FONF EXPANSION/SABRE PARK BCP

TOWN OF NIAGARA, NEW YORK

Final Engineering Report

NYSDEC Site Number: C932162

Prepared for:

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15 NOVEMBER 2014

CERTIFICATIONS

I, Joel B. Landes, am currently a registered professional engineer licensed by the State of New York, I had primary direct responsibility for implementation of the remedial program activities, and I certify that the Remedial Action Work Plan was implemented and that all construction activities were completed in substantial conformance with the Department-approved Remedial Action Work Plan.

I certify that the data submitted to the Department with this Final Engineering Report demonstrates that the remediation requirements set forth in the Remedial Action Work Plan and in all applicable statutes and regulations have been or will be achieved in accordance with the time frames, if any, established in for the remedy.

I certify that all use restrictions, Institutional Controls, Engineering Controls, and/or any operation and maintenance requirements applicable to the Site are contained in the environmental easements created and recorded pursuant ECL 71-3605 and that all affected local governments, as defined in ECL 71-3603, have been notified that such easements have been recorded.

I certify that a Site Management Plan has been submitted for the continual and proper operation, maintenance, and monitoring of all Engineering Controls employed at the Site, and that such plan has been approved by Department.

I certify that all documents generated in support of this report have been submitted in accordance with the DER's electronic submission protocols and have been accepted by the Department.

I certify that all data generated in support of this report have been submitted in accordance with the Department's electronic data deliverable and have been accepted by the Department.

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, Joel B. Landes, of Langan Engineering Environmental, Surveying, and Landscape Architecture, D.P.C. (Langan), am certifying as Owner's Designated Site Representative for the site.

076348-1	15 November 2014	Stamp/Signature
NYS Professional Engineer #	Date	

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LIST OF ACRONYMS

Acronym	Definition
AAR	Alternatives Analysis Report
AOC	Area of Concern
ASTM	American Society for Testing and Materials
AWQS	Ambient Water Quality Standards
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
BMP	Best Management Practice
CAMP	Community Air Monitoring Plan
C&D	Construction & Demolition
CFR	Code of Federal Regulations
CHASP	Construction Health and Safety Plan
CLP	Contract Laboratory Program
COC	Contaminant of Concern
CQAP	Construction Quality Assurance Plan
DER	Division of Environmental Remediation
DRO	Diesel Range Organics
DSHM	Division of Solid & Hazardous Materials
DUSR	Data Usability Summary Report
EC/IC	Engineering Control and Institutional Control
EDD	Electronic Data Deliverable
EDR	Environmental Data Resources
ELAP	Environmental Laboratory Approval Program
EM	Electromagnetics
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
FER	Final Engineering Report
FSP	Field Sampling Plan
GC	Gas Chromatography
GPR	Ground Penetrating Radar
GPS	Global Positioning System
GRO	Gasoline Range Organics
HASP	Health & Safety Program
HAZWOPER	Hazardous Waste Operations Emergency Response
HDPE	High-Density Polyethylene
IHWDS	Inactive Hazardous Waste Disposal Site
IRM	Interim Remedial Measure
IRMWP	Interim Remedial Measures Work Plan
MMP	Material Management Plan
MS/MSD	Matrix Spike / Matrix Spike Duplicate

Acronym	Definition
NAVD	North American Vertical Datum
NWI	National Wetland Inventory
NYCRR	New York Codes Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYS DEC DER	New York State Department of Environmental Conservation Division of Environmental Remediation
NYS DEC PBS	New York State Department of Environmental Conservation Petroleum Bulk Storage
NYSDOH	New York State Department of Health
NYS DOT	New York State Department of Transportation
O&M	Operations & Maintenance
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PE	Professional Engineer
PID	Photoionization Detector
PM	Particulate Matter
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance / Quality Control
QAPP	Quality Assurance Project Plan
QEP	Qualified Environmental Professional
RAOs	Remedial Action Objectives
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RE	Remedial Engineer
RI	Remedial Investigation
RIR	Remedial Investigation Report
RIWP	Remedial Investigation Work Plan
SCOs	Soil Cleanup Objectives
SCGs	Standards, Criteria and Guidance
SEQR EAF	State Environmental Quality Review Environmental Assessment Form
SMP	Site Management Plan
SOP	Site Operations Plan
SPDES	State Pollutant Discharge Elimination System
SSDS	Sub-Slab Depressurization System
SSURGO	Soil Survey Geographic
SVOCs	Semi-Volatile Organic Compound
SWPPP	Stormwater Pollution Prevention Plan
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure

Acronym	Definition
TOGS	Technical and Operation Guidance Series
TPH	Total Petroleum Hydrocarbons
USEPA	United State Environmental Protection Agency
UST	Underground Storage Tank
VOCs	Volatile Organic Compound
XRF	X-Ray Fluorescence

1.0 BACKGROUND AND SITE DESCRIPTION

Fashion Outlets II, LLC and Macerich-Niagara, LLC (collectively "Macerich" for the purpose of this report) entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) as a "Volunteer" to investigate and, where necessary, remediate a 47.8-acre property located in the Town of Niagara, New York. The Fashion Outlet of Niagara Falls (FONF) Expansion/Sabre Park property (hereinafter referred to as the "Site") has been remediated to Track 4 Commercial Use BCP Cleanup criteria, and is redeveloped with a new 225,000 square-foot expansion of the existing FONF mall, including 175,000 square feet of new enclosed gross leasable area to the existing FONF mall, an additional 1,720,000 square feet of asphalt paved parking areas, 273,750 square feet of landscaped areas, and 225,000 square feet of stormwater detention ponds. Also, a new Secure Storage facility has been constructed in the southwest corner of the Site to replace the former Secure Storage facility.

The Site is located in the Town of Niagara, New York and includes the ±34-acres former Sabre Park Mobile Home Community located at 1705 Factory Outlet Boulevard (a/k/a Fashion Outlet Boulevard, a/k/a Third Avenue Extension, a/k/a Connection Boulevard - Assessor's Parcel Number 160.08-1-2, 160.08-1-6 and 160.08-1-7), an approximate 10.35-acre parcel located on the southern portion of the larger approximately ±41.3-acre FONF property located at 1900 Military Road, (specifically, a portion of Assessor's Parcel Numbers 145.20-1-15), and a smaller parcel encompassing approximately 3.45-acres on the western side of the Site located at 1755 Factory Outlet Boulevard (a/k/a Fashion Outlet Boulevard, a/k/a Third Avenue Extension, a/k/a Connection Boulevard - Assessor's Parcel Number 160.08-1-1). A Site Location Map is provided as Figure 1. The total footprint of the Site subject to the BCP is approximately 47.8-acres. The Site is bounded by Factory Outlet Boulevard/Route 190 to the west/northwest, the existing Fashion Outlets of Niagara Falls to the east, and National Grid power lines to the south. The boundaries of the Site are described in Appendix A: Survey Map, Metes and Bounds. A Site layout map is provided as Figure 2.

An electronic copy of this FER with all supporting documentation is included as Appendix B.

2.0 SUMMARY OF SITE REMEDY

2.1 REMEDIAL ACTION OBJECTIVES

Based on the results of the Remedial Investigation, the following Remedial Action Objectives (RAOs) were identified for this site.

2.1.1 Groundwater RAOs

RAOs for Public Health Protection:

- Prevent ingestion of groundwater containing contaminant levels exceeding drinking water standards; and,
- Prevent leaching of chromium from characteristically hazardous soil to groundwater.

RAOs for Environmental Protection:

- Prevent discharge of groundwater that would result in surface water contamination.

2.1.2 Soil RAOs

RAOs for Public Health Protection:

- Prevent ingestion/direct contact with soil that poses a risk to public health and the environment given the current and future intended use of the Site; and,
- Prevent inhalation of or exposure to contaminants volatilizing from contaminated soil.

RAOs for Environmental Protection:

- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Remove characteristically hazardous soil/fill.

2.1.3 Soil Vapor RAOs

RAOs for Public Health Protection:

- Prevent exposure to contaminants in soil vapor; and,
- Prevent migration of soil vapor into occupied structures.

2.2 DESCRIPTION OF SELECTED REMEDY

The Site was remediated in accordance with the remedy approved by the NYSDEC in the 9 October 2013 Interim Remedial Measures Work Plan (IRMWP) and 30 April 2014 Remedial Action Work Plan (RAWP). Based on the results of Langan's July 2013 Remedial Investigation, fill throughout the entire Site contained metals, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphynels (PCBs), pesticides, and herbicides at concentrations exceeding unrestricted residential SCOs, and the anticipated costs associated with additional excavation required to achieve a Track 1 cleanup were deemed to be uneconomical and unreasonable. Therefore, a Track 4 remedy was selected for the Site, and residual contaminated soil and water was left in place. Site-specific SCOs were developed for soil exceeding 6NYCRR Part 371 hazardous criteria and PCB-impacted soils that exceed 1 ppm at the surface and 10 ppm in the subsurface. Management of the residual contaminated soil and groundwater left at the Site is addressed via site-wide engineering controls, accompanying Environmental Easements (Appendix D), and Site Management Plan (SMP) (Appendix C).

The factors considered during the selection of the remedy are those listed in 6NYCRR 375-1.8. The remedial action consisted of:

1. Full-time implementation of a Community Air Monitoring Program (CAMP) for particulates and VOCs.

2. Excavation and off-site disposal of 164,627.17 tons of construction related spoils exceeding the restricted commercial SCOs;

3. Excavation and offsite disposal of two hot spot areas, including PCB-impacted soils with concentrations exceeding 10 mg/kg (716.6 tons), and chromium impacted soils with concentrations exceeding the RCRA Characteristically Hazardous Waste Criteria of 5 mg/L (682.1 tons);

4. Excavation and disposal of approximately 258.5 tons of low-level radioactive waste (LLRW) encountered during installation of building utilities and interior piers in the northern portion of the FONF mall building pad.

5. Sampling and analysis of excavated soil/fill in accordance with the requirements of the selected disposal facilities. The excavated soil/fill was classified and segregated, based on the analytical results of the soil characterization sampling.

6. Transportation and off-site disposal of soil/fill material at permitted facilities in accordance with the RAWP, disposal facility requirements, and applicable laws and regulations for handling, transport, and disposal.

7. Systematic screening of imported soil and excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a photoionization detector (PID).

8. Collection and permitted discharge of approximately 10,698,200 gallons of perched, contaminated groundwater and accumulated stormwater exceeding Part 703 GA criteria to the Niagara Falls Water Board (NFWB) wastewater treatment facility.

9. Installation of vapor barriers with active sub-slab depressurization systems beneath the mall expansion building and occupied office building of the relocated Secure Storage facility;

10. Construction of a site-wide soil cap/cover system consisting of the following to prevent human exposure to remaining contaminated soil/fill remaining at the Site:

    a. Placement of a minimum of 1 foot of certified clean soils meeting the Allowable Constituent Levels for Imported Fill or Soil for Commercial Uses (Appendix 5 of DER 10) over all landscaped areas;

    b. Placement of a combination of a minimum of 6 inches of certified clean clay and a minimum of 1 foot of certified clean soils meeting the Allowable Constituent Levels for Imported Fill or Soil for Commercial Uses (appendix 5 of DER 10) at the stormwater detention ponds.

    c. Pavement with varying depths of subbase (4 inches to 12 inches) in the parking lots and drive aisles, and concrete building foundations under all buildings;

11. Backfilling of remedial excavation areas to development grade with clean virgin quarried stone or clean fill meeting the requirements of NYSDEC Division of Environmental Remediation (DER) Draft DER-10 – Technical Guidance for Site Investigation and Remediation, Section 5.4, or virgin, native imported crushed stone.

12. Execution and recording of Environmental Easements that cover the entire extent of the BCP property to restrict land use and manage the engineering controls to prevent exposure to contamination remaining at the Site

13. Development and implementation of a SMP for long-term management of residual contamination as required by the Environmental Easements, which includes plans for: (1) Institutional and Engineering Controls, (2) monitoring, (3) operation and maintenance, and (4) reporting;

14. Annual certification of the institutional and engineering controls listed above.

Remedial activities were completed at the Site on 12 November 2014.

3.0 INTERIM REMEDIAL MEASURES, OPERABLE UNITS AND REMEDIAL CONTRACTS

Prior to the issuance of the RAWP, remediation activities at the Site were being conducted in accordance with a NYSDEC-approved IRMWP. However, the remedy for this site was performed as a single project, and operable units or separate construction contracts were not utilized. The information and certifications made in the April 2014 RAWP were relied upon to prepare this report and certify that the remediation requirements for the site have been met.

4.0 DESCRIPTION OF REMEDIAL ACTIONS PERFORMED

Remedial activities completed at the Site were conducted in accordance with the NYSDEC-approved 9 October 2013 Interim Remedial Measures Work Plan (IRMWP) (revised on 17 January 2014) and 30 April 2014 Remedial Action Work Plan (RAWP). No deviations from the IRMWP or RAWP were noted.

4.1 GOVERNING DOCUMENTS

4.1.1 Construction Health and Safety Plan (CHASP)

All remedial work performed under this remedial action was in full compliance with governmental requirements, including Site and worker safety requirements mandated by Federal OSHA. The Construction Health and Safety Plan (CHASP) was complied with for all remedial and invasive work performed at the Site. The CHASP meets the requirements of 29 CFR 1910 and 29 CFR 1926 (which includes 29 CFR 1910.120 and 29 CFR 1926.65). The CHASP included, but was not limited to, the following components listed below:

- Organization and identification of key personnel;
- Training requirements;
- Medical surveillance requirements;
- List of site hazards;
- Excavation safety;
- Work zone descriptions;
- Personal safety equipment and protective clothing requirements;
- Decontamination requirements;
- Standard operating procedures;
- Contingency plans;
- Community Air Monitoring Plan; and
- Material Safety Data Sheets

4.1.2 Quality Assurance Project Plan (QAPP)

The QAPP was included as Appendix C of the NYSDEC-approved RAWP, dated 30 April 2014. The QAPP describes the specific policies, objectives, organization, functional activities and quality assurance/ quality control activities designed to achieve the project data quality objectives.

4.1.3 Construction Quality Assurance Plan (CQAP)

The CQAP was included as Appendix C of the NYSDEC approved RAWP, dated 30 April 2014, and managed performance of the remedial action tasks through designed and documented QA/QC methodologies applied in the field and in the lab. The CQAP provided a detailed description of the observation and testing activities that were used to monitor remedial construction quality and confirm that remediation activities were conducted in conformance with the remediation objectives. The CQAP includes:

- Responsibilities and authorities of the organizations and key personnel involved in the design and construction of the remedy;
- The qualifications of the quality assurance personnel who demonstrate that they possess the training and experience necessary to fulfill project-specific responsibilities;
- The observations and tests used to monitor construction and the frequency of performance of such activities;
- The sampling activities, sample size, sample locations, frequency of testing, acceptance and rejection criteria, and plans for implementing corrective measures as addressed in the plans and specifications;
- Requirements for project coordination meetings between the Owner and its representatives, the Construction Manager, Remediation Contractor, remedial or environmental subcontractors, and other involved parties;
- A detailed description of field equipment decontamination and management of investigation derived waste;
- Field instrument calibration procedures and sample identification and custody guidelines;
- Description of the reporting requirements for quality assurance activities including such items as daily summary reports, schedule of data submissions, inspection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation; and,
- Description of the final documentation retention provisions.

4.1.4 Soil Excavation Method and Approach

The Remedial Engineer provided oversight for all invasive work and the excavation and load-out of excavated material. The entire Site was subject to some form of excavation including but not limited to general site grading, utility excavation, storm water detention pond excavation, building foundation excavation, or hotspot excavations. Excavation was conducted using conventional hydraulic excavation equipment. Excavation depths were achieved using laser levels and GPS units connected to the earthwork equipment. Survey data was downloaded to the instruments and grading was completed in real time. Excavations on the site ranged in depth from less than one foot at the existing mall parking area resurfacing activities to approximately 12-feet at the storm water detention ponds and sanitary sewer utility installation. During excavation and installation of deeper utilities, structural support was required. Specific structural supports were determined by the Construction Manager and Remediation Contractor and their engineer; both telescoping and non-telescoping trench boxes were utilized as structural supports during construction and remedial activities. The Remediation Contractor was responsible for support of excavation and protection of the adjacent, existing mall building as required while completing the work in accordance with applicable regulations and guidance.

Soil Dewatering/Stabilization

During the course of the project, contaminated perched groundwater and stormwater runoff accumulated within open excavations requiring dewatering. Dewatering fluids were collected, transported and disposed of in accordance with applicable local, State, and Federal regulations. All dewatering fluids were pumped into a series of five fractionation tanks to settle out solids before being discharged to the sanitary sewer under a NFWB Wastewater Facilities Wastewater Discharge Permit for Industrial Commercial User, Permit No. ICU-72 issued 22 October 2013 granted to MCI. In accordance with the permit, discharge water samples were collected at a frequency of 1 sample per month.

Soil Stockpiles

To the extent possible, excavated soil was live-loaded and transported off-site for disposal at previously approved soil disposal facilities. Soil stockpiles associated with hotspot excavations were constructed for staging of site soil, pending loading or characterization testing. Separate stockpile areas were constructed to avoid co-mingling materials of differing types (e.g. PCB-impacted soil, LLRW, and hazardous chromium impacted soil). Stockpile areas met the following minimum requirements:

- The excavated soil was placed onto a minimum of two layers of 8-mil polyethylene sheeting of sufficient strength and thickness or equivalent to prevent puncture during use;

- Equipment and procedures were used to place and remove the soil that minimized the potential to jeopardize the integrity of the liner;

- Stockpiles were covered at the designated times (see below) with minimum 8-mil plastic sheeting or tarps which were securely anchored to the ground. Stockpiles were routinely inspected and broken sheeting covers were promptly replaced;

- Stockpiles were covered upon reaching their capacity of approximately 2,000 cubic yards until ready for loading. Stockpiles that had not reached their capacity were covered at the end of each work day;

- Each pile was staked and labeled with a number to coincide with labeling on the associated sample container for proper correlation of the analytical results to the pile;

- Stockpiles were inspected at a minimum once each week and after every storm event. Results of inspections were recorded in a logbook and maintained at the Site and made available for inspection by NYSDEC;

- Soil stockpiles were continuously encircled with silt fences. Hay bales were used as needed near catch basins, stormwater and other discharge points; and,

- A dedicated water truck equipped with a water cannon was available on-site for dust control.

General site soils were stockpiled and covered at the end of each workday with minimum 8 mil plastic sheeting and tarps which will be securely anchored to the ground with sand bags or clean quarried virgin stone pending load out or reuse.

Load Out, Transport and Off-Site Disposal Plan

A summary of the quantities of waste removed from the Site is provided in Section 4.3, in Table 2, and Appendix I. RCRA hazardous waste consisting of hazardous chromium contaminated soil and LLRW was encountered during this remediation project. All hazardous and non-hazardous material was handled, transported and disposed in accordance with applicable Part 360 regulations and other applicable local, state and

federal regulations. The waste removal contractor provided the appropriate permits, certifications, and written commitments from disposal facilities to accept the material throughout the life of the contract (see Appendix F). Material was transported by a waste removal contactor who possessed a valid New York State Part 364 Waste Transporter Permit, under EPA-generated hazardous or non-hazardous waste manifests, as applicable, in order to track the waste from "cradle-to-grave".

The Remedial Engineer reviewed disposal facilities for regulated material before materials left the Site to document that the facility had the proper permits and to review their requirements. Non-hazardous contaminated soil was disposed at a facility licensed to handle this material. Waste Transporter Permits including facility names and license numbers are included in Appendix F.

All submittals were reviewed by the Remedial Engineer. Commitment letters were supplied on the facility's letterhead, and included the Site as the originating site, the analytical data provided to and reviewed by the facility, and any restrictions on delivery schedules or other conditions that may cause rejection of transported materials.

The Remedial Engineer or a Qualified Environmental Professional (QEP) under his direct supervision tracked the destination of all contaminated material removed from the Site, including excavated hazardous soil, contaminated soil, solid waste and fluids, and documentation associated with that disposal showing requisite approvals for receipt of the material.

Truck Traffic Control

The material excavated during this remediation was transported from the Site to the disposal facility via the truck route specified in the Remediation Contractor's SOP provided as Appendix M in the RAWP. Truck routes were selected by considering the following:

- Limiting transport through residential areas;
- Use of defined truck routes;
- Limiting the total distance to the major thoroughfares; and
- Safety in access to highways.

Egress points for truck and equipment transport from the Site were kept clean of dirt and other materials during Site remediation via water truck and mechanical sweeper. All trucks used to transport excavated material remained closed and sealed during transportation.

4.1.5 Stormwater Pollution Prevention Plan (SWPPP)

The erosion and sediment controls for all remedial construction were performed in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control and the site-specific Storm Water Pollution Prevention Plan prepared by Stantec Consulting Services Inc. (Stantec) and dated 19 July 2013. The SWPPP is included in Appendix E of the SMP.

4.1.6 Community Air Monitoring Plan (CAMP)

The CAMP was developed in accordance with the requirements of NYSDEC DER-10 and with the provisions of the New York State Department of Health (NYSDOH) Community Air Monitoring Plans. The CAMP was developed to protect off-site receptors, including residences and businesses from potential airborne contaminant releases during intrusive field activities. The CAMP provided for the downwind, real-time monitoring of VOCs, odors and particulates (i.e., dust).

Implementation of the CAMP was accomplished at each air monitoring station (AMS) using TSI Model 8530 DustTRAKs to monitor for particulates and MiniRAE 3000 PIDs to monitor for VOCs.

Action levels used for the protection of the community and visitors were set forth in the CAMP included in the CHASP. As defined in the CHASP, the particulate action level at the Site was set at 150 micrograms of dust per cubic meter of air (ug/m^3) above background and the VOC action level at the Site was set at 5 ppm above background for a 15-minute average. DustTRAKs and PIDs were monitored on a continuous basis during remediation and construction activities. Fifteen minute running averages were calculated from the data recorded and averages were compared to the action levels prescribed in the CAMP.

The DustTRAK alarm limits were set to alert personnel of instantaneous spikes i.e., particulate/dust concentrations in excess of the action level of 150 ug/m^3 and the PID alarm limits were set to alert for VOC concentrations in excess of the action level of 5 ppm. Field personnel responded to alarms by implementing mitigation measures as required by the CAMP. Field personnel observed ambient air conditions to check for visible dust emissions and/or odors. If observed, mitigation measures were implemented. CAMP results are summarized in Section 4.2.5 and raw data is presented in Appendix G. Air monitoring station locations are also shown by month in Figure 6A through 6L.

4.1.7 Contractors Site Operations Plans (SOPs)

SOPs for this remedial project consisted of the construction specifications for the Site, including safety, health and emergency response, excavation, storage, handling, transport, and disposal (see Appendix O). The Remedial Engineer reviewed all plans and submittals for this remedial project (i.e., those listed above plus contractor and subcontractor submittals) and confirmed that they were in compliance with the IRMWP and RAWP. All required remedial documents were submitted to NYSDEC and NYSDOH in a timely manner and prior to the start of work.

4.1.8 Citizen Participation Plan

The Citizen Participation Plan established a protocol for citizen participation, including creating document repositories to contain a copy of all applicable project documents, and is included in Appendix G of the RAWP.

Document repositories have been established at the following locations and contain all applicable project documents:

Town of Niagara Town Hall
7105 Lockport Road
Niagara Falls, NY 14305
Phone: (716) 297-2150
Hours: Monday through Friday: 8:00 AM to 4:30 PM,

NYSDEC Region 9 Office
270 Michigan Avenue
Buffalo, NY 14203
Phone: (716) 851-7000
Hours: Mon. To Fri. 8:30 AM to 4:30 PM

4.2 REMEDIAL PROGRAM ELEMENTS

4.2.1 Contractors and Consultants

The Volunteer contracted with Mark Cerrone, Inc. (MCI) to act as the General Contractor, Construction Manager, and Remediation Contractor. Langan was retained as the Remediation Engineer. Mr. Joel B. Landes, P.E. of Langan is the Remediation Engineer of record and is certifying the FER. MCI, alongside the building and caisson construction manager (L.P. Ciminelli) and Greater Radiological Dimensions (GRD) implemented the remedial activities at the Site. MCI is a Remediation Contractor and

has experience at contaminated urban sites. The Remedial Contractor maintained a full staff and complement of equipment to conduct remedial excavation activities.

4.2.2 Site Preparation

Prior to commencing the major earthworks, the Remediation Contractor completed mobilization and Site preparation for remedial activities in October 2013. Descriptions of mobilization and site preparation activities are provided below.

- Mobilized necessary remediation personnel, equipment, and materials to the site;
- Constructed a stabilized construction entrance consisting of non-hazardous material capped with gravel roadway at the site exit;
- Constructed an equipment decontamination area for trucks, equipment, and personnel that come into contact with impacted materials during remedial activities;
- Installed erosion and sedimentation control measures in conformance with requirements presented in the SWPPP;
- Installed temporary fencing to limit unauthorized access to the areas where remediation activities will be conducted; and
- Acquired agency approvals and permits including DOB and DOT permits for site including perimeter fencing and signs, sidewalk use, and sewer and water permits.

Agency approvals required by the RAWP are included in Appendix E. Other non-agency permits relating to the remediation project are provided in Appendix F.

A NYSDEC-approved project sign was erected at the project entrance and remained in place during all phases of the remedial action.

4.2.3 General Site Controls

Site Security

Security at the Site was maintained during both working and nonworking hours. The following security measures were implemented: perimeter fencing, temporary fencing

and/or barriers, warning tape, maintenance of sign-in/sign-out sheets, and implementation of safe work practices;

- Perimeter Fencing - The Site work area was enclosed with a perimeter security fence, to control access for unauthorized personnel. Access gates provided ingress and egress access to the Site.

- Temporary Fencing - The perimeter fence was supplemented by temporary construction fencing as needed to delineate and secure areas of the ongoing remediation activities. Such temporary fencing was at least 4 feet high, and constructed of orange, high-density polyethylene (HDPE) (or engineer approved equivalent). The following areas were subject to this requirement:

    - Areas where soil removal, stockpiling or loading for off-site transport occurred;
    - Areas designated as health and safety exclusion zones;
    - Areas utilized for personnel or equipment cleaning activities; and,
    - Any areas where the remediation activities had a potential to cause a disruption to the normal vehicular or pedestrian traffic.

- Posting of Warning Tape and Signs - Warning tape or sign was installed at certain locations, such as open excavations, cleaning areas, and stockpile areas;

- Implementation of Safe Work Practices - Implementation of safe work practices provided for additional Site security during remediation. Safe work practices that contributed to overall Site security included the following:

    - Maintaining temporary construction fencing and signage around all open excavations;
    - Parking heavy equipment in a designated area each night and removing keys;
    - Maintaining an organized work area, including maintaining access roads, and proper storage of all tools and equipment;
    - Conducting a daily security review and health and safety meetings; and
    - Maintaining covers on staging areas.

Relevant Site Personnel Table	
Remedial Engineer	Joel Landes, P.E. (Langan)
Construction Manager	Macerich-Niagara LLC
Remediation Contractor	Mark Cerrone, Inc. (MCI)
Health & Safety Officer	Tony Moffa (Langan)
Field Safety Officer (FSO) & Qualified Environmental Professional (QEP)	Justin Hall (Langan)
Quality Assurance Officer (QAO)	Ryan J. Wohlstrom (Langan)

Erosion Control Measures and Site Perimeter Security Fencing

Storm water pollution prevention and erosion control measures included:

- Frequent watering of the roadways, excavation, and fill areas;
- Maintenance of the perimeter security fencing; and
- Construction and maintenance of stabilized construction entrance/exit pads and Site roadways.

Equipment Decontamination

Vehicle cleaning was conducted near site entrance. Equipment, such as excavator buckets and tracks, were cleaned in the truck wash area using hand held implements.

Waste Management

Miscellaneous wastes generated during remedial activities including general refuse, used construction equipment and excess material, perimeter and temporary fencing, used disposable sampling equipment, and personal protective equipment (PPE) were managed and disposed as non-hazardous solid waste.

Subsurface Screening

Field screening was conducted during the removal of all slabs, surface cover, subsurface structures, and general invasive soil excavation work. Langan continuously inspected and field screened fill and soil for petroleum or solvent odors and/or staining and field screened for VOCs using a PID. PID readings were obtained from soil contained within the excavator bucket and directly from the excavation sidewalls and bottom.

During excavation and installation of the storm sewer to the northwest of the FONF mall expansion building pad, Langan detected sustained PID readings ranging from 10 to 20 ppm within 15 feet of the work area. As a result, work activities were halted and a temporary fence was constructed around the excavation to prevent access by Site personnel. Within approximately 20 to 30 minutes, PID readings within the area had dropped to background levels. Shortly thereafter, Langan identified silty black soil exhibiting elevated PID readings (PID = 20 – 60 ppm). A sample of this material was collected and analyzed for VOCs. Analytical results did not reveal the presence of VOCs at concentrations exceeding Unrestricted Residential SCOs (see Appendix E). On 22 May 2014, Langan submitted the analytical results and course of action for the VOC hotspot area, which was approved via e-mail by NYSDEC on 23 May 2014 (see Appendix E).

No other elevated PID readings (i.e., above background levels) were detected throughout the Site.

During excavation and installation of the storm sewer system in the northern portion of the FONF mall building pad, LLRW was encountered within and adjacent to the utility trench. Greater Radiological Dimensions, Inc. (GRD) was on-site for the remainder of excavation work completed surrounding the LLRW hot spot, and screened all materials for the presence of absence of LLRW. Additional LLRW that was encountered was excavated and hauled off-site for disposal. The discovery and remediation of LLRW is further discussed in Section 4.3.1.

Problems Encountered

There were no problems encountered.

4.2.4 Nuisance controls

Dust Control Plan

A QEP under the supervision of the Remediation Engineer and the Construction Manager monitored the remediation and construction activities for dust generation and the need for dust suppression. Nuisance dust was controlled with mitigation measures as required (e.g., use of water hoses and covering stockpiled soil with tarps). Preventative measures for dust generation included:

- routinely applying water on haul roads;
- hauling material in properly tarped/covered containers;

- restricting on-site vehicle speeds to 10 miles per hour (mph);
- maintaining site entrances, site roadways, and the truck wash area;
- wetting equipment, stockpiles, and excavation faces;
- spraying water on excavator buckets during excavation; and
- covering soil stockpiles.

Odor Control

The QEP monitored the remediation and construction activities for odor generation. Based on Site conditions, the application of engineering controls to suppress odors and vapors were not required during remedial activities.

Truck Routing

- Traffic routing and signage changes were coordinated with the NYSDOT and all appropriate permits were received prior to commencing fieldwork. Only trucks possessing a valid NYSDEC Part 364 Permit were allowed to enter the Site for purposes of transporting contaminated materials requiring this permit. Truck entrances were made via a locked gate along the western side of the Site off Fashion Outlet Boulevard. The Site was fenced and there were no other means of entrance or egress. On-site vehicle traffic was generally limited to the crushed stone roadways.

- The truck route between the Site and the nearest major highway (Interstate 190) as presented in the RAWP was followed. Truck queuing outside the Site was minimized.

Other Nuisances

A plan for rodent control was developed and utilized by the contractor prior to and during Site clearing and grubbing, and during remedial work. In addition, a plan for noise control was developed and utilized by the contractor for all remedial work and conformed to local ordinances.

Complaints

No complaints were filed throughout the project.

4.2.5 CAMP results

The CAMP was implemented in accordance with the approved RAWP for the duration of remedial activities to protect the health and safety of site workers and the surrounding community, and to address potential nuisance dust and/or odors. Implementation of the CAMP was accomplished at each AMS using TSI Model 8530 DustTRAKs to monitor for particulates and MiniRAE 3000 PIDs to monitor for VOCs.

Air monitoring for particulates and VOC data began at the Site on November 18, 2013 and continued until 31 October 2014. As defined in the RAWP, the particulate action level at the Site was set at 150 ug/m^3 above background. PIDs were monitored on a continuous basis during remediation and construction activities. Fifteen minute running averages were calculated from the data recorded in each respective PID and averages were compared to the action levels prescribed in the CAMP. The DustTRAK alarm limits were set to alert personnel of instantaneous spikes (i.e., particulate/dust concentrations in excess of the action level of 150 ug/m3 and the PID alarm limits were set to alert for VOC concentrations in excess of the action level of 5.0ppm.

On 24 April 2014, at approximately 11:30 AM, Langan received a high-level dust alert from the DustTrak stationed near the FONF mall building pad. Langan field personnel confirmed that elevated readings were due to the dumping of clean virgin crushed stone for the FONF mall sub-base occurring immediately adjacent to the air-monitoring station and recommended that MCI use additional water for dust suppression. Particulate matter with particles less than 10 µm in diameter (PM10) concentrations exceeded the 15-minute average threshold concentration for the site (150 µm/m3 greater than background) for a period of 26 minutes. Following the application of water to the work area, no additional PM10 exceedances were observed.

No additional remote alarms or action levels were triggered during Langan's perimeter air monitoring. Additionally, Langan conducted work zone air monitoring with a PID and portable dust monitor. VOC and dust concentrations were below applicable action levels within the work zone. However, as a precautionary measure, Langan requested that MCI perform dust mitigation by spraying from a water truck or hose to minimize any visible dust which may have been generated during soil excavation activities. Copies of all field data sheets relating to the CAMP are provided in electronic format in Appendix G, and air monitoring station locations are shown in Figures 6A through 6L.

4.2.6 Reporting

Progress Reports

Monthly progress reports (see Appendix H) were submitted to NYSDEC and NYSDOH by electronic media during remedial activities. The progress reports generally included a description of the following:

- Specific remedial activities conducted during the reporting period and those anticipated for the next reporting period;
- Description of approved modifications to the work scope and/or schedule;
- Sampling results received following internal data review and validation, as applicable; and
- Update of schedule including percentage of project completion, unresolved delays encountered or anticipated that could affect the future schedule, and efforts made to mitigate such delays.

Unanticipated conditions were promptly communicated to NYSDEC and NYSDOH project managers. Necessary modifications to the work scope and additional remedial plans developed to address specific conditions encountered were communicated verbally and via e-mail with NYSDEC and NYSDOH. In addition, during implementation of the remedial action, several on-site meetings were held and attended by Macerich, MCI, and Langan.

All Monthly reports are included in electronic format in Appendix H.

The digital photo log required by the RAWP is included in as an attachment to each monthly report in Appendix H.

4.3 CONTAMINATED MATERIALS REMOVAL

A BCP Track 4 remedy, which conformed to the Site's remedial action goals and RAOs, was implemented at this Site in accordance with 6 NYCRR Part 375 Environmental Remediation Programs (2006), DER-10 (2010), the IRMWP (9 October 2013), and the RAWP (30 April 2014). The remedial action included the removal of fill and soil exceeding RCRA hazardous waste regulatory criteria, a PCB hot spot area, and LLRW.

The Remediation Contractor, under the supervision of the Remedial Engineer, divided the Site material into categories depending on known or suspected levels of the Contaminants of Concerns (COC). The categories of material were separately managed to 1) avoid co-mingling of contaminated and potentially contaminated material with

apparently clean material, and 2) handle and characterize material for on-site reuse or off-site disposal at an approved facility. The categories are as follows:

- Hazardous Chromium Material – This material refers to historic fill that contained chromium at concentrations exceeding the RCRA Characteristically Hazardous Waste Criteria of 5 mg/L.
- Contaminated, Non-hazardous PCB Material – This material refers to historic fill that contained PCBs in exceedance of 10 mg/kg.
- Low-Level Radioactive Waste – This material refers to fill and slag exhibiting radiation levels that exceeded the background concentrations of 5,000-7,000 counts per minute (cpm).
- Contaminated, Non-hazardous Material – This material refers to historic fill or underlying native soil that contained exceedances of the Part 375 commercial use SCOs.

The Remedial Contractor arranged for transportation and off-Site disposal of all material types in accordance with applicable federal, state, and local regulations. NYCRR Part 364-permitted transporters were used as required to haul the excavated hazardous material to the designated disposal facilities. Langan provided third party oversight and review of all transportation and disposal arrangements made by the Remedial Contractor.

Residual contaminated soil and groundwater was left in place. Management of the residual contaminated media left at the Site is addressed in accompanying Environmental Easements (Appendix D) and Site Management Plan (Appendix C), which provides the procedures necessary to operate and maintain the engineering and institutional controls at the Site (see Figures 10 and 11).

Figures showing exceedances of the Unrestricted Use and Restricted Commercial Use SCOs identified during the 2013 remedial investigation are included as Figures 3 and 4. A figure showing the locations where remedial excavation was performed for the Site are shown in Figure 5.

Table 2 shows the total quantities of each category of material removed from the Site and the disposal locations. A summary of post-excavation soil samples at the hot spots and associated analytical results are summarized in Tables 5 and 6.

A detailed exported materials tracking spreadsheet is provided as Appendix I. Manifests and bills of lading are included in electronic format in Appendix K. Waste Transporter Permits including facility names and license numbers are included in Appendix F.

4.3.1 Soil

Hazardous Chromium Contaminated Soil

Removal of characteristically hazardous chromium-impacted fill/soil identified in boring LSB-23 during the RI was completed subsequent to the demolition of the existing Secure Storage facility buildings in order to access and remove the material. A summary of the RI analytical data can be viewed in Table 1 and the location of LSB-23 is provided in Figure 2. The chromium hotspot removal consisted of an excavation footprint approximately 75 feet by 25 feet, with an excavation depth ranging from 6 to 7 feet bgs.

After all materials were excavated, post-excavation endpoint soil samples were collected at a frequency of 1 sample per 20 linear feet of sidewall, and 1 per 900 square feet of excavation base, plus quality control samples. The excavation remained open until laboratory analytical results confirm chromium levels were below characteristically hazardous concentrations of 5 mg/L via TCLP analysis. A total of 12 confirmatory end point samples were collected from the chromium hotspot excavation and analyzed for total chromium and chromium by the TCLP analysis to document compliance with the criteria discussed above. Upon receipt of the analytical data, the chromium hotspot was backfilled and compacted to the required development grade depth with re-usable on-site materials, covered by the soil cap/cover system. A summary of the endpoint analytical data can be viewed in Table 6 and Figure 7.

Soils were excavated, stockpiled, loaded, transported, and disposed in accordance with the Materials Management Plan found in Section 5.4 of the RAWP, and confirmatory end point sampling was completed in accordance with the Remedial Performance Evaluation found in Section 5.2 of the RAWP. Section 4.3.1.1 and Table 2 shows the total quantities of each category of material removed from the Site and the disposal locations.

Contaminated, Non-Hazardous PCB Material

The PCB hotspot remediation included excavation of PCB-impacted soil that exceeded 10 mg/kg at one location at the southwest side of the Site. Based on the RI data, PCBs were detected at concentrations exceeding 10 mg/kg at test pit location LTP-46 at a depth ranging from approximately 2 to 4 feet bgs. The PCB hotspot removal consisted of an excavation footprint approximately 40 feet by 40 feet, with an excavation depth of 10 feet bgs. After all materials were excavated, post-excavation endpoint soil samples were collected at a frequency of 1 sample per 20 linear feet of sidewall, and 1 per 900 square feet of excavation base, plus quality control samples. The excavation remained

open until laboratory analytical results confirmed PCBs exceeding 10 mg/kg have been removed.

A total of 10 confirmatory end point samples (8 sidewall and 2 bottom samples) were required for the PCB hotspot excavation and analyzed for total PCBs. Analytical results did not reveal the presence of PCBs at concentrations exceeding unrestricted SCOs in the samples collected. Upon receipt of the analytical data, the PCB hotspot was backfilled and compacted to the required development grade depth with re-usable on-site materials, covered by the soil cap/cover system. This analytical data is summarized in Table 5 and Figure 7.

Soils were excavated, stockpiled, loaded, transported, and disposed in accordance with the Materials Management Plan found in Section 5.4 of the RAWP, and confirmatory end point sampling was completed in accordance with the Remedial Performance Evaluation found in Section 5.2 of the RAWP. Section 4.3.1.1 and Table 2 shows the total quantities of each category of material removed from the Site and the disposal locations.

Low-Level Radioactive Waste (LLRW)

On Friday, 18 April 2014, MCI was excavating a trench for the installation of the new storm sewer system on the existing Fashion Outlets of Niagara Falls property. At approximately 2:00 pm, the project team was informed by Allied that one of the truck loads triggered an elevated radiation warning level (approx. 5x background). This truck was immediately directed back to the Site and the contents were dumped on a double poly-lined stockpile area, specifically created for this material. At this time, Langan issued a "Stop Work" order for the area where these excavated materials had originated and notified Gregory Sutton and Glenn May of NYSDEC and Matthew Forcucci of NYSDOH of the discovery. At the request of Langan and MCI, GRD mobilized to the Site to screen the open excavation, the rejected truck load, and background conditions using a Ludlum model 2221 with a 44-10 probe (gamma scintillator). GRD's screening identified the following:

- Background levels for GRD instrument = 5,000-7,000 counts per minute (CPM); Levels in excavation = 35,000-52,000 CPM; Level at surface of truck load = 65,000 CPM;

- Visual identification of slag material within the excavation at approximately 1 to 3 feet below grade surface (ft bgs), localized to 20-25 foot length of trench

(approximately 25 cubic yards of material). Elevated levels of radiation were detected off the slag identified in the trench.

GRD collected three samples identified as FO-001, FO-002, and FO-003 for analysis of full gamma spectroscopy (with isotopic radium, uranium and thorium) and waste classification. The purpose of this sampling was to identify radiation dosage levels to complete a dosage assessment for this material and to determine a suitable disposal facility. GRD's dosage assessment determined LLRW located within the LLRW hotspot is below the established NYSDEC/NYSDOH limit of 100 mRem/year.

GRD calculated two separate dosage assessments, the simplistic dosage assessment and the Residual Radiation (RESRAD) Dose Model assessment. The simplistic dosage assessment performed by GRD calculated the maximum dosage to be 80 mRem/year (direct contact with 40 µRem/hour LLRW material for 40-hours per week for 50 weeks per year) which is below the established NYSDEC/NYSDOH limit of 100 mRem/year. The RESRAD Dose Model assessment performed by GRD calculated the maximum dosage to be 91 mRem/year, which is below the established NYSDEC/NYSDOH limit of 100 mRem/year. GRD's RESRAD Dose Model assessment is provided in Appendix T.

On 30 April 2014, Langan submitted a LLRW Work Plan to NYSDEC defining the material screening, training, shielding, decontamination, handling, storage, sampling, and disposal practices that will be implemented during intrusive work within the LLRW hot spot area. On 1 May 2014, NYSDEC approved the LLRW Work Plan and authorized work to continue within the LLRW hotspot.

On 2 May 2014, Langan submitted an e-mail to NYSDEC requesting approval to excavate and dispose of the entire LLRW hotspot area in accordance with the previously submitted work plan and applicable laws and regulations per NYSDEC Department of Environmental Remediation (DER)-38 Cleanup Guidelines for Soils Contaminated with Radioactive Materials. On 5 May 2014, NYSDEC approved the request, and a copy of this approval is included in Appendix E. On 7 May 2014, MCI began excavation and stockpiling of the material within the LLRW hotspot. GRD was onsite for full-time surveying of excavated soils and overseeing the excavation and stockpiling, with Langan. Excavated soils were loaded and hauled to the existing LLRW stockpile in the southern portion of the site (see Figure 8), where they were stockpiled on and subsequently covered in two layers of poly sheeting. GRD assessed the excavation and confirmed that all LLRW was removed from the area. Upon completion of the remediation, GRD screened the excavator bucket and truck bed to ensure that no

residual LLRW remained. The GRD LLRW report and analytical data are provided in Appendix T.

Contaminated, Non-Hazardous Material

During development of the Site, excess fill/soil with concentrations exceeding the Restricted Commercial SCOs were generated, including pond excavations, parking lot and building pad grading, utility trenching, building plumbing, and building foundation installations throughout the Site. This material was excavated, loaded, and disposed off-site at approved disposal facilities.

During construction activities, two previously unidentified areas of concern (AOCs) were identified in the northwest corner of the Site. These locations included soils and perched groundwater exhibiting odors, PID readings, and sheen, and are detailed below.

PAOC #1: Water Utility Line Installation – Northwest Corner of Site

On 26 February 2014, during the excavation and installation of the water utility line within the footprint of the FONF expansion building pad, Langan observed the remains of a highly degraded 55-gallon drum. The soil surrounding the drum fragment consisted of historic fill with no evidence of impacts based on visual, olfactory, and PID readings; however, sheen was observed on the perched groundwater water entering the excavation.

In accordance with *Section 4.2.7 - Contingency Plan* of the RAWP, Langan completed the following:

- Construction of a temporary fence around the excavation to prevent access by unauthorized personnel.
- Preliminary sampling of soils and groundwater within the vicinity of drum remains for laboratory analysis of the following:
    - Target Compound List (TCL) VOCs
    - TCL Semi-Volatile Organic Compounds (SVOCs)
    - Target Analyte List (TAL) Metals
    - PCBs
    - Pesticides
    - Herbicides

Two soil samples (WL-EX-1 and WL-EX-2) were collected from the southern and western sidewalls of the water line excavation, respectively, where Langan observed

the greatest evidence of impacts in the soil and the degraded 55-gallon drum. Groundwater sample (GW-1) was collected from accumulated groundwater in the water line excavation which exhibited sheen.

Upon discovery of PAOC #1 on 26 February 2014, the NYSDEC was notified via telephone. On 3 March 2014, Mr. Kevin Glaser (NYSDEC) inspected the Site and observed PAOC #1. Based on the observed condition of the drum (only 1/4 of the drum remained), Langan believed that the drum was previously dumped at the site as scrap metal. On 5 March 2014, Langan prepared a summary memorandum for the NYSDEC documenting the PAOC discovery and analytical results of soil and groundwater samples. As described below, the concentrations of each constituent detected above criteria was compared to previously detected concentrations of these compounds during the RI. VOCs, SVOCs, and PCBs were detected at concentrations below applicable NSYDEC criteria in all samples collected. Pesticides and herbicides were not detected above laboratory reporting limits in any samples submitted. Metals were detected at concentrations exceeding NSYDEC criteria in both soil and groundwater samples. Concentrations of metals detected in soil samples collected at PAOC #1 are consistent with background conditions observed across the Site during the remedial investigation. Metals concentrations detected in the sample GW-1 were higher than those previously identified at the Site during the RI. Additionally, these concentrations exceed criteria set by the NFWB for discharge to the sanitary system.

Langan proposed proceeding with excavation of the water utility trench and dispose of soils off-site at the pre-approved Allied Landfill. The perched groundwater would be pumped into on-site fractionation tanks, solids allowed to settle, and then resampled to see if it complied with the NFWB discharge criteria. On 11 March 2014, NYSDEC authorized the "Discovery of Previously Unknown AOC" memorandum's proposed actions (see Appendix E).

On 18 March 2014, MCI completed the excavation and installation of the water line utility within the extents of the previously unknown AOC. The excavation within the previously unknown AOC measured approximately 5 feet in width by 80 feet in length and 4 feet in depth. Soils excavated were loaded and hauled to the pre-approved Allied landfill on non-hazardous manifests. Imported stone from Lafarge quarry was used as sub-base and backfill for the water line piping. During excavation and installation of the water line utility MCI pumped infiltrating perched water to two separate fractionation tanks. Water pumped to the tanks was not comingled with other waters and was allowed to sit undisturbed for 24-hours to allow suspended solids to fall out of solution. On 19 March 2014, Langan collected two water samples from the water line utility

fractionation tanks (PU-AOC-WS-1 and PU-AOC-WS-2). Samples collected were analyzed for VOCs, SVOCs, Part 375 Metals, hexavalent and trivalent chromium, PCBs, pesticides, herbicides, and cyanide.

On 21 March 2014, Langan received analytical results for the two water samples collected from the water utility fractionation tanks. Analytical results of the fractionation tank water sampling were compared to the Niagara Falls Water Board (NFWB) discharge criteria and the NYSDEC TOGS standards. VOCs, SVOCs, PCBs, pesticides, herbicides, and cyanide were not detected above laboratory reporting limits. Manganese was detected above the NYSDEC TOGS standard but below the NFWB criteria in sample PU-AOC-WS-1 (335 ug/L). Barium, lead, nickel, and zinc were detected in both samples above the laboratory reporting limits but below the NFWB discharge criteria and the NYSDEC TOGS standards. On 25 March 2014, Langan authorized the pumping of stored water in the water line utility fractionation tanks to Pond 2 for storage before discharge to the NFWB sanitary sewer system as no exceedances of the NFWB discharge criteria were detected in either water sample.

PAOC #2: Elevated VOC Hotspot – Northwest Corner of Site

On 15 May 2014, during the excavation and installation of the storm sewer to the northwest of the proposed FONF mall expansion building pad, Langan detected sustained PID readings ranging from 10 to 20 ppm within 15 feet of the work area. As a result work activities were halted and a temporary fence was constructed around the excavation to prevent access by site personnel. Within approximately 20 to 30 minutes, PID readings within the area had dropped to background levels. Shortly thereafter, Langan identified a silty black soil exhibiting elevated VOC readings (PID = 20-60 ppm). A sample of the suspect material was collected and submitted for laboratory analysis of Part 375 VOCs at Paradigm Environmental Services (Paradigm). Analytical results revealed low levels of petroleum-related VOCs at concentrations below NYSDEC Part 375 Unrestricted Use SCOs (see Appendix E).

On 22 May 2014, Langan submitted an e-mail to NYSDEC outlining the proposed material screening, stockpiling, and health and safety measures to be conducted during any remaining excavation within this area. On 22 May 2014, NYSDEC approved the proposed plan and authorized work to continue within the elevated VOC hotspot. On 24 September 2014, Langan oversaw the completion of the storm sewer system through the VOC hotspot. Langan monitored VOCs with a PID during excavation and installation of the remaining storm sewer manhole and associated piping. During excavation and

installation, VOCs within the excavation area did not exceed 0.0ppm. Excavated soil was loaded and hauled off-site for disposal.

4.3.1.1 Disposal Details

Waste Characterization Soil Sampling

For contaminated, non-hazardous soil requiring off-site disposal, analytical results from Langan's 2013 Remedial Investigation (RI) were used for waste characterization requirements in accordance with the permit requirements of the disposal facilities. A summary of soil samples collected during the RI is included on Table 1.

The analytical tests included the following parameters:

- Target Compound List (TCL) VOCs via EPA Method 8260;
- TCL SVOCs via EPA Method 8270;
- Target Analyte list (TAL) Metals via EPA Methods 6010, 7470/7471, 9010/9012/9014, and 7196;
- PCBs via EPA Method 8082; and
- Pesticides via EPA Method 8081.

The remediation contractor conducted additional sampling of stockpiled soils from the PCB, LLRW, and hazardous chromium stockpiles to confirm that excavated material met the requirements of the selected disposal facilities. Samples were analyzed for the specific constituents of concern at each hotspot. Analytical results are shown on Tables 5 and 6, and laboratory analytical reports are included in Appendix M.

Total Quantities Removed

Hazardous Chromium Material

A total of 682.06 tons of characteristically hazardous chromium material was transported off-site by NYCRR Part 364-permitted transporters to CWM Chemical Services, LLC located in Model City, NY, which was the disposal facility approved to accept the material. 21 loads were disposed between 12 September and 2 October 2014. The hazardous chromium soil excavation area is indicated on Figure 5 and disposal quantities are summarized in Table 2.

Contaminated PCB Material

A total of 716.6 tons of PCB-impacted material was transported off-site by NYCRR Part 364-permitted transporters to CWM Chemical Services, LLC located in Model City, NY, which was the disposal facility approved to accept the material. 20 loads were disposed of between 17 December and 19 December 2013. The approximate area of soil excavation is indicated on Figure 5 and disposal quantities are summarized in Table 2.

Low-level Radioactive Waste (LLRW)

A total of 258.5 tons of LLRW was transported off-site by NYCRR Part 364-permitted transporters to Waste Management Mahoning Landfill located in Mahoning, Ohio, which was the disposal facility approved to accept the material. Eleven loads were disposed of on 20 June 2014. All loads originated from the northern portion of the FONF mall building pad.

Contaminated Non-Hazardous Material

A total of 164,627.17 tons non-hazardous contaminated soil were transported off-site by permitted haulers to one of two disposal facilities approved to accept the material, specifically:

- Allied Waste Niagara Falls Landfill, Niagara Falls, NY: 150,568.77 tons (7,235 total loads) were disposed between 22 November 2013 and 31 October 2014.
- Modern Disposal Services, Inc., Lewiston, NY: 14,058.40 tons (599 total loads) were disposed between 6 December 2013 and 19 September 2014.

4.3.1.2 On-Site Reuse

Upon approval by the Remediation Engineer, excavated soil/fill outside the hotspot areas were reused to replace excavated soils as needed to establish the design grades at the Site. This fill reuse strategy was consistent with the future land use (e.g., commercial) and use of engineering and institutional controls to prevent future exposure to contaminated soils and groundwater that will remain on-site. Figure 9 shows the location of soils reused on-site.

4.3.2 Contaminated Groundwater/Surface Water

As a requirement of the permit, Langan and MCI collected monthly discharge samples at the outfall to the NFWB sewer system. Between December 2013 and October 2014,

construction dewatering included the collection and off-site discharge and treatment of approximately 10,698,200-gallons of perched, contaminated, dewatered groundwater and accumulated stormwater. This water was discharged to the City of Niagara sanitary sewer system where it flowed to the Niagara Falls Water Board Wastewater Facility and was treated under the Niagara Falls Water Board Wastewater Facilities Wastewater Discharge Permit for Industrial Commercial User permit number ICU-72, dated 22 October 2013. Pumped water was held within a series of five fractionation tanks allowing suspended solids to settle out. After suspended solids settled, the water was discharged at a rate of up to 150,000-gallons of purged water per day

Table 3 summarizes the daily discharge from the Site, and Table 4 summarizes the monthly discharge sample analytical data. No exceedances of the NFWB criteria were identified during any of the sampling events.

4.4 REMEDIAL PERFORMANCE/DOCUMENTATION SAMPLING

Per the RAWP, endpoint documentation soil sample collection was completed at the hot spots from the bottom of each sidewall for every 20 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area. Based on these criteria, 2 base endpoint samples and 8 sidewall samples were collected at the PCB hotspot, and 2 base endpoint samples and 12 sidewall samples were collected at the hazardous chromium hotspot, plus required QA/QC samples, were collected.

Tables 5 and 6 summarize the endpoint soil sample results and include comparison to the applicable SCOs.

Data Usability Summary Reports (DUSRs) were prepared for all data generated in this remedial performance evaluation program. These DUSRs are included in Appendix L, and associated raw data is provided electronically in Appendix M.

4.5 IMPORTED BACKFILL

Throughout the course of the remedial action, materials were imported to the Site for use as backfill around utilities and under the building slab and parking areas, as well as being used for the cap/cover system outlined in the RAWP. With the exception of the imported virgin quarry stone, samples were collected from each of the import sources per the requirements outlined in DER-10. Per the NYSDEC-approved RAWP, imported virgin stone was not required to be sampled.

A table of all sources of imported backfill with quantities for each source is shown in Appendix J, and manifests and bills of lading are included in electronic format in Appendix L. Backfilled areas of the Site are identified on Figure 9. Imported material documentation including tables summarizing chemical analytical results for backfill, in comparison to allowable levels, are shown on Tables 7, 8, and 9, and laboratory analytical data reports are provided in Appendix M.

4.5.1 Stone

Certified clean ¾-inch and 1 ½-inch virgin quarry stone from Lafarge Niagara Aggregate Plant of Niagara Falls, NY was used to backfill the utility trenches within the building pad and parking areas and for the parking area and building pad subbase. A total of 182,705.97 tons (7,988 total loads) of this material was imported to the Site between 18 November 2013 and 31 October 2014.

Certified clean ¾-inch and 1 ½-inch virgin quarry stone from Gernatt Asphalt Products, Inc. of Collins, NY was used for the 6-inch SSDS stone venting layer and suction pits. A total of 8,871.81 tons (320 total loads) of this material were imported to the Site between 29 April and 12 August 2014.

A table of all sources of imported backfill with quantities for each source is included in a table in Appendix J and backfilled areas of the Site are identified on Figure 9. Per the NYSDEC-approved RAWP, imported virgin stone was not required to be sampled. Documentation from the quarry certifying that the material was virgin, clean stone is included in Appendix F.

4.5.2 Topsoil

Topsoil imported from the Niagara Falls High School Athletic Fields and the Inactive Town of Tonawanda Landfill was imported to the Site and placed as clean fill over the landscaped areas. Prior to import and placement at the Site, Langan sampled the topsoil in accordance with DER-10. Langan collected 17 grab samples and 7 composite samples from stockpiled topsoil at the Niagara Falls High School Athletic Fields, and 24 grab samples and 12 composite samples from stockpiled topsoil at the Inactive Town of Tonawanda Landfill. Grab samples were analyzed for VOCs, and composite samples were analyzed for SVOCs, metals, pesticides, herbicides, and PCBs.

Analytical results from these sampling events are included as Tables 7 and 8 and were summarized in the 24 April 2014 and 16 May 2014 Importation of Topsoil requests submitted to NYSDEC. As detailed in these requests, no constituents were detected in

any samples collected at concentrations exceeding the Allowable Constituent Levels for Imported Fill or Soil for Commercial Uses (Appendix 5 of DER-10). Approval to reuse this topsoil as part of the engineered cap/cover system is included in Appendix E. A total of approximately 14,600 tons of topsoil from the Inactive Town of Tonawanda Landfill and 9,370 tons of topsoil from the Niagara Falls High School were imported to the Site from 29 April through 22 October 2014.

4.5.3 Clay

Clay excavated from a virgin clay pit located at the Mawhiney Trucking Helmich Site was imported to the Site and used for the clay liner at Pond 1a. Prior to import and placement at the Site, Langan sampled the clay in accordance with DER-10. Langan collected 6 grab samples and 2 composite samples from the northeast portion of the clay pit where material was being excavated for use at that time. Grab samples were analyzed for VOCs, and composite samples were analyzed for SVOCs, metals, pesticides, herbicides, and PCBs.

Analytical results from these sampling events were summarized in the 20 September 2014 Importation of Clay request submitted to NYSDEC and are included as Table 9. As detailed in these requests, with the exception of acetone, no constituents of concern were detected in any samples collected at concentrations exceeding the Allowable Constituent Levels for Imported Fill or Soil for Commercial Uses (Appendix 5 of DER-10). However, all detections of acetone were also flagged as being identified in the associated batch blank for the samples, and acetone is a common laboratory contaminant. Approval to use this clay as part of the engineered cap/cover system is included in Appendix E. A total of 424.29 tons of clay were imported to the Site on 1 and 2 October 2014.

4.6 CONTAMINATION REMAINING AT THE SITE

Table 1 and Figures 3 and 4 summarize the results of soil samples collected at the site during the RI that exceed the commercial use SCOs. During the remedial action, a majority of the soil impacts were excavated as a result of construction activities associated with building foundation installation, parking area construction, pond excavation, and storm sewer and utility installation. Limited areas of contaminated soils remain across the site at depths up to 5-feet below post-construction grades. Since contaminated soil remains beneath the Site after completion of the remedial action, Institutional and Engineering Controls are required to protect human health and the environment. These Engineering and Institutional Controls (ECs/ICs) are described in the following sections. Long-term management of these EC/ICs and residual contamination

will be performed under the Site Management Plan (SMP) approved by the NYSDEC. Figure 12 shows the location of remaining soil contamination at the Site.

4.7 ENGINEERING CONTROLS

4.7.1 Soil Cap/Cover System

Exposure to remaining contamination in soil/fill at the Site is prevented by a cap/cover system comprised of a minimum 3-inch thick asphalt cap (which is comprised of 2.5 to 3 inches of binder course and a an approximate 1.5-inch top course) at parking areas, a 4-inch concrete cap at building slabs, a 5-inch concrete cap at sidewalks, a minimum 1-foot thick clean imported topsoil cover at all landscaped areas, and a combination of a minimum 6-inch thick clay cap and 1-foot thick clean imported topsoil cover at detention ponds. The minimum 6-inch thick clay cap was installed along the pond sidewalls to the top of the normal water surface elevation. The remaining upper areas of the pond sidewalls were covered with at least 1-foot of clean imported topsoil. As an additional construction measure, the ponds were covered by a 40-mil HDPE textured geomembrane to ground surface. The parking areas, sidewalks, and building slabs are underlain by 4 to 12 inches of stone sub base. The cap/cover system is installed across the entire footprint of the Site. Figures 10 and 11 show the locations and cross sections of the cap/cover system. An Excavation Work Plan, which outlines the procedures required in the event the cover system and/or underlying residual contamination are disturbed, is provided in Appendix A of the SMP.

4.7.2 Sub-Slab Depressurizaion System (SSDS)

Exposure to soil vapor infiltration into fulltime occupied buildings located at the Site is prevented by sub-slab depressurization systems (SSDS) that include a 20-mil vapor barrier (20 mil Stego Wrap) and an active sub-slab depressurization system beneath the two fulltime occupied building's (the FONF mall expansion building, and the Secure Storage office building). Conduit and pipe penetrations through the slabs were sealed to prevent infiltration of vapors through the foundation slab penetrations. Two active sub-slab depressurization systems installed as engineering controls in the two fulltime occupied structures will be operated to mitigate soil vapor intrusion. Sub-slab components for each of these systems were installed as part of construction of the new buildings. The SSD systems were designed to create negative pressure under the newly constructed FONF mall building expansion, and the newly constructed Secure Storage office building foundation slabs, which will eliminate human exposure to possible soil vapors that would otherwise infiltrate through the foundation slabs into the occupied areas. Details of the system design and layout are provided in the Engineering

and Institutional Control Plan section of the Site Management Report. As-built drawings for the FONF Mall and Secure Storage are shown in Appendix Q and Appendix R, respectively.

Conceptual Remedial Approach

An SSD system creates a depressurized (low vacuum) field beneath the building floor slabs by extracting the sub-slab air with vacuum blowers for each building. This low vacuum field reverses the natural pressure gradient and diverts potentially impacted vapors from the subsurface of buildings, to the atmosphere at the building rooftop level. This reduces the potential for intrusion into the building.

System Design

Calculations for each SSD system were based on the volume of sub-slab soil pore space to be affected (using an assumed depth of influence of 1.5 feet below the building slab) and three air changes of the pore space volume per day. Details of each individual system are discussed below.

Mall Expansion SSDS

The Mall expansion design consists of six sub-slab depressurization suction pits connected to two rooftop regenerative blowers. Each rooftop blower is connected to three suction pits. The system was incorporated into the new construction of the building, allowing for the installation of 6 inches of ¾ inch clean crushed stone and a continuous vapor barrier membrane. The calculation for the required vacuum for this system was calculated based on the total pressure losses throughout the system. Calculations resulted in a required sub slab vent inlet vacuum pressure of 5 inches water column (WC), piping losses of at least 32 inches of WC, knock out tank losses of 5 inches WC, filter losses of 5 inches WC, and silencer losses of 5 inches WC. Given the design requirements, the roof-mounted blower systems both provide a minimum of 695 cubic feet per minute (CFM) at 52 inches WC. Sub-slab depressurization system specs and component documentation can be found in Appendix S.

Secure Storage Office Building SSDS

The Secure Storage office building design consists of a single sub-slab depressurization suction pit connected to a regenerative blower. The system was incorporated into the new construction of the building, allowing for the installation of 6 inches of ¾ inch clean crushed stone and a continuous vapor barrier membrane. The calculation for the

required vacuum for this system was calculated based on the total pressure losses throughout the system. Calculations resulted in a required sub slab vent inlet vacuum pressure of 5 inches WC, piping losses of at least 5 inches WC, knock out tank losses of 5 inches WC, filter losses of 5 inches WC, and silencer losses of 5 inches WC. Given the design requirements, the blower system provides a minimum of 49 cubic CFM at 25 inches WC.

System Installation

The SSDS components were installed in accordance with the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006. The SSD systems include a sub-slab collection layer, riser pipes to convey the collected vapor to the roof, and regenerative blowers. Installation of the SSD system was completed by Greater Niagara Mechanical (GNM), a licensed SSDS installation contractor. Prior to initial start-up of the SSDS, the system was inspected to confirm that all system components were in place. The system was implemented in accordance with manufacturer's recommendations.

Installation of the SSD systems included the following tasks:

- Compacting the soil subgrade;
- Placing geotextile fabric over the footprint of the building on the compacted subgrade;
- Placing a 6-inch layer of approximately ¾-inch clean crushed stone below building slab;
- Installing approximately 2' x 2' x 1' suction pits that were filled with 2-inch clean crushed stone;
- Running 4-inch SSD system piping from the suction pits to the blowers;
- Placing 20-mil Stego vapor barrier across the 6-inch clean crushed stone layer and sealing all seams to create the sub-slab vapor barrier;
- Pouring concrete slab on top of vapor barrier and sealing concrete slab joints to maximize depressurization;
- Installation of electric blower systems to generate the required sub-slab vacuum;
- Confirmatory testing of the systems was completed to confirm that the systems functioned as designed, prior to being placed in full operation.

All reports, forms, and other relevant information generated during testing of the SSDS are provided in Appendix U.

System Testing

Following installation of the SSD systems, the following tests were performed:

- With the depressurization system operating, smoke tubes were used to check for leaks through concrete cracks, floor joints, and at the suction points. Any leaks identified were sealed.

- With the depressurization system operating, vacuum tests using a micro-manometer were conducted on permanent monitoring points located throughout the buildings concrete floor and the building's exterior sidewalk monitoring locations to confirm that a negative pressure vacuum was being created throughout the entire buildings footprint. Negative pressure readings from the monitoring points ranged from 0.005 to 0.070 inches of water.

Subsequent to installation, Greater Niagara Mechanical tested the SSD systems to ensure that at each sample port, a pressure of 3 psi was maintained over an 8 hour period. Any deficiencies in the system were addressed at the time they were noted, and the system was retested as required. Copies of all testing certifications are provided in Appendix U.

System OM&M

Inspection of the SSDS will be conducted on an annual basis to establish that it is operational and performing within the design specifications. Any deficiencies noted during these inspections will be addressed immediately. Unscheduled inspections and/or sampling may take place when a suspected failure of the SSDS has been reported or an emergency occurs that is deemed likely to affect the operation of the system. A troubleshooting guide for the blower system provided by the manufacturer is included in Appendix S.

Procedures for operating and maintaining the SSD systems are documented in the Operation and Maintenance Plan in Section 4 of the SMP. The Monitoring Plan also addresses inspection procedures that must occur after any severe weather condition has taken place that may affect on-site ECs.

4.8 INSTITUTIONAL CONTROLS

The Site remedy requires that environmental easements be placed on the property to (1) implement, maintain and monitor the Engineering Controls; (2) prevent future exposure to residual contamination by controlling disturbances of the subsurface

contamination; and, (3) limit the use and development of the Site to commercial uses only. The environmental easements for the Site were executed by the Department on 8 October 2014, and filed with the Niagara County Clerk on 30 October 2014. The County Recording Identifier number for this filing is 2014216492. A copy of the easements and proof of filing is provided in Appendix D.

4.9 DEVIATIONS FROM THE REMEDIAL ACTION WORK PLAN

The RAWP specified that the three stormwater detention ponds were to be lined to grade surface with at least 6 inches of certified clean clay. However, as an additional construction measure, the ponds were redesigned during excavation activities based on observed site conditions. The pond redesign included the installation of a 40-mil HDPE textured geomembrane along the bottom and sidewalls of the ponds. Additionally, the minimum 6-inch thick clay cap along the pond sidewalls was redesigned to only extend to the top of the normal water surface elevation in the ponds. The remaining upper areas of the pond sidewalls were covered with at least 1-foot of clean imported topsoil. The revised pond design drawings were submitted to NYSDEC for approval On 10 September 2014 and approved via e-mail on 17 September 2014. The revised pond design drawings are provided in Appendix V.