

## 6.0 QUALITATIVE RISK ASSESSMENT

### 6.1 Potential Human Health Risks

The identification of potential human receptors is based on the characteristics of the Site, the surrounding land uses, and the probable future land uses. The future Niagara Falls Municipal Complex Site is presently vacant/undergoing site redevelopment. Under unremediated Site use conditions, human contact with Site soil can be expected to occur primarily by two types of receptors: trespassers who may traverse or use the property; and construction workers that may access the Site to service utilities. Trespassers may be comprised of children, adolescents, and adults, whereas construction workers would be limited to adults. The site is serviced by municipal (supplied) water. Therefore, groundwater exposure would be limited to direct contact by construction workers.

In terms of future use, the current Site owner (City of Niagara Falls) is redeveloping the majority of the Site as a portion of the new Municipal Complex. While such use could be compared to commercial use, it is LCS' understanding that unrestricted use is desired to minimize potential exposures to the future building occupants and site groundskeepers or construction workers.

The chemicals prevalent in unremediated soil and/or groundwater at elevated concentrations are petroleum and solvent-based VOCs as well as heavy metals. The contaminants can be released to ambient air as a result of physical disturbance of subsurface soil particles, and in the case of the VOCs, volatilization either from or through the soil/fill underlying future building structures. Off-site transport of chemicals via storm water runoff and leaching is also possible. Under both the unremediated and future (unrestricted) use conditions, potential exposure routes are incidental ingestion, dermal contact, and inhalation of re-suspended particulates in air; inhalation of volatile compounds in ambient or indoor air; and dermal contact with compounds in surface water runoff or groundwater.

For the trespasser and construction worker scenarios, health-risk based lookup values specifically addressing these types of receptors are not widely published, as estimates of exposure frequency and duration tend to be site-specific in nature. However, the NYSDEC has published health risk-based lookup values for several chemicals under various exposure scenarios in the June 2006 document entitled "New York State Brownfield Cleanup Program Development of Soil Cleanup Objectives Technical Support Document" (a.k.a., "Technical

Support Document”). The Technical Support Document forms the basis for the health-based SCOs presented in 6NYCRR Part 375-6. Based on incorporation of these types of receptors and exposures, the unrestricted health-based SCOs presented in the Technical Support Document are considered protective of human health under both the current and future site use condition.

In addition to the unrestricted health-based SCOs, Table 3 includes USEPA health-based recommended soil cleanup objectives as published in NYSDEC Part 375 SCOs. These values are considered protective of human health under an unrestricted use scenario, and are thus conservative comparative criteria for the reasonably anticipated municipal future use scenario.

As shown on Table 3, Trichloroethene and Tetrachloroethene compounds were not detected above any of the comparative criteria. Accordingly, potential health risks exist for a property with a desired status for unrestricted use. The health-based criteria described above are for individual constituents; cumulative or synergistic effects among chemicals may yield greater risks.

## 6.2 Potential Ecological Risks

The Niagara Falls Municipal Complex Site is a former commercial area in a developed, urban area in the City of Niagara Falls. The Site was vacant with numerous structures, and the surface contains soil with grass and a couple of trees, providing little or no wildlife habitat or food value. No natural waterways are present on or adjacent to the Site. The reasonably anticipated future use is commercial (or municipal) with the majority of the Site to be covered by the future building, landscaping and/or paved areas. As such, no unacceptable ecological risks are anticipated under the current or reasonably anticipated future use scenario.

## 7.0 SUMMARY AND CONCLUSIONS

Based on the information and analyses presented in the preceding sections, constituents of concern (COCs) at the site are comprised of solvent-based VOCs and to a lesser extent, heavy metals. These COCs are prevalent in subsurface soil and/or in site groundwater within the area. As a result of solvents-related VOCs and to a lesser extent heavy metals, the groundwater concentrations do indicate unacceptable human health risk to current and reasonably anticipated future receptors. Such risks, as well as impact to the environment are expected to be addressed through implementation of the IRM.

It was determined during the course of RI planning that remedial measures would be required to address impacted soil and groundwater at the Niagara Falls Municipal Complex. Specifically, an Interim Remedial Measure (IRM) involving soil remediation was recommended during the RI process in lieu of delaying this measure until after completion of the RI/RAR. A discussion of the IRM construction is presented in Section 8.0.

## 8.0 INTERIM REMEDIAL MEASURES

An IRM was implemented at the Niagara Falls Municipal Complex Site concurrent with RI activities. Details of the IRM approach are described in the August 2007 IRM Work Plan (Ref. 7). Based on the nature and extent of contamination as indicated by prior investigations and the planned redevelopment of the subject property, the IRM Work Plan called for source removal via excavation, with off-site disposal of impacted soil. The IRM Work Plan was advertised with the Brownfield Cleanup Program Application for the Site in the September, 2007. The Work Plan was approved in December, 2007.

The IRM work was implemented, on a design-build basis, by LCS on behalf of the Site developer, CLP3, LLP Ciminelli Development. Excavation and backfill activities were contracted by CLP3, LLP to Mark Cerrone, Inc. Remediation was initiated on December 11, 2007 and was substantially completed by January 17, 2008. Some soil characterization and off-site disposal was completed at a later date.

Impacted soil at the Site that exceeded NYSDEC Part 375 SCOs for solvent-based volatile organic compounds (VOCs) was removed by excavation and transported off-site for disposal at Tonawanda Landfill located in Tonawanda, NY. Soil that was not suitable to the Tonawanda Landfill was transported to CWM, located in Model City, NY. Specific elements of the IRM included:

- Excavation and on-site staging of non-impacted surface soil. Approximately 4,400 tons of non-impacted soil was temporarily relocated to an onsite spoils laydown area for reuse.
- Excavation of solvent and metals impacted soil. Approximately 21,980 tons of impacted soils were removed for off-site disposal.
- Permanent closure of four USTs discovered during the excavation work.
- Verification sampling of the sidewalls and bottom of the excavation. LCS personnel collected 7 bottom and 51 sidewall verification samples within the excavation limits. Geotextile demarcation layer was placed where verification samples did not meet Part 375 criteria (i.e., partial north wall of excavation beyond property line).
- Off-site transportation and disposal of impacted soil to the Tonawanda Landfill, Tonawanda, New York. All trucks were lined with polyethylene

liners so allow the soil be fully evacuated from the truck. Approximately 42,000 gallons of groundwater and snow melt water was collected in the excavation during excavation activities.

- The Bottom entire excavation was scraped using a track mounted bulldozer.
- Placement and compaction of non-impacted on-site and “clean” (i.e., Part 375 (unrestricted Use compliant) soil from off-site sources.
- Placement of a minimum 12-inch layer of No. 2 crusher run stone to the bottom of the excavation to provide a firm base for placement of the backfill soils. The crushed stone originated from the Lafarge Stone Quarry in the town of Niagara Falls, NY.

Excavation of the metals contaminated soil was completed first as they were limited to shallow soils and surrounded by non-impacted soils. Such consisted of performing an excavation measuring approximately 62 feet by 25 feet by 5 feet deep. Following removal of the metals contaminated soils, clean overburden soils were excavated and staged on-site for reuse at the completion of the remedial activities.

Excavation of the solvent -contaminated soils was performed following removal of the localized metals contaminated soils and clean overburden soils. The excavation extended vertically until underlying bedrock was encountered typically approximately 15 feet below ground surface (ft. bgs). The excavation did not extend past the property boundaries with the exception of the northern border, where excavation was extended as far north as deemed feasible to remove underground storage tanks (USTs) and accessible surrounding contaminated soils.

As indicated above, LCS personnel collected 7 bottom and 51 sidewall verification samples within the excavation limits. Figure 4 shows verification sample locations. Sample data are presented in Appendix F. All bottom samples verified conformance with Part 375 SCOs. In addition, all sidewall samples collected within the property boundaries met the Part 375 SCOs. At the request of the NYSDEC, and with authorization from CLP3, LCS collected additional samples just north of the Site to have a better understanding as to what contaminants still remain in that area, following removal of the USTs and accessible impacted soils in that area. No evidence of impacted soils was noted remaining in any other

portion of the excavation. The NYSDEC notified LCS that a failure to meet Part 375 SCOs in that area will not constitute further investigation or remediation.

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## 9.0 REMEDIAL ALTERNATIVES EVALUATION

The final remedial measure for the Niagara Falls Municipal Complex Site must satisfy Remedial Action Objectives (RAOs). Remedial Action Objectives are site-specific statements that convey the goals for minimizing or eliminating substantial risks to public health and the environment. For the Niagara Falls Municipal Complex Site, appropriate RAOs are:

- Removal of soil COCs within the Site to levels protective of human health.
- Mitigate loadings to groundwater from impacted soil COCs of the Site at levels that could be expected to result in exceedances of groundwater quality standards.

As discussed in Section 8.0, Part 375 RSCOs were employed as soil cleanup goals to provide a measure of performance against these RAOs. The SCOs are soil concentration limits protective of human health and groundwater quality. Achievement of the SCOs was confirmed through verification sampling.

Because the IRM achieved removal of soil within the limits of the Site to below Part 375 SCOs, the IRM successfully achieved the above-described remedial action objectives.

In addition to achieving RAOs, NYSDEC's Brownfield Cleanup Program calls for remedy evaluation in accordance with DER-10 Technical Guidance for Site Investigation and Remediation (December 2002). Specifically, the guidance states "When proposing an appropriate remedy, the person responsible for conducting the investigation and/or remediation should identify and develop a remedial action that is based on the following criteria..."

- **Overall Protection of Public Health and the Environment.** This criterion is an evaluation of the remedy's ability to protect public health and the environment, assessing how risks posed through each existing or potential pathway of exposure are eliminated, reduced, or controlled through removal, treatment, engineering controls, or institutional controls.
- **Compliance with Standards, Criteria, and Guidance (SCGs).** Compliance with SCGs addresses whether a remedy will meet applicable environmental laws, regulations, standards, and guidance.

- **Long-Term Effectiveness and Permanence.** This criterion evaluates the long-term effectiveness of the remedy after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: (i) the magnitude of the remaining risks (i.e., will there be any significant threats, exposure pathways, or risks to the community and environment from the remaining wastes or treated residuals), (ii) the adequacy of the engineering and institutional controls intended to limit the risk, (iii) the reliability of these controls, and (iv) the ability of the remedy to continue to meet RAOs in the future.
- **Reduction of Toxicity, Mobility or Volume with Treatment.** This criterion evaluates the remedy's ability to reduce the toxicity, mobility, or volume of site contamination. Preference is given to remedies that permanently and significantly reduce the toxicity, mobility, or volume of the wastes at the site.
- **Short-Term Effectiveness.** Short-term effectiveness is an evaluation of the potential short-term adverse impacts and risks of the remedy upon the community, the workers, and the environment during construction and/or implementation. This includes a discussion of how the identified adverse impacts and health risks to the community or workers at the site will be controlled, and the effectiveness of the controls. This criterion also includes a discussion of engineering controls that will be used to mitigate short term impacts (i.e., dust control measures), and an estimate of the length of time needed to achieve the remedial objectives.
- **Implementability.** The implementability criterion evaluates the technical and administrative feasibility of implementing the remedy. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc.
- **Cost.** Capital, operation, maintenance, and monitoring costs are estimated for the remedy and presented on a present worth basis.
- **Community Acceptance.** This criterion evaluates the public's comments, concerns, and overall perception of the remedy.

Evaluation of the IRM against these criteria is presented below.

***Overall Protection of Public Health and the Environment*** – Since the IRM achieved removal of all impacted soil within the boundaries of the Site to SCOs, the IRM is protective of human health and the environment and successfully achieved the RAOs for the Site.

***Compliance with SCGs*** – The IRM was performed in accordance with applicable, relevant, and appropriate standards, guidance, and criteria.

***Long-Term Effectiveness and Permanence*** – Since the IRM achieved removal of all impacted soil within the boundaries of the Site, no residual wastes remain on the Site. As such, the IRM provides long-term effectiveness and permanence.

***Reduction of Toxicity, Mobility, or Volume with Treatment*** – Through removal of all impacted soil, the IRM permanently and significantly reduced the toxicity, mobility, and volume of Site contamination.

***Short-Term Effectiveness*** – The short-term adverse impacts and risks to the community, workers, and environment during implementation of the IRM were effectively controlled. Temporary safety construction fencing was placed around the outer perimeter of the work area to distinguish the work zone and discourage trespassing. During soil excavation and loading activities, dust monitoring was performed to assure conformance with NYSDOH-approved community air monitoring action levels. Erosion and sedimentation control were accomplished through the construction of earthen berms and/or the use of straw bails. The potential for chemical exposures and physical injuries were reduced through safe work practices, proper personal protection, environmental monitoring, establishment of work zones and site control, and appropriate decontamination procedures. The IRM achieved the RAOs for the Site in approximately 1 month.

***Implementability*** – No technical or action-specific administrative implementability issues were associated with implementation of the IRM.

**Cost** – The capital cost of the IRM was approximately \$2,535,925.00. Post-remedial bedrock groundwater monitoring will be undertaken if required by the NYSDEC. Accordingly, long-term O&M costs have not been separately allocated for this Site.

**Community Acceptance** – The IRM Work Plan was advertised and made available for comment with the BCP application. No comments opposing the work were received.

Based on the above screening, the IRM in conjunction with post-remedial groundwater monitoring (if required by the NYSDEC) satisfies the criteria necessary for these measures to be considered the final remedy for the Niagara Falls Municipal Complex Site.

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## 10.0 REFERENCES

1. *Magnetometer and Limited and Focused Subsurface Soil & Groundwater Investigation, Portion of the Proposed Niagara Falls Municipal Complex, 915 Cleveland Avenue, Niagara Falls, New York*, dated July 11, 2007, prepared by LCS, Inc.
2. *Soil and Groundwater Investigation – Portion of the Proposed Niagara Falls Municipal Complex Report, 915 Cleveland Avenue, Niagara Falls, New York*, prepared by LCS, Inc., dated September 20, 2007
3. *Remedial Investigation Work Plan for Niagara Falls Municipal Complex*, prepared by LCS, Inc., dated August 2007.
4. *Interim Remedial Measures Work Plan for Brownfield Cleanup Program – Niagara Falls Municipal Complex*, prepared by LCS, Inc., August 2007.

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