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ALTERNATIVE ANALYSIS REPORT
Triple Cities Metal Finishing Corporation
4 Nowlan Road
Hillcrest, New York
NYSDEC BCP ID C-704045

Prepared for:

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and
New York State Department of Environmental Conservation

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Revised April 2011
November 2010
Project No. 99011A

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Drawing No. 1 – Site Location Plan
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REPORT

ALTERNATIVE ANALYSIS REPORT

Triple Cities Metal Finishing Corporation
Hillcrest, New York

I, Christopher Maroney, P.E., certify that I am currently a NYS registered professional engineer and that this Alternative Analysis Report was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

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April 7, 2011

1. INTRODUCTION

The Alternative Analysis Report (AAR) has been prepared on behalf of Binghamton Realty, Inc. for the former Triple Cities Metal Finishing Facility (TCMF) located at 4 Nowlan Road in the community of Hillcrest, Broome County, New York (Drawing No. 1).

The AAR identifies and evaluates remediation alternatives to address impact to soil and groundwater at the site from historical use of the site. The identified impacts are generally related to metals stored, used and discharged at the site.

The alternatives that will be evaluated will take in consideration site-specific conditions, the protection of public health and the environmental and applicable regulations. The AAR will address alternatives that are appropriate to mitigate potential threats to public health and the environment and is consistent with the remedial objectives of the site. At the time of the AAR submittal there are no re-development plans for the site. The site is currently occupied by two tenants: Catskill Mountain Industries, a sand art packager and distributor, and Parts Channel, Inc. an automotive parts distributor that uses a portion of the building for office/administrative and vehicle drop-off. The site is zoned for industrial and commercial uses. The AAR takes into consideration remedial options that are consistent with zoning.

1.1 General Overview

Binghamton Realty, Inc. entered into a Brownfield Cleanup Agreement (BCA) with New York State Department of Environmental Conservation (NYSDEC) effective December 6, 2004 to investigate, and as necessary, remediate the former TCMF.

A multi-phase Remedial Investigation (RI) including implementing vapor mitigation was completed by GeoLogic NY, Inc. (GeoLogic) in accordance with the NYSDEC approved Remedial Investigation Work Plan, dated February 2, 2005, revised August 8, 2005.

An RI Report, dated November 2009, was completed for the remedial investigation at the TCMF facility and approved by NYSDEC on January 5, 2010.

The 6NYCRR Part 375 Restricted Use Soil Cleanup Objectives for Commercial (SCO's) are the identified objectives for TCMF under the BCA.

1.2 Site Background Information

TCMF manufactured products with decorative, functional and corrosion-resistant finishes that included zinc, chrome and nickel for the military, aerospace and automotive industries from 1953 to 1999. All facility processes were terminated at the Nowlan Road facility in 1999. The site, consisting of two contiguous parcels, encompasses 0.88 acres, and is bordered on the south by Beckwith Avenue and on the east by the B. W. Elliot Manufacturing Company (former CAE Link Electronics facility), on the west by two commercial properties and a residence, and on the north by Nowlan Road. There are residences and a gas station north of Nowlan Road. Further south, west and north are residential properties.

The 27,000-square foot industrial building is located on a 0.62-acre parcel and the office building (former residential structure) is located on a 0.26-acre parcel. The industrial building was used primarily for production work with offices in the northern portion of the building and warehousing in the east and west additions. The former residential structure housed the corporate offices.

TCMF submitted a Part A application for interim status when the hazardous waste regulations were first enacted, and although it did not utilize interim status, and operated as a generator, it has been subject to corrective action under the hazardous waste regulations.

The initial primary contaminants of concern at TCMF were cadmium, chromium, nickel and zinc. These were the primary metals used in the TCMF plating business. In the 1980's at TCMF, 1,1,1-trichloroethane was included on the NYSDEC SPDES permit testing parameters for the effluent stream from the facility. 1,1,1-trichloroethane was not used in the facility processing, but was used to clean off carbon build-up on direct current generators. The DC generators were phased out in the 1980's and replaced with rectifiers.

Trichloroethene (TCE) is a contaminant of concern identified by NYSDEC in the Community of Hillcrest.

1.3 Summary of Previous Investigations

Investigations and studies that have been completed at TCMF prior to entering into the BCA have included:

- A facility assessment for the USEPA to gather information on, and evaluate the potential for, releases to the environment from solid and hazardous waste handling practices, "Preliminary RCRA Facility Assessment" (November 1993, TRC);
- Air emissions testing assessing the 1998 emissions levels at TCMF, "Air Emission Study" (September 1999, ERM and NYSDEC);
- Surface soil sampling at TCMF and within the Hillcrest community, and catch basin sediment sampling, "RCRA Phase I Sampling" (August 1999, GeoLogic);
- Evaluation of subsurface soil and groundwater at the site that included analyses of interior concrete flooring and underlying soils, "RCRA Phase II Subsurface Investigation" (May 2000, GeoLogic);
- Evaluation of groundwater and subsurface soils under the building, at site boundaries and off-site, “Continuing Phase II Subsurface Investigation” (May 2002, GeoLogic); and
- Corrective Action Study, (May 2003, GeoLogic).

These investigations have included: surface soil sampling at the facility and within the community (August 1999, GeoLogic); an evaluation of subsurface soil and groundwater at TCMF including the installation of permanent monitoring wells, and the chemical analysis of the concrete flooring and underlying soil in the former plating area (May 2000, GeoLogic); and additional investigative actions below the building footprint and off-site in a hydraulically downgradient direction from the facility (May 2002, GeoLogic).

The focus of these previous evaluations has been to identify potential sources of heavy metals, primarily, cadmium, chromium, zinc and nickel, and their impact on groundwater quality. The evaluation of volatile organic compounds in soil was performed at a few locations on the TCMF site (May 2000, GeoLogic). Since trace to no volatile organic solvent

compounds were detected in the soils collected at TCMF, and the concentrations in groundwater were similar to or lower than upgradient concentrations, organic solvents were not contaminants of concern for the subsequent Corrective Action Study. NYSDEC was in agreement with this opinion, and concluded that no additional investigation or remediation for these constituents was required at that time (NYSDEC, June 20, 2000 correspondence to TCMF).

The following table summarizes the concentration ranges for metals and TCE in soils and sediments from 1999 through 2008 at TCMF:

Table 1-1
Summary of Metals of Concern and TCE Concentrations in Soils

Analytes	No. of Samples Analyzed	Concentration Range mg/kg	6NYCRR Part 375 SCO Commercial mg/kg	No. of Samples Exceeding Part 375 Commercial
Metals				
Cadmium	61	<0.105 to 761	9.3	31
Chromium*	61	7.8 to 18,900	1,500	7
Chromium VI	2	<4.78 to 6.39	400	0
Copper	46	13.7 to 3,250	270	8
Nickel	46	11 to 1050	310	6
Zinc	50	37.9 to 22,100	10,000	1
Volatiles				
TCE	46	<0.0008 to 0.260	200	0

**-Total Chromium*

RCRA Phase I Sampling Summary

Surface soil sampling at TCMF and in the Hillcrest community was completed in 1999 under RCRA to evaluate potential impact to surface soils via atmospheric deposition from former air emission at the TCMF facility. The upper three inches of surface soils were collected and analyzed for metals and cyanide. The locations were selected based upon the following considerations: availability of on-site locations with exposed surface soils; locations with similar geologic settings as TCMF, the likely patterns of atmospheric deposition from TCMF; the predominant prevailing wind directions; other documented wind directions, and the atmospheric effects associated with the TCMF facility location in a valley-hillside setting.

The metal concentrations reported in the three surface soil samples collected at/near the TCMF site did not exceed the 6NYCRR Part 375 Restricted Use Soil Cleanup Objectives for Commercial (SCO's) for the thirteen metals analyzed.

Three sediment samples were collected from each of three catch basins present in the vicinity of the TCMF facility. These catch basins were receptacles for surface water runoff, drainage from TCMF's roof and point of discharge for overflow from TCMF, and a possible receptacle for former point-source discharges from CAE Link.

The sediment samples were analyzed for the metals, cyanide, and volatile organic compounds (VOC's). The metal concentrations reported in the sediment samples were similar to the range of concentrations observed in the surface soil samples. The volatile organic analyses for the three sediment samples reported either no contaminant concentrations above the detection limits or were below TAGM 4046 Soil Cleanup Objectives.

RCRA Phase II Summary

The objectives of the Phase II Investigations were to determine the concentrations of organic compounds (primarily solvents) and inorganic substances (metals) in the subsurface beneath the TCMF facility.

Prior to 1986, sanitary and/or process wastewater was discharged to three subsurface leaching systems (Outfall 001, 002 and 003), two of which (Outfall 001 and 002) were regulated by the State Pollution Discharge Elimination System Permit (SPDES) from 1980 to 1986. By early 1986, TCMF was connected to the municipal sanitary sewer system, and discharges to the SPDES permitted outfalls were discontinued.

The subsurface leaching system for former Outfall 001 was located on the east side of the circa-1980's building footprint, and former Outfall 002 was located on the west side of the 1980's building footprint. Former Outfall 003, identified as receiving sanitary waste, was

located on the north side of the TCMF facility. Subsequently, the facility expanded, the outfall structures for former Outfalls 001 and 002 were reportedly filled with soils, and building additions were placed over the two outfall systems. Former Outfall 003 is located between the building and Nowlan Road, below an asphalt parking area.

During the course of the Phase II evaluations completed for TCMF under RCRA, thirty-four borings were advanced, six monitoring wells were also installed, and four concrete floor cores were collected.

Based on the analytical results for both soil and groundwater sampling completed during the Phase II it was concluded that the former outfalls at TCMF were not a source of organic contamination in the subsurface soils or in the groundwater. The analytical results of the concrete cores suggest that the concrete floors within the TCMF building would not be classified as hazardous waste by toxicity if the floors in the building were to be removed.

During the evaluations under RCRA, soils were encountered at TCMF that contained levels of cadmium, chromium, copper, and nickel that are above the SCO's. Cadmium, chromium, copper, lead, nickel, selenium, thallium, and zinc were also detected in the groundwater at levels exceeding NYS Ambient Water Quality Standards and Guidance. A limited number of soil samples collected at TCMF were analyzed for volatile organic compounds. The TCE concentrations in the eleven soil samples that were analyzed were below the SCO's.

Corrective Measure Study

The Corrective Measure Study (CMS) focused solely on heavy metals at TCMF and the media (subsurface soils and groundwater) affected by heavy metals (GeoLogic, May 2003). In the CMS, a summary of where metals exceeding TAGM 4046 Soil Cleanup Objectives and Water Quality Standards were identified during the RCRA Phase I and Phase II investigations, and the potential of these soils and groundwater impacting both pubic health and the environment, were evaluated. No comment on the CMS from NYSDEC under RCRA was received, and TCMF subsequently entered into the BCA.

2. SITE CHARACTERISTICS

2.1 Geologic Setting

TCMF is located on a terrace approximately 50 feet above the current Chenango River channel. The topography features in the vicinity of the site include a hillside rising over 400 feet above the facility approximately 2,000 feet east of the site, Phelps Creek flowing off the hillside in a southwesterly direction within 1,000 feet southeast of the site and the Chenango River with its southerly flow located within 2,000 feet west of the site. TCMF and a large portion of the Hillcrest community are located on the terrace above the river channel and along the east hillside. TCMF overlies the NYSDEC designated Sole-Source Endicott-Johnson City Area Aquifer.

The geology of the terrace consists of glacial meltwater (outwash) deposits of sand and gravel with variable silt content that range in thickness from approximately 30 to 55 feet. Lacustrine silt, sands and clay deposits underlie the outwash sand and gravel unit ranging in thickness from 130 to 160 feet. A boring advanced to 177 feet by CAE Electronics adjacent to the northeast corner of the TCMF property documented that the silt layer is over 140 feet thick at that location. Underlying the lacustrine deposit is a sand and gravel deposit. The Town of Fenton water supply wells are screened in this lower sand and gravel deposit.

2.2 Hydrogeologic Setting

Groundwater has been historically encountered in the lower portion of the surficial outwash sand and gravel unit along the east boundary of TCMF. Groundwater elevation data collected at the wells installed by TCMF have reported fluctuations in groundwater levels of less than 1.0 foot over the period between Feb 2000 and March 2008.

Based on the data collected in the wells that are monitored by TCMF, direction of groundwater flow is to the west. Groundwater from within the outwash sand and gravel unit beneath the TCMF eventually discharges to the Chenango River.

Surface water runoff at the site is directed to the north into storm sewer catch basins located within Nowlan Road, to the east onto the adjacent BW Elliot properties parking area drainage systems, and to the south into Beckwith Avenue and directed into storm water catch basins

within the street.

2.3 Site-Specific Geology

The soils consist of outwash sand and gravel underlain by lacustrine silt, sand and clay. The outwash sand and gravel deposits extended to depths ranging from approximately 25 and 28 feet below ground surface (bgs) on the east side of the TCMF property, to depths ranging from approximately 32 to 34 feet bgs. Elevation data to the top of silt shows a defined downward dip from east to west in the silt unit at TCMF. All borings advanced for TCMF terminated in the upper outwash sand and gravel unit or the underlying silt unit. No borings extended into the lower sand and gravel unit that underlies the silt unit.

2.4 Groundwater Usage

As indicated in the RI Report, the Hillcrest Water District #1 located in the Town of Fenton has three water supply wells located north of TCMF. Fenton Well #3 is the primary water supply well for the community of Hillcrest and is the closest community water supply well to TCMF, approximately 3,000 feet from TCMF. The Town of Fenton indicated that Fenton Well #1 operates approximately 1 hour a day to maintain the pumping equipment; and Fenton Well #2, reportedly used occasionally (about once a month for well maintenance), are both located further north of Fenton Well #3. All three water supply wells are reportedly screened in the lower sand and gravel deposit underlying the silt unit.

The Fenton Wells are monitored by the Broome County Department of Health (BCHD). Since 1984, water samples have been collected from Fenton Well #3 and analyzed for organic compounds. Routine analysis for metals reportedly began in 1990 at Fenton Well #3, and continues on a semi-annual basis. Cadmium and chromium concentrations have never been detected above the detection limits in the samples collected. CAE Electronics installed a monitoring well located approximately 750 feet south of Fenton Well #3 that has been identified by CAE Electronics as a sentinel well for the Town Water Supply Wells. The monitoring well is screened within the upper sand and gravel unit. No cadmium or chromium has been detected in this well above method detection limits or exceeding Water Quality Standards.

3. SUMMARY OF NATURE AND EXTENT OF IMPACTS

3.1 Sub-Slab and Soil Vapor at TCMF

Soil vapor underlying the TCMF building has been impacted by TCE at levels that warranted vapor mitigation. TCE in sub-slab soil vapors range from 11 to 270 ug/m^3. The concentration of TCE at 13,000 ug/m^3 previously reported by others in sub-slab soil vapor has not been replicated. The results of the vertical soil vapor contaminant gradient underlying the TCMF building do not suggest the presence of deeper (8 foot or greater) contaminant source(s) of the contaminants observed in the sub-slab soil vapor samples. The results do suggest that contaminated vapors collect and concentrate directly under the confining zones of the concrete floor.

A vapor mitigation system has been installed within the portion of the TCMF building that is currently occupied during the workweek on a daily 8-hour basis.

3.2 Summary of Metals in Soils

Soil samples were collected and analyzed for total metals both outside the TCMF industrial building footprint and from below the industrial building. Up to sixty-one samples were analyzed for metal content. The SCO's were exceeded for cadmium, chromium, copper, nickel and zinc content (see Table 1.3-1). The majority of the soils exhibiting metal concentration exceeding the SCO's are present under the TCMF industrial building. Of those that exceeded SCO's outside the building footprint, the highest concentrations were observed at Outfall 002, with one sediment sample exceeding both the SCO and Hazardous Waste level for toxicity for cadmium content.

3.3 Summary of TCE Contamination

Borings were advanced hydraulically upgradient of the TCMF property on the former CAE Link property, along the TCMF's east and west property boundaries, through Outfall 001 and 002 structures (see Drawing No. 2), on the south side of the TCMF office building structure and along the west side of Chenango Street to evaluate TCE content in soil, groundwater and sediments. The table summarized TCE concentrations reported in the samples analyzed.

Table 3-1
TCE Concentration Summary

Location	TCE Concentrations				
	Groundwater Sand & Gravel Unit	Groundwater Silt Unit	Silt Soils	Sand & Gravel Soils	Sediment
CAE Link Property	8 to 21 ug/L	16 to 24 ug/L	ND to 200 ug/kg		
East Side TCMF	4 to 11 ug/L	10 to 18 ug/L	20 to 72 ug/kg		
West Side TCMF	12 ug/L	5 to 20 ug/L	6 to 50 ug/kg		
Outfall 001		22 ug/L	5 to 15 ug/kg	ND to 5 ug/kg	ND to 6.2 ug/kg
Outfall 002			ND to 50 ug/kg	ND to 14 ug/kg	ND
South Side TCMF Office Bldg.	8 ug/L	76 ug/L	170 ug/kg		
West Side Chenango Street	2 ug/L	12 to 32 ug/L	ND to 27 ug/kg		

3.4 Water Quality at Monitoring Wells

Six monitoring wells were installed as part of the RCRA investigations, three on the TCMF property, and three hydraulically downgradient of the TCMF property. These six wells and an upgradient CAE Link well were also sampled as part of the RI.

Groundwater samples were analyzed for RCRA metal and TCE content during the investigations completed under RCRA as well as the RI work. Metals were detected at concentrations exceeding water quality standards at the seven wells. The highest concentrations of chromium and cadmium were detected at the wells on the TCMF property. Groundwater underlying the site has TCE concentrations similar to the concentrations observed in groundwater both upgradient and downgradient of the site. The following table summarizes these sampling events:

Table 3-2
Groundwater Contaminant Concentration Summary

On–Site Monitoring Wells: MW-1, MW-2, and MW-5

Contaminant On-Site	Range	Standard	No. of Excursions	No. Exceeding Standard
	µg/l	µg/l		
for MW-1				
Cadmium	47 to 200	5.0	5	5

Contaminant On-Site	Range	Standard	No. of Excursions	No. Exceeding Standard
	µg/l	µg/l		
Chromium	42 to 1,000	50	5	4
TCE	9 to 10	5.0	3	3
for MW-2				
Cadmium	55 to 246	5.0	5	5
Chromium	247 to 1,700	50	5	5
TCE	9 to 14	5.0	3	3
For MW-5				
Cadmium	34 to 480	5.0	3	3
Chromium	97 to 850	50	3	3
TCE	8 to 9	5.0	2	2

Upgradient Monitoring Well: MW-18

Contaminant Off-Site	Range	Standard	No. of Excursions	No. Exceeding Standard
	µg/l	µg/l		
for MW-18				
Cadmium	<1 to 3	5.0	5	0
Chromium	76 to 102	50	5	5
TCE	11 to 25	5.0	3	3

Cross and Downgradient Monitoring Wells: MW-3, MW-4, and MW-6

Contaminant Off-Site	Range	Standard	# Excursions	No. Exceeding Standard
	µg/l	µg/l		
for MW-3				
Cadmium	9 to 56	5.0	4	4
Chromium	99 to 120	50	4	4
TCE	10 to 12	5.0	2	2
For MW-4				
Cadmium	<1 to 7	5.0	4	1
Chromium	26 to 120	50	4	2
TCE	4 to 10	5.0	2	1
for MW-6				
Cadmium	17 to 120	5.0	3	3
Chromium	32 to 100	50	3	1
TCE	11	5.0	1	1

3.5 Contaminant Source Evaluation - Outfalls 001 and 002

At Outfall 001 there was no definitive demarcation between backfill material and waste sediments as observed at Outfall 002. The zones of waste sediments appeared to be dispersed within the backfill material. The TCE concentration within these waste sediment zones as well as

the underlying backfill material were below the SCO for TCE. The concentration of cadmium and chromium within these waste sediment zones are above the SCO's.

The results observed at the overflow structure for Outfall 001 do not suggest that this catch basin received discharges from TCMF that impacted soil quality, or is the source of elevated soil vapors that have been observed by NYSDEC at nearby sampling points. No volatile compounds were detected in the soils above the method detection limits, and cadmium and chromium concentrations are well below the SCO's.

The waste sediments that were observed in the two drywell structures for Outfall 002 were similar. Trace to no TCE was detected in the backfill material, the waste sediments or underlying soils (see Table 3-1). The concentration of cadmium and chromium within these waste sediments are above the SCO's.

The observed concentrations of TCE at Outfalls 001 and 002 do not suggest or support that these former discharge points are potential sources of the TCE that has been detected in soil vapor and groundwater in the vicinity of the site.

3.6 Source Area Characterization-Former CAE Link

The recent data collected during this evaluation should be reviewed with an historical perspective. The former CAE Link facility is an identified source of TCE. Historical concentrations of TCE in excess of one million ug/kg have been reported in soils at that facility. A TCE groundwater plume has been attributed to the former CAE Link facility since at least the early 1980's. Contaminant concentrations over time would normally be expected to increase hydraulically downgradient of the source as a result of groundwater flow.

Data collected during this evaluation as well as during the Source Characterization Studies by NYSDEC and by the CAE Link consultants, have reported 'scattered' elevated concentrations of TCE (>100 ppb) east of the former CAE Link facility, west of the former TCMF facility, and north of Nowlan Road. Based on the historical concentrations reported at the CAE Link facility, the current TCE concentrations observed within groundwater and soil are not considered exceptional. Variability in TCE concentrations should be expected and can be attributed to

sample time and seasonal fluctuation of the water table, sample collection, variability in the geologic units in which the monitoring well screens were placed, screen lengths, contaminant plume movement, and variability in the accuracy in laboratory techniques.

3.7 Public Health Exposure Summary

A Qualitative Human Health Exposure Assessment (QHHEA) was completed as part of the RI for TCMF. Two identified contaminant sources (TCMF and CAE Link) and two classes of contaminants (metals and VOC's) were evaluated in the QHHEA.

TCMF has been identified as a source with identified releases of cadmium, chromium and zinc. No volatile organic compounds, specifically TCE, have been identified at the TCMF property at levels that suggest a source. The former CAE Electronic facility has had identified sources of TCE.

The summary of the QHHEA are presented below:

Current exposure through the inhalation of airborne contaminants from TCMF is non-existent; the facility ceased all metal processing in 1999.

Community residents' exposure to surface soils, either through direct ingestion through hand-mouthing of soils or through the ingestion of airborne soil particulates from TCMF is unlikely given the current site use and the absence of a complete exposure pathway.

There are no known exposure pathways to subsurface soils at TCMF to the residents of Hillcrest.

There is currently no exposure to heavy metal through ingestion or inhalation of the municipally-provided water based on the chemical data collected directly from the municipal water supply wells.

Because of the site setting characteristics (majority of site is covered by asphalt pavement and the existing buildings), the potential for exposure to metals in subsurface soils is most

likely limited to construction workers engaged in below floor slab activities and utility workers outside the building footprint. This exposure could be mitigated through the use of proper personal protective equipment. Groundwater is not expected to be encountered during typical construction or utility work activities due to the recorded depths of groundwater at the site. In general, municipal workers, utility workers and environmental drilling contractors, as a group, have the potential of exposure to subsurface soils, with the drilling contractors having the greatest potential for exposure to both soil and groundwater. While this represents a potential exposure pathway, this group would be the most aware of the potential for exposure, and apply appropriate action to minimize or eliminate the exposure.

The concentrations of TCE in sub-slab soil vapor underlying the TCMF building indicate the potential exposure through inhalation for building occupants at TCMF. This is considered a complete exposure pathway for TCE at TCMF; therefore, vapor mitigation has been implemented at TCMF for the protection of indoor air quality in the current occupied space. While the potential for vapor intrusion remains a potential exposure concern in the remaining portions of the building, expansion requirements of the current vapor mitigation system are presented in the Maintenance & Monitoring Plan that has been developed for the site.

4. REMEDIAL ACTION OBJECTIVES

The site-specific Remedial Action Objectives (RAO) for TCMF are based on the results of the completed investigations under RCRA, the Soil Cleanup Objectives presented in the RI Report, and the conclusions reached in the RI. The development of the RAO's is consistent with the remedy selection process presented in the Final Program Policy DER-10 *Technical Guidance for Site Investigation and Remediation*, dated May 13, 2010.

The data that has been collected at the TCMF property and at properties both upgradient and downgradient of the TCMF property do not suggest an on-site TCE source that has impacted groundwater quality in the Hillcrest community. With NYSDEC's acceptance of the RI report and conclusions presented in the report, it is our understanding that the criteria to be taken into consideration under NYCRR 375-1.8(d)(2) with regards to off-site source of groundwater contamination with no on-site source or contribution have been met, and that the RAO will not

include further consideration for TCE in either soil or groundwater.

The following RAO's have been set to achieve or maintain conditions at TCMF that are protective of public health and the environment:

Table 4-1
Summary of Potential Exposures and
Remedial Action Objectives

Media	Contaminants of Concern	RAO	Potential Exposure Applicability
Surface Soils and Subsurface Soils	Chromium, Cadmium	*Environmental Health:* Prevent ingestions/direct contact with impacted surface and subsurface soils.	Complete pathway for construction & utility workers
		Environmental Protection: Prevent the migration of contaminant via groundwater at levels exceeding water quality standards.	
Groundwater	Chromium Cadmium	*Environmental Health:* Prevent ingestion of groundwater with contaminant levels exceeding Class GA water quality standards.	Incomplete pathway
		Environmental Protection: Remove the source of impact to SCO's.	
Soil Vapors	VOC's TCE	*Environmental Health:* Prevent the migration of VOC's from soil and groundwater into the building by maintaining Engineering Controls.	Complete pathway for Building Occupants

4.1 Metals in Soil

Under current site conditions, surface and subsurface soils represent an incomplete exposure pathway for Hillcrest residents, building occupants and site visitors. A complete exposure pathway to metals in soils is likely limited to construction or utility workers engaged in intrusive

work that would remove the existing surface barriers that include asphalt pavement and the concrete floors inside the TCMF building. Soils with elevated metal in near surface soils were encountered underlying the building concrete floors. Subsurface soils with the highest elevated metal content were observed at the Outfall 002 and underlying the building.

The RAO for soils is for the protection of the environment with consideration to Hazardous Waste regulations.

4.2 Metals in Groundwater

As presented in the RI Report (Section 5.2.1.4), no complete exposure to metals through the injection or inhalation of the municipally-provided water supply to the Hillcrest community has been demonstrated.

The RAO's for groundwater is for the protection of the environment and focuses on removal of source metal contamination in soil under conditions that are impacting groundwater quality.

4.3 VOC's in Soil Vapor

No additional RAO will be developed as part of this AAR. During the completion of the RI work, a Sub-Slab Vapor Mitigation (Depressurization) System was installed in response to concentrations of VOC's, primarily TCE, that were observed in the sub-slab soil vapor samples at TCMF.

The TCMF facility had been unoccupied for several years and the building had only been used for storage. Once the East Addition portion of the building became occupied by one full-time employee, the installation of a vapor mitigation system became necessary.

An Interim Maintenance and Monitoring Plan and Annual Interim Maintenance and Monitoring reports for the Vapor Mitigation System have been submitted under the RI (see Section 2.5). Considerations for the expansion of the Vapor Mitigation System are components of the Plan. The Annual Interim Maintenance and Monitoring reports will eventually be incorporated in the Periodic Review Reports per DER-10.

5. ALTERNATIVE ANALYSIS

This Alternative Analysis (AA) will identify feasible remedial options whose goals to achieve the RAO's outlined in Section 4.

The Alternative Analysis does not include discussions or alternatives for vapor intrusion issues. Vapor intrusion concerns have been identified for the existing buildings, and soil vapor intrusion has been addressed under the site OM&M Plan.

This AA is not an all-inclusive study of *all* potentially feasible remedies. Feasible remedial technologies are dependent upon contaminants of concern and the media affected. At TCMF, the contaminants of concern are heavy metals, and the media affected is subsurface soils and groundwater. Unlike organic contaminants that are affected by biological and physical processes that can reduce the contaminant to non-toxic forms, elemental metals, while typically associated with other organic and inorganic compounds, do not undergo oxidative or reductive processes.

The site-specific cleanup objectives set for TCMF under the BCA is restricted commercial use defined under 6 NYCRR Part 375. The potential remedial technologies that will be screened evaluated are those that allow the use of site-specific SCO's that are protective of public health and the environment established in 6 NYCRR Part 375-3.8(e) and to the NYSDEC TOGS 1.1.1 Water Quality standards, criteria and guidance values (SCG).

Those technologies that are retained for further consideration will be evaluated by the following criteria:

- Compliance with SCO's/SCG's
- Overall Protection of Public Health and the Environment
- Short-term Effectiveness
- Long-term Effectiveness

- Reduction of Toxicity, Mobility or Volume of Contaminant
- Implementability
- Cost
- Land Use

5.1 Remedial Alternative for Metals in Soils

5.1.1 Alternative 1 – No Further Action

Under the No Further Action Alternative, no soil remediation would be implemented. No complete exposure pathway has been identified for the residents of Hillcrest, or building occupants to soils impacted by heavy metals that exceed the SCO's under current site conditions. Exposure to utility and construction workers to elevated metals in soils that currently underlying impermeable covers (asphalt and the building) can be addressed through Institutional Controls. This alternative is feasible and is retained for further consideration.

5.1.2 Alternative 2 – Focused Excavation/Off-site Disposal

Under NYCRR Part 375-1.8(c) source removal and control measures hierarchy, the removal and/or treatment is considered most preferable.

Soils that could be considered as the source area of groundwater contamination and/or potential future source area of groundwater contamination may be amenable to excavation. Excavated soils would require disposal at an approved off-site facility, and analytical testing would be required for both disposal purposes and to confirm the extent of required excavation. This option is potentially feasible and, therefore, will be further evaluated.

5.1.3 Alternative 3 - Containment of Soil

After removal and/or treatment, containment is the next preferable remedial goal; and if full containment is not feasible, then the source should be contained to the greatest extent feasible. The majority of soil samples analyzed that exhibited elevated metals were observed underlying

the building. Elevated metals containment of soil will be further evaluated.

5.1.4 Alternative 4 – Stabilization

Stabilization through the immobilization of contaminants is an acceptable remedy that can be effective in addressing metals in soils. The chemical fixing of contaminants in soils can be used to process excavated soils that have re-use potential, excavated soils that require pre-treatment prior to land disposal, and impacted in-situ soils.

The ex-situ treatment of impacted soils is not applicable at this site because pre-treatment of soils for off-site disposal would not be required and there is no potential for re-using soils on site. While the ex-situ treatment of impacted soils is removed from further consideration, the in-situ chemical treatment to immobilize the metals in the soils is considered a possible viable option that will be further evaluated.

5.2 Remedial Alternatives for Metals in Groundwater

5.2.1 Alternative 1 – No Further Action

Under the No Further Action Alternative, no groundwater remediation would be implemented. No complete exposure pathway has been identified for the residents of Hillcrest, or building occupants to groundwater impacted by heavy metals. No impact to the municipal water supply wells from metal contamination from TCMF has been documented, and is considered unlikely based on information that has been collected to date. On-going evaluation of groundwater quality may be needed to evaluate the impact that these contaminants that remain have on future groundwater quality trends (see Institutional Controls).This alternative is feasible and is retained for further consideration.

5.2.2 Alternative 2 - Extraction and/or Treatment of Groundwater

The objective of any remedial alternative is to provide protection to public health and the environment by minimizing exposures as well as reducing contaminant levels. For the impact of groundwater off-site from an on-site source, the removal, containment or treatment of the on-site source is the desired approach under NYCRR Part 375-1.8(d)(3)(ii)(a).

Elevated metals in groundwater are highest at the property. No data collected during the studies completed for TCMF (or at CAE Electronics) suggest that groundwater with elevated metals originating from TCMF will reach the Chenango River or the Town of Fenton Wells. Since no complete exposure pathways to the residents, municipal or utility workers, or the TCMF building occupants to groundwater at TCMF have been identified, the restoration of groundwater impacted by metals through *direct* remedial techniques (such as through extraction and treatment) is not retained for further consideration.

5.2.3 Alternative 3 – Institutional and Engineering Controls

Institutional controls and engineering controls with environmental easements are incorporated in the remedial procedures in NYCRR Part 375-1 where residual contaminants of concern remain following the implementation of remedial action(s). The general purposes of institutional and engineering controls are to eliminate or reduce potential exposures to the contaminants of concern. Institutional and engineering controls are currently being implemented under the approved site's Vapor Mitigation OM&M Plan. The monitoring and maintenance requirement of the vapor mitigation system along with trigger events that would initiate further vapor mitigation expansions are current institutional controls. An Institutional, Engineering Control for groundwater may include on-going monitoring to evaluate downgradient water quality as it relates to the potential for human exposure.

Environmental easements provide notice to property owners of the presence and locations of those contaminants and identify site uses and activities which should and should not occur in the future in order to maintain the "acceptable exposure".

This option is retained for further evaluation.

6. SCREENING OF REMEDIAL ALTERNATIVES

The process used in the screening of remedial options for both soil and groundwater take into consideration those remedies whose goals are aimed at protecting public health and the

environment. Protection may be achieved by minimizing exposure and reducing contaminant levels in an effort to restore groundwater and soil to SCO's/SCG's.

6.1 Alternative 1- No Further Action for Soil and Groundwater

No further actions would be undertaken under the No Action Alternative. Since there are no short-term or long-term risks to the public or the environment associated with the No Action Alternative, or any known public or environmental receptors of elevated metals in groundwater, the No Action Alternative is considered protective of public health and the environment. The No Action Alternative would not actively reduce or eliminate contaminant concentration and would include no additional engineering or institutional controls.

Overall Protection of Public Health and the Environment

There is no current complete exposure pathway to the Hillcrest residents, building occupants or utility workers to soils or groundwater impacted by heavy metals. Soils that exceed the SCO's underlie the building, or are at depths greater than those typically encountered during utility work. No exposure to impacted groundwater has been identified. The data supports that metals from TCMF are not impacting nor will impact the municipal water supply wells. Assuming no increase in introduction of metals to groundwater, existing contaminants in the groundwater would naturally attenuate, or would remain localized to the site.

Compliance with New York State Standards

The concentrations of metals in groundwater at the site will continue to exceed the NYS Water Quality Standards for Groundwater. The reported metal concentrations are representative of a water sample with suspended soil particles (not filtered groundwater). Contaminant concentrations will remain stable or decrease, provided that no additional contaminants are released to the groundwater.

Compliance to the site-specific SCO's is not achieved with the No Action Alternative. Concentrations of metals in soils exceed the site-specific SCO's.

Short-term Effectiveness

As stated above, there are no known complete exposure pathways. The No Action Alternative

would not pose any short-term risks to the public health and the environment, since no remedial actions are associated with this alternative.

Long-term Effectiveness

No long-term efforts would be required to maintain the No Action Alternative. The No Action Alternative does not provide protection against all potential future exposure scenarios. Future site activities, such as alterations to, or demolition of the building, could alter the current incomplete exposure pathway conditions at TCMF.

Reduction of Toxicity, Mobility or Volume of Contaminant

Since this alternative does not involve any remedial efforts, the toxicity, mobility or volume of contaminants are not altered or reduced. Metals do not readily migrate, especially within the soil vadose zone. The available leachable metals in soils are not expected to increase under current site conditions. The concentrations of metals in groundwater are anticipated to remain similar or decrease over time.

Implementability

The No Action remedy is easily implementable since no active remedy would be undertaken.

Cost

There are no costs associated with implementing the No Action Alternative.

Land Use

The site-specific SCO's are for restricted commercial use. There is no current, intended, or reasonably anticipated future land use changes that would be affected by the presence of metals in soils under the conditions observed.

6.2 Alternative 2 –Containment with Institutional and Engineering Controls

The RAO for metals contaminants is to remove or prevent exposure to metals in soil and groundwater, and to remove the source of metal contaminants in soils and/or prevent the migration of these metals from soils into groundwater.

Containment is a demonstrated remedy for metals in soils, and is generally applicable for widespread, shallow and/or low-level contamination, and generally not applicable for sites with high groundwater table or sites located within a floodplain. As stated earlier, TCMF is not mapped within a floodplain and depth to groundwater is not considered shallow (approximately 28 to 30 feet below ground surface).

Horizontal containment is typically an impermeable barrier (asphalt, concrete, geotextiles) that prevent the exposure from direct contact to contaminants in soils. Containment also provides protection of soils below the barrier from certain environmental influences (both natural and anthropogenic) that can affect the soil chemistry. The chemistry of water that is allowed to leach down through soils can change the adsorption or precipitation properties of the soil. These chemical changes can potentially increase the mobility of the contaminants that are attached to the soil particles. The leaching process can also drive down through gravitation forces contaminants in soils that could subsequently impact groundwater quality. Containment provides protection from these environmental influences.

Horizontal containment would be provided by the building and asphalt pavement. Containment at the site is already in place and would not require any additional action. Controls would include deed restrictions to maintain the property for commercial use and restrict the use of groundwater at the property (Institutional Controls), and a development of an Operation, Monitoring and Maintenance Plan for the building (Engineering Control). Groundwater monitoring may be a component of the containment with institutional control alternative.

Overall Protection of Public Health and the Environment

With containment, soils with elevated metals are allowed to remain on site. Containment is a remedy that reduces or removes potential exposure pathways. Containment minimizes contaminant migration mechanisms, thereby reducing the potential of increase impact to groundwater.

Compliance with New York State Standards

Obtaining compliance with SCO's of metals in soils is not the objective of containment. Containment does not reduce the concentration of metals in soils. Containment is a mechanism

of managing soils with elevated metals within the vadose zone.

Short-term Effectiveness

The building already is acting as a barrier minimizing the mobility of the contaminant and preventing a point of exposure to impacted soils to all identified populations. The short-term effectiveness for containment would require maintaining the current incomplete exposure pathways currently existing at TCMF. Utility trenches that exhibit deterioration in the concrete integrity have already been filled with new concrete under RCRA directive further reducing direct contact by building occupants to impacted soils.

Long-term Effectiveness

Containment provides long-term protection as long as the containment barrier is present and is maintained. Containment would be considered a remedy for managing the subsurface soils with elevated metals that exist below the building as long as the building is present. Long-term effectiveness of containment can be enhanced through institutional controls. Should the building be demolished, removing the containment, evaluation of other remediation options to obtain the site-specific SCO's would be plausible.

Reduction of Toxicity, Mobility or Volume of Contaminant

While containment is not considered a treatment remedy for reducing contaminants toxicity or volume, containment through horizontal capping reduces or eliminates the leaching mechanisms that facilitate the migration of metals in soils from the vadose zone downward to groundwater.

Implementability

Under current conditions, the TCMF building acts as a cap or barrier preventing the infiltration of atmospheric water through the soils with elevated metals that exist below the building.

Since the building is considered the containment barrier, implementability would require only standard maintenance and construction applications for maintaining the building's integrity.

Cost

The cost of implementing containment with institutional and engineering control described above

is considered low compared to active remedial alternatives. The majority of the cost is associated annual groundwater monitoring component. The cost of routine building maintenance is not considered a direct cost. No present worth analysis has been included in the cost estimates.

6.3 Alternative 3 – Focused Excavation/Off-site Disposal & Containment with Institutional and Engineering Controls

The objective of any soil remediation is to reduce contaminants, to levels that reduce or eliminate exposure of the contaminant to potential receptor(s) and to levels that are protective of groundwater quality.

Under present property conditions, the subsurface soils with elevated metals concentrations are not accessible to direct contact. There is no complete exposure pathway to subsurface soils at TCMF to the residents of Hillcrest under current property conditions. Also, exposure pathways to contaminated soils below the building by occupants (including construction workers) is also considered incomplete.

In addition to the containment and institutional control alternative discussed in the previous section, the remedial objective of limited excavation of sediments and soils would be to remove the identified potential source at Outfall 002 that is impacting groundwater quality (see Drawing No. 2). Groundwater monitoring may be a component of the limited excavation with containment with institutional control alternative.

Overall Protection of Public Health and the Environment

This remediation action provides for the partial reduction of contaminant levels in accessible subsurface soils and the removal of sediments that have been identified as Hazardous Waste based on toxicity characteristics.

Short-term Effectiveness

While there is limited potential exposure to the community during the excavation of soils outside the building, there is potential for exposure to site workers and building occupants, if present. This exposure is minimal and can be further minimized or eliminated through restricting access

to the excavation area and through proper PPE and monitoring. The excavations will not be subject to producing airborne particulate and access to the work zones will be constrained.

Long-term Effectiveness

The excavation of a source of metal contaminants provides long-term and permanent protection to building occupants under present facility conditions.

Reduction of Toxicity, Mobility or Volume of Contaminant

Through the partial excavation and removal of metal contaminated soils/sediments from the site, the overall volume of the contaminant on the site is reduced.

Implementability

Soils and sediments at Outfall 002 exceed the SCO's for metals and exceed Hazardous Waste levels for cadmium. These impacted soils/sediments were encountered within one of the two structures associated with Outfall 002. Removal of these soils/sediments to the bottom of this Outfall structure is feasible. The removal of impacted soils/sediments and the structures of the other structure associated with Outfall 002 as well as Outfall 001 are not feasible at this time since these other structures underlie the building. The information collected at the other structure for Outfall 002 and at Outfall 001 does not support the need to perform active soil remediation at these locations at this time.

The remediation of soils that exceed the SCO's for metals that underlie the building extend to depths up to 11 feet below the concrete floors. Complete removal of impacted soils by excavation to these depths inside the building are not achievable under current building condition (restricted overhead heights and entry limitations for equipment to achieve the excavation depths). Containment is a preferred alternative for addressing potential exposure to soils with elevated metal concentrations underlying the building.

Compliance with New York State Standards

The objective of excavation is to remove or reduce the volume of contaminants within soils so that the remaining soils meet appropriate cleanup requirements. The two applicable or appropriate cleanup requirements for metals in soils are as follows:

The limited excavation of impacted soils/sediment from one of the structures of Outfall 002 would not achieve the SCO's for the contaminants of concern, but it would remove the soils/sediments that have been identified as Hazardous Waste.

Cost

The cost budget for this partial soil remediation effort include fieldwork oversight and coordination, labor, equipment, post excavation sampling, replacement of asphalt cover, characterization of excavated soils, and transportation and disposal of excavated soils. The total budget for the limited excavation of soils with containment and institutional control is considered low compared to other remedial alternatives. The majority of the cost is associated with annual groundwater monitoring component. The cost of routine building maintenance is not considered a direct cost. No present worth analysis has been included in the cost estimates.

6.4 Alternative 4 - Stabilization with Containment and Institutional and Engineering Controls

Under present property conditions, the subsurface soils with elevated metal concentrations are not accessible to direct contact. There is no complete exposure pathway to subsurface soils at TCMF to the residents of Hillcrest under current property conditions. Also, exposure pathways to contaminated soils below the building by occupants (including construction workers) is also considered incomplete.

In addition to the containment and institutional control alternative discussed in Section 6.2, the remedial objective of stabilization is to reduce the overall leachability of elevated metals in soil to reduce the migration of metals into groundwater. This alternative would allow the impacted soils to remain in place. Groundwater monitoring may be a component of the stabilization with containment with institutional and engineering controls alternative.

Metals associated with the aqueous phase of soils are subject to movement with groundwater, and may be transported downward through the vadose zone to groundwater through atmospheric precipitation and groundwater fluctuations. Metals, unlike organic contaminants, cannot be

degraded, although oxidation states can be transformed to other oxidation states reducing mobility and/or toxicity.

The stabilization of metals, by mechanisms of adsorption and precipitation, will prevent movement of metals into groundwater. The downward transportation of metals in soils does not readily occur to any great extent unless the metal retention of soil is overloaded or, if the metal's associated waste enhances mobility. Several other factors can influence the mobility of metals in soils including, but not limited to, the degradation of organic matter in the soil matrix, changes in pH and redox potential due to natural weathering soil processes, the introduction of other contaminants, and/or remediation schemes.

In addition to the containment and institutional control alternative discussed previously, this remedial objective would include using a proprietary stabilization process. A stabilizing compound would be injected or flooded in the vicinity of Outfall 002 to immobilize contaminants associated with this former outfall. Groundwater monitoring would be a component of the limited excavation with containment with institutional control alternative.

Overall Protection of Human Health and the Environment

No complete exposure pathway to soils with elevated metals is known to exist at TCMF under current site conditions. This remediation objective provides further protection to the environment. Source elimination by removing the availability of leachable metals in soils will directly contribute to the rehabilitation of water quality at the site.

Short-term Effectiveness

The in-situ stabilization of metals in soils is a process whose effectiveness can be almost immediate. Its effectiveness can be measured through TCLP analysis of the soils and through the monitoring of groundwater concentrations. Since the impacted soils are left in-place during treatment, there is no exposure to the community residents. Exposure to site workers is similar to previous exposures while advancing soil borings and installing groundwater monitoring wells. Exposure is minimal and can be controlled through proper PPE and personal hygiene.

Long-term Effectiveness

Since the objective of in-situ stabilization is to improve groundwater quality at the site, this remedy provides a long-term solution for the elevated metals in soils by reducing the mobility and toxicity of metals in soils. The chemically fixed soils would not be subject to those factors affecting contaminant mobility. Since metal content is not reduced by stabilization, future site re-development may require the excavation and off-site disposal of the stabilized soils.

Reduction of Toxicity, Mobility or Volume of Contaminant

The in-situ stabilization process provides a permanent reduction of the mobility and solubility of metals in soils, however it does not result in the reduction of contaminant volume. Since metals are not subject to degradation processes, the reduction of contaminant volume for metals can only be achieved through those processes that physically remove the metals from the impacted media, such as excavation of impacted soils for off-site disposal.

Implementability

While stabilization is not a new remediation technique for contaminants in soils, most stabilization processes typically involved cementaceous and clay mixtures with low viscosities. It is proposed that a new proprietary stabilization process be used for the in-situ stabilization of subsurface soils at TCMF. The proprietary process involves a stabilization solution whose viscosity can be field modified from low viscosity (on the order of water) to higher viscosities. The application of the stabilization mixture through direct injection techniques and soil flooding enhances the ease of application in the restrictive physical conditions that exists at TCMF.

Treatability testing would need to be conducted to evaluate the soil chemistry, and to develop the proper stabilization mixture and application methods that would be applicable for site conditions.

Compliance with New York State Standards

The objective of in-situ stabilization is to improve groundwater quality at the site. Reduction of metals in groundwater may be achieved through stabilization. Remediation through stabilization would be performed on those on-site soils within the area that has been demonstrated as a source area that has/is impacted groundwater quality (Outfall 002).

The evaluation of the effectiveness of the stabilization should be directly apparent in groundwater concentration trends and through post-application soil analysis.

Cost

The cost of implementing soil stabilization in the area of Outfall 002 is considerably higher than the other discussed alternatives. There is also only an assumption that the soil chemistry is amenable to stabilization. Actual costing can only be provided after treatability studies are completed. The costs associated with the implementation of a treatability study are likely to exceed costs associated with the implementation of source removal outside the building footprint. The cost of routine building maintenance is not considered a direct cost. No present worth analysis has been included in the cost estimates.

7. RECOMMENDATIONS FOR REMEDIAL ACTIONS

Recommended remedial actions are selected in an effort to achieve the goals of protecting public health and the environment. Remediation goals include actions that are intended to reduce or eliminate exposure by eliminating or reducing the chemical source, the point of exposure, or the pathway to the potential receptor. Under current site conditions, no complete or direct exposure pathways have been identified to any population considered (Hillcrest residents, building occupants, utility/municipal workers). This includes both exposure to impacted soils and groundwater. Therefore, the goals of the recommended remedial actions are focused on the protection of the environment (primarily impact to groundwater quality).

The screening of remedial alternatives included No Action, Containment with Institutional and Engineering Controls, Focused Excavation with Containment, Institutional and Engineering Controls, and Stabilization with Containment & Institutional Control.

While the No Action Alternative and the Containment with Institutional and Engineering Controls Alternative would not address the impact to groundwater quality in the area of Outfall 002 or reduce the toxicity or volume of contaminants, these two alternatives can be justified since no complete exposure pathways to the contaminants at TCMF under current site conditions have been identified. The two alternatives are also consistent with the remedial action objectives for

TCMF since it provides for the protection of public health and the environment. These two alternatives do not address elevated metal content in soils that are not currently considered under containment at TCMF.

While stabilization of soils would immobilize elevated metal content in soils, the process is only as successful as the ability to deliver the stabilization chemicals to the affected areas. The only area that has been identified outside existing containment areas (the building footprint) that contained waste sediments and exhibited elevated metal content is at Outfall 002, Drywell A. The removal of this drywell structure and its contents are more favorable than stabilization.

To address the soils/sediments within one of the two structures of Outfall 002, Alternative 3 is a feasible option for further consideration based on the following:

The excavation of impacted soils/sediments at Outfall 002 is feasible with no anticipated impact to the building structure.

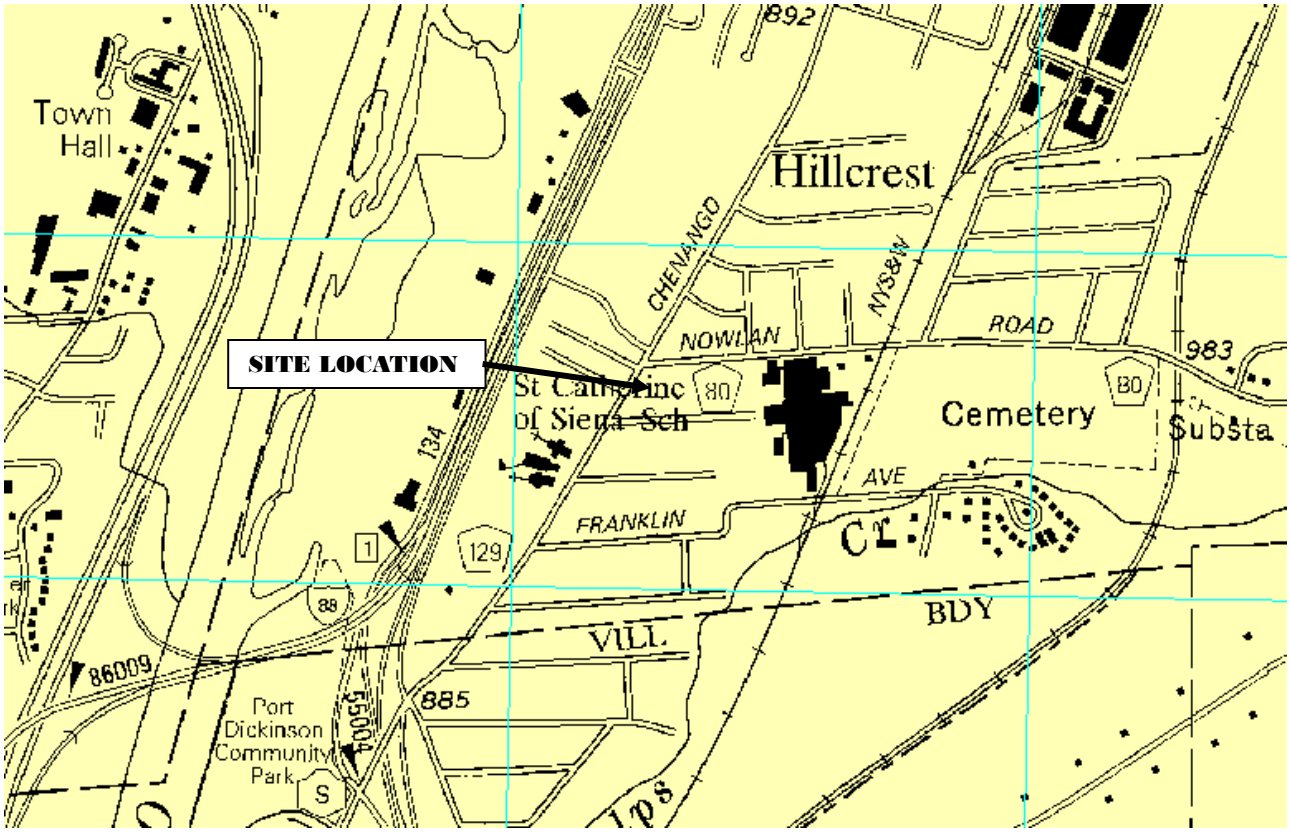
The data collected during the investigated efforts at TCMF has demonstrated that metal concentrations in soil exceed SCO's primarily in two areas, below the southwest section of the building and in the area of former Outfall 002. Groundwater data demonstrates that groundwater has been impacted the greatest at Outfall 002. The soil data below the southwest section of the building does not substantiate that this is the source of metals in groundwater. If this area was the source, the metal concentrations at monitoring well MW-5 should be higher than the concentrations at MW-1 and MW-2, based on soil concentrations. The soils that exhibit elevated metals below the southwest section of the building are greater than 10 feet above the water table and generally depict a decreasing trend in metal concentration with depth.

Containment is considered a remedial action that is currently present at TCMF and that provides adequate protection from exposure potentials to shallow impacted soils below the building as well as providing a barrier to those soils from environmental influences. Institutional Controls in the form of a deed restriction to address property and groundwater use, and Engineering Controls in the form of an operation, monitoring and maintenance plan

for the building could further enhance the protections that containment at TCMF. Containment with institutional controls provides source control, protection from potential exposure to the contaminants, and a notice mechanism to building occupants and future property owners to site conditions and activities that would warrant special actions (i.e. renovation work, building demolition).

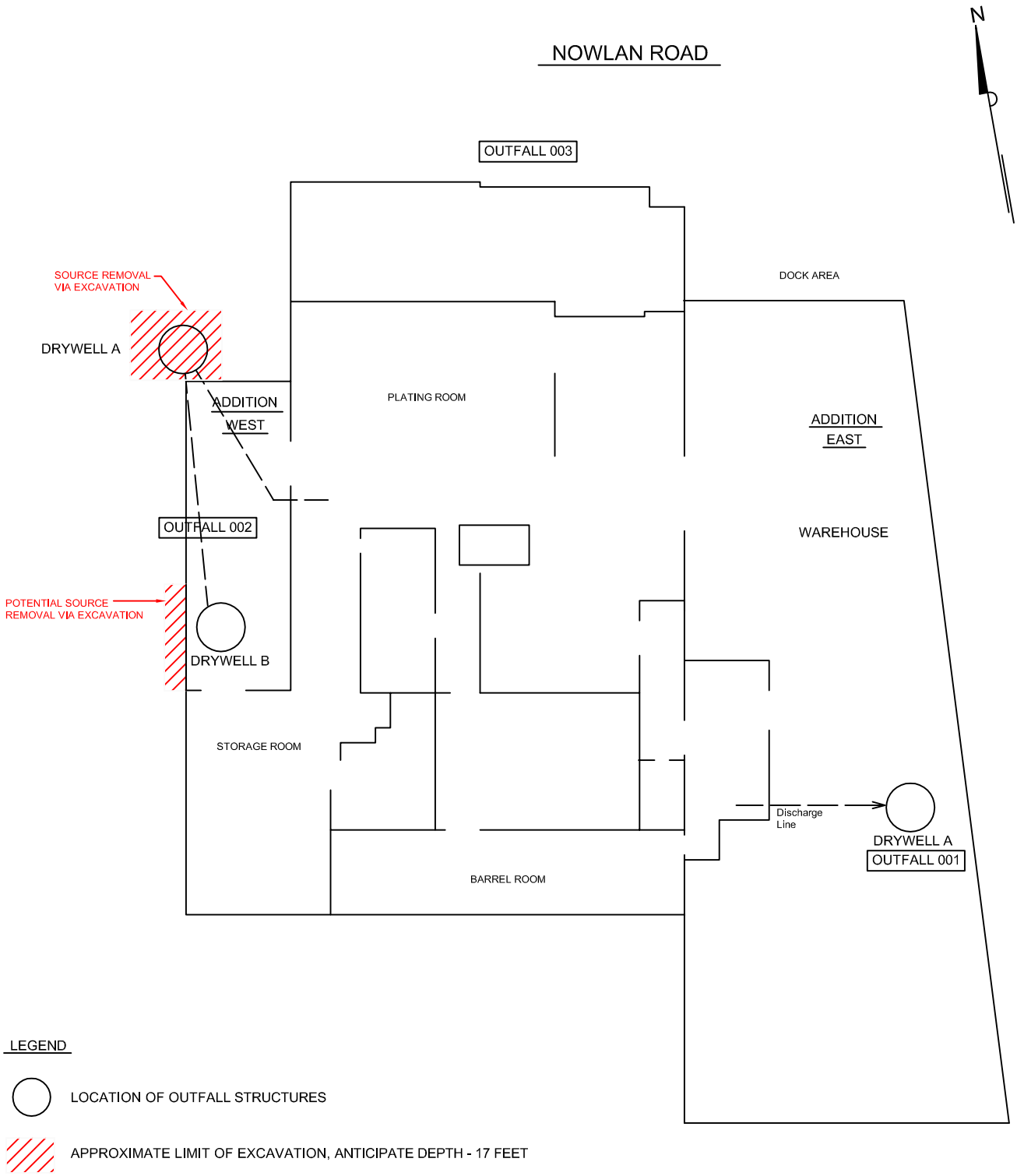
8. CONCLUSIONS

Based on the screening of the of the three remedial alternatives presented in Section 6.0, Alternative 3 achieves the NYSDEC evaluation criteria, and is therefore, the recommended alternative. Alternative 3 will meet each of the RAO's established for the site and will be effective as long as the building remains on the site.



Source: www.nysgis.state.ny.us

REMEDIAL INVESTIGATION
SITE LOCATION PLAN
TRIPLE CITIES METAL FINISHING CORPORATION
BINGHAMTON, NEW YORK
Drawing No. 1



LEGEND

LOCATION OF OUTFALL STRUCTURES

APPROXIMATE LIMIT OF EXCAVATION, ANTICIPATE DEPTH - 17 FEET

APPROXIMATE SCALE:

0' 10' 30' 60'

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GeoLogic

GeoLogic NY, Inc.

ALTERNATIVE ANALYSIS REPORT
BUILDING PLAN
TRIPLE CITIES METAL FINISHING CORP.
BINGHAMTON, NEW YORK

DR. BY:	SCALE:	PROJ. NO:
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