REPORT ON REMEDIAL INVESTIGATIONS & RECOMMENDED REMEDIAL ACTIONS TIOGA AVENUE PROPERTY BCP SITE #C851031 CORNING, NEW YORK

By:

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Rochester, New York

On behalf of:

Corning Property Management Corporation
and
Corning Incorporated

For:

New York State Department of Environmental Conservation
Avon, New York

File No. 33123-011
Revised 30 July 2010

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File No. 33123-011

New York State Department of Environmental Conservation
Region 8 Division of Environmental Remediation
6274 East Avon-Lima Road
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Attention: Gary Bonarski, P.E.

Subject: Report on Remedial Investigations & Recommended Remedial Actions
BCP Site #C851031/BCA Index #B8-0767-08-01
Tioga Avenue Property
Corning, New York

Dear Mr. Bonarski:

On behalf of Corning Property Management Corporation and Corning Incorporated (collectively referred to as Corning), Haley & Aldrich of New York (Haley & Aldrich) is submitting herewith the Remedial Investigations & Recommended Remedial Actions Report (RI Report) for the above referenced BCP Site. This document is submitted in accordance with the Brownfield Cleanup Agreement (BCA) for the Tioga Avenue Property, BCA Index #B8-0767-01/Site #C851031, between the New York State Department of Environmental Conservation (NYSDEC) and Corning.

The RI Report presents available information on the current and former land-use and geographic setting, environmental history, and geology and hydrology of the Site. This RI Report also presents a summary of previous intrusive and non-intrusive Site assessment activities as well as a more detailed summary of the recent remedial investigation (RI) activities. Recommendations for a remedial action program are warranted based on the results of the RI activities and are provided at the conclusion of this Report.

The RI Report has been developed in accordance with the NYSDEC (6 NYCRR) Part 375 Brownfield Cleanup Regulations dated December 2006, the draft "Technical Guidance for Site Investigation and Remediation" (DER-10 dated May 2010) and other relevant NYSDEC technical and administrative guidance.

This RI Report is updated and revised in accordance with the Department's letter of 25 June, 2010 that provided comments and questions on the 30 April 2010 draft of the RI Report.

We appreciate the Department's prompt review of this report and look forward to working with the Department as we now move into the remedial action and redevelopment phase of the Tioga Avenue BCP Property.

Sincerely yours,
HALEY & ALDRICH OF NEW YORK

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EXECUTIVE SUMMARY

Corning Property Management Corporation and Corning Incorporated (collectively referred to as "Corning") are planning for the future reuse and redevelopment of the Tioga Avenue Property that contained the former Corning Fall Brook manufacturing plant and related facilities located in the City of Corning, Steuben County, New York. With closure of manufacturing operations, Corning entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC or the Department) as a "participant" to investigate and, as necessary, to remediate any remaining contaminants on the Tioga Avenue Property. The goal of these actions is to facilitate the reuse and redevelopment of the property in ways that are protective of human health and the environment. Corning anticipates, and the BCA specifies, that future use of the Tioga Avenue property will be commercial or industrial or a mixture of those uses. A specific redevelopment plan for the Site has not emerged as of the date of this report.

This report provides the results of the Remedial Investigation (RI) program for the Site. Corning has undertaken this program consistent with the applicable NYSDEC Brownfield Cleanup Program (BCP) regulations and related guidance documents, and most notably the guidance criteria in NYSDEC DER-10, Draft Technical Guidance for Site Investigation and Remediation. The investigation was performed in accordance with the Remedial Investigation Work Plan (RIWP) dated April 2009 that was reviewed and approved verbally on September 24, 2009 and in writing on September 28, 2009 by the NYSDEC in conjunction with the New York State Department of Health (NYSDOH). The review process included public notification and document availability consistent with the Citizen Participation Plan (CPP) for this BCA Site. The investigations included a comprehensive sampling program designed to characterize soil/fill and groundwater across the Site involving both targeted investigations of specific "areas of concern" (AOCs) as well as systematic characterization of historic fill material that is present across the Site. Delineation of AOCs was facilitated by the Environmental Site Assessment (July 2007) activities and related information as contained in the Corning BCA application and which are described in the RIWP. The Remedial Investigation (RI) program was implemented with the oversight of NYSDEC.

Property History and Current Condition

The BCA "Site" consists of the "Tioga Avenue Property" which contained the former Fall Brook glass manufacturing plant, the General Machine Shop, the Pilot Plant, and related facilities. The Site occupies 14.18 acres of now undeveloped property located at the contiguous addresses of 213, 219, and 239 East Tioga Avenue within the City limits. The Site is situated along the north side of East Tioga Avenue between Steuben Street to the east and Chemung Street to the west. The northern Site boundary is formed by railroad and flood control easements that isolate the Site from the Chemung River. The Site is situated within an area of mixed residential, commercial and industrial development which includes the operating World Kitchen LLC (World Kitchen) glass manufacturing facility that is contiguous with the northeastern boundary of the Site. Storm water on the property is controlled by the existing buried piping system that conveys surface water to the City sewer system or to the Corning waste water treatment plant which is operated under a State Pollution Discharge Elimination System (SPDES) Permit #0003981 administered by the NYSDEC.

The BCA property has a history of at least 148 years of manufacturing and industrial activity recently by Corning and previously by other parties unrelated to Corning. The Blossburg and Corning Railroad Company acquired the property in 1854 and actively used the Site to support the transportation of coal.

Remnants of the former rail use appear evident from the recent remedial investigations. The historic fill on the property is comprised of materials that are in large part coal-derived. Corning subsequently manufactured glass on the property from the late 1920's until 2002 when the Fall Brook plant was closed. Corning's operations on the property included approximately 400,000 square feet of space in seven main buildings with associated infrastructure that fully occupied the Site. The Fall Brook facility decommissioning and demolition started in late 2006 and finished in 2007 under NYSDEC oversight. Copies of these activities are documented in records that have been provided to the Department.

Most of the buildings and support structures on the Fall Brook property were demolished to ground surface except for certain small storage buildings and other facilities associated with the operating waste water treatment plant (e.g. equalization tank and associated water conveyances). In addition, World Kitchen uses portions of Corning property to facilitate the ongoing operations of the World Kitchen plant. Such uses are mostly located in the northeast area of the BCP Site next to the World Kitchen plant including the new batch house, the associated rail spur, materials storage areas (mostly for cullet storage), access ways to the World Kitchen property from adjacent streets, and other supporting infrastructure.

Currently access to the BCA Site is secured by perimeter fencing that surrounds the property except for an asphalt covered parking area with an office trailer situated in the southeast corner of the Site at the intersection of Tioga Avenue and Steuben Street. Otherwise, the property is almost completely covered by impervious surfaces following the demolition project including concrete building slabs and asphalt paving and referred to herein as "ground cover or cap". All of these surfaces were thoroughly cleaned in the final stages of the demolition project as described in the project documentation. A relatively small amount of the existing ground surface on the Site is not covered with a hard surface which encompasses a narrow strip of landscaping (grass) situated within the Site fence line between the former manufacturing buildings and Tioga Avenue.

Remedial Investigation Program Scope

The investigation program for the Tioga Avenue Property was conducted in accordance with the RIWP to identify if "contaminants" are present on the property as defined in the BCP regulations. The RIWP provides a description and analysis of the AOCs identified on the BCA Site based on Site historical documentation and on results of pre-BCA "Site characterization" investigations on the property. This information enabled development of an exploration program to further and more fully evaluate the AOCs identified as containing substances of potential concern and to refine the Site conceptual model. The RIWP was reviewed with the NYSDEC and NYSDOH and the final RIWP reflects the comments and suggestions of those agencies which, after agency approval, was offered for public review and comment in accordance with the CPP.

The investigation process has involved a high density of soil and groundwater sampling points focused in the AOCs as described in the RIWP as well as at systematic closely-spaced locations (100 foot or less on center) across the property. Systematic soil/fill sampling was performed with the primary objective to further assess the nature and extent of historic fill material that is present on the Site. Additional samples, not anticipated in the RIWP, were collected and reviewed on an on-going basis with the Department during the investigation program. These additional samples were collected based on observations during the field work such as noticeable odors, staining or readings on field instruments and were mostly obtained in a portion of the Site where petroleum impacted soils are present. Groundwater sampling was performed from wells on all sides of the property to determine groundwater

depth, flow direction, and quality. In total approximately 212 soil samples and 19 groundwater samples were collected at 99 boring locations and 13 monitoring well locations.

Based on historical Site use, the soil and groundwater investigations focused on the organic and inorganic constituents known or suspected to be associated with the Site referred to as "Site-related" parameters, as well as for an "expanded" and much broader suite of substances irrespective of any known or reasonably expected use on the Site. These parameter lists are presented in the approved RIWP. The expanded parameter list was analyzed to provide the data necessary to verify the presence or absence of these substances on the property. The "Site-related" parameters included the class of compounds or individual constituents that could be present in most any historic fill (as defined by applicable regulations) or otherwise could be present associated with the historical and/or the railroad operations on the Site and included: petroleum hydrocarbon compounds, polynuclear aromatic hydrocarbons (PAHs), and the primary inorganic/metallic substances that were formerly used in glass manufacturing on the Site (antimony, arsenic, barium, cadmium and lead). All of the analytical data were collected, analyzed and validated in accordance with the approved Quality Assurance/Quality Control Program in the RIWP.

The significance of the investigation data obtained was evaluated in accordance with the applicable NYSDEC BCP regulations contained in 6 NYCRR Part 375. For soil and historic fill samples, results were compared to the risk-based Soil Cleanup Objectives (SCOs) as specified under Subpart 375-6 of the regulations assuming the future land use will be restricted to commercial and/or industrial development. However, for purposes of the RI program, the evaluation criteria defaulted to the lower of the SCOs (commercial being the most restrictive) in assessing the significance of the data. The significance of the groundwater results were screened against the New York State drinking water standards and criteria found in NYSDEC's "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations", dated June 1998. This comparison represents a conservative screening level analysis given lack of any actual use of Site groundwater for potable purposes.

To facilitate evaluation of the large data set for the Tioga Avenue Site RI Program, an overall summary of the sample analytical results is provided in Table V of the accompanying report text which contains a breakdown of total number of samples by media, the number of sample detections, the percentage of detections, and basis of evaluation of the significance of the detections.

Remedial Investigation Results

Results of the Site characterization and investigation program for the Site have enabled development of the following Site Conceptual Model:

Site Hydrogeology - Subsurface conditions on the Tioga Avenue Property generally consist of a mixture of fill materials placed over a long period of Site use. This material can be described as historic fill. Investigations performed indicate the historic fill to be characterized as reworked soil intermixed with various materials including coal derived materials (dust, ash and coal pieces), brick and other debris. The depth of this material ranges across the Site up to 14 feet in thickness below ground surface, (with the exception of one boring location B249-MW where upwards of 20 feet of historic fill was encountered).

The fill material is underlain by alluvial materials comprised of sand and gravel deposits that are more than 70 feet deep. The alluvial materials that underlie the Site have characteristics similar to those of the Chemung River Valley regional groundwater aquifer. Well

measurements on the Tioga Avenue Property indicate depth to water ranging from 17 to 25 feet BGS. Groundwater at the Tioga Avenue Property generally flows in a west to east direction consistent with natural flow conditions within the Chemung River Valley. We understand that groundwater is being extracted for industrial use by Corning and by World Kitchen that may locally influence groundwater flow conditions.

Soil Conditions – Sampling performed indicates the presence of certain inorganic contaminants in excess of the SCOs established for commercial or industrial property. Sampling of historic fill material on the Site indicates the presence of arsenic and, to a lesser degree, lead at concentrations exceeding SCOs. Arsenic was detected at concentrations above SCOs in 31 of 182 samples. Lead was detected above SCOs in 7 of 182 samples. In addition, there were single detections of both mercury and copper reported in samples higher than SCOs. Analysis of the halogenated and non-halogenated organic parameters were reported as either non-detect or at levels below the relevant SCOs with two exceptions. Only benzo(a)pyrene and trimethylbenzene were detected at two locations within the historic fill at levels slightly higher than the SCOs. There were no detections of any of these elements or compounds above SCOs in non-fill (natural) soils below the historic fill.

The sampling program included extensive analysis of historic fill from within AOCs 6, 7 and 8 where bulk above and below ground tanks of fuel oil and to a lesser extent gasoline products were in use in the past. Investigations in these areas indicated the presence of residual petroleum substances with staining and odors observed during drilling. When analyzed, representative impacted samples lacked the presence of any detectable levels of petroleum constituents. Despite these results, it is likely that residual weathered petroleum substances remain in this area of the Site most likely related to past storage/use activities.

Groundwater Conditions – Groundwater samples have been collected Site-wide and analyzed for expanded parameters in accordance with the RIWP. Inorganic analyses indicate the detection of certain naturally occurring metals above criteria in wells that are located both on the up-gradient and down-gradient peripheries of the Site including: aluminum, iron, manganese, selenium, and sodium. In addition, antimony was also detected at 2 of 13 well locations at levels slightly higher than the analytical detection limit and ground water standard. All of these inorganic analyte detections are indicative of the levels these metals are naturally present within the soil strata and which sediments/silt become entrained in ground waters during sampling, or which have higher solubility and could be dissolved in groundwater such as is likely the case with sodium. There were no organic compounds detected higher than comparison criteria in any of the water samples except for an isolated detection of isopropylbenzene reported in two samples at levels slightly higher than drinking water standards. These samples were collected at locations within and down-gradient of AOCs 6, 7 and 8 where petroleum substances were observed in subsurface soil/fill. Except for isopropylbenzene, there is little evidence that groundwater is adversely affected by petroleum constituents related to the former operations on the Site.

Qualitative Human Health Exposure Assessment – A Qualitative Human Health Exposure Assessment (QHHEA) was performed based on the investigation information for this Site in accordance with NYSDEC and NYSDOH guidelines as identified in the RIWP. The assessment evaluates whether any of the substances of concern identified on the Site could present a pathway of human exposure and the extent to which such exposure could present unacceptable risk. The QHHEA analysis is driven by the historical fill on the Site and presence of certain

heavy metal substances detected sporadically in this material, primarily arsenic. These substances were detected at random locations in the historic fill and are not indicative of any specific release/spill points on the Site nor have they caused any adverse impact to groundwater. Moreover, the presence of arsenic (and to a lesser extent, other detected substances) only in fill below the existing ground cover (floor slabs) further indicates that the historic fill pre-dates the Fall Brook plant operation.

The main conclusions of the QHHEA are that: 1) the SCO for arsenic defaults to the calculated risk-derived value even though this substance could be present naturally or as "background" at higher levels; 2) theoretical potential risk may exist from direct contact with the historic fill (ingestion or inhalation) that may contain a substance above SCOs regardless of the origin of that fill/substance; 3) direct contact with historic fill could constitute exposure; 4) currently, the potential for human exposure to historic fill is precluded because the Site is capped and secured from any unauthorized entry; 5) there is no potential for exposure to groundwater by ingestion lacking any potable use of that resource on the Site; and 6) any other pathway (dermal contact or inhalation) is inconsequential based on the groundwater detections at the Site. The QHHEA also considers the presence of apparent petroleum substances in subsurface soil on a portion of the Site. From an exposure perspective, these conditions represent a "nuisance" condition in the absence of any petroleum constituent detections and similarly there is no current exposure pathway.

Remedial Investigation Conclusions

This RI Report documents environmental conditions on the former Fall Brook property BCA Site in fulfillment of the scope and objectives of the RIWP. In accordance with ECL 27-1411(1) and 6 NYCRR 375-1.6, and as required by Section II C. of the BCA for this Site, this RI Report supports the following conclusions:

- Significant remedial investigations have been performed on the Tioga Avenue Property BCP Site in 2007 and 2009. No further remedial investigations are necessary or warranted on the Site to complete the RI process.
- The nature and extent of contamination associated with the Site has been defined in accordance with the RIWP objectives.
- Source areas as defined by the BCP have not been identified on the Site.
- The Site contains historic fill material as defined by the 6 NYCRR Part 375 regulations that is broadly distributed on the property. Some of the historic fill samples contain certain elements higher than the SCOs for commercial property. These elements were detected sporadically at random locations on the Site. In addition, some of the historic fill material contains apparent petroleum residues that, except for one low level value, do not exceed any chemical specific SCO, but may present some future "nuisance" condition, most notably odors.
- Groundwater has been extensively sampled on the Site for the "expanded parameters" and determined not to be significantly affected by past Site operations given the overall lack of detections of these substances higher than comparison criteria. A single petroleum-derived compound (isopropylbenzene) was the only organic compound detected on the Site above

the comparison criteria and this compound was detected only slightly above the NYS Drinking Water Standards. This detection was only present in two of thirteen wells on the Site.

- Several other organic substances were detected during the two groundwater sampling events (2007 and 2009) most of which were below the laboratory practical quantitation limit (thus only estimated) and all of which were below the Drinking Water Standards. These low detections were all reported in monitoring wells that are both up-gradient and down-gradient of the Site and indicative of the ambient groundwater quality conditions in the general area of the Site.

- Certain inorganic substances have been detected in groundwater above the Drinking Water Standards. Except for antimony, all of these elements were detected in monitoring wells that are both up-gradient and down-gradient of the Site and indicative of the ambient groundwater quality conditions in the general area of the Site. All of the inorganic substances detected are naturally occurring elements in soil and are frequently detected in groundwater samples because of the presence of low levels sediment/silt in groundwater samples and very low limits of analytical detection. The limited antimony detections stand out because the comparison criterion for this substance is set at a low level compared to other elements that have comparable or higher natural abundance.

- Exposure to historic fill is currently precluded by existing access controls and ground cover on the property that effectively "caps" the Site. Stormwater on the property is collected, treated, monitored and discharged from the Site under a NYSDEC SPDES permit.

- Ground water is not used for potable purposes on the Site.

The Remedial Investigations were performed to identify if contaminants are present on the Site that present the potential for adverse affect on human health or the environment in the context of a planned future commercial and/or industrial development of the Tioga Avenue Property. The RI Program was performed with agency approval and oversight following the RIWP, DER-10 and other applicable guidance of the NYSDEC and NYSDOH. Based on the RI Program conclusions stated above, it is our opinion that remedial actions will be warranted during future use and redevelopment of Tioga Avenue Property.

Remedial Action Recommendations

The remedial investigation results indicate that remedial action is warranted to mitigate the potential for exposure to contaminants that could be associated with future commercial and/or industrial development of the Site. Consistent with the BCP, it is reasonable and appropriate to conclude that the potential future risk presented by exposure to historic fill or nuisance conditions can be remediated during and after future Site development by institutional controls and engineering controls memorialized in an environmental easement for the Site. The RI Program has produced a sufficient quantity and quality of data to support development of a Remedial Work Plan as appropriate for future use and development of the Site.

Consistent with Section II.A.2. of the BCA, Corning plans to submit an "Alternatives Analysis Report" and "Remedial Action Work Plan" for the Tioga Avenue Site detailing the scope and implementation process for the proposed institutional and engineering controls for the Site. The institutional controls

will include a restriction on the future Site use to commercial or industrial uses consistent with the BCA, and a restriction on any future potable use of groundwater on the Site. The engineering control will entail the use and maintenance of cover systems as approved by NYSDEC. An environmental easement will be executed for the Site to ensure that these institutional and engineering controls remain in place.

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1. INTRODUCTION

Corning Property Management Corporation and Corning Incorporated (collectively referred to in this document as "Corning") have entered into a Brownfield Site Cleanup Agreement (BCA), Index #B8-0767-08-01/Site #C851031, with the New York State Department of Environmental Conservation (NYSDEC) in consultation with the New York State Department of Health (NYSDOH) for the real property located at 213, 219, and 239 East Tioga Avenue in the City of Corning, Steuben County, New York as shown on Figure 1. This property is owned and was used by Corning to support the former Fall Brook glass manufacturing plant, the General Machine Shop, Pilot Plants and related facilities. Historically this property was owned and used by other entities unaffiliated with Corning for various railroad operations and maintenance facilities. This property is referred to as the Tioga Avenue Property or the "Site".

Corning completed the process of closure of the Fall Brook facility and demolition of the manufacturing buildings on the Site in 2007 under NYSDEC oversight including removal of structures to grade and securing the Site. A timeline of activities is summarized below. With the closure and removal of the former manufacturing facilities, Corning is planning to reuse and redevelop the Site under the Brownfield Cleanup Program (BCP) as a "participant" to investigate and to remediate any "contaminants" on the Tioga Avenue Site, as necessary, for protection of public health and the environment. Corning anticipates, and the Site BCA specifies, that future use of the Tioga Avenue Property will be commercial, industrial or a mixture of those uses. As of this report date, the Site is mostly vacant and a specific redevelopment plan for the Site has not emerged.

1.1 Remedial Investigation Purpose and Objectives

Consistent with the BCA and applicable regulations, the Remedial Investigation activities as documented in this report were undertaken with the overall goal to facilitate the reuse and redevelopment of the property in ways that are protective of human health and the environment. To achieve this goal the Remedial Investigations was performed in fulfillment of the following BCP objectives:

- To define the nature and extent of contamination on the Site.
- To identify if contaminant source areas are present on the Site.
- To determine whether remedial action is needed for protecting of human health and the environment.
- To produce data of sufficient quantity and quality to support the development of an acceptable Remedial Work Plan.

1.2 Regulatory Framework & Timeline

This Report on Remedial Investigation & Recommended Remedial Action (RI Report) presents the Site investigation results and has been prepared in accordance with the following primary documents:

- the Remedial Investigation Work Plan – Tioga Avenue Site (as revised April 2009) and approved by the NYSDEC in consultation with the NYSDOH,
- NYSDEC (6 NYCRR) Part 375 Brownfield Cleanup Regulations dated December 2006,
- "Technical Guidance for site Investigation and Remediation" (Draft DER-10 dated December 2002), and

- other relevant NYSDEC technical and administrative guidance for site investigation and characterization.

Implementation of Remedial Investigation (RI) Program included public notification and document availability consistent with the approved Citizen Participation Plan (CPP) in accordance with regulatory requirements and CPP requirements. The RI Program field investigations were implemented with the oversight of NYSDEC between the time period of October through November 2009

As a basis for the information provided herein, the following is a summary of activities associated with the site environmental assessment, investigation and facility closure process for the site:

- Mid - 2006 Initiate Environmental Site Assessment (ESA)
- Late - 2006 Initiate Decommissioning and Demolition
- Mid 2007 Complete Decommissioning and Demolition
- July 2007 BCP Application (including finalized ESA Report)
- September-October 2007 Undertake Phase II ESA Investigations
- November 2007 BCP Application Accepted by NYSDEC
- April 2008 Corning Executes (signs and submits) BCA with Clarifications/Revisions Reviewed with NYSDEC
- September 2008 NYSDEC Executes (signs) BCA
- October 2008 BCP Remedial Investigation Work Plan (RIWP) Submitted to NYSDEC
- February 2009 NYSDEC Comments on RIWP
- March 2009 Corning Meets with NYSDEC and NYSDOH to Review RIWP Comments
- April 2009 Revised RIWP Submitted & Approved by NYSDEC
- August 2009 NYSDEC Comments on Revised RIWP
- September 2009 RIWP and Addendum Approved by NYSDEC and NYSDOH
- September-November 2009 Undertake Remedial Investigation Field Investigations

As indicated in the RIWP, this RI Report provides a comprehensive analysis of all the Site data. The RI Report incorporates the ESA information, the Phase II ESA (subsurface investigation) findings along with the most recent RI results. Between the Phase II ESA and RI, significant subsurface exploration and a broad suite of analysis of soil and groundwater samples has been undertaken at the Site to meet the overall RI objectives of identifying and characterizing the nature and extent of Site conditions, and deriving conclusions and the need and scope for environmental actions at the site.

1.3 BCP RI Report Content

Based on the assessments and investigations, including the recent RI completed under NYSDEC oversight and in accordance with the approved RIWP, this RI addresses the DER-10 requirements of: identification/characterization of contaminant sources (including attributes such as amount, concentration, fate and transport, etc), hydrogeologic factors, potential human or environmental exposure routes and sensitive receptors (if present). This report also presents the recommended Site remedy based on the finding and conclusions of Site investigations and considering the current, intended, and reasonably anticipated land use of the Site.

Specifically, this RI Report provides an overview of environmental conditions as currently known on the Site as set forth in the approved RIWP and which address DER-10 requirements. The RI Report content provides the following information:

- Relevant information from existing environmental reports and the institutional knowledge of Corning personnel familiar with the former manufacturing operations on the Site; various historical records on the prior railroad operations; and recently and previously conducted intrusive and non-intrusive Site investigations.
- Technical overview and findings from the RIWP, including a discussion of data reliability and usability.
- Site cleanup objectives, including summary tables (with locations, media, depth, etc.) and discussion of analytical results compared to the BCP Soil Cleanup Objectives (SCOs) and the New York State Ground Water Standards (collectively referred to as the "comparison criteria".
- Investigation field logs (including soil descriptions, well installations, etc.), subsurface condition summaries (including stratigraphic cross sections).
- Site base mapping, supporting figures presenting sampling results/data, groundwater contour mapping.
- Qualitative Human Health Exposure Assessment summary and discussion prepared in accordance with applicable NYSDOH Guidance.
- Conclusions and recommendations, including a conceptual Site model summary.

The following sections of this document provide the details of the BCP RI program.

Section 2 of the RI Report presents the property use information and project background, which includes a Site description, historical use summary, physical and environmental setting, and summary of previous investigations. This information provides a basis for the investigation process including identification of the potential "Areas of Concern" (AOCs) on the Site and the focus for the RI program.

The Site use and setting information presented in Section 2 was used to refine the investigation objectives and scope as detailed in Section 3. Section 3 describes the methods employed in characterizing Site conditions and verifying contaminant presence or absence on the Site.

Section 4 presents the results of the RI subsurface investigation activities, including laboratory analyses, and quality assurance/quality control protocols used in collection and analysis of investigation samples. Extensive Site sampling data were obtained during the RI process. The data are summarized in a series of tables and figures relative to the established comparison criteria under the BCP.

Section 5 of the RI Report presents the Conceptual Site Model which documents the nature and extent of contamination on the Site. Based on these findings, Section 5 also contains results of a Site-specific Qualitative Human Health Exposure Assessment evaluating the data set in the context of human health exposure and risk.

Section 6 presents the overall findings and conclusions, including a summary of the recommended remedy to address issues identified during the RI.

References used in assessment of this Site and for development of this Report are identified in the Bibliography presented at the end of the Report text.

2. SITE DESCRIPTION AND HISTORY

2.1 Site Description

The Site comprises 14.18 acres of property located within the City of Corning, Steuben County, New York being generally situated along the north side of East Tioga Avenue between Steuben Street to the east and Chemung Street to the west. The Site location is shown on Figure 1. The northern Site boundary is formed by railroad and flood control levee easements that isolate the Site from the Chemung River. The Tioga Avenue Site contained the former Corning Fall Brook glass manufacturing plant, General Machine Shop, Pilot Plants and related support facilities, the demolition of which was completed in 2007 in accordance with the City of Corning demolition permit and with oversight of the NYSDEC. Documentation for the planning and execution of the demolition project is contained in reports and related documentation materials that have been provided to the NYSDEC and the NYSDOH. The property boundary and former manufacturing facility layout is shown on Figure 2.

Prior to Corning Fall Brook and other Site facilities closure and decommissioning, the Site contained approximately 400,000 square feet of space in seven main buildings. These buildings included the former main glass manufacturing facility and associated warehouse and batch material storage areas, various trades shops (the mason, platinum and fabrication shops and central trades pilot plants), and the general machine shop (GMS). Glass manufacturing activities were discontinued in the Fall of 2002 but operation of the central trades (including the platinum shop), the mason shop, and batch material storage (mix house), continued until facility decommissioning that started in late 2006. All of these pre-existing buildings and support structures have been demolished to ground surface except for certain small storage buildings maintained by Corning as well as other "non-Corning" support structures and certain existing infrastructure associated with the neighboring manufacturing facility as further described below.

BCP Property Boundary

The Tioga Avenue Site subject to the BCA is 14.18 acres in size, as described above. The Site boundary is shown on Figures 2 and 3 relative to the former and current site layout. The Tioga Avenue Site is contiguous with property owned by World Kitchen LLC (World Kitchen) and unaffiliated with Corning. The World Kitchen LLC facility is an active manufacturing operation producing consumer glassware products and uses/occupies portions of the Site for its operations. Such uses are mostly located in the northeast area of the BCP Site next to the World Kitchen plant including the new batch house, the associated rail spur, housed and un-housed materials storage areas (mostly for cullet storage), access ways to the World Kitchen from adjacent streets, and other supporting infrastructure. These facilities are generally shown on Figures 2 and 3.

A portion of the World Kitchen property houses the former wastewater treatment plant (WWTP) that remains in operation by Corning for treatment of stormwater from the former Fall Brook and related facilities areas that currently comprise the Tioga Avenue Property BCA Site. The WWTP is operated in accordance with the State Pollution Discharge Elimination System (SPDES) Permit #NY-0003981 maintained by Corning with the NYSDEC, Division of Water. Corning formerly used the WWTP for treatment of process waste water and storm water related to the former manufacturing operations. With closure of the manufacturing activities, the WWTP and SPDES permit are now maintained to treat only stormwater from the Tioga Avenue Property BCA Site. Future disposition of the WWTP and the Corning SPDES permit withdrawal will be coordinated with the Division of Water. Corning has been

engaged with the Division of Water on the status of the WWTP operations and has kept the Division of Water updated on future plans under the BCA. Cessation of the current stormwater controls and WWTP will be conducted pursuant to the applicable NYSDEC requirements and purview of the Division of Water.

The WWTP is not part of the Site or BCP RI Work Plan based on the BCA determination letter from NYSDEC dated November 2007 wherein the Department has determined that the WWTP parcel does not meet the definition of a "brownfield Site" as there is "no reasonable basis to believe that contamination is likely to be present on this parcel or that contamination or the potential presence of contamination is complicating the redevelopment or reuse of this parcel". Accordingly, the RI and RI Report are focused on the 14.18-acre Tioga Avenue Site, as shown on the figures in this report.

Current Conditions

Currently the Site is generally level, largely covered by impervious surfaces including concrete floor slabs and asphalt paving remaining after the buildings were razed. Access to the Site is secured by perimeter fencing. The Site is largely vacant and unused except for small storage buildings, a well house, certain facilities associated with the WWTP (notably the equalization tank and pump house), as well as the areas and structures used by World Kitchen to support its operations as described above. The fencing nearly surrounds the entire property except for an asphalt covered parking area with an office trailer situated in the southeast corner of the Site at the intersection of Tioga Avenue and Steuben Street. All of the impervious concrete/asphalt surfaces were thoroughly cleaned in the final stages of the demolition project. A relatively small amount of the existing ground surface on the Site is not covered with a hard surface which encompasses a narrow strip of landscaping (grass) situated within the Site fence line between the former manufacturing buildings and Tioga Avenue.

2.2 Land Use, Zoning and Development Plans

The Site is located in an urban area of mixed industrial, commercial, residential and recreational land use at the edge of the City of Corning's central business district. The Tioga Avenue Property is currently zoned for industrial use. A narrow strip of Corning property separates the northern Site boundary from the Chemung River, and a railroad easement, electrical utility easement, and flood control embankment are present on that property creating a physical separation between the Site and the Chemung River as shown on Figure 2. A buried pipe through the easement serves as the SPDES-permitted outlet for treated stormwater from the Site via the WWTP described above.

The World Kitchen LLC property described above is located adjacent to the northeast corner of the Site. A combination of parking lots (for the World Kitchen facility and the former Fall Brook plant), vacant land, and one residential property are located on the east side of Steuben Street east of the Site, beyond which are located private residential properties. Commercial and residential properties are located to the southeast of the Site, and a City park (Denison Park) is located two blocks to the southeast of the southeast corner of the Site.

Residential apartment properties and the Corning Civic Center buildings are located south of Tioga Avenue south of the Site, and the Corning Hospital and a mixed residential and commercial area are located in the next blocks south. The Steuben County Convention and Conference Center is located in the block west of the southwest corner of the Tioga Avenue Site, beyond which is the east end of the Market Street commercial district.

Consistent with the BCA, future development of the site is planned to be commercial and/or industrial in nature, however, the specific Site redevelopment plans have not emerged as of the date of this RI Report.

2.3 Geologic Setting, Groundwater and Surface Water Resources

2.3.1 Geologic Setting

The Site is essentially flat, with an average ground surface elevation of approximately 924 feet above sea level. The topography in the area of the Site is also shown on Figure 1.

The Site is located in a river valley formed within the Allegheny Plateau. The valley was a pre-glacial stream course that was broadened and deepened during advance and retreat of glaciers. The glacial influence resulted in a thick but variable sequence of glacial till and post-glacial alluvium and lacustrine deposits overlying bedrock. Anthropogenic fill soils commonly overlie the natural soil deposits in areas with historic development or disturbances such as are present on the Site.

Subsurface conditions on the Site have been defined by explorations on the Site to depths up to 72 feet below ground surface and conditions below that depth are inferred from the geologic reports referenced in this report. There are only two stratigraphic units identified during the RI explorations comprised of historic soil fill of varying composition that is underlain by a sand and gravel deposit that are uniformly present across the Site. Based on the explorations performed during the RI Program, these stratigraphic units are more fully described as follows:

- The historic fill material is described as a mixture of granular soil with varying amounts of ash-like material, cinders, brick and other debris. The ash like material observed varies in color from gray to black derived from coal use and/or combustion. This fill was encountered at depths ranging from 0.5 to 14 feet below ground surface (with the exception of one boring location B249-MW where upwards of 20 feet of historic fill was encountered).

- The underlying alluvium is naturally occurring consisting of undisturbed poorly-graded to well-graded sand with varying amounts of gravel and relatively low percentage of silt. The alluvium was not fully penetrated by any of the explorations during this investigation. As indicated in the RIWP, an assessment of any confining clay deposits interbedded or underlying the alluvium at the Site was completed in the soil borings; no clay layers or units were encountered during the Site RI boring program.

Background information reports (Ground Water Associates, 1984 and USGS, 1982) indicate the soil deposits with a thickness of least 70 feet to 100 feet below ground surface are present locally and regionally and that bedrock is present at depths up to or exceeding 100 feet below ground surface During the 2009 RI, select monitoring wells were advanced to deeper intervals (up to 70 feet below ground surface) and bedrock was not encountered. Figures 3 and 4 present the subsurface exploration locations and associated cross-sections of the subsurface materials encountered in the recent soil test borings and monitoring well installations conducted on the property by Haley & Aldrich; Appendix A contains test boring logs and well installation reports for these explorations.

2.3.2 Hydrogeology and Groundwater Resources

The alluvial sand and gravel deposits that underlie the Site and surrounding Corning area form a regional groundwater aquifer (Corning Primary Water Supply Aquifer as indentified in NYSDEC Technical and Guidance Series (TOG) 2.1.3) that is used as a source of potable water. Corning City municipal water supply wells are located within one-half mile of the Site and extract groundwater from this aquifer.

Proximate to the Site, water supply wells in the alluvial aquifer remain in use, including one present on the Site and other wells present on the adjacent World Kitchen property. The wells are reported to be screened from approximately 60 to 70 feet below grade. The Site well provides supply of make-up water to the adjacent WWTP the location of which is shown at the small "well house" in eastern end of the Site. The adjoining World Kitchen wells are operational and used in its manufacturing processes.

Water level measurements obtained in October 2007 and November 2009 at the Site monitoring wells indicate groundwater ranges (seasonally and/or spatially) approximately 17 to 25 feet below ground surface. Site groundwater elevations are relatively uniform (i.e., less than one foot of variability across Site in most recent measurement event) and the water level data indicate groundwater flow beneath the Site is generally toward the east at a relatively low gradient. Groundwater contours for November 2009 water levels are provided on Figure 4. No appreciable difference in groundwater elevations were identified during the RI Program in the deeper well intervals compared to the shallow. This condition indicates the presence of a deep unconfined water bearing unit consistent with what the hydraulic records indicate is present in this area.

Regional groundwater flow in the vicinity of the Site is generally toward the east consistent with the regional flow direction of the Chemung River sand and gravel aquifer. Locally, flow direction may be influenced by groundwater extraction from high capacity industrial production wells located on the World Kitchen property as well as the production well on the Site property (see groundwater contours on Figure 5). Variation in groundwater level can be expected to occur as a result of seasonal differences and/or fluctuation in the level of the Chemung River, which is known to vary by several feet.

2.3.3 Surface Water Resources

No surface water bodies exist on the Site. The ground surface is nearly covered in its entirety with an impervious cover (concrete slabs or asphalt). Surface water runoff from precipitation at the Site is controlled by the existing buried piping system that conveys surface water to the City or to the Corning waste water treatment plant which is operated under a State Pollution Discharge Elimination System (SPDES) permit administered by the NYDEC (see Section 2.1 for additional discussion of the WWTP).

2.4 Site History

A detailed assessment of the history and use of the Site was prepared as documented in the Haley & Aldrich ESA (July 2007), previously submitted to the NYSDEC as a component of the Corning BCP Application. The discussion below provides an overview of the Site history information presented in

the ESA and used as a basis for development of the RI Program. The ESA can be referenced for more detailed Site history and related environmental information including copies of the referenced information sources.

The Site information in the ESA includes the site history summary based on the information sources as specified in DER-10 (Appendix 3A, Records Search Requirements); production and industrial property use information; ownership research information; description of raw materials or wastes used, generated and/or stored; locations of storage, tanks or container areas; aerial photographs; public environmental records or databases on permits and related compliance records; identification of potential fill areas; Site reconnaissance; and interviews with persons knowledgeable of Site history and conditions. The ESA was utilized to develop the subsequent Site investigations and a basis for the sampling and analytical plan in the approved RIWP.

2.4.1 General Site Use

Railroad Site Use (1850s – 1929)

The history records reviewed indicate that development on the Site dates to at least the 1850s and probably before that time. These records indicate that the property was acquired by the Blossburg and Corning Railroad in 1854 and used primarily for the transportation of coal. It is documented in "*History of the Corning Painted Post Area*" (Dimitroff and Janes, as revised 1991) that the Blossburg and Corning rail system had established its rail transportation center in Corning in 1859 and that its machine shops had been established in 1862 on parts of what is now the BCP Site. An 1873 Steuben County Atlas indicates that the Blossburg and Corning Rail Road repair shops and roundhouse occupied the Tioga Avenue Site at that time and were situated in the eastern portion of the Site. Sanborn maps indicate that railroad operations and roundhouse, engine house, and machine shop structures were present on Site at least through 1921. Remnants of former railroad maintenance structures were evident during recent manufacturing facilities decommissioning being generally situated in the eastern part of the Site in the area of the Batch Material and Mix House facilities.

History records indicate that the Blossburg system was reorganized under the Fall Brook Coal Company in the late 1860s and was renamed the Fall Brook Railroad Company in 1892 before ultimately becoming part of the New York Central Railroad in 1899. Title records indicate that Corning Glass Works purchased the property from the New York Central Railroad Company in 1929.

Corning Site Use (1929 - present)

The Sanborn map for 1930 indicates that a Corning Glass Works manufacturing plant was present at that time. Some of the buildings that had been part of the railroad company facility were used for the Corning Glass Works manufacturing plant. These included the buildings that became the cullet storage, batch material storage, and Fall Brook mix buildings that were grouped together at the east end of the Site. The original, eastern portion of the glass manufacturing plant building, located just to the west of the cullet storage, batch material storage, and Fall Brook mix buildings, was also present on Site by 1930.

Various additions to the plant were constructed after 1930. The General Machine Shop (GMS), which was located on the west side of the Site, was constructed in approximately 1951. The

GMS, Central Trades, and Mason Shop buildings located in the western end of the Site housed large shops for general machining and milling of manufacturing tools, manufacturing-tool fabrication, and related activities and trades such as masonry and carpentry that supported Corning's local manufacturing operations. Glass manufacturing activities ceased in the Fall of 2002 with certain of the smaller support operations (such as the Platinum and Mason Shops) remaining in operation as late as 2007. The entire Fall Brook plant and almost all related facilities were removed during the building demolition project completed in 2007. Currently the Site is mostly vacant pending redevelopment.

The wastewater treatment plant (WWTP) located on the World Kitchen property was constructed in the late1960s, with a second WWTP building added in the 1980s that remains in operation for management and permitted discharge of stormwater from the Site.

2.4.2 Former Site Operations

The nature of past operations on the Site has, or is suspected, to involve the use of substances or activities that appear to have the potential for environmental impact. This information was used in development of "areas of concern" and "Site contaminants" at the outset of the RI process for the Site and summarized as below.

Historic Railroad Operations

The operations conducted during pre-Corning ownership consisted mostly of coal transportation activities and a major rail transportation center including railroad car and engine maintenance, and railcar manufacturing. Coal-derived materials are a significant component in the on-site historical fill and legacy of the prior rail use of the Site. These conditions are further described in prior investigation summaries below. Available information indicates that the railroad operations may represent potential sources of contamination by oil or other petroleum products, metal finishing materials, coal combustion residues, polynuclear aromatic hydrocarbons and metals.

Fall Brook Plant Operations

The Corning Fall Brook manufacturing operations at the Site produced glass tubing, glass wool, and other glass products including glass tubes used in the following products: television sets, lighting accessories, diodes, automobiles and other products. Although Corning's glass-making operations at the Site were not chemical-intensive, certain operations and types of raw materials included the use and potential for release of heavy metals, petroleum fuel products, or hazardous substances.

In addition to the silica and other inert raw materials primarily used in glass production, certain hazardous substances were also used as manufacturing ingredients including lead monoxide (litharge), and arsenic oxide. Raw materials were stored in the Mix House and in silos in the area of the glass making tanks. Molten glass was produced in the glass making tanks using natural gas. Cullet produced from off-spec glass was reused in the glass making operation, and cullet stored in covered bins at locations near the mix house and glass making tanks.

Five above ground storage tanks (ASTs) are known to have been in past use at the Site including a 500,000-gallon stormwater and wastewater equalization tank, a 300-gallon diesel

fuel storage tank that was associated with the equalization tank pump house, a 1,000-gallon process wastewater holding tank in the Mason Shop, a 100-gallon oil tank in the Mix House, and a 100-gallon hydrofluoric acid storage tank in the Platinum Shop in the Central Trades building. Except for the stormwater equalization tanks, these ASTs were cleaned and removed during the Site demolition project.

Historical information indicates that several underground storage tanks (USTs) and bulk above ground storage tank (AST) were also in use in the past for storage of various petroleum products. These USTs/AST are reported to have been removed but records detailing the closure process are not available given timeframe of closure (which pre-dates UST regulatory requirements). More detailed discussion of USTs/AST is presented in Section 4 below.

Waste Materials

Site operations necessitated the use and storage of petroleum products and hazardous substances at several locations on the property, as well as generation and storage of hazardous and non-hazardous waste. Waste types historically generated at the Site primarily included:

- waste leaded glass;
- lead-contaminated sludge from the WWTP;
- paint-shop waste;
- particulates from air emission control devices; and
- tank debris and refractory brick from decommissioning activities.

Between approximately 1980 and 1992, the facility operated under the US EPA and NYSDEC Resource Conservation and Recovery Act (RCRA) environmental programs as an Interim Status facility for hazardous waste storage. After a closure plan and post closure sampling was approved by NYSDEC and then implemented by Corning, clean-closure of its interim status was obtained from NYSDEC in 1992. After 1992, hazardous waste was stored on a "less-than-90 day" basis. Hazardous substances contained in Site-generated waste included: ignitable waste paint and mineral spirits, corrosive wastes (including hydrochloric acid and chromic acid), arsenic compounds, barium, cadmium, chromium, lead, selenium, benzene, chlorinated solvents, methanol, and waste oil.

2.5 Previous Site Investigations and Assessments

In accordance with the BCP and DER-10, this RI Report incorporates the previous Site investigation information conducted at the Site prior to the Remedial Investigation to provide a complete technical overview. The following summary of investigations preceding the RI provides the basis for identification of the areas of concern (AOCs). These AOCs were the focus of the Site investigations and development of a sampling and analytical plan. The previous Site assessments or investigations identified a series of AOCs which have been consolidated on Table I for reference. AOC locations are shown on Figure 3. The AOC summary on Table I includes the status of how, or when, the AOC was further investigated or assessed for purposes of this RI.

2.5.1 RCRA Inspections

As part of the RCRA closure process described above, a "Corrective Action Prior To Loss of Interim Status" (CAPT LOIS) inspection was performed at the Site in 1990. The inspection was performed for the US EPA by CDM Federal Programs Corporation. The inspection report identified three (3) Solid Waste Management Units (SWMUs), each designated as a Container Storage Area (CSA):

1. The WWTP Sludge Storage Area (CSA-1) – a concrete pad adjacent to WWTP 1 for staging hoppers for filter sludge from WWTP operations. (This area is not located on the Tioga Avenue Site and is not owned by Corning.)
2. A Hazardous Waste Storage Pad (CSA-2) – a 20-by 30-foot diked concrete pad for pallets of bag-house dust and the filled hoppers for filter sludge from WWTP operations.
3. A Drum Storage Area (CSA-3) – a 30- by 40-foot bermed and fenced concrete pad for storage of drums of liquid waste and new product.

The CAPT LOIS report concluded that these SMWUs were all in generally good condition and that no evidence or record of releases was found during the inspection.

2.5.2 Preliminary RCRA Facility Assessment (RFA)

In 1993, a Preliminary RCRA Facility Assessment (RFA) was performed by TRC Environmental Corporation under contract to the USEPA. The assessment identified eight (8) areas of concern (AOCs) at the Site described as follows:

1. Hazardous Materials Pen (same feature as CSA-3 above)
2. Former Drum Storage Area
3. Former Fuel Oil UST Area
4. WWTP Sludge Storage Area (same feature as CSA-1 above)
5. Hazardous Waste Accumulation Pad (same feature as CSA-2 above)
6. Electrostatic Precipitators
7. Bag House Dust Collectors
8. Paint Shop Accumulation Area

AOC #1, #4 and #5 correspond to the CSA #3, #1 and #2, respectively, identified in the CAPT LOIS report described above. The Preliminary RFA report indicated that a potential for past release existed at AOC #1, 2 and 3, and no evidence of release at AOC #4 (CSA-1). At #5 (CSA-2), a low potential for release was indicated, but the wastes were indicated to be well contained and no evidence of a release was identified.

Environmental issues identified for AOC #6 and #7 were related to a potential for fugitive air emissions, and did not involve the potential for surface or subsurface release at these AOCs. The report indicated that no evidence of release was found at AOC #8, a paint storage area located inside the facility in a fully-enclosed basement area with a sound concrete floor.

2.5.3 Environmental Site Assessment (ESA)

In 2006, Haley & Aldrich initiated an assessment of Site environmental conditions on the Tioga Avenue property. A copy of the ESA Report (July 2007) is part of the BCP Application to support the eligibility/acceptance into the BCP.

A review of available Site historical information and records from a variety of sources were compiled into an initial list of AOCs, including applicable items described in the RCRA inspection and assessment activities described above, where environmental contaminants were known or suspected to have been handled, stored, and potentially released. Identification of this initial comprehensive list of AOCs in the ESA report was based on records review, Site observations and institutional knowledge of various Corning employees. While some limited existing environmental sampling information was available, the ESA did not include any intrusive Site investigation activities with sampling and analysis of environmental media.

The AOC list in the ESA Report was further evaluated and expanded upon during the planning and implementation of the building demolition project. Additional AOCs were later identified and added to the list based on supplemental Site information and/or observations of Site conditions during the building decommissioning and demolition process. Accordingly, the following areas, historical uses or conditions were identified as potential AOCs on the Tioga Avenue Site (and are shown on Figure 2):

AOC ID	*Description*
(Sitewide)	Former Railroad Company Railcar/Engine Maintenance & Manufacturing Operations
(Sitewide)	Potential for Heavy Metals in Shallow Soils
(Sitewide)	Site Groundwater Quality/TCE in Plant Water Supply Wells
2.	Hazardous Waste Storage Pad
3.	Former Hazardous Materials Drum Storage Pad
4.	Former Drum Storage Area
5.	Current Hazardous Materials Storage Building
6.	Former Fuel Oil Underground Storage Tanks (UST)
7.	Former Gasoline UST
8.	Former Fuel Oil AST at Fire System Water Tank
9.	Former Fuel Oil AST at GMS Annex
10.	1950s-era Oil Drum Storage House Located North of GMS Annex
11.	Areas of Oil Staining on the GMS Slab
12.	Area of Oil Staining on the Fall Brook Slab in the Gun Mounts Area
13.	Former Septic System & Storm Sewers
14.	Hydraulic System Pit for the GMS Dock Levelers
15.	Hydraulic Elevator Pits
16.	Boiler House Blow Down Pits
17.	Unidentified Pipe and Sump Outside the Mason Shop PP1 Building
18.	1950s-era Acetone Drum Storage Near Multiform Office and 1930s-era Acid Ampoule Burial Area
19.	1950s-era Paint Shed Northeast of Gate 3
20.	1950s-era Arsenic Acid Bulk Storage Area
21.	1950s-era Cyanide Storage Building Located at NW Corner of Central Trades

These AOCs were further assessed or investigated in subsequent phases of investigation, as summarized on Table I. Findings regarding these investigations and the sampling results for the Phase II ESA and RI Program follow.

2.5.4 Phase II Environmental Site Assessment (Phase II ESA)

The results of the Phase II ESA were described in detail in the RIWP along with supporting investigation information including laboratory analytical reports, field exploration records, data quality evaluation summaries and other pertinent information. The data and results generated from the Phase II ESA were used in development of the RIWP scope and have been incorporated in summary form into this RI Report to enable the comprehensive evaluation of Site data. The data summary tables in this RI Report therefore contain the full Site data set with consolidated results from both the Phase II ESA and the RI Program. The RI Report also appends relevant details from the Phase II ESA for ease of reference including copies of test boring logs and well completion reports, and the laboratory analytical report deliverables.

The Phase II investigation program was conducted in September and October 2007, and included completion of 45 borings throughout the Site with soil sampling and analysis for a broad suite of parameters based on the identified AOCs. These investigations included characterization of historical fill present on the Site and assessment of Site hydrogeology and groundwater quality conditions. The objective of the Phase II ESA program was to confirm presence or absence of contamination as may be associated with the recent and historical industrial Site use.

Based on historical Site use, soil and groundwater investigations focused on the organic and inorganic constituents known or suspected to be associated with the Site referred to as "Site-related" parameters, as well as for an "expanded" and much broader suite of substances irrespective of any known or reasonably expected use on the Site. The expanded parameter list was analyzed to provide the data necessary to verify the presence or absence of these substances on the property. The "Site-related" parameters included the class of compounds or individual constituents that could be present in most any historic fill (as defined by applicable regulations) or otherwise could be present associated with the historical and/or the railroad operations on the Site and included: petroleum hydrocarbon compounds, polynuclear aromatic hydrocarbons (PAHs), and the primary metallic substances that were formerly used in glass manufacturing on the Site (antimony, arsenic, barium, cadmium and lead). All of the analytical data were collected, analyzed and validated relative to the Site-specific Data Quality Objectives.

The significance of the investigation data obtained were evaluated in accordance with the applicable NYSDEC BCP regulations contained in 6 NYCRR Part 375. For soil and historic fill samples, results were compared to the risk-based Soil Cleanup Objectives (SCOs) as specified under Sub-part 375-6 of the BCP regulations assuming the future land use will be restricted to commercial and/or industrial development. The significance of the groundwater results are screened against the New York State drinking water standards and criteria found in NYSDEC's Technical Operational and Guidance Series (TOGS) 1.1.1 "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations", dated June 1998. This comparison represents a conservative screening level analysis given lack of any actual use of Site groundwater for potable purposes.

Results of the Phase II ESA were used in development of the RI Program focusing in the areas of the Site and on the types of substances suspected to be potentially present that could constitute contamination. The findings of the Phase II ESA are presented in the RIWP detailed by AOC and including specific recommendations on the AOCs warranting further evaluation during the RI Program and the AOCs not warranting further evaluation. The Phase II ESA sampling program provided the following understanding on soil and groundwater conditions on the Tioga Avenue BCP Site.

Soil Analysis Results

Explorations indicate that historic fill material is present throughout the Site. Physical characterization of the historic fill indicates this material is composed of a heterogeneous mixture of coal-derived ash/dust, coal pieces, and lesser amounts of other debris such as brick intermixed with soil to depths generally up to 14 ft bgs and deeper at specific locations. The character and extent of historical fill encountered during the Phase II ESA are detailed on Boring Logs provided in Appendix A. The results of the soil boring program indicated that although some constituents were detected in historic fill (but not in the underlying soil) samples, the levels detected were mostly below relevant BCP SCOs for commercial and/or industrial land use. In many samples, none of the analytes were reported above laboratory detection and/or practical quantitation limits (MDLs or PQLs).

Laboratory analysis of this fill material included a sample population for the Site-related contaminants of concern, as well as the expanded suite of organic and inorganic parameters whether or not many of these substances were suspected to be present at the Site. The results were generally below the laboratory detection limits (and SCOs), with the exception of arsenic (detected above the SCO in 10 of 47 samples) and to a lesser extent lead, copper and/or mercury (detected in soil above the SCO two of the 47 samples).

The Phase II data did not indicate the presence of specific metal concentrations or source areas given the heterogeneous nature of the fill and sporadic nature of metal detections contained therein. The Phase II data also show no evidence of metals exceeding any of the SCOs either in the underlying native soil strata or in groundwater on the Site. The conclusion can be made that the random presence of metals is characteristic of historic fill and these substances are not mobile.

Observations during the soil boring program also indicated the presence of weathered petroleum impact in the subsurface soils in areas of the Site where historical petroleum fuel above and below ground tanks (ASTs/USTs) were used for product storage in the past. Analysis of affected soil indicated limited detections of certain petroleum constituents at concentrations above the BCP SCOs.

Groundwater Analysis Results

The Phase II ESA included a preliminary assessment of groundwater flow and quality conditions on the Site involving the installation and sampling of six monitoring wells. The six wells were installed generally along the south and north Site property line (locations shown on Figure 3). Water level measurements during the Phase II indicated a general west to east groundwater flow direction on the Site. Historical water level measurements are included in Table II.

Groundwater samples were collected and analyzed for a broad suite of parameters including the Target Compound List (TCL) of volatile and semi-volatile compounds, the Target Analyte List (TAL) metals, polychlorinated biphenyls (PCBs), and organo-chlorine pesticides. The results of sampling performed indicate that groundwater has not been adversely impacted by Site contaminants. Certain naturally occurring inorganic constituents, mostly manganese and sodium, were detected at levels higher than NYSDEC TOGS 1.1.1 comparison criteria that are representative of ambient water quality conditions (and not the site) given detections across the Site (e.g. in both up gradient and down gradient wells) or that detections were otherwise consistent with the presence/levels these substances naturally occur and be present in groundwater samples. Similar findings were made relative to the organic compound detections in up gradient and down gradient wells except that none of the detected values exceeded the comparison criteria (e.g. drinking water standards).

3. REMEDIAL INVESTIGATION PROGRAM

The RI exploration and analytical testing program was undertaken in accordance with the approved Remedial Investigation Work Plan and provisions of the Site BCA, including the applicable regulatory requirements of 6 NYCRR Part 375 - Brownfield Cleanup Regulations, DER-10 and applicable regulatory guidance (NYS DEC TAGM and TOG). The RI was performed in accordance with objectives, scope, quality assurance project plan (QAPP) and standard operating procedures (SOPs) in the approved RIWP. Prior to initiating investigations, the RIWP was reviewed and approved by the NYSDEC and NYSDOH, and included public review and comment. The RI explorations and analytical testing program was completed with NYSDEC oversight and technical input throughout the process. Exploration and testing locations were modified in certain areas of the site during the field program at NYSDEC's request. Monthly Progress Reports have been provided to the NYSDEC in accordance with Section XI of the BCA since the project was initiated in October 2009.

The investigation process has involved a high density of soil and groundwater sampling points focused in the AOCs as described in the RIWP as well as at systematic closely-spaced locations (100 foot or less on center) across the property. Systematic soil/fill sampling was performed with the primary objective to further assess the nature and extent of historic fill material that is present on the Site. Additional samples, not anticipated in the RIWP, were collected and reviewed on an on-going basis with the Department during the investigation program. These additional samples were collected based on observations in the field of apparent impact such as noticeable odors, staining or readings on field instruments and were mostly obtained in a portion of the Site where petroleum impacted soils are present. Groundwater sampling was performed from the existing and newly installed wells on all sides of the property to determine groundwater depth, flow direction, and quality. In total 212 soil samples and 19 groundwater samples were collected at 99 boring locations and 13 monitoring locations. Results of the sampling program are summarized by boring/well location on Tables II, III and IV for the soil and groundwater samples. These tables provide a comprehensive summary of investigation results as obtained during the Phase II investigations and the RI program.

As with the Phase II investigation data summarized above in Section 2, the significance of the sampling data obtained during the RI Program were evaluated in accordance with the relevant BCP SCOs for soil and the NYS Drinking Water Standards (TOGS 1.1.1) for groundwater assuming that the future land use will be commercial or industrial or a combination of these uses. For purposes of the RI program, the evaluation criteria default to the lower of the SCOs (commercial being the most restrictive) in assessing the significance of the soil data. For groundwater the comparison criteria also represents a conservative (lowest) screening level analysis given lack of any actual use of Site groundwater for potable purposes on the Site.

To facilitate evaluation of the large data set for the Tioga Avenue Site, an overall summary of the sample analytical results (both the Phase II and the RIWP investigations) is provided in Table V which contains a breakdown of total number of samples by media, the number of sample detections, the percentage of detections, and basis of evaluation of the significance of the detections.

3.1 Remedial Investigation Objectives

The goal of the RI Program was undertaken to: complete the site investigation process by identifying the nature and extent of contamination on the Site; to determine whether contamination warrants

remedial action; and, to provide data of sufficient quantity and quality to support development of a Remedial Work Plan if remedial action is warranted for the Site. Based on the Site use history and the Phase II ESA results, the RI Work Plan was developed and implemented with NYSDEC/NYSDOH oversight to meet the following specific objectives of the Site:

- Confirm the nature and quality of the historical fill that is present throughout the Site;
- Further delineate the extent, including depth profiling, of historical fill at the Site;
- Resolve any further soil and groundwater assessment of AOCs 6, 7 and 8 identified in previous assessments and investigations (including potential impact from possible historical releases of fuel oil and/or gasoline from former ASTs/USTs); and
- Consolidate Site information into a Conceptual Site Model.

3.2 Citizen Participation Plan

A Citizen Participation Plan (CPP) was developed, reviewed and approved by NYSDEC for this Site in accordance with the scope, timeframes and content of Section I of the BCA. In accordance with ECL 27-1417, the associated BCP regulatory requirements of 6 NYCRR Part 375-1.10 and 375-3.10 and related CPP Guidance, Corning has developed a CPP to satisfy the public notice and comment requirements for the Tioga Avenue BCP RI.

To date, Corning has undertaken two rounds of public notice for the Site under the CPP, first integral with the application to the BCP and second prior to implementation of the RI. The public notice and comment periods have allowed interested stakeholders and citizens the opportunity to review project documents and provide comments through the NYSDEC. The CPP identified the objectives, timeframes and activities undertaken at the Site, including the following elements:

- Fact sheets were prepared based on the NYSDEC templates and content requirements describing: the property information, background, history and environmental summary; project description; proposed schedule; and BCP information. Specifically, the Tioga Avenue fact sheets have included Site maps, Site information, specific key agency and Site contact information, overview of the CP process (public notice and comment mechanisms), identification of key Site issues and BCP process overview (including Site application, investigation, remedy selection, certificate of completion and Site management process).
- Outreach included public notices posted in local media outlets and mailing and distribution of CPP communications to stakeholders including providing copies of fact sheets to residents of the adjoining apartment buildings through their landlords or apartment building managers, adjacent landowners, individual property tenants, interested organizations, media, the City of Corning, and other local, county, state, and U.S. government officials and representatives.
- Establishment of local repositories (Southeast Steuben County Library, located in Corning, New York and NYSDEC Region 9 Office in Avon, New York) to provide public access to project documentation including the approved BCP Application, the CPP, the approved RIWP and related project information.

Execution of the CPP in accordance with the relevant notice and review period requirements was completed prior to the RI. Information (such as documentation of public notices and mailing affidavits) was submitted to the NYS DEC in accordance with the CPP requirements.

3.3 Soil Characterization

3.3.1 Soil Borings Advancement

The RI Program included 54 soil borings completed at the Site by Nothnagle Drilling Incorporated of Scottsville, New York between 30 September 2009 and 27 October 2009 augmenting the 45 borings previously completed borings during the Phase II ESA (for a total of 99 total borings). Continuous soil sampling was completed during the boring installation programs using direct push methods, which utilized 4-foot long by 2-inch wide macro-core samplers, composed of stainless steel hollow stem samplers with internal disposable acetate sleeves. The steel samplers were decontaminated and equipped with new acetate sleeves between investigation intervals.

Soil borings were located within previously identified AOCs (such as UST areas). As stipulated in the approved RIWP a systematic approach in explorations and sampling, included additional Site borings at predetermined locations throughout the Site in uniform grid fashion to further assess the historical fill material. In addition, certain boring locations were varied or new locations added to the program based on conditions observed in the field or as otherwise requested by the NYSDEC. These changes were summarized in the monthly progress reports to the NYSDEC.

The field sampling program was observed by Haley & Aldrich field geologists, who screened soils for the presence of volatile organic compounds (VOCs), visually examined and classified soil types on soil boring logs (included in Appendix A for both sample events). VOC screening was done using the headspace method and a handheld photo-ionization detector (PID). PID results are summarized on the soil boring logs. The NYSDEC was present on the Site periodically throughout the boring program.

Boring locations within AOCs were chosen in the field based on Site conditions such as utility presence and observations, and PID screening results from previous Phase II ESA borings. The predetermined grid borings were spaced throughout the Site in an approximate 100 feet by 100 feet grid. Boring locations for both the Phase II ESA and the RI Program are shown on Figure 3.

Each soil boring was advanced until native soil was encountered, and in some cases borings were further advanced to the water table based on the AOC, evidence of impacted soil, or in accordance with the NYSDEC's request (as indicated below). Soil borings designated as planned groundwater monitoring well locations were advanced to the water table or a deeper target depth in accordance with the RIWP.

3.3.2 Soil Sampling and Analysis

As stipulated in the approved RIWP, selected samples were planned for specific analyses based on AOC (i.e. at applicable boring locations petroleum related analyses targeted in accordance with NYSDEC STARS Memo #1, "Petroleum-Contaminated Soil Guidance Policy") and augmented with a systematic approach in sampling (including both a broader suite of analytes at certain locations and additional samples from selected borings across the Site independent of the AOCs). In general, one to three soil samples from each test boring were retained for off-Site laboratory analysis. Soil samples were submitted to the Environmental Sciences Corporation

laboratory in Mt. Juliet, Tennessee. Soil sample analytical results are summarized on Table III. The full analytical reports including expanded deliverable packages are contained in Appendix C.

3.3.2.1 Historical Fill Characterization Samples

For assessment of historical fill, multiple samples were collected from each test boring for analysis of the Site-related metals. A total of 145 soil boring samples representative of historic fill were collected and submitted for analysis during the RI Program. Given the extent and heterogeneous nature of the historical fill on the property the sampling program consisted of the following process.

- One grab sample collected from 0 – 1 feet beneath any sub-base gravel layer underlying pavements or former facility concrete slabs was submitted for analysis of the Site-related metals (Antimony, Arsenic, Barium, Cadmium, Lead) on the basis of assessment of the "exposed soil" criteria as described in the BCP Regulations (despite being generally below existing impervious surface materials at the majority of the Site).
- Beneath the 0 – 1 foot sample, additional grab samples were obtained from each two foot interval throughout the historical fill layer. These samples were homogenized into a composited sample for analysis of the Site-related metals to assess the overall quality of historical fill on the Site.
- One grab sample from native soil beneath the historical fill was obtained and submitted for analysis of the Site-related metals to be used to assess the potential for the known or suspected Site-related metals to impact underlying soil.
- Additional grab samples of historical fill materials were obtained, as necessary, based on field observations for any sample locations exhibiting potential contamination from visual observations or field screening.
- The expanded parameter list inclusive of other non-target substances were analyzed in 20 percent of the sample population for confirmation of non-presence on the Site. These samples were obtained at predetermined boring locations within the sample grid and from the upper 0-1 foot bgs zone at locations where the historical fill is present.

3.3.2.2 Characterization of AOCs and Native Soil

For assessment of the AOCs representing specific potential sources of impact (i.e., potential fuel oil releases from historical ASTs/USTs), multiple borings were performed within each AOC as stipulated in the approved RIWP. The boring locations were chosen based on the Phase II ESA findings and field conditions with NYSDEC concurrence. (Note that boring B259, originally intended as an AOC characterization boring, was relocated to the southwest corner of the Site at the request of the NYSDEC.)

Soil samples were retained at the boring locations biased to the highest potential level of impact, as determined by field screening and observations. Selected samples were obtained in native soil below the zone of potentially-impacted materials to assess contaminant mobility.

The AOCs investigated were associated with former petroleum bulk storage facilities and included AOCs 6, 7 and 8. Therefore the samples retained for characterization were analyzed for TCL VOCs as well as the petroleum-related semi-volatile organic compounds (SVOCs) consistent with the NYSDEC STARS Memo #1 (STARS SVOCs). Samples collected to characterize native soil for potential contaminant mobility were analyzed for the expanded parameter list including: TCL VOCs, TCL SVOCs, TAL Metals, PCBs, and/or STARS SVOCs. Analytical results were assessed relative to the BCP Soil Cleanup Objectives (SCOs).

Soil samples were collected from borings B-253 (23 - 24 ft) and B-254 (22 - 23 ft), located in the vicinity of AOC 8 in accordance with the RIWP. As described in the RIWP, the concern in and surrounding AOC 8 is the potential for fuel oil-related impacts near the water table. TCL VOC analysis of both samples was specified on the chain-of-custody documentation. However, the samples were inadvertently logged in at the laboratory as TCL SVOCs. Therefore, SVOCs were analyzed and reported, and TCL VOCs were not analyzed. The SVOC results indicate petroleum-related compounds were detected in the samples at concentrations far below SCOs. These results are consistent with historical data in AOC 8.

As discussed with the Department on 9 December 2009, it is not anticipated that VOC data from the vicinity of B-253 and B-254 will be necessary in the future, as the Field Completeness Objective for the Remedial Investigation was met.

3.4 Groundwater Characterization

3.4.1 Installation of Groundwater Monitoring Wells

Seven additional groundwater monitoring wells were installed as part of the RI Program to augment the six existing well locations (for a total of 13 monitoring well locations). Each well was installed using 4 ¼-inch hollow-stem auger. The wells were constructed using 2-inch diameter PVC riser pipe and 10-foot length of PVC well screen and surrounding sand-pack. Most of the wells (10 of 13 wells) were installed to screen across the water table surface (approximately 17 to 25 feet below ground surface) to assess shallow groundwater conditions. An additional 3 wells (B-247MW, B-248MW, and B-249MW) were completed to assess conditions at deeper intervals and (screened approximately 60 -70 feet below ground surface). In accordance with RIWP, the deeper wells were specifically installed to assess the deeper strata where the existing industrial pumping wells are completed. These three RI wells are in a deeper monitoring interval, but within the same alluvium deposit as the shallower wells described above.

Following installation, the newly-installed RI monitoring wells, as well as the pre-existing six Phase II ESA wells, were all subsequently developed/re-developed on 27 October 2009, approximately one week prior to sampling. The locations of the seven new RI monitoring wells are shown on Figure 3 (along with the six previous Phase II ESA monitoring wells). Haley & Aldrich field geologists observed the well installations and documented construction on monitoring well logs (included in Appendix A).

3.4.2 Groundwater Sampling and Analysis

In conformance with procedures in NYSDEC TAGM 4015 guidance, the site-wide groundwater sampling event occurred at the seven new RI wells and six existing wells (installed as part of the Phase II ESA) between 4 November 2009 and 6 November 2009. Static water level readings were measured in each well prior to sampling as are summarized in Table II. The field sampling program included evaluation of non-aqueous liquids (NAPL) and none were identified.

Groundwater sampling was performed by Haley & Aldrich using low flow purging methods, with in-line monitoring of field parameters, pH, dissolved oxygen (DO), oxidation reduction potential (ORP), specific conductivity and turbidity. Groundwater monitoring field forms are included in Appendix B. As with the soil samples, groundwater samples for each of the monitoring wells were submitted to ESC Laboratories in Mt. Juliet, Tennessee for analysis of TCL VOCs, TCL SVOCs, STARS SVOCs, and/or TAL metals, except the samples from B-247MW, B-248MW, and B-249MW which were analyzed for TCL VOCs only in accordance with NYSDEC requirements. All of the inorganic analyses were performed by total constituent analysis (e.g. unfiltered) consistent with NYSDEC TAGM 4015. Low flow sampling methods reduced but did not eliminate sample turbidity or presence of sediments/silt in the water samples. Groundwater sample analyses are summarized on Table IV for both the Phase II ESA and the RI Programs. The full analytical reports and expanded deliverables are provided electronically in Appendix C.

3.5 Location & Elevation Survey

The location and elevation(s) of each test boring (ground-surface) and monitoring well (ground-surface and inner casing reference) were surveyed by Weiler Associates of Horseheads, New York and referenced to the previously established Site datum in December 2009. The survey data was used to establish the static groundwater elevation across the Site. Static water level readings were measured in each well prior to sampling. Survey and water level measurements are summarized on Table II and a groundwater contour map illustrating groundwater flow conditions is included as Figure 5.

3.6 Investigation Derived Waste

In conformance with procedures in NYSDEC TAGM 4032 guidance, drilling spoils were returned to the open boreholes at each boring and sealed at ground surface except where monitoring wells were installed, in which case, the drilling spoil was drummed and staged on-site. Groundwater generated from monitoring well development and sampling was also contained in drums and staged on site. A composite sample of the contents of the soil drums was collected on 27 October 2009 for waste characterization and disposal profiling of drilling spoils. The results of the groundwater sampling program were used for waste characterization and disposal/treatment profiling of the drummed well water. The soil cuttings, purge water, and development water were transported and disposed of at EQ Detroit, MI as non-hazardous waste during the week of 14 December 2009.

4. REMEDIAL INVESTIGATION RESULTS

The following section provides a summary of all investigation data collected for the Site, both from the 2007 Phase II investigation described in the RIWP, and from the 2009 RI, described above. A summary of recent and historical soil analytical data is provided as Table III. A summary of recent and historical groundwater analytical data is provided as Table IV. Table V presents a tabulated summary of analytical detections for the full data set including the quantity and percentage detected higher than the established comparison criteria (e.g. SCOs and TOGs 1.1.1). Figure 3 shows the exploration locations and the full laboratory data reports including the expanded (Category B) deliverables as specified in the RIWP are copied to a compact disc contained in Appendix C.

The laboratory results for soil were compared to the 2006 NYSDEC NYCRR Part 375 Soil Cleanup Objectives for Commercial and Industrial Uses (SCOs). The laboratory results for groundwater were compared to the 1998 New York State Technical and Operational Guidance Series (TOGS) 1.1.1 - Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. This assessment is conservative as evaluation of all the soil data default to the commercial criteria (lowest or most restrictive) for soil and to drinking water criteria considering there is no potable use of groundwater on the Site.

4.1 Summary of Soil Results

A summary of the soil sampling analytical data set is provided in Table III. The narrative below summarizes soil collected to date.

4.1.1 Soil Characterization

During the Phase II Investigation and RI Program, soil was characterized during drilling by Haley & Aldrich field geologists. Consistent with the Phase II ESA, the soils were classified and generally found to be representative of two distinct strata – historical fill and natural undisturbed alluvial materials (silt, sands, and gravel) as are further described in Section 2.3. Historical fill was generally encountered between 1 and 14 feet below ground surface, and in once incidence to 20 feet below ground surface. In addition to visual characterization, a handheld PID was used to screen the soil for potential VOC presence and odors, staining or other observable evidence of impact recorded on the Test Boring Reports. Test Boring Reports were completed for each exploration location which includes soil descriptions and other observations and are included as Appendix A in this report.

In general, elevated PID readings, odors and/or staining were observed to be most prevalent in proximity to AOC 6, 7 and 8 where former petroleum product storage areas existed as shown on Figure 3. Additional drilling and sampling was performed in these areas biased to where the higher PID readings and/or other petroleum impact such as staining and odors were observed in the field during drilling and reviewed with NYSDEC during the RI program.

Historic Fill Summary

The Site contains historic fill material that is broadly distributed on the property as determined by the systematic sampling program described in the RIWP. Results are summarized visually as shown the Plan and Profile Figures 3 and 4 of this report. These Figures provide a north-

south and east-west cross-sectional view of the exploration results including the relationship of the existing ground surface cover (largely concrete), fill presence/depth, underlying native soil stratigraphy and static groundwater level. The historic fill does not extend near to or below the depth of groundwater as measured during the recent or past site investigations.

Extensive sampling of the historic fill indicates that a relatively small percentage of samples contain certain elements higher than the SCOs for commercial property including arsenic and, to a lesser extent, lead. These elements were detected sporadically at random locations and are broadly distributed on the Tioga Avenue Site. The arsenic and lead detections were all encountered in shallow historic fill beneath the former concrete floor slabs, which pre-date Corning's use of the property. In addition to the nature of the fill, the presence beneath the older buildings pre-dating Corning's Site use indicates the fill origin and placement was most likely linked to the previous operations or otherwise representative of the heterogeneous historic fill and not representative of distinct source(s) of these contaminants linked to prior use historically or by Corning.

Overall, sampling of the historic fill indicated that arsenic was detected at concentrations above the most restrictive SCO (e.g. restricted commercial) in 31 of 182 samples or approximately 17% of the sample population. Lead was detected above SCOs in 7 of 182 samples or approximately 4% of the sample population. In addition, there were two isolated detections of both mercury and copper reported in samples higher than SCOs. Analysis of the halogenated and non-halogenated organic parameters were also extensively performed within and beneath the historic fill and all results were reported as either non-detect or at levels below the relevant SCOs with two exceptions. Only benzo(a)pyrene and trimethylbenzene were detected at two locations within the historic fill at levels slightly higher than the SCOs.

Undisturbed native soil beneath the fill was sampled at most of the boring locations. The soil analytical results of the natural material beneath the historical fill did not have any concentrations of any organic or inorganic substance exceeding SCOs.

Former UST/AST AOCs

In accordance with the approved Work Plan, the sampling program also included extensive analysis of the subsurface conditions (including historic fill) within AOCs 6, 7 and 8. These AOCs are located on the northern end of the Site as shown on Figure 3 where bulk above and below ground tanks of fuel oil and to a lesser extent gasoline products were in use in the past. The petroleum storage/use activities associated with each of these AOCs are described in the RIWP including the locations of the former ASTs and USTs. The RI explorations (and prior Phase II ESA) were conducted at the location of these ASTs/USTs including throughout the area of the former tank locations to define the nature and extent of petroleum substances (e.g. odors) within each AOC.

In overview, the investigations in these areas indicated the presence of residual petroleum substances with staining and odors observed during drilling including PID readings which generally ranged from 10 to 169 parts per million. Conditions observed in the field, including the PID readings are documented on the soil boring logs in Appendix A. It is apparent that residual weathered petroleum substances remain in this area of the Site most likely related to past storage/use activities; however, when analyzed, representative impacted samples lacked the presence of any detectable levels of petroleum constituents except for one low level value, that

does not exceed any chemical specific SCO. These results have been characterized and represent a "nuisance" condition related to residual contamination from prior petroleum product storage and use on the Site.

These weathered petroleum odors were generally noted in soils extending to the water table. Laboratory analytical data do not indicate the presence of VOCs and/or SVOCs above SCOs in soil (as more fully detailed below); these data are consistent with residual weathered petroleum compounds that apparently are no longer present in significant amounts and thus present little risk in comparison to the SCOs. Nevertheless, field observations indicate the presence of petroleum odors and staining that have the potential to create a "nuisance" condition during future development of the property.

4.1.2 Soil Analytical Results

A total of 212 soil samples were collected at the Site in 2007 and 2009, including field duplicate samples along with other quality control samples as described in the RIWP. A total of 49 samples were collected in 2007 and a total of 163 samples were collected in 2009. The samples were analyzed for one or more of the following parameters: Target Analyte List (TAL) metals, "Site-specific metals", VOCs, SVOCs, polycyclic aromatic hydrocarbons (PAHs), PCBs, and/or pesticides as shown in the table below.

Analyte List	Number of 2007 Samples	Number of 2009 Samples	Total Number of Samples**
TAL Metals	7	10	17
Site Metals*	38	127	165
Cyanide, Only	4	--	4
TCL SVOCs	15	14	29
PAHs	20	--	20
STARS SVOCs	--	9	9
TCL VOCs	38	24	62
STARS VOCs	4	--	4
PCBs	16	2	18
Pesticides	5	--	5

*Site metals consist of Antimony, Arsenic, Barium, Cadmium, and Lead.
**QA/QC samples (e.g. sample duplicates) are not listed in this table.

The sections below provide a summary of the analyte detections (excluding duplicate samples) from 2007 and 2009 in soils relative to the SCOs for the Site and development of the Site Conceptual Model. All of the data are summarized on Table III relative to the SCOs and the sampling locations referenced to Figure 3.

Metals:

A total of 182 samples were collected and analyzed for metals (Site metals or TAL metals) in 2007 and 2009. Of those samples:

- Thirty-one (31) samples contained arsenic concentrations greater than the commercial and industrial SCOs, which default to 16 mg/kg based on exposure/risk. The arsenic detections

occurred sporadically in a low percentage of the sample population and only within the historic fill.

- Seven (7) samples contained lead at concentrations greater than the commercial SCO, which is 1,000 mg/kg. No samples contained lead greater than or equal to the industrial SCO, which is 3,900 mg/kg.

- One (1) sample contained copper concentrations greater than the commercial SCO (270 mg/kg), and industrial SCO (10,000 mg/kg).

- One (1) sample contained mercury at concentrations greater than the commercial SCO (2.8 mg/kg), and industrial SCO (5.7 mg/kg). The general randomness of the metal detections within the historic fill encountered during the RI Program is demonstrated by the mercury results. In particular, a duplicate analysis of the same sample produced markedly different mercury results (3.1 mg/kg vs. 39.9 mg/kg). This variability suggests that the detections are more likely to be random within the historical fill and not related to a source of mercury contamination.

- Other metals were also detected in many of the samples at levels below the SCOs and indicative of their natural occurring presence in the environment.

As noted above, arsenic, lead, copper and mercury were the only elements/metals detected at concentrations that exceeded the SCOs. The detections were located sporadically at random locations on the Site. These detections were mostly apparent in shallow fill (0 – 1 ft), and below impermeable cover (asphalt and concrete), but generally not in deeper historic fill. There were no detections of any metals higher than SCOs in any of the samples obtained from the native soil materials immediately below the historic fill.

Semi-Volatile Organic Compounds

A total of 58 samples were collected and analyzed for SVOCs, PAHs, and/or STARS SVOCs in 2007 and 2009. Of those samples, one compound, benzo(a)pyrene was detected at concentrations greater than commercial SCOs in one boring (B-105, 0-4 ft bgs). Benzo(a)pyrene is a pyrogenic compound common to historical fill material containing coal ash and combustion products. It is essentially insoluble, and was not detected in native soil samples or in groundwater below the historic fill.

Volatile Organic Compounds

A total of 66 samples were collected and analyzed for TCL VOCs and/or STARS VOCs in 2007 and 2009. Of those samples, one VOC, 1,2,4-trimethylbenzene, was detected in concentrations slightly greater than commercial SCOs in one boring (B-116, 6-10 feet). 1,2,4-trimethylbenzene is typically associated with gasoline.

Polychlorinated Biphenyls & Pesticides

A total of 23 samples were collected and analyzed for a combination of PCBs and/or pesticides in 2007 and 2009. PCBs and pesticides were not detected in any of the samples analyzed.

4.2 Summary of Groundwater Analytical Results

Thirteen wells were installed and sampled/re-sampled as part of the Phase II and this RI. Six of the wells were sampled in both 2007 and 2009, and the remaining 7 were sampled during the 2009 Site-wide event. The water samples were analyzed for a combination of metals, VOCs, SVOCs, PCBs, and/or pesticides as shown in the table below:

Analyte List	Number of 2007 Samples	Number of 2009 Samples	Total Number of Samples*
TAL Metals	6	10	16
Cyanide	2	--	2
TCL SVOCs	2	2	4
PAHs	4	--	4
STARS SVOCs	--	2	2
TCL VOCs	6	13	19
PCBs	2	--	2
Pesticides	2	--	2

*QA/QC samples (e.g. sample duplicates) are not listed in this table.

A summary of the groundwater results (excluding duplicate samples) is provided on Table IV relative to the SCOs and the sampling locations referenced to Figure 3. The following is an overview of analytes detected, including those above the relevant standards and guidance values.

Volatile Organic Compounds

All of the site wells were analyzed for the full TCL compound list of VOCs (both sample events) and the results were generally non-detect for all constituents, except for the following:

- Selected samples, from wells at both up gradient and down gradient locations at the Site exhibited traces of selected VOCs (including 1,1,1-trichloroethane, 1,1-dichloroethane, chloroethane, perchloroethene, trichloroethene and toluene). Many of these detections were below the laboratory practical quantitation limits, and all of these detections were below the comparison criteria (NYS TOGS 1.1.1 drinking water standards or guidance values, June 1998). The locations and comparative levels of detections reported during this exploration program indicates these substances are characteristic ambient water quality in the general area of the Site.

- One VOC, isopropylbenzene, was detected in two of the wells proximate to the former petroleum storage areas at concentrations exceeding the comparison criteria. Isopropylbenzene is a petroleum constituent typically associated with gasoline. The exceeded criteria were in wells B-250-MW and B-251-MW, at 19 ug/L and 8.2 ug/L, respectively. The TOGS drinking water standard for isopropylbenzene is 5.0 ug/L. Additionally, cyclohexane and methylcyclohexane (also associated with petroleum products) were detected in site wells, but were at concentrations at or below 5 ug/L. These detections are most likely related to residual weathered petroleum remaining from the former petroleum storage activities and are very low level lacking any higher or more frequent detections in groundwater and lacking evidence of NAPL at the site.

- During each sampling event several additional VOCs were detected in the groundwater samples at trace levels. None of these VOCs were detected above TOGs 1.1.1 standard or guidance values. These detections included acetone, carbon disulfide and chloroform in 2007 and bromodichloromethane and dibromochloromethane in 2009. These substances are either laboratory reagents or are derived from chemicals used in disinfection of drinking water. While the Data Useability Summary Reports (DUSRs) summarized in Section 4.3 below could not technically reject the sample delivery groups containing these data based on the DUSR criteria, it is nevertheless our opinion these constituents are typical of laboratory introduction during analysis and are not related to the Site.

Semi-Volatile Organic Compounds

SVOCs were not detected in the Site wells at concentrations above comparison criteria.

Metals

The expanded metal parameters (TAL metals) were completed in the Site monitoring wells in 2007 and in 2009 from the expanded well network in accordance with the RIWP. All of the samples were analyzed for total constituents (both dissolved and un-dissolved fractions) in accordance with NYSDEC TAGM 4015. Selected analytes were detected in samples, including the following seven metals detected in the groundwater in excess of comparison criteria (TOGS 1.1.1 standard or guidance values) in 2007 and/or 2009:

Analyte	**Number of 2007 Detections** *(6 Wells)*	**Number of 2009 Detections** *(10 Wells)*
Aluminum	2	4
Antimony	1	2
Iron	1	3
Manganese	4	2
Sodium	6	10
Thallium	1	0
Selenium	0	6

These metals, and the others reported present in Site groundwater below TOGS 1.1.1 standards or guidance values are inorganic substances that can, and many are, naturally abundant in the environment. These substances are commonly found in an undissolved form in ground water samples that contain sediments/silt within the groundwater samples. While low flow sampling reduces sediment levels during the sampling process, it does not eliminate sediment presence/bias in samples especially at the low limits of detectability for these analytes. Lack of data reproducibility between sample events is a further indicator of how results can be influenced by the sampling process/condition and not Site/source related. As shown on Table IV, this is the case with antimony, iron, manganese, selenium and thallium, all of which have distinctly different reported analytical results between sampling events at the same well locations.

The data set further indicates that detections are characteristic of an ambient or background groundwater quality condition in the Site area given the detection of elements at consistent levels in wells that are both up gradient and down gradient of the Site. This condition applies to all of the reported data with the possible exception of two detections of antimony reported slightly higher than the

detection limit/comparison criterion. This condition is, in our opinion, indicative of sample quality (turbidity) given its natural abundance compared to the other inorganic analytes and because the comparison criterion is far lower than the other inorganic analytes. As summarized on Table IV, antimony was detected slightly higher than drinking water standard (3 ug/L) at two well locations, B-143-MW (at an estimated value of 7 ug/L in 2007 and at 52 ug/L in 2009) and B-250-MW (39 ug/L).

PCBs & Pesticides

No PCBs or pesticides were detected in the groundwater, except for trace pesticide levels observed during the 2007 sampling event. The pesticide compounds were detected in excess of comparison criteria, but below laboratory practical quantitation limits (less than 50 parts per trillion) and, as documented in the RIWP, of no significance to the Site.

4.3 Quality Assurance/Quality Control & Data Usability Summary

The RI sampling and analysis program included the following quality assurance/quality control (QA/QC) procedures in accordance with the RIWP and DER-10:

- Collection and analysis of quality control samples including duplicate, blank and matrix spike/matrix spike duplicates (MS/MSD).
- Use of a NYSDOH ELAP-certified laboratory using analytical methods promulgated in US EPA-846.
- Expanded laboratory deliverables including NYSDEC ASP Category B level packages for a representative subset of the sampling program and ASP Category A level packages for the balance of the samples analyzed.
- Preparation of Data Usability Summary Reports (DUSRs) for each sample delivery group (SDG) by a NYSDEC-approved data validator in accordance with the procedures set forth in the NYSDEC "Guidance for the Development of Quality Assurance Plans and Data Usability Summary Reports," September 1997. These reports are referred to as Data Useability Summary Reports (DUSRs) for each laboratory sample delivery group which are included in Appendix D. These same QA/QC procedures were followed during the Phase II ESA program, the results of which are provided in the approved RIWP including a comprehensive set of DUSRs for all Phase II data sets.

All the environmental samples collected during the RI Program were analyzed by the laboratory in accordance with the approved RIWP with the overall objective to assess the completeness of the Site data in terms of its precision, accuracy, and representativeness. During data validation, the sample results were qualified in accordance with the USEPA National Functional Guidelines for Evaluating Organic and Inorganic Analyses where appropriate. The qualifiers were assigned to the reported results as described in the DUSRs and presented in the summary data tables attached to the RI Report. The analytical results for the RI Program were found to be compliant with the data quality objectives for the project and usable, with the qualifications noted in the DUSRs contained in Appendix D. Overall, these qualifications are minor, related to adjustments to the laboratory reporting limits and do not compromise the usability of the data. There are, however, certain notable exceptions regarding apparent laboratory/sampling interferences. These interferences cannot be described in the DUSRs results but are otherwise inferred to exist including the following:

- the presence of the commonly used laboratory solvents (e.g. acetone and carbon disulfide) in samples that are not related to the Site, and

- the presence of common by-products of potable water treatment chemicals (bromodichloromethane, chloroform, and dibromochloromethane) in samples that are not related to the Site.

Therefore, in summary, evaluation of the completeness of the data is defined as a measure of the amount of valid (usable) data obtained from a measuring system compared to the amount expected to be obtained during an investigation. The completeness goal for all data uses is that a sufficient amount of valid data be generated so that determinations can be made related to the intended data use with a high degree of confidence. The completeness objective as indicated in the RIWP was 90 percent or greater. Validation of the 2009 data indicate that greater than 99 percent completeness was achieved for the RI (including during the Phase II ESA as summarized in the RIWP) conducted at the Tioga Avenue Site.

5. CONCEPTUAL SITE MODEL

As described in DER-10, the Conceptual Site Model (CSM) process is utilized to: 1) develop a framework for analysis of contaminants identified at the Site during the investigative process and, 2), to provide the basis for determining the need and scope of the remedial action process that is protective of human health and the environment. The CSM process includes delineation of the Contaminants of Concern (COCs), assessment of the extent and transport of the COCs within the environment, and development of a Qualitative Human Health Exposure Assessment (QHHEA) to determine if COCs presence could constitute an exposure pathway currently or under the future intended land use scenarios. More specifically, the CSM addresses:

- Sources of Contamination;
- Nature and Extent of Contamination;
- Dominant Fate and Transport Characteristics (based on Site conditions and contaminants encountered);
- Potential Exposure Paths; and
- Potentially Impacted Receptors.

The Tioga Avenue Site CSM has been prepared using information derived from the ESA (including Site history information related to the fill), Site characterization data from the 2007 Phase II ESA and the 2009 RI explorations, sampling and analytical testing program. These investigations document the following key factors on contaminant presence and mobility used in development of the CSM for the Tioga Avenue BCP Site:

Site Features/Characteristics:

- The majority of the ground surface is currently almost entirely covered by concrete floor slabs, or asphalt creating a physical barrier between the ground surface and the underlying historic fill material. These surfaces were thoroughly swept and washed after building demolition.

- Immediately below this barrier is fill consistent with the definition of "historic fill" as described in NYCRR Part 375-1.2(x). The historic fill is present generally between depths of 0 and 14 feet or more below the existing ground surface cap. The historic fill is broadly distributed across the Site and is likely to have existed before Corning's acquisition and manufacturing use on the Site.

- Native alluvial deposits were encountered below the historical fill. This deposit is comprised of a thick sand and gravel stratum which forms an unconfined aquifer that is continuous across the site. There were no indications of the presence of a confining strata within the alluvial deposit observed during the RI drilling program.

- Based on the most recent Site wide elevation data, the groundwater table has a low gradient (on the order of less than a foot across the Site at an approximate El 906), ranges from 17 to 25 feet in depth within the alluvial deposits, and flows from west to east at the Site.

- Groundwater flow at the Site is generally toward the east consistent with the natural regional flow direction of the Chemung River sand and gravel aquifer. Locally, flow direction may also be influenced by groundwater extraction and industrial use on the World Kitchen property as

well as on the Site property. Hydrogeologically, there is relatively little difference in groundwater elevations between the deep and shallow monitoring interval water elevations on the Site, which is consistent with regional and local geologic conditions observed at the Site (unconfined sand and gravel alluvium aquifer).

- Groundwater is not utilized as a potable resource at the Site.

Site Data:

- Overall, the analytical results of historic fill samples are representative of the heterogeneous background conditions typical of historic fill. Arsenic and lead were detected in a relatively low percentage in some of the shallow fill samples (mostly from 0 -1 foot bgs) at concentrations exceeding SCOs. The spatial distribution and SCO exceedences in the data set do not indicate that elevated arsenic and/or lead concentrations originate from a point source(s), but rather are random in nature and indicative of elements that could be present within historic fill on the Site.

- Other inorganic detections above comparison criteria were detected in groundwater but not in the historical fill and these detections are indicative of ambient water quality conditions given the urban Site setting and not the site.

- The Site analytical data do not indicate that the native alluvial deposits beneath the historic fill contain any metal (or any other organic compound) concentration higher than the SCOs or, in the case of naturally occurring inorganics, at levels within which they would naturally exist in the soil.

- The sampling program included extensive analysis of fill from within AOCs 6, 7 and 8 where bulk above and below ground tanks of fuel oil and to a lesser extent gasoline products were in use in the past. Investigations in these areas indicated the presence of residual petroleum substances with staining and odors observed during drilling. When analyzed, representative impacted samples lacked the presence of detectable levels of almost all of the related petroleum constituents. It is concluded that the few limited detections of specific petroleum related constituents, the observed odors and possible groundwater sheen, are indicative of highly weathered residues remaining from petroleum product use many years ago. Conditions identified do not indicate the existence of any active petroleum spill/leakage or source area. The extent of these impacts were defined during the RI and located by the AOC area shown on Figure 3.

- Investigations of soil and groundwater across the property and within the AOCs have not indicated the presence of VOCs substances (petroleum or non petroleum) exceeding comparison criteria on the Site except for detections of two petroleum substances in isolated samples slightly higher than drinking water standards (isopropylbenzene detected in two groundwater samples at 8.2 and 19 ug/l versus the standard of 5 ug/l) and one detection in soil slightly higher than commercial (but not industrial) SCOs (1,2,4-trimethlybenzene detected below the laboratory PQL at 210 mg/kg versus SCOs of 190 mg/kg and 310 mg/kg respectively based on commercial and industrial land use). Consistent with the RIWP, investigation results did not warrant any need for assessment of soil vapor media absent the presence of detectable levels of any VOC constituents. *Nevertheless, the potential nuisance conditions that could be related to the petroleum odors as described above are considered in the exposure assessment as a potential "air/inhalation" pathway as further described below.*

5.1 Contaminants of Concern

A summary of the Site contaminants of concern, potential source evaluation, and delineation of nature and extent has been distilled from extensive Site explorations, sampling and testing completed as are described in detail in the preceding sections of this report. The Phase II and RI Programs have included:

- 99 soil borings,
- 13 monitoring wells (including several deep interval locations),
- 212 soil and 19 groundwater samples analyzed for a combination of Site contaminants of concern and a broader suite of analytical parameters.

Based on the investigation and analytical results as summarized above, the Site COCs have been identified based on the detection of any one of a broad suite of organic and inorganic substances that are Site-related and are present at the Site at levels higher than the relevant standards, criteria, and guidelines (SCGs) or the established "comparison criteria" for this Site. Consistent with the RIWP, the significance of the Site data were evaluated on the basis of the SCOs as specified in the Part 375 BCP Regulations for soil (based on a commercial and/or industrial use as specified in the BCA) and the NYS Drinking Water Standards specified in NYSDEC TOGS 1.1.1. for groundwater. The SCOs represent risk-derived concentrations determined by the NYSDEC/NYSDOH to be fully protective of human health under commercial or industrial land use. The groundwater criteria default to the drinking water standards during the RI process and are acknowledged to be very conservative even for a screening-level assessment considering that groundwater is not used for potable purposes at the Site. Based on the Site soil and groundwater sampling results, other media such as impacts to ambient air are included in this evaluation.

The COC analysis included the entire Site soil and groundwater data set summarized on Table V which identifies those substances that were detected at levels higher than comparison criteria. Table V identifies those substances that are retained as COCs and the basis for that determination. Based on DER-10 criteria, the determination of COCs for this Site were based on the following factors:

- COC substances have been detected in excess of screening criteria.
- COC substances can be linked to the Site and not to naturally occurring and/or ambient conditions surrounding the Site.
- COC substances have been detected at a frequency and in sufficiently detectable concentrations that would indicate the likelihood that consequential amounts of the COC could have originated from and presently exist on the Site with a reasonable potential for human or environmental exposure.
- A COC has been identified for which numeric comparison criteria are absent, and thus are not applicable, but which otherwise present a potential for qualitative/nuisance condition in soil, groundwater and ambient air as described in NYSDEC guidance criteria. This COC includes the presence of weathered petroleum residues in AOCs 6, 7 and 8.

As summarized on Table V, detailed evaluation of the Site data set has resulted in identification of COCs on the Tioga Avenue Site. COCs include arsenic and lead above SCOs albeit in a relatively small percentage of the historic fill that is present throughout the Site, as well as residual weathered

petroleum in soil and in groundwater that exists in the former petroleum storage areas on the Site. While chemical analysis of the petroleum impacted media do not indicate significant detections of petroleum constituents, this material is nevertheless identified as a COC and carried forward in the remedial planning process because this material represents a potential "nuisance" condition. Table V summarizes all the sample results/detections higher than the comparison criteria and the rationale of which of these detections are identified as COCs. These COCs have been identified as being "Site-related" and were included in the Qualitative Human Health Assessment (QHHEA) that was performed in accordance with NYSDOH protocol as detailed below.

5.2 Chemical Properties of Contaminants of Concern

The physical properties of chemical compounds influence their behavior, fate and transport, and potential migration in the environment, therefore influencing potential pathways that may result in or lead to human and environmental exposure. The following information (derived from chemical compound summaries generated by the Agency for Toxic Substances and Disease Registry (ATSDR) provides general information on the physical properties of the COCs identified at the Site including arsenic, lead and petroleum substances. This information provides general information of the behavior of the COCs in soil, groundwater and ambient air that may influence the potential for exposure to receptors. The information below, along with the RI Program results, were used to evaluate if potential exposure pathways could exist in connection with any of the COCs identified at the Site. Potential exposure pathways are further described and form the basis of the site-specific qualitative human health exposure assessment (QHHEA) performed for the Tioga Avenue BCP Site. The QHHEA was performed in accordance with DER 10, and specifically, the relevant NYSDOH QHHEA guidelines appended to DER 10.

Arsenic and lead are naturally occurring elements that are widely distributed in the earth's crust and soils, and have otherwise been widely used as ingredients in a variety of products/processes. RI results have not shown that the disposition of these elements at the Site can be linked to any specific use or to former glass manufacturing operations given their random distribution. Because these elements are natural components of the earth's crust, low levels of the elements are found in nearly all environmental media and can be present at higher levels in the environment based on past use. Lead for example frequently exists in higher levels in soil near roadways as a result of deposition from historical use of "leaded" gasoline. Similarly, arsenic can be found at higher than background concentrations where it was historically an ingredient of certain pesticides. Both elements also exist or accumulate in higher levels from coal and/or the combustion of coal as is apparent within the historical fill on the Site. Regardless of the origin however, these elements are predominantly inorganic and are known to be relatively immobile in the environment. These assumptions have been demonstrated by the RI data (e.g. no evidence of these elements above SCOs or background in the native alluvial soil or in groundwater at the Site). The arsenic and lead contained in the historic fill on the Site, like other metals, tends to remain bound in solid compounds in soil and would remain in the upper layer of soil or fill. Because of these characteristics, exposure to arsenic or lead impacted soil tends to occur primarily as a result of direct dermal contact with the affected soil or inhalation/ingestion of windborne dust emanating from the surface soils.

Weathered petroleum residuals in historic fill, soil and groundwater are identified as a COC within the area of the Site where petroleum fuel products were used in the past. Contamination by petroleum residuals is widespread in modern society because of their use in common petroleum-based products such as gasoline, kerosene, fuel oil, mineral oil, and asphalt. Petroleum is often released to the environment through industrial processes or byproducts from commercial or private uses. Residual

petroleum products consist of substances that originate from crude oil and, in the case of the Site, exist in a highly weathered residual form after years in which they have been naturally broken down by organisms found in soil and water. The RI results indicate the presence of weathered petroleum substances including discernable petroleum odors, soil staining and a sheen on groundwater, yet the volatile and semi-volatile compounds associated with petroleum products/spills were not detected at levels higher than comparison criteria except for very limited exceptions. Nevertheless, the occurrence of weathered petroleum contamination is identified as a COC because it presents a potential "nuisance" condition consistent with how a "nuisance" is defined in relevant NYSDEC guidance. The most common source of exposure to the weathered petroleum in the subsurface is by inhalation of the nuisance odors present near a release. Other routes of exposure include ingestion of contaminated soil/water, and absorption from direct contact with skin.

5.3 Qualitative Human Health Exposure Assessment

A Qualitative Human Health Exposure Assessment (QHHEA) is an evaluation of the potential for a complete pathway to exist by which human receptors may be exposed to the Site contaminants. Specifically, the QHHEA process has been used during the RI process as initial screening tool to assess the potential that any COC identified in the Site CSM (arsenic and lead in historical fill, and petroleum substances in fill, soil and groundwater) could represent a current or potential future human exposure and thereby present the potential for adverse health risk. This initial screening process is used to focus results of the RI on the Remedial Action program as may be warranted to mitigate human exposure and potential risk that may currently exist or which could exist during future commercial or industrial Site development consistent with the Site BCA. The Tioga Avenue Site QHHEA has been completed in accordance with DER-10 requirements for human health exposure assessment with the following specific objectives for the Tioga Avenue BCP Site:

- Qualitatively evaluate actual or potential exposures to Site COCs;
- Characterize the exposure setting, identify potential exposure pathways, and evaluate contaminant fate and transport;
- Derive a conclusion whether or not a complete exposure pathway could exist currently or be reasonably anticipated in the future whereby human contact to the medium which contains contaminants on the Site could potentially occur; and,
- If the QHHEA concludes that complete exposure pathways are potentially present at the Site, describe the nature of the population exposed, or potentially exposed, to contaminants that are present at the Site and provide recommendations on additional exposure analysis and/or for remedial actions appropriate to mitigate the exposure pathway.

  Or

  If the QHHEA concludes that complete exposure pathways do not currently exist or could reasonably exist in the future, further human health exposure assessment is not warranted.

In accordance with the QHHEA guidance, analysis of exposure pathways for each of the COCs identified on the Site as are described above includes a positive determination that an exposure pathway is "complete" if all the following factors or conditions are identified at the Site:

1. presence of a contaminant in a medium (soil, air, or water);
2. a receptor (i.e., a Site visitor, occupant or worker);
3. a transport mechanism (i.e. volatilization) within which the contaminant can migrate to the receptor; and
4. a route of exposure (i.e. inhalation) for the receptor.

The QHHEA for the Site is detailed on Table VI which identifies the potential for exposure pathways to exist currently or that could reasonably exist in the future based on commercial or industrial site development and re-occupancy. For each media (soil/fill, groundwater, air) on the Site, Table VI presents an assessment of whether COCs are/could be present, the key fate and transport characteristics of these substances, the potential current and future human exposure/land use scenarios, and identification of exposure pathways. Pathway analysis is based on the assumed exposure scenarios as consistent with the relevant State and Federal guidelines as referenced above and as appropriate for this Site.

As described on Table VI the current and reasonably anticipated exposure settings for the Site are based on inadvertent ingestion, adsorption or inhalation of COCs to the extent these substances have been identified as being contained within historical fill, groundwater or ambient air at the Site. Exposed populations include workers under the current limited Site use scenario, and workers and occupants of the Site during future development and commercial and/or industrial re-occupancy of the Site. The future Site use scenario includes the assumption that the existing ground surface will be disturbed (e.g. concrete and asphalt removed) to allow for redevelopment of the Site. The rationale for the Site exposure setting is further described on Table VI based on the RI Program findings.

In summary, exposure pathways are incomplete and not currently present at the Site because there are controls on the Site that mitigate the potential for exposure to any reasonably anticipated current site occupant. These controls are, in effect, comparable in scope to "engineering controls" as these controls are defined in the relevant regulations of 6 NYCRR Part 375-1 including a surface cap, access restriction/control and lack of potable use of groundwater that prevent the potential for exposure. Assessment of future conditions assume that yet to defined commercial and/or industrial development will occur involving removal of the existing ground cover or "cap" to accommodate new construction. Under this scenario the QHHEA process concludes that exposure pathways to certain receptor populations could potentially become complete during future site development and/or during future Site occupancy.

These QHHEA findings support the conclusions of the RI Program and form the scope of the Remedial Action program as presented in Section 6 of this report. These findings specifically identify potential remedial options that appear warranted and appropriate for the Site, and which can be readily implemented. The options considered are consistent with applicable regulatory requirements to mitigate the potential for any future adverse human or environmental from potential exposure to COCs on the Site.

6. CONCLUSIONS & RECOMMENDATIONS

In accordance with the NYSDEC BCA for the Tioga Avenue Site, Corning has undertaken this RI Program as a "participant" to investigate the nature and extent of contaminants on the Tioga Avenue Site. The information developed during the RI is used to determine if remedial actions are warranted to facilitate the reuse and redevelopment of the property in ways that are protective of human health and the environment. Corning anticipates, and the BCA specifies, that future use of the Tioga Avenue Site will be commercial or industrial or a mixture of those uses.

This RI Report provides the results of the RI Program and incorporates previous Site investigation data and results. The RI has been completed consistent with the applicable NYSDEC 6 NYCRR Part 375 Regulations and related guidance documents (most notably the guidance criteria in NYSDEC DER-10), and the RIWP as approved by the NYSDEC in conjunction with the NYSDOH.

The RI included a comprehensive exploration and sampling program designed to characterize soil/fill and groundwater across the Site involving both targeted investigations of specific "areas of concern" (AOCs) as well as systematic characterization of the Site focused within the historic fill material found to be present across the Site.

6.1 Conclusions

Based on the previous Site environmental records, documentation research, investigations and this RI program, the following conclusions have been identified to meet the RI objectives and Site characterization requirements from the applicable regulatory and guidance requirements described above:

- The Site has been comprehensively characterized. Extensive characterization of soil and groundwater has been completed at the Site since 2007. A total of 99 borings and 13 groundwater monitoring wells have been completed. These explorations were, at a minimum, completed at approximately 100-foot intervals over the areal extent of the Site. Correspondingly, 212 soil samples and 19 groundwater samples were collected and analyzed at the Site. Additional explorations are not warranted to characterize the nature and extent of contamination at the Site or are necessary to determine the need and scope for a remedial action plan for the Site.

- Contaminants of concern at the Site consist of arsenic, lead, and residual weathered petroleum constituents in the historical fill. Arsenic and lead were detected in some of the shallow historical fill samples (mostly from 0 -1 foot bgs) at concentrations representative of historical fill. The data do not indicate that elevated arsenic and/or lead concentrations originate from a point source(s). Some evidence of residual weathered petroleum constituents was observed in the fill but not detected by laboratory analysis in concentrations exceeding SCOs except for the detection of one analyte in one of the soil samples. While chemical detections were not apparent during the RI program, it is reasonable to anticipate that petroleum-impacted soils could be encountered during future property development proximate to the former AST/UST areas.

- The historical fill and the Site inorganic COCs in the historic fill appear to pre-date Corning's use of the property, as the COCs were detected below concrete the floor slabs of the former

Fall Brook facility. This condition appears to indicate the Site COCs are most likely to be associated with the historical fill than with glass manufacturing operations.

- Corning and others used and stored petroleum at the Site for industrial purposes and investigations have identified the presence of residual impacts consisting of highly weathered residual petroleum in the historic fill, soil, and groundwater within the former storage and dispensing areas. Analytical testing of soil and groundwater have not indicated any significant detections of remaining chemical constituents of petroleum as a result of attenuation, however, the presence of petroleum is otherwise documented based on residual staining and odors. These conditions are thus characterized as representing a "nuisance" condition.

- Underlying native soils have not been adversely impacted by the fill. Some evidence of weathered residual petroleum was observed in soil samples at or near the water table depth interval. The very limited petroleum constituents detected in soil (one sample) and groundwater (two samples) samples are not indicative of a persistent source of petroleum contamination rather highly attenuated or weathered petroleum impacted media.

- Groundwater has not been affected by the presence of historical fill. Certain naturally occurring substances (metals/inorganics) were detected at concentrations ranging above the TOGS 1.1.1 standard or guidance values; however, these detections are indicative of ambient groundwater quality and/or a common result from the sampling process (e.g. sediment/silt present in samples).

- The effects on groundwater from petroleum constituents at the former weathered petroleum AOCs are negligible. No free petroleum product was observed and only indications of trace residual impacts (slight sheen on groundwater samples or limited VOCs or SVOCs detected in down gradient well testing) were observed, which are not indicative of a significant active source of petroleum contamination.

- The majority of the ground surface is currently covered by concrete floor slabs, or asphalt paving remaining from the former Fall Brook manufacturing plant. These surfaces were swept and washed after building demolition.

These RI Program results and conclusions as are summarized above provided the input necessary for the Qualitative Human Health Exposure Assessment (QHHEA) for the Site that was prepared in accordance with applicable NYSDOH guidance. The QHHEA is used to determine whether any of the COCs identified at the Site could pose an existing or potential hazard to the exposed or potentially exposed populations. Results of the QHHEA were that:

- There were no complete human health exposure pathways identified at the Site under the current Site conditions. Access to impacted soils is mitigated by the surface cap created by the former facility floor slabs and paved areas, and Site access is controlled/restricted by fencing that surrounds the Site. There is no potential exposure to COCs in groundwater as groundwater is not, nor is planned to be, used for drinking water purposes and the groundwater that is otherwise in current use for industrial purposes does not contain the identified COCs.

- The potential for future complete exposure pathways from inadvertent ingestion, dermal absorption, and inhalation of a COC could potentially exist to the extent that the concrete/asphalt cap is removed and the historical fill becomes exposed at the ground surface

and/or disturbed; or if groundwater that does contain COCs is extracted in the future and used in a way that creates an exposure pathway.

It is our opinion based on these RI Program results that remedial actions are warranted to mitigate the potential that human or environmental exposure could exist during and after the proposed future commercial and/or industrial development of the Tioga Avenue Site.

6.2 Recommended Site Remedy

Based on the RI results, remedial action appears to be warranted to mitigate the potential for exposure to contaminants that could be associated with future commercial and/or industrial development of the Site. The RI Program has produced a sufficient quantity and quality of data to support development of a Remedial Work Plan as appropriate for current, intended, and reasonably anticipated future commercial/industrial land use of the Site. Consistent with the BCP, it is reasonable and appropriate to conclude that the potential future risk presented by exposure to historic fill (e.g., Site COC metals) or nuisance conditions (e.g., weathered petroleum residues) can be readily remediated during and after future Site development by institutional controls and engineering controls, and memorialized in an environmental easement for the Site.

Therefore, consistent with Section II.A.2 of the BCA, Corning plans to submit an "Alternatives Analysis Report" and "Remedial Action Work Plan" for the Tioga Avenue Site to document the overall Remedial Action Goal and Objectives, the remedial alternative screening process, and to detail the scope and implementation process for the proposed institutional and engineering controls for the Site. The institutional controls will include a restriction on the future Site use to commercial or industrial uses consistent with the BCA, and a restriction on any future potable use of groundwater on the Site. The engineering control will entail the use and maintenance of cover systems as approved by NYSDEC. An environmental easement will be executed for the Site to ensure that these institutional and engineering controls remain in place. The environmental easement, along with a NYSDEC-approved Site Management Plan (SMP), would be utilized to effectively mitigate and further minimize the already low potential exposure pathways identified in the Site qualitative human health exposure assessment.

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TABLE VI: FATE & TRANSPORT AND POTENTIAL EXPOSURE PATHWAYS FOR SITE CONTAMINANTS OF CONCERN
TIOGA AVENUE BCP SITE REMEDIAL INVESTIGATION PROGRAM
CORNING INCORPORATED
CORNING, NEW YORK

Media	Constituents of Concern (COCs)	Fate & Transport	Potentially Affected Populations	Exposure Pathways *Ingestion*	*Absorption*	*Inhalation*	Potential Exposure Setting & Mechanism
Historic Fill Materials	▪ Arsenic and Lead ▪ Weathered Petroleum Hydrocarbons (principally olfactory; limited detection of petroleum constituents-trimethylbenzene was detected above SCOs in one sample)	▪ Arsenic and lead (COCs) detections limited and are confined to the historical fill layer. These COCs are immobile and have not impacted underlying native soils or groundwater. ▪ Weathered petroleum residues limited to areas of former petroleum storage and impacts limited to odors in the historic fill materials. ▪ The Site is largely covered with a concrete/ asphalt cap, with access controlled which precludes direct exposure to impacted historic fill. ▪ COCs could be present in dust potentially generated during excavation activities within the historic fill.	▪ Current Site Workers	Incomplete	Incomplete	Incomplete	**Ingestion:** No current pathway exists due to the presence of the concrete/asphalt cap covering a majority of the Site. COCs could become a potential future exposure pathway if the historic fill is exposed during excavation and inadvertently ingested. **Absorption:** No current pathway exists due to the presence of the concrete/asphalt cap covering a majority of the Site. Could become a potential future exposure pathway if the historic fill is exposed during excavation and contacts skin. **Inhalation:** No current pathway due to the presence of an impervious concrete/asphalt cap covering a majority of the Site. Areas that do not contain an impervious surface are landscaped and grass covered which minimize dust generation and mitigate potential for contact. Could become a potential future exposure pathway if historic fill is disturbed, and dust particles are generated, as for example, during future site construction and development.
			▪ Future Construction Workers ▪ Future Site Workers/ Occupants	Potentially Complete	Potentially Complete	Potentially Complete	

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TIOGA AVENUE BCP SITE REMEDIAL INVESTIGATION PROGRAM
CORNING INCORPORATED
CORNING, NEW YORK

Media	Constituents of Concern (COCs)	Fate & Transport	Potentially Affected Populations	Exposure Pathways *Ingestion*	*Absorption*	*Inhalation*	Potential Exposure Setting & Mechanism
Groundwater	▪ Weathered Petroleum Hydrocarbons (principally olfactory; limited detections of petroleum constituents-only isopropylbenzene detected above groundwater standards in two samples in limited area of the Site)	▪ Groundwater is not currently, nor is it intended to be used for drinking water purposes. ▪ Groundwater is currently extracted from a deeper well outside (both horizontally and vertically) of the petroleum-affected area. Extracted groundwater is used for industrial purposes at the WWTP and at the World Kitchen facility.	▪ Current Site Workers	Incomplete	Incomplete	Incomplete	**Ingestion:** No pathway as Site groundwater is not currently used, nor under any reasonable future use scenario would groundwater be used for potable water. **Absorption:** No current pathway. Currently groundwater is only used for industrial processes (WWTP makeup water), outside of petroleum-affected area. Could be a future potential exposure pathway under a different non-potable usage scenario if impacted groundwater comes into contact with skin, and COC absorbed. However, this potential for exposure is considered incomplete because analysis of impacted groundwater has not contained petroleum constituents in excess of screening criteria. In addition, any extracted groundwater would otherwise be largely isolated from exposure (e.g. contained within the process-pipes, tanks, etc.). **Inhalation:** Based on data collected within the impacted area, this pathway is unlikely due to the lack of petroleum constituents being detected in groundwater.
			▪ Future Construction Workers ▪ Future On-Site & Off-Site Workers/ Occupants	Incomplete	Incomplete	Incomplete	

TABLE VI: FATE & TRANSPORT AND POTENTIAL EXPOSURE PATHWAYS FOR SITE CONTAMINANTS OF CONCERN

TIOGA AVENUE BCP SITE REMEDIAL INVESTIGATION PROGRAM
CORNING INCORPORATED
CORNING, NEW YORK

Media	Constituents of Concern (COCs)	Fate & Transport	Potentially Affected Populations	Exposure Pathways *Ingestion*	*Absorption*	*Inhalation*	Potential Exposure Setting & Mechanism
Air	▪ Weathered Petroleum Hydrocarbons (nuisance odors)	▪ Possible petroleum odors present in historic fill may be present if exposed during excavation activities in affected areas of the Site. ▪ Potential that petroleum odors could create nuisance condition in future building space.	▪ Current Site Workers	Incomplete	Incomplete	Incomplete	**Ingestion:** Not an applicable pathway. **Absorption:** Not an applicable pathway. **Inhalation:** No potential current pathway exists because Site is covered and vacant. Could become a potential future pathway if nuisance odors are encountered during site construction and exist after development.
			▪ Future Construction Workers ▪ Future Site Workers/ Occupants	Incomplete	Incomplete	Potentially Complete	