City of Port Colborne
Sampling Plan – Phase II Environmental Site Assessment
40-44 Killaly Street West, Port Colborne, Ontario

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Objective of the Phase II Environmental Site Assessment

To confirm whether contamination exists on site, including the nature and extent of any potential contamination, within an acceptable range of accuracy. Intrusive sampling procedures will be used in order to delineate specific areas of contamination, if any, and specify areas where remediation is necessary.

Number and Type of Substances of Concern

Substances of concern include:
- Possible asbestos-containing materials in automotive service garage on site
- Potentially hazardous mould growth on ceiling tiles throughout garage
- Possibility of lead-based paint used on garage walls
- Presence of polychlorinated biphenyl (PCB)-containing fluorescent light ballasts within garage
- Past leakage of underground hydraulic hoist, located in garage
- Storage of automotive chemicals, including fluids, oils, degreasers and lubricants in small containers throughout site
- Presence of three (3) steel aboveground storage tanks (AST) and one (1) underground storage tank (UST) on subject property:
  - AST1- new oil stored in 800L tank, located in backroom of garage
  - AST2- used motor oil stored in tank, located to southwest of garage
  - AST3- empty tank, previously used for storage of furnace oil, located to northeast portion of site
  - UST1- located at north end of site, of unknown chemical quantity and content
- Presence of six (6) 250L drums of unidentified quality at southern portion of site
- Presence of three (3) cylinders containing ozone-depleting substances
- Evidence of petroleum hydrocarbon (TPH) contamination in vicinity of former pump island on northern portion of site
- Presence of debris throughout site, including engine parts, empty drums and tires
- Presence of likely-elevated nickel concentrations as a result of historical industrial activities near site

Number of Matrices to be Assessed

The geology within the vicinity of the site is interpreted to consist of mainly silt and clay, with minor sand. The groundwater flow direction is to the southeast. Matrices to be assessed will include soil, and potentially also groundwater if contamination is detected to extend toward groundwater resources.
Hazards Posed by Sampling – Health and Safety Plan

Objective

AMEC Earth and Environmental, having conducted a Phase I Environmental Site Assessment, concluded that further investigation (a Phase II Environmental Site Assessment) would be required to quantify contamination on the aforementioned site.

During the initial phase, some observations demonstrated cause for certain precautionary methods regarding particular aspects of the site. The following table identifies potential hazards and corresponding preventative techniques, and indicates necessary protocol and safe practices to ensure the health and safety of those involved in the Phase II Environmental Site Assessment on the site at 40-44 Killaly Street West, Port Colborne, Ontario.

Contact Information

In the event of injury or accident, use discretion when determining severity of the incident. If, at any point during the Phase II Environmental Site Assessment process, an emergency occurs, please call 9-1-1 for immediate care. For Ambulance Services: (905) 688-2191.

For any minor abrasions or injuries, a first aid kit is on site and fully stocked for immediate care.

Niagara College of Applied Arts and Technology should be contacted in regards to any additional requests at time of extraction of USTs, removal of impaired soil and groundwater or additional remedial efforts/costs ensued.

Niagara College Laboratories is to be informed upon the completion of excavation and extraction. They are to be notified of when to expect delivery of samples for analysis, and can be reached at:

Niagara College of Applied Arts and Technology
135 Taylor Road
Niagara-on-the-lake, Ontario
(905) 641-2252

Overview of Personal Protective Equipment (PPE)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Potential Hazard</th>
<th>Potential Risk</th>
<th>Equipment Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fieldwork, Site Inspection</td>
<td>Suspected petroleum-impacted soil, rough terrain, sharp objects, proximity to large machinery</td>
<td>Injury due to tripping, falling, etc.</td>
<td>Boots, steel-toed</td>
</tr>
<tr>
<td>Uncontrollable weather conditions</td>
<td>Hypothermia, pneumonia, frost bite, etc.</td>
<td></td>
<td>Outerwear (jackets, gloves, hats), long, thick socks</td>
</tr>
<tr>
<td>Abrasion, skin irritation</td>
<td>Scraps and other abrasions, metals of unknown ages, tetanus.</td>
<td></td>
<td>Long, thick pants; long-sleeved</td>
</tr>
</tbody>
</table>
Concerns about Off-Site Impacts

There are two concerns of offsite impacts: those from offsite that impact the subject site and the possibility for contamination to have left the subject property, leading to contamination offsite.

Geographically, the site of interest is situated over 1 kilometre from the INCO industrial plant. This facility operated from 1918 to 1984 as a base metal refinery. It currently produces electro cobalt as well as processes precious metals. As noted in the Phase I ESA, emissions from this facility have resulted in contamination, which is above criteria, of nickel, copper, and cobalt to the northeast of INCO, the area in which 40-44 Killaly Street lies.

Based on the location of the ASTs and UST in close proximity to the property line, there is a possibility that any leak or spill may have migrated off the property. The visual presence of staining on the ground surface directly under the ASTs is evidence of a leak, or possibly a spill.

In addition, the on-site presence of USTs, from the 1950s to the present, suggests that there is probable contamination. The previously-conducted Phase I and Phase II assessments made note of contamination that extended offsite. Previously, USTs have been removed due to the presence of petroleum hydrocarbon contamination found in soil samples, and impacted soil was excavated from site.

Based on reasonable evidence and previous incidents, there is a possibility that contamination will exist off site. The Phase II will address and assess these issues through intrusive sampling.
Operational Status of the Site

The subject property is currently owned by Mrs. Edwina Dekoning, and is occupied by an automotive service garage known as 'Ruston’s Auto Parts'. Currently, the garage is a functioning and operational automotive shop.

Future Land Uses

The site is appropriate for future commercial or industrial applications, as these are likely to operate within similar production, emission, and discharge standards. It is likely that the this subject property would be costly to remediate for future residential, parkland or agricultural applications.

Proposed Sampling Methods

Sampling methods will include soil and potentially also groundwater sampling to determine contaminant concentrations at representative locations across the site.

A two-stage sampling plan, including the collection of all samples during a single survey, will be employed. The sampling plan design most appropriate for the specific situation will include a combination of judgement sampling and systematic sampling methods.

Judgement sampling procedures will be used due to the availability of extensive information about the site, especially the specific locations of potential areas of contamination. This method is also being utilized because significant contamination is expected to be present throughout the site, issued forth from a number of different sources.

Excepting those specific locations where known information has rendered them likely to be contaminated, systematic techniques will be used throughout the entire site. Within systematic sampling procedures, samples are collected at regular patterns along points on a grid. Because of the presence of various chemicals, probable high concentrations of nickel and general automotive debris in multiple locations throughout the site, the use of a grid in order to establish regular sampling points is expected to provide comprehensive coverage of the entire area.

Before sampling can take place, we recommend that the garage be demolished and all drums, cylinders and small containers currently present on the site be removed. Because of the potential presence of hazardous substances throughout the site, all waste material should be transported to a hazardous materials facility for disposal/recycling. In addition, in order to expose subsurface soil and facilitate sampling procedures, asphalt and gravel present throughout the station, as well as the cement floor of the garage, must also be stripped off and properly discarded.
**Number of Samples**

The number of samples obtained will be dependent on the extent and depth of contamination found. In general however, our team will begin by obtaining five (5) samples from the soil directly below each of the ASTs, and (1) sample from the soil directly below each of the six (6) drums. Through the use of a Dutch auger, a depth of twenty (20) centimetres will be penetrated in order to effectively capture any contamination present in surface soils (see Appendix B\(^1\)). If contamination is detected to extend from a certain point, a second round of samples will be obtained from the area of concern.

Following the excavation of the UTS and hydraulic hoist, a total of eleven (11) samples will be obtained from regular points in the soils directly below each of these equipments (see Appendix C). A total of four (4) samples will be obtained from regular points in the soils surrounding each of them. A split spoon sampler will penetrated a depth of twenty (20) centimetres in order to collect soil samples from under and around the previously-existing hoist and UST. If contamination is detected extending from a particular point, a subsequent set of samples will be collected around the pollution migration pathways.

Because any background samples are expected to also yield high heavy metal concentrations, background samples will not be obtained. Instead, one sample collected from each sampling set will be split in order to provide replicates for analysis. Replication serves as a check on verification, ensuring that results are not based on chance events. In addition, travelling blank samples from each set will also be submitted to the laboratory in order to provide a check on analytic procedures.

The site is an irregular-shaped property, on a total of 0.71 acres. Through the use of systematic sampling procedures, a total of twenty (20) additional samples will be collected from the remainder of the site by means of a Dutch auger. Augers will be extended twenty (20) centimetres into each sampling location for the collection of soil. If laboratory results identify contamination existing in one or more position, additional samples will be obtained for the purpose of delineation.

In order to determine regular points for soil collection, a grid will be graphed onto the site diagram (see Appendix D for a map of proposed sampling locations). Because 0.71 acres roughly converts into 30927.5 feet squared, the samples will be obtained approximately every 48 square feet.

**Parameters Being Tested for**

Parameters required for analysis were determined on the basis of the history of the site, as well as the potential for contamination as determined in the Phase I ESA. These parameters include polychlorinated biphenyls (PCBs) and ozone-depleting substances (ODS) such as acetylene, propane and nickel concentrations. In addition to these specific chemicals, contamination due to leaks, spills or leaching of other environmentally-hazardous substances are also being testing for, including automotive chemicals like hydraulic fluid, lubricants, degreasers, motor and

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\(^1\) Please note that Appendices B, C and D are not provided in the context of this report.
furnace oils and anti-freeze under the parameter of benzene, toluene, ethylbenzene, and xylenes (BTEX) and total petroleum hydrocarbons (TPH). Due to the prevalence of general automotive solid waste throughout the site at the time of the reconnaissance, contamination from engine parts, empty drums, tires and other debris will also be tested for.

Objectives for Each Sample

In general, samples will be obtained from the surfaces directly below the former UST, ASTs, drums and hydraulic hoist in order to test for any contamination that may have travelled downward in soils from these equipments. Samples will also be obtained from the soils surrounding the excavated hoist and storage tanks in order to check for horizontal pollution migration. Finally, due to the presence of scattered automotive waste throughout the property, including engine parts, chemicals, used oil filters, and tires, for which exact locations cannot be determined, systematic soil samples will be obtained throughout the remainder of the site in order to check for potential contamination. Please see Appendix A for a table which summarizes the specific locations, parameters being tested and objectives for each sample.

Methodology for Sample Collection, Preservation and Analysis

With the exception of sampling type, all other aspects of our approach for collecting soil samples have already been described. Due to the large number of samples required for this Phase II ESA, grab samples will be used for their cost-effectiveness, as they are often less expensive to obtain than composites. Grab samples are single samples, collected a specific location on a site, over a short period of time. All of the soil samples collected during our fieldwork will be acquired by means of the grab sampling technique.

In terms of storage techniques, samples will be stored in airtight glass containers and refrigerated in a cooler. Immediately following the collection of soil samples, they will be transported to a CAEAL-certified laboratory for analysis. From the period of collection to delivery of samples, cooler temperatures will be maintained at <10 degrees Celsius in order to prevent microbiological activity from taking place in the organic materials collected.

In relation to analysis, laboratory technicians will test submitted samples for the parameters listed above, according to the method guidelines for specific substances. Following provision of results, chemical analyses developed will be compared to regulatory criteria in order to determine subsequent steps required.

Quality Assurance/Quality Control

Replicates will be taken at a 1 sample from each set; that is area of interest. A set is based on the specific area that is being sampled; there will be a set for the UST, a set for the area surrounding the hoist, a set for the area surrounding the ASTs, and so on. This is higher than a 1:10 ratio of replicates to samples. In addition a blank will be submitted with each round. Both of these procedures will ensure the quality, and integrity of the samples taken. It also allows for the quality assurances and quality control of the lab processing the samples to be verified. Blank samples will also be submitted for all matrices, including both soil and water.
A manifest will accompany all rounds of samples, from the point of sampling to the lab, which will document all persons responsible for them, the conditions in which they were kept, and the sample size and type. All samples will be labelled on both the top and bottom of the sample containers with the weight, sample number, as it corresponds with the map, and the person responsible for taking the sample.

**References**


Appendices

Appendix A – Table

<table>
<thead>
<tr>
<th>Sample Number and Location</th>
<th>Total No.</th>
<th>Matrices</th>
<th>Parameter</th>
<th>Sampling Type</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>AST1, No.1-5</td>
<td>5</td>
<td>Soil</td>
<td>Evidence of BTEX and TPH</td>
<td>Subsurface</td>
<td>20 centimetres</td>
</tr>
<tr>
<td>AST2, No.6-10</td>
<td>5</td>
<td>Soil</td>
<td>Evidence of BTEX and TPH</td>
<td>Subsurface</td>
<td>20 centimetres</td>
</tr>
<tr>
<td>AST3, No. 11-15</td>
<td>5</td>
<td>Soil</td>
<td>Evidence of BTEX and TPH</td>
<td>Subsurface</td>
<td>20 centimetres</td>
</tr>
<tr>
<td>Drums, No. 16-21</td>
<td>6</td>
<td>Soil</td>
<td>Evidence ODS, TPH, BTEX</td>
<td>Subsurface</td>
<td>20 centimetres</td>
</tr>
<tr>
<td>UST1, No. 22-32 (ground); 33-36 (sides)</td>
<td>14</td>
<td>Soil</td>
<td>Evidence ODS, TPH, BTEX</td>
<td>Subsurface</td>
<td>20 centimetres</td>
</tr>
<tr>
<td>Hoist, No. 37-47 (ground); 48-51 (sides)</td>
<td>14</td>
<td>Soil</td>
<td>Evidence TPH, BTEX</td>
<td>Subsurface</td>
<td>20 centimetres</td>
</tr>
<tr>
<td>Entire site, No.52-71</td>
<td>20</td>
<td>Soil</td>
<td>Evidence of LBP, nickel, ACM, hazardous mould, PCB</td>
<td>Subsurface</td>
<td>20 centimetres</td>
</tr>
</tbody>
</table>
Appendix E – Site Map
Appendix F – Revised Sampling Plan

Following the return of laboratory analyses which indicated the need for additional sampling, the following amendments were made to the original sampling plan in order to delineate contamination.

Revised Depth

In addition to the original depth of 20 centimetres, another 80 centimetres will be penetrated below ground to obtain second round sampling (100 centimetres or 1 metre total).

Revised Proximity

We selected sampling points with a radius of 175 centimetres from the central sampling locations (32c, 33c, and 65c).

Revised Appendix A – Table

<table>
<thead>
<tr>
<th>Sample Number and Location</th>
<th>Total No.</th>
<th>Matrices</th>
<th>Parameter</th>
<th>Sampling Type</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UST1, No.32</strong></td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32.a</td>
<td></td>
<td>Soil</td>
<td>Evidence of BTEX, TPH and lead</td>
<td>Subsurface</td>
<td>100 centimetres</td>
</tr>
<tr>
<td>32.b</td>
<td>1</td>
<td>Soil</td>
<td>Evidence of BTEX, TPH and lead</td>
<td>Subsurface</td>
<td>100 centimetres</td>
</tr>
<tr>
<td>32.c</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32.d</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>32.e</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>UST1, No.33</strong></td>
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<td></td>
<td></td>
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<tr>
<td>33.a</td>
<td></td>
<td>Soil</td>
<td>Evidence of BTEX, TPH and lead</td>
<td>Subsurface</td>
<td>100 centimetres</td>
</tr>
<tr>
<td>33.b</td>
<td>1</td>
<td>Soil</td>
<td>Evidence of BTEX, TPH and lead</td>
<td>Subsurface</td>
<td>100 centimetres</td>
</tr>
<tr>
<td>33.c</td>
<td></td>
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<tr>
<td>33.d</td>
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</tr>
<tr>
<td>33.e</td>
<td></td>
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<td></td>
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<tr>
<td><strong>Entire site, No.65</strong></td>
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<tr>
<td>65.a</td>
<td></td>
<td>Soil</td>
<td>Evidence of BTEX, TPH and lead</td>
<td>Subsurface</td>
<td>100 centimetres</td>
</tr>
<tr>
<td>65.b</td>
<td>1</td>
<td>Soil</td>
<td>Evidence of BTEX, TPH and lead</td>
<td>Subsurface</td>
<td>100 centimetres</td>
</tr>
<tr>
<td>65.c</td>
<td></td>
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<td></td>
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<tr>
<td>65.d</td>
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<tr>
<td>65.e</td>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>

Please note that all other information, including proposed sampling methods and objectives, remains the same as specified in our original sampling plan.