and its daughter products were detected in samples collected from each of the four wells located across the area where the former Alliance waste storage areas were located. The four wells include:

- AMSF-MW-9S, located outside the facility building just west and upgradient of the former location of the AOC 5B waste storage shed. Concentrations of PCE detected at MW-9S ranged from 19 to 77 µg/L, and concentrations of 1,1,1-TCA ranged from 160 to 930 µg/L.

- AMSF-MW-31, located inside the building east of the AOC 5B waste storage shed. Concentrations of PCE ranged from less than 1 to 20 µg/L, and concentrations of 1,1,1-TCA ranged from 1 to 110 µg/L .
- AMSF-MW-26, located in the former Paint Shop area (AOC 6) west and upgradient of the former location of the AOC 5A outdoor waste storage area. Concentrations of PCE ranged from 3 to 7 µg/L, and concentrations of 1,1,1-TCA ranged from 1 to 85 µg/L.
- AMSF-MW-27, located east and downgradient of the AOC 5A outdoor waste storage area. Concentrations of PCE ranged from 5 to 6 µg/L, and concentrations of 1,1,1-TCA ranged from 8 to 9 µg/L.

Exceedance of groundwater standards for lead and selenium were detected in one of the MW-26 samples (concentrations of 82 and 24 µg/L, respectively), but exceedances were not detected in the sample from the subsequent monitoring event. The selenium concentration that exceeded the SCO was within the range of selenium concentrations observed at other Site wells located outside of AOCs and is considered to be representative of background conditions at the Site. Exceedances for iron, magnesium and sodium in a sample from MW-9S are also considered to be due to background conditions.

The AOC 5A SVI assessment sample AM-SVIA1 exceeded DOH guidelines for 1,1,1-TCA and daughter product 1,1-DCE. No exceedances of SVI guidelines were detected at AOC 5B location AM-SVIA3.

4.4.5.2 Interpretation of Results and Conceptual Model of AOC 5 Contamination

The absence of SCO exceedances by chlorinated VOCs in the AOC 5 soil samples collected during the RI contrasts with the presence of PCE, 1,1,1-TCA and other chlorinated ethenes and ethanes in groundwater at AMSF-MW-9S. The data suggest that the source of the groundwater contamination at AMSF-MW-9S is located upgradient of AOC 5.

The presence of 1,4-dioxane in AOC 5B soil samples and the absence of contamination in those samples by 1,1,1-TCA suggests that the presence of the 1,4-dioxane in the soil at those locations is unlikely to have been related to spills of degreasing solvent formulated with 1,1,1-TCA.

4.4.6 AOC 6 – Former Paint Shop

4.4.6.1 Exceedances of Applicable Standards and Guidance

Exceedances in AOC 6 samples of applicable SCOs, groundwater standards and guidance values, and guidance values for evaluating the potential for soil vapor intrusion are shown on Figure 14-6/7.

Exceedances of POGW SCOs for PCE daughter product cis-1,2-DCE and 1,1,1-TCA daughter product 1,1-DCA were detected in the shallow soil sample collected from AOC 6 test boring PS-TB-1 (cis-1,2-DCE at a concentration of 0.49 mg/kg compared to the POGW SCO of 0.25 mg/kg, and 1,1-DCA at a concentration of 0.41 mg/kg compared to the POGW SCO of 0.27 mg/kg). Exceedance of the 0.1 mg/kg POGW SCO for 1,4-dioxane was detected in the deeper sample from that boring (0.14 mg/kg in the sample from 8 ft.). Zinc was detected in one soil sample from the AMSF-MW-26 test boring at a concentration that exceeded NYSDEC's SCO for protection of ecological resources, but the concentration (229 mg/kg) did not exceed human health or groundwater protection SCOs. No other exceedances of SCOs were detected other than exceedances of SCOs for aluminum which are considered to be related to background conditions.

As indicated in the AOC 5 summary, exceedances of groundwater standards at Former Paint Shop Area monitoring well AMSF-MW-26 included PCE and cis-1,2-DCE, 1,1,1-TCA and its daughter products, and the metals lead and selenium.

The AOC 6 SVI assessment samples AM-SVIA13 and AM-SVIA14 exceeded DOH guidelines for PCE and 1,1,1-TCA and some of the daughter products.

4.4.6.2 Interpretation of Results and Conceptual Model of AOC 6 Contamination

The SCO exceedances detected in AOC 6, which appear to be limited in lateral and vertical extent, were of a magnitude that barely exceeded the standards. The effects of upgradient groundwater conditions on the groundwater quality and soil vapor conditions in AOC 6 would appear to be greater than those that may be related to the potential impact of the AOC 6 soil contamination.

4.4.7 AOC 7 – Former Plating Area

Exceedances in AOC 7 samples of applicable SCOs, groundwater standards and guidance values, and guidance values for evaluating the potential for soil vapor intrusion are shown on Figure 14-6/7.

No exceedances of SCOs were detected in AOC 7 soil samples.

As indicated above, exceedances of groundwater standards at Former Paint Shop Area monitoring well AMSF-MW-26, which is located just to the south of the former plating area, included PCE and cis-1,2-DCE, 1,1,1-TCA and its daughter products, and lead and selenium.

SVI assessment sample AM-SVIA1 exceeded DOH guidelines for 1,1,1-TCA and daughter product 1,1-DCE.

The groundwater and SVI exceedances detected in AOC 7 samples do not appear to be related to sources of contamination in AOC 7.

4.4.8 AOC 8 – Former Spray Wash Area

Exceedances in AOC 8 samples of applicable SCOs, groundwater standards and guidance values, and guidance values for evaluating the potential for soil vapor intrusion are shown on Figure 14-8.

No exceedances of SCOs or SVI assessment guidelines were detected in AOC 8 samples.

As indicated above, exceedances of the groundwater standards for PCE and 1,1,1-TCA were detected in samples collected from AOC 8 well AMSF-MW-27. These do not appear to be related to sources of contamination in AOC 8.

4.4.9 AOC 9 – Supplemental Vapor Intrusion Assessment

Exceedances of SVI guidance values at sample locations that are peripheral to or outside of the footprint of AOCs 1 through 8, the Other Areas and OU-1 are shown on Figure 14-9.

At most of those locations, the analytical results for the sub-slab vapor and indoor air sample pair exceeded DOH guidance values for mitigation or monitoring.

The RI data indicate that in the parts of the building that are beyond the immediate vicinity of the former degreaser area in AOC 1, the primary source for the contamination by chlorinated VOCs in sub-slab vapor is the migration of contaminants from the contaminated groundwater plume that underlies the building.

The RI SVI assessment data collected in 2013 are generally consistent with the data collected during the monitoring performed in previous years in connection with the RI of the ITT site. The overall consistency indicates that the combined set of previous and RI sample data is sufficient to characterize the nature and extent of soil-vapor contamination beneath the building.

4.4.10 AOC 10 – Supplemental Site-Wide Groundwater Characterization

Exceedances of groundwater standards and guidance values at sample locations that are peripheral to or outside of the footprint of AOCs 1 through 8, the Other Areas and OU-1 are shown on Figure 14-10.

The data presented on Figure 14-10 include the results for the four new wells installed on the downgradient side of the AMSF facility. The data indicate that contamination of shallow bedrock groundwater by both 1,1,1-TCA and its daughter products and by PCE and vinyl chloride (a PCE daughter product) is present at the eastern property line.

The supplemental investigation of Site-wide groundwater conditions also included installation and sampling of four soil vapor probes (AOC10-SV-1 through -4) at locations along the east Site boundary. This component of the program was designed to determine whether any groundwater impacts have the potential to present a risk of soil vapor intrusion in off-Site buildings located downgradient or cross-gradient from the Site. As described in Section 4.3.3 of the report, the sampling detected traces of PCE (concentrations of 1.8 to 33 micrograms per cubic meter, µg/m3) at three of the four locations sampled, and TCE (5.9 µg/m3) at one of those locations. EPA guidance (EPA's Vapor Intrusion Database: Evaluation and Characterization of Attenuation Factors for Chlorinated Volatile Organic Compounds and Residential Buildings, EPA 530-R-10-002, March 2012) indicates that applying an attenuation factor of 0.001 to predict potential indoor air concentrations from shallow soil gas concentrations is a conservative (biased towards being protective) approach when evaluating soil vapor. Applying a factor of 0.001 to the concentrations detected in the downgradient boundary soil vapor samples yields potential indoor air concentrations at least two to three orders of magnitude lower than the NYSDOH indoor air guidelines for PCE, TCE and methylene chloride (30, 2 and 60 $\mu g/m^3$, respectively). The results therefore indicate that conditions at the downgradient boundary do not represent a potential risk of vapor intrusion in the buildings on adjacent properties to the east.

Sampling of the shallow bedrock wells located on the south side of the AMF building (AMSF-MW-3S and AMSF-MW-10) indicated that PCE was present at concentrations of 25 to 70 µg/L, which is above the NYSDEC groundwater standard for PCE of 5 µg/L. Based on the hydraulic gradient and soil concentration data, it appears unlikely that PCE contamination from the SCO exceedance identified in AOC 1 would be contributing to the conditions on this side of the Site. The northeastward hydraulic gradients along the south side of the Site that are evident from the data presented on Figures 9a through 9e indicate that off-Site contamination may be migrating on to the Site from the area to the south.

Groundwater conditions detected on the western side of the Site include exceedances of the 5 µg/L standards for 1,1,1-TCA and 1,1-DCA (concentrations of up to 12 µg/L of those two compounds) at monitoring well AMSF-MW-4, and the exceedances detected at AMSF-MW-9S that were described above in Section 4.4.2.2.

4.4.11 AOC 11 - Supplemental Site-Wide Soil Characterization

Previous investigations included a significant amount of soil sampling and analysis in areas around the exterior of the facility building. Additional sampling on the south and east sides of the Site was performed during the RI to provide more thorough Site-wide soil characterization.

Exceedances of SCOs detected in the AOC 11 soil samples are shown on Figure 14-11. Exceedances of SCOs for PAHs and nickel were detected in one of the three surface soil samples collected to characterize Site-wide soil conditions. The concentrations of five PAHs exceeded SCOs; however, the detected concentrations of those five PAHs (830 to 1,800 µg/kg) are not unusual for surface soil in an urban or industrial area. Furthermore, because the sample was collected at a location adjacent to the facility parking lot, the PAH detections are presumed to reflect conditions related to pavement constituents and/or parking lot run-off. The nickel concentration (34 mg/kg) exceeded the SCO for protection of ecological resources, but not human health or groundwater protection SCOs.

Exceedances of SCOs for aluminum, iron, magnesium and calcium detected in several samples are due to background conditions and do not represent environmental contamination.

4.4.12 Other Area 1

Exceedances in Other Area 1 samples of applicable SCOs, groundwater standards and guidance values, and guidance values for evaluating the potential for soil vapor intrusion are shown on Figure 14-12.

No exceedances of SCOs were detected in soil samples from the Other Area 1 test boring.

As indicated above in the results summary for AOC 5, exceedances of the groundwater standards for PCE and 1,1,1-TCA were detected in samples collected from Other Area 1 well AMSF-MW- 31. Concentrations of PCE ranged from less than 1 to 20 µg/L, and concentrations of 1,1,1-TCA ranged from 1 to 110 µg/L. These concentrations are roughly an order of magnitude lower than the concentrations observed at upgradient well AMSF-MW-9S.

SVI assessment samples AMSF-16 and AM-SVIA2 exceeded DOH guidelines for PCE, 1,1,1-TCA and daughter product 1,1-DCE. The concentration of 1,1,1-TCA detected in 2013 sample AM-SVIA2 (2766 µg/m^3) were approximately 10 times lower than had been detected in 2009 at nearby sample location AMSF-16. The PCE concentration (232 µg/ m^3) detected at AM-SVIA2 was roughly the same as that detected in 2009 at AMSF-16.

The contamination detected in the Other Area 1 groundwater and SVI assessment samples do not appear to be related to sources of contamination in Other Area 1.

4.4.13 OU-1 – Northwest Corner

4.4.13.1 Exceedances of Applicable Standards and Guidance

Exceedances in OU-1 samples of applicable SCOs, groundwater standards and guidance values, and guidance values for evaluating the potential for soil vapor intrusion are shown on Figure 14-13.

No SCO exceedances were detected in OU-1 soil samples collected during the RI, nor were any detected in OU-1 soils samples collected during previous investigations.

As shown on Figure 14-13 and described in more detail below in the next section (Section 4.4.13.2), exceedances of groundwater standards for 1,1,1-TCA and its daughter products were detected at each OU-1 shallow and intermediate bedrock well. Exceedances of groundwater standards for PCE or other chlorinated ethenes were noted at each of the OU-1 wells except for AMSF-MW-7 and RW-3, but the maximum chlorinated ethene concentration (20 µg/L) was far lower than the concentrations of 1,1,1-TCA observed in these same wells.

SVI assessment sample results indicated conditions that exceeded guidelines suggesting the need for monitoring or mitigation of the potential for soil vapor intrusion by chlorinated ethane and ethene compounds at all the OU-1 sample locations.

4.4.13.2 Interpretation of Results and Conceptual Model of OU-1 Contamination

As described in Section 2.5.13 of this report, extensive sampling of soil vapor and soil in the outdoor area between the AMSF building and the adjacent ITT site had been performed previously by GeoServices and O'Brien and Gere. The previous sampling performed in the OU-1 area west of the AMSF building targeted in particular the areas surrounding stormwater recharge well RW-2 and shallow bedrock groundwater monitoring well AMSF-MW-7. The purpose of this sampling had been to identify whether sources of 1,1,1-TCA and other VOCs were present in the vicinity of these two wells. Collectively, the data from the previous sampling indicated that surface spills of solvent material in this area of the AMSF Site were not the source of the concentrations of VOCs detected in groundwater at AMSF-MW-7 and RW-2.

Previous investigations had not included sampling of soil inside the OU-1 section of the AMSF building. Sampling of soil under the building was performed during the RI at the test boring for AMSF-MW-32 (OU-1-TB-MW-1), and no indications of the presence of soil contamination were noted. That test boring was installed approximately 15 feet from SVI assessment point AMSF-05, the location where the highest concentrations of 1,1,1-TCA have been found in sub-slab vapor in OU-1.

The results of OU-1 groundwater sampling support a conclusion that there is not a source area for the OU-1 contamination in the footprint of the OU-1 section of the building. Concentrations of 340 to 690 µg/L of 1,1,1-TCA were detected in the groundwater samples collected at AMSF-MW-32, the well located inside the OU-1 section of the building. These were 2 to 3 times lower than the levels of 1,1,1-TCA detected in the shallow (AMSF-MW-13) and intermediate (AMSF-MW-16i) wells located directly to the west outside the building, and 4 to 10 times lower than the concentrations observed in samples from AMSF-MW-33 at the southwest corner of the OU-1 section of the building.

As described in Section 4.1.1, the absence of a thick overburden sequence beneath the gym pit and related sump located 20 feet east of AMSF-MW-32 and sub-slab vapor sample location AMSF-05, and the existence of fill material beneath and surrounding the pit and sump, provide a mechanism by which contaminated soil vapor can migrate from the water table to the sub-slab environment beneath the floor of the OU-1 section of the building.

Shallow bedrock well AMSF-MW-33 was installed at the southwest corner of the OU-1 section of the AMSF building primarily to fill the data gap in the shallow bedrock monitoring well network between OU-1 wells AMSF-MW-7 and -13S and monitoring well AMSF-MW-9S, located 200 feet to the southeast. The groundwater monitoring results for AMSF-MW-33, which consistently exhibited the highest 1,1,1-TCA concentrations of the OU-1 wells on the three occasions that it was sampled (concentrations ranging from 1,900 to 3,600 µg/L of 1,1,1-TCA), indicate that there is continuity of the 1,1,1-TCA contaminant plume between OU-1 and monitoring well AMSF-MW-9S, with 1,1,1-TCA concentrations diminishing in the direction of MW-9S. The fact that in each of the events in which wells AMSF-MW-7, -13S and -33 were sampled the highest 1,1,1-TCA concentration was observed at MW-33, also suggests the presence of a shallow bedrock horizon source for 1,1,1-TCA contamination that is located to the south of MW-7 and -13S (at a distance of 75 or more feet to the south or southwest of recharge well RW-2), and indicates that RW-2 is not the location of the source of the OU-1 contamination. Groundwater elevation data indicate that former degreasing operations and locations of past releases of 1,1,1-TCA on the ITT site are likely source areas for that contamination.

The presence of a diesel-like petroleum product found as a film on the water removed from OU-1 recharge well RW-3 during the August 2015 cleanout activities indicates that there may be petroleum-product LNAPL on the water table in the area of RW-3. LNAPL was not reported to have been encountered in RW-3 in the past, nor was it observed in the well during the RI, or in the RW-3 catch basin at times when the water level in the catch basin was above the top of the well casing. However, a petroleum odor was noted in the water removed from the RW-2 and RW-3 storm sewer networks during the April 2014 storm survey activities, and this suggests that the petroleum occurrence at RW-3 may have been present at that time.

It is presumed that the source of the petroleum product was a past spill or release of diesel fuel to one of the loading dock or driveway catch basins located upstream of RW-3. Given the available information, it appears likely that such a spill would have occurred in the relatively recent past.

The presence of petroleum fuel LNAPL at RW-3 does not indicate that release of LNAPL to RW-3 is a potential source of the groundwater contamination by chlorinated VOCs that is present in OU-1. Had LNAPL with solvent contamination been released to RW-3, groundwater contaminant concentrations would be much higher than those that have been observed in the samples that have been collected from RW-3 and nearby shallow-bedrock wells. The presence of chlorinated VOCs in groundwater at RW-3 is due instead to the presence of the broader groundwater contaminant plume originating to the west of OU-1.

5.0 QA/QC Evaluation

5.1 DATA USABILITY

Laboratory reports received from Spectrum and TestAmerica for samples submitted for laboratory analysis during the RI were forwarded to Data Validation Services for review of the usability of the laboratory analytical data. Samples submitted to Paradigm Environmental Services, which included the soil vapor screening program samples, IDW waste characterization samples, and the spot welder wastewater sump residue sample, were not subject to data usability review.

Results of the reviews were reported by DVS in its two Data Usability Summary Reports (DUSRs), copies of which are presented in Appendix F.

As documented in the DUSRs, the data usability reviews were completed by DVS using applicable guidance from the USEPA Region 2 standard operating procedures for data validation and the USEPA National Functional Guidelines for Data Review. The DUSRs were also prepared in accordance with Appendix 2B of DER-10. Full reviews of the data deliverable summary forms and raw sample data for RI samples and limited reviews of raw QC data were performed in accordance with the above-referenced guidance. The scope of each review is described in detail in the DUSRs.

In summary, most of the laboratory data were found to be usable as reported by the labs or usable with qualification due to typical processing or matrix effects. However, a limited number of results were found to be unusable:

- Method 8260 analysis results that report no detection for 1,4-dioxane in soil and water samples are not usable because of a processing issue inherent in the methodology which leads to very poor instrument response.
- the result for the SVOC hexachlorocyclopentadiene in soil sample MW-29-S-1 was rejected due to a lack of recovery in the matrix spike (MS) and MS duplicate of that sample.

The DUSR which evaluated the SVI assessment samples collected in OU-2 reviewed the results for three samples collected with canisters that were found to have lost some of their reported initial vacuum prior to the start of sampling (sample numbers AM-SVIA4-SSV, -6-SSV, and -16-IA). Results of the analyses of these samples were qualified as estimated. However, reasonable similarity between the results for the field duplicate and its parent AM-SVIA4-SSV sample (the sample which had the largest loss of vacuum of the three affected samples) indicated that there was not likely to have been a large effect on the samples as a result of the loss of vacuum prior to sampling.

The reviewed results described in the DUSR have been incorporated into the various RI data summary tables and figures presented in this report.

5.2 QA/QC SAMPLES

QA/QC sample results including trip blanks, equipment blanks, and rinsate blanks are summarized on Tables B1 through B5 in Appendix F. Low level detections of acetone and methylene chloride and some metals were found in rinsate blank results. The impact of these results on project data were considered during the data usability review described above and are not significant.

6.0 Qualitative Exposure Assessment

6.1 GENERAL CONSIDERATIONS

As specified in NYSDEC's Technical Guidance for Site Investigation and Remediation (DER-10, May 2010), a qualitative exposure assessment for both human health and fish and wildlife resources qualitatively determines the route, intensity, frequency and duration of actual or potential exposures to contaminants.

The Site consists of a ±120,000 square-foot, one-story industrial building with no basement and slab-on-grade construction. The remainder of the Site is covered by either grass or asphalt, the latter of which is used for parking and/or loading ramp space.

The property, which is approximately 7 acres in size, is identified as Monroe County Tax Parcel No. 119.17-1-2, located in the Town of Gates, New York. The Site is relatively level and slopes gently to the south. Ground surface elevations range from approximately 570 ft. amsl at the northern Site boundary to 560 ft. amsl along Pixley Industrial Parkway to the south. Surface water run-off from developed areas of the Site and surrounding properties is generally directed to a network of catch basins/ groundwater recharge wells. The recharge wells are vertical wells installed in bedrock to depths ranging from approximately 19 to 149 feet below ground surface (ft bgs). Roof drains from the southwest part of the Site building discharge to a ditch which flows to the west along the north side of Pixley Industrial Parkway.

No federally- or state-designated wetlands, streams, ponds or lakes are located on the Site or immediately adjacent properties. There is a stormwater retention pond on a property located northeast of the Site. No schools or federal, state, county, municipal or community parks or recreational areas are known to be present in the immediate vicinity of the property.

Current and reasonably-anticipated future use of the Site includes commercial and industrial (light manufacturing) uses. The tenants currently occupying the building conduct light manufacturing and a variety of commercial activities, including automotive repair, wine distribution, large format sign printing, gymnastics studio, office and shop activities for residential waterproofing business, and recreational pickle-ball. Land uses in the surrounding area include industrial facilities on the properties to the east, south and west of the AMSF facility and a multi-screen movie theater and its parking lot on the adjacent property to the north. The nearest residences are in residential neighborhoods located 1,000 feet to the southeast, 1,500 feet to the south, and 1,500 feet to the west of the Site boundaries.

The Site characterization elements of the qualitative exposure assessment for the AMSF are documented in the discussion of results presented above in Section 4.3 of this report.

6.2 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

A qualitative human health exposure assessment identifies areas of concern and chemicals of concern (COCs), identifies and evaluates actual or potential exposure pathways, characterizes the potentially exposed receptors (residents, workers, recreational users, etc.), and identifies how any actual and/or potential exposure pathways might be eliminated or mitigated.

6.2.1 AOCs and COCs

The areas of concern and chemicals of concern present at the AMSF Site have been identified in the foregoing sections of this report.

6.2.2 Human Health Exposure Pathways

The five elements of an exposure pathway include:

1) the source of contamination (release location if known, or contaminated media at the point of exposure if the original source is not known);
2) environmental media and transport mechanisms;
3) point of exposure;
4) route of exposure (ingestion, inhalation, or adsorption through the skin); and
5) receptor population.

An exposure pathway is complete when all five elements of a pathway are documented, whereas a potential exposure pathway exists when any one or more of the five elements comprising an exposure pathway is not known.

Possible exposure routes through which potential receptors may come into contact with the contaminants of concern detected on-Site include:

- Inhalation of volatile substances released from soil, soil vapor and/or groundwater (remediation worker, construction worker, utility worker, occupational worker (employee of tenant company), visitors, patrons, etc.).

  Exposures to the occupational workers, visitors and patrons could occur from vapor intrusion into the building. The potential human health exposure pathway from soil vapor intrusion is the first priority among potential exposures at the Site.

  Exposures to remediation workers could occur during remedial work, such as excavation or groundwater sampling. Exposures to construction workers and utility workers could occur on the Site during any ground-intrusive work. In particular excavation or storm sewer line or catch-basin repair in the vicinity of recharge well RW-2 likely represents the area and activity with the highest risk of exposure to contaminated vapors. These potential exposures to remediation, construction and utility workers would be mitigated by use of monitoring equipment, such as PIDs, as well as use of personal protective equipment (PPE) to the extent needed.

- Ingestion and dermal contact with VOCs detected in subsurface soil in the vicinity of and downgradient from AOCs 1, 5 and 6 (remediation worker, construction worker, utility). Exposures to construction workers and utility workers could occur in impacted areas during any ground-intrusive work. These exposures to workers could be mitigated through use of PPE and proper work procedures (i.e. no eating, smoking, or drinking in work zones; and removal of PPE and washing prior to eating, smoking, or drinking once outside the work zone).
- Results of the downgradient boundary soil vapor sampling, which found that contaminants in soil vapor were present at concentrations two to three orders of magnitude below conservative guidance concentrations, indicate that exposure through soil vapor intrusion into downgradient off-Site buildings is unlikely.

The following potential pathways of exposure have been reviewed but do not represent a complete pathway of exposure:

- Contact with or ingestion of contaminated groundwater by occupants, off-Site residents, workers, and visitors. Complete pathways for these exposures are not present because of the following specific conditions encountered at and near the Site: the supply of potable water to users in the area is provided by Monroe County; groundwater use for potable or other purposes is not known to be occurring; and the water table occurs below the bedrock surface, and where present in the overburden is present at depths greater than 10 feet.

6.2.3 Summary

Potential current and future exposures are summarized as follows:

Vapor inhalation exposure pathways for on-Site occupants, occupational workers, and patrons/visitors will be addressed with vapor intrusion monitoring and/or mitigation measures.

Exposure pathways involving vapor inhalation during construction or utility work, inhalation of contaminants suspended in air on soil particles during earthwork or volatilized from groundwater during groundwater sampling would be expected to be temporary, limited to periods of excavation/earth work or groundwater sampling, and mitigated with engineering controls.

Direct exposure by way of ingestion, inhalation or dermal contact with impacted soils or groundwater will also be transient in nature and will be restricted to periods of earth work, utility work and any remediation work that may be required.

Implementation of appropriate institutional and engineering controls and a Site Management Plan (SMP) will allow for control of these exposures.

Potential for off-Site exposures to Site contaminants was not indicated by the results of the RI.

6.3 FISH AND WILDLIFE EXPOSURE

For evaluations of fish and wildlife exposures and ecological risk, NYSDEC guidance focuses attention on sensitive ecological receptors. The following information was developed concerning the potential presence of sensitive receptors.

Stantec performed reconnaissance of the Site and the Site vicinity. No wildlife was observed on the Site. There is a scrub/shrub woodlot on a portion of the property located south of the Site and south of Pixley Industrial Parkway. The majority of the Site consists of an industrial/commercial building that occupies approximately one half of the property. Asphalt drives and parking and grass covered areas occupy the remainder of the Site.

A request was sent to the New York Natural Heritage Program and the U.S. Fish and Wildlife Service website was reviewed to determine any known occurrence of rare, endangered and/or threatened species in the vicinity of the Site.

The response from the NYSDEC Natural Heritage Program indicated a historical record of a rare plant in the area of the project site: in 1867, Northern Bog Aster (Symphyotrichum boreale, listed by NYS as Threatened) was collected from "Fisk's Woods, Gates". There is no existing bog habitat on Site or in the near vicinity of the Site. Northern Bog Aster is not present on the Site. No significant natural communities or other significant habitats are known to be present on or in the immediate vicinity of the Site.

The U.S. Fish and Wildlife Service provides an on-line searchable database for occurrences of federally listed threatened or endangered species by county. The database identifies the bog turtle (Clemmys muhlenbergii) as the only federally threatened or endangered species occurring in Monroe County. According to USFWS policy, if a subject site contains no habitat suitable for the subject species, no further investigation is required. Given that the subject Site and surrounding vicinity is located in a commercial/industrial area with no marsh cover/sedge wetlands that are the preferred habitat of the bog turtle, no further investigation is needed.

Given the available information and the primarily industrially developed environmental setting of the area, with the exception of the above-noted scrub/shrub woodlot located to the south of the subject property, significant sensitive ecological receptors have not been identified as being present at the Site or elsewhere in the vicinity of the Site. Stormwater runoff from the building roof and parking lots of the Site is directed to five (5) bedrock infiltration wells. Field investigation has identified that shallow groundwater flow is to the northeast and east. There is also surface drainage that flows to a west flowing road ditch along Pixley Industrial Park. There is no indication that stormwater runoff from the Site is negatively affected by on-Site surface contact and there is no provision to direct surface flow into the noted woodlot to the south. Possible exposure pathways for fish and wildlife are therefore not subject to further evaluation in this assessment. However, the following observations are provided concerning means of addressing generic potential ecological exposure risks associated with the Site.

Inhalation and contact by ecological receptors with suspended particles in air is not considered a risk unless subsurface soils are excavated and exposed to dispersion mechanisms. There is no proposed excavation of soils on-Site. NYSDEC and the Monroe County Department of

Environmental Services (MCDES) would be involved in reviewing and approving plans for pre-treatment and discharge of and associated permits required for any long-term discharge of any treated water generated by a remedial system for Site groundwater should one be required in the future.

7.0 Conceptual Site Model

Occurrences of soil contamination by chlorinated VOCs were identified in the Former Degreaser Area (AOC 1) and the Former Paint Shop (AOC 6). In AOC 1, a single exceedance of an SCO for chlorinated VOCs was detected in the 15 samples collected (PCE at a concentration of 2.2 mg/kg compared to the POGW SCO of 1.3 mg/kg). In AOC 6, exceedances of SCOs for chlorinated VOCs were detected in 1 of the 4 samples collected (cis-1,2-DCE at a concentration of 0.49 mg/kg compared to the POGW SCO of 0.25 mg/kg, and 1,1-DCA at a concentration of 0.41 mg/kg compared to the POGW SCO of 0.27 mg/kg). The soil data and the supporting evidence from the field screening of test boring soil samples, soil vapor screening, sub-slab vapor and groundwater monitoring performed in both areas indicate that each occurrence of soil impact is of limited lateral and vertical extent.

The RI activities have included thorough efforts to identify and examine infrastructure features that could have been pathways for introduction of solvent waste to OU-1 recharge well RW-2. No evidence of such a pathway was found. No record or other direct evidence of past waste disposal to the recharge well system has been identified. RI storm sewer inspection and recharge well cleanout activities demonstrated that past or present connections to drain lines other than stormwater lines are not present in the pipe network leading to recharge wells AMSF-RW-2 and AMSF-RW-3.

Data from this RI and previous studies, including the ITT site RI, have demonstrated that the highest concentrations of chlorinated VOC contaminants in bedrock and groundwater have been present in the shallow bedrock in the area on the northeast portion of the ITT site and the adjacent northwest portion of the AMSF Site. The shallow horizon of the bedrock sequence in which the highest levels of contamination have been found exhibits the highest permeability of the bedrock units underlying the site, and it is characterized by the common occurrence of solution-enlarged fractures and voids.

Had discharge of dense non-aqueous phase liquid (DNAPL) solvent waste to RW-2 or its upstream network been the mechanism by which chlorinated VOC contamination was introduced to this area of the Site, the DNAPL would have dropped to the bottom of the 149-foot deep AMSF-RW-2 recharge well, and contamination would have primarily been present in the deepest bedrock horizons intersected by the bottom of AMSF-RW-2, rather than in the shallow bedrock horizons that are closer to the top of the AMSF-RW-2 recharge interval.

The data that has been generated by the various investigations is consistent with the following conceptual model for the introduction and distribution of chlorinated VOC contamination in this part of the Site. DNAPL migrated to the east and northeast, in the general direction of the hydraulic gradient that is present in this area, through the shallow bedrock horizons from known release areas on the ITT site to the AMSF Site. Once the contamination migrated onto the northwest portion of the AMSF site, AMSF-RW-2 acted as a vertical conduit for migration of DNAPL to greater depths.

Conceptual Site Model

The expanded network of shallow-bedrock wells installed during the RI in the AMSF building and along the downgradient, eastern side of the Site have provided the information needed to establish the nature and extent of the groundwater contamination at the Site. RI results confirmed that concentrations of 1,1,1-TCA and related daughter products are highest in the OU-1 area, with contamination extending beneath the building to the eastern side of the Site. Contamination by PCE and its daughter products is present at lower concentrations, with the highest levels found in the area of the former degreaser in AOC 1. The data suggest that declines in contaminant levels seen at some wells along the western side of the Site may be related to contaminated soil removal activities performed at the ITT site. It is anticipated that contaminant levels at the Site will decline gradually over time as a result of natural attenuation. However, VOC material adsorbed to the bedrock matrix in shallow, intermediate and deep bedrock in the area of the northwest corner of the AMSF Site and adjacent areas of the ITT site is likely to continue to provide a source for exceedances of groundwater quality standards across the Site.

Results of the extensive SVI assessment that has been performed during the RI and the previous investigations at the Site indicate that chlorinated VOCs are present in sub-slab soil vapor beneath many sections of the AMSF building at concentrations that result in exceedances of NYSDOH guidance criteria used to evaluate what actions may be needed to address the potential for intrusion of soil vapor into the building. The areas affected include the areas in and surrounding OU-1 and AOCs 1 and 6 but also other areas of the building that are not AOCs. The distribution of contamination in sub-slab vapor at the Site and the presence of potential pathways for migration of vapors from bedrock groundwater along foundation elements suggest that the groundwater contaminant plume is the source for the contaminants in sub-slab vapor.

8.0 Summary and Conclusions

The RI has constituted a thorough effort to screen for, target, and characterize potential sources of soil, soil vapor and groundwater contamination at the AMSF Site. The data from all the phases of the AMSF RI, when considered together with the data from the previous sub-slab sampling performed during the ITT site RI in the AMSF building and the extensive soil, groundwater, and bedrock matrix sampling performed for the ITT site RI in OU-1, have defined the nature and extent of contamination at the Site, provided the information necessary to perform a qualitative assessment of potential exposures to the Site contamination, and provided the information needed to develop an analysis of potential remedial alternatives for the Site.

The results of the RI indicate the following:

- Occurrences of soil contamination by chlorinated VOCs were identified in the Former Degreaser Area (AOC 1) and the Former Paint Shop (AOC 6). In both areas, the chlorinated VOCs were detected at concentrations that were above protection of groundwater SCOs. The SCO exceedances included PCE at a concentration of 2.2 mg/kg compared to the POGW SCO of 1.3 mg/kg, cis-1,2-DCE at a concentration of 0.49 mg/kg compared to the POGW SCO of 0.25 mg/kg, and 1,1-DCA at a concentration of 0.41 mg/kg compared to the POGW SCO of 0.27 mg/kg. None of the concentrations detected exceeded SCOs for protection of public health at commercial use sites.

- Exceedances of the groundwater protection SCO for the volatile compound 1,4-dioxane were detected in soil samples from one boring each in both the Former Degreaser Area (AOC 1) and the Former Paint Shop (AOC 6) and at two boring locations in the Former Waste Storage Areas (AOC 5B).

- Zinc was detected in one soil sample from the Former Paint Shop (AOC 6) at a concentration that exceeded NYSDEC's SCO for protection of ecological resources, but the concentration (229 mg/kg) did not exceed human health or groundwater protection SCOs.

- PAHs and nickel were found to exceed SCOs in one of the three surface soil samples collected to characterize Site-wide soil conditions. The concentrations of the five PAHs exceeding SCOs (830 to 1,800 µg/kg) are not unusual for surface soil in an urban or industrial area, and because the sample was collected at a location on the east side of the facility adjacent to the facility parking lot, the PAH detections are presumed to reflect conditions related to pavement constituents or parking lot run-off. The nickel concentration (34 mg/kg) exceeded the 30 mg/kg SCO for protection of ecological resources but not human health or groundwater protection SCOs.

- Occurrences of soil contamination above SCOs were not detected in the other areas investigated. Exceedances of SCOs for aluminum, iron, magnesium and calcium detected in many samples are due to background conditions and do not represent environmental contamination.

- At all but two of the 21 locations sampled during the RI, chlorinated VOCs were found in sub-slab vapor beneath the AMSF building at concentrations which exceed guidance values established by the New York State Department of Health indicating that monitoring or mitigation of the potential for intrusion of contaminated soil vapor into buildings may be needed. In some areas of the building very low concentrations of the same compounds were detected in indoor air samples. None of the concentrations detected represented exceedances of the Health Department's indoor air quality guidelines that were in effect in April 2013 at the time the samples were collected. However, in August 2015 the NYSDOH lowered the air guideline concentration for TCE from 5 to 2 µg/m3, and TCE concentrations detected at two of the 16 locations sampled (2.58 µg/m3 at AM- SVIA4 and 2.26 µg/m3 at AM- SVIA6) exceed the new guideline. A duplicate of the AM- SVIA4 sample, in which TCE was not detected above a concentration of 1 µg/m3, did not exceed the new guideline.

- Sampling of soil vapor along the eastern boundary of the Site detected traces of PCE (concentrations of 1.8 to 33 micrograms per cubic meter, µg/m3) at three of the four locations sampled, and TCE (5.9 µg/m3) at one of those locations. Other chlorinated VOCs potentially associated with the groundwater contamination identified at the Site were not detected. Comparison of the results to NYSDOH indoor air guidelines using a generally accepted, conservative attenuation factor for predicting potential indoor air concentrations indicate that conditions at the downgradient boundary do not represent a potential risk of vapor intrusion in the buildings on adjacent properties to the east.

- Exceedances of groundwater standards for chlorinated VOCs were found at each well sampled during the RI, although the samples from AMSF-MW-28, located near the southeast corner of the Site, exhibited only a marginal exceedance for one constituent. The expanded network of shallow-bedrock wells installed during the RI in the AMSF building and along the downgradient, eastern side of the Site have provided the information needed to establish the nature and extent of the groundwater contamination at the Site. RI results confirmed that concentrations of 1,1,1-TCA and related daughter products are highest in the OU-1 area, with contamination extending beneath the building to the eastern side of the Site. Contamination by PCE and its daughter products is present at lower concentrations, with the highest levels found in the area of the former degreaser in AOC 1.

- The only occurrence of an exceedance of a groundwater quality standard for potential contaminants other than VOCs was a detection of 82 µg/L of lead in the June 2013 sample collected from AOC 6 / AOC 7 monitoring well AMSF-MW-26. The lead concentration in the September 2013 sample from that well was, however, below the TOGS standard of 25 µg/L. Exceedances of groundwater standards and guidance values for iron, magnesium, selenium and sodium that were detected at several other locations are due to background conditions present naturally in groundwater in the area.

- With one exception, semi-volatile organic compounds (SVOCs, which include PAHs) and pesticides and PCBs were not detected in Site groundwater samples. The one exception was a single detection of a trace of the SVOC caprolactam, for which there is no applicable groundwater standard.

Results of a qualitative assessment of the potential for exposure to the occurrences of contamination identified at the Site indicate that the potential for inhalation of VOCs present in sub-slab vapor is the primary potential human health exposure issue that will need to be addressed at the Site. As indicated above, the potential for soil vapor intrusion is an issue that impacts many sections of the AMSF building, including areas not associated with or adjacent to specific areas of concern. As in the RI Work Plan, the building-wide issue of the potential for soil vapor intrusion is designated as AOC 9.

An Alternatives Analysis evaluating remedial options for addressing the conditions indicated by the findings of the RI will be performed as the next step in the BCP remedial investigation program for the AMSF Site.

9.0 References

1. Remedial Investigation Work Plan, New York State Brownfield Cleanup Program, BCP Site #C828101, Former Alliance Metal Stamping & Fabrication, 12 Pixley Industrial Parkway, Town of Gates, Monroe County, New York. Stantec Consulting Services Inc., January 2012 revised.
2. Plan for the Second Phase of Remedial Investigation Drilling Activities, BCP Site #C828101 - Former Alliance Metal Stamping & Fabrication Facility, 12 Pixley Industrial Parkway, Town of Gates, Monroe County, New York. Stantec, February 21, 2013.
3. Work Plan for Remedial Investigation in Operable Unit 1, Brownfield Cleanup Program Site #C828101, Former Alliance Metal Stamping & Fabrication Facility , 12 Pixley Industrial Parkway, Town of Gates, Monroe County, New York. Stantec, December 13, 2013.
4. Work Plan for Supplemental Remedial Investigation, Brownfield Cleanup Program Site #C828101, Former Alliance Metal Stamping & Fabrication Facility , 12 Pixley Industrial Parkway, Town of Gates, Monroe County, New York. Stantec, March 27, 2015.
5. Supplemental Remedial Investigation Schedule and Scope, BCP Site #C828101, Former Alliance Metal Stamping & Fabrication Facility , 12 Pixley Industrial Parkway, Town of Gates, Monroe County, New York. Stantec, May 15, 2015, letter to T. Schneider, NYSDEC.
6. Sub-Slab Sample Results, Former ITT Rochester Form Machine and Surrounding Properties, Town of Gates, New York, Site #8-28-112: Figure 1 – Sample Locations; Figure 2 – Tetrachloroethene; and Figure 3 - 1,1,1-Trichloroethane. O'Brien & Gere Engineers, Inc., Draft (October 2009).
7. Remedial Investigation Report, Former ITT Rochester Form Machine Facility, Site # 8-28-112, Town of Gates, New York. O'Brien & Gere Engineers, Inc., April 11, 2014. (Copies of Figure 3-1 and Tables 5-1a, 5-4a, and 5-4b from this report are presented in Appendix K.)
8. 2013-2014 Vapor Intrusion Monitoring Sampling Results – December 5-6, 2013. O'Brien & Gere Engineers, Inc., and ITT Corporation, March 19, 2014, letter to D. Maguire. (A copy of this report is presented in Appendix K.)
9. Technical Guidance for Site Investigation and Remediation (DER-10), NYSDEC, May 2010.
10. NYSDEC's Commissioner Policy CP-51 Soil Cleanup Guidance, NYSDEC, October 21, 2010.
11. NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, NYSDOH, October 2006.