

US EPA ARCHIVE DOCUMENT

Corrective Measures Study/ Corrective Measures Proposal

Lake Shore Foundry Co., Inc.
653 S. Market Street
Waukegan, Lake County, Illinois 60085

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Submitted to:

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Land and Chemicals Division
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1.0 INTRODUCTION/PURPOSE

The purpose of the Corrective Measures Study/Corrective Measures Proposal (CMS/CMP) portion of the Resource Conservation and Recovery Act (RCRA) corrective action process is to identify and evaluate potential remedial alternatives for the releases that have been identified at and/or from the former Lake Shore Foundry Co. Inc. (the Facility). This report submittal is a required deliverable of an Agreed Consent Order between USEPA and Lakeshore Foundry (November 2006) which is now being cooperatively followed by NorStates Bank, as default property owner of the foreclosed property.

The Facility is located at 653 Market Street in Waukegan, Lake County, Illinois 60085. The dimensions of the property are approximately 270 feet north-south and 135 feet east-west (Figure 1). The 0.77 acre Lake Shore Foundry (LSF) property contained a single corrugated metal building and the original brick building, which both have been demolished. The property is currently vacant. The Facility is located on the western shoreline of Lake Michigan.

1.1 Site History

1.1.1 Site Operating History

Previous foundry operations at the property date back to approximately the 1920s. Sanborn Maps show a small foundry operation on the property in 1924. LSF started its operations on the property in 1924. Products previously produced by LSF included brass, bronze and aluminum sand, and permanent mold castings. The Facility previously manufactured red brass and tin bronze, products which may have contained lead.

The Facility ceased operations in June 2010. The building was demolished in August 2010. NorStates Bank received the abandoned facility by default foreclosure on May 18, 2009.

1.1.2 Previous Environmental Investigations

During a February 2003 Compliance Sampling Inspection (CSI), the United States Environmental Protection Agency (USEPA) and the Illinois Environmental Protection Agency (IEPA) [Booz Allen Hamilton (BAH), *Trip Report for Soil Sampling Activities, Lake Shore Foundry*, 24 November 2004], six samples were collected from areas outside the Facility building/structure from the ground surface. Several samples were found to exceed the Toxicity Characteristic Leaching Procedure (TCLP) lead regulatory limit set forth in 40 CFR 261.24. In September 2004, USEPA, IEPA, and USEPA's contractors performed additional sampling on LSF property, and several of these soil samples were found to be above the regulatory limit for lead (BAH, 2004).



1.1.3 Status of Work Completed Under Consent Order

During the period from November 17, 2006 (the effective date of the Consent Order between the Respondents and USEPA) to Present substantial work was conducted per the terms of the Consent Order. In summary, the work that was completed and reviewed by USEPA included, but was not limited to:

- **Interim Measures Work Plan** including completion of several iterations of soil, sediment, and groundwater sampling and analysis.
- **Interim Measures Completion Report** which included documentation of excavation, treatment, and off-site disposal of contaminated soils as a corrective measure.
- **Description of Current Conditions (DOCC) Report** which included completing 4 rounds of groundwater sampling and analysis. The last correspondence related to the 4th round of groundwater sampling and analysis occurred in an email to EPA dated September 14, 2009.
- **A Letter of Credit was maintained** with funding to cover the above Consent Order tasks. USEPA provided concurrence to incrementally reduce the LOC following task completion.

1.2 Previous Reports and CMS/CMP Report Organization

The following documents have been prepared for the Facility and submitted to USEPA. These documents are provided in Appendix A in CD-ROM format.

1. USEPA Administrative Order on Consent, Effective November 17, 2006
2. April 27, 2007 Interim Measures Work Plan, Quality Assurance Project Plan (QAPP) and Site Health & Safety Plan approved by USEPA in letter dated May 15, 2007.
3. August 31, 2007 Interim Measures Report approved by USEPA in letter dated October 26, 2007
4. January 24, 2008, Interim Measures Completion Report
5. March 20, 2008 Description of Current Conditions (DOCC) Report and Work Plan
6. June 12, 2008 Summary of Agreed DOCC Field Sampling Plan
7. August 12, 2008 Description of Current Conditions Report, Addendum
8. January 6, 2009, DOCC Report, Addendum (2nd Round of Groundwater Sampling/Analysis);
9. February 22, 2011 Update Letter (Demolition Summary) to USEPA on Former Lakeshore Foundry
10. March 20, 2009, DOCC Report (e-mail), Addendum (3rd Round of Groundwater Sampling/Analysis);
11. June 22, 2009, DOCC Report (e-mail), Addendum (4th Round of Groundwater Sampling/Analysis);



12. March 29, 2011, DOCC Report, Addendum (5th Round of Groundwater Sampling/Analysis);
13. July 20, 2011, DOCC Report, Addendum (6th Round of Groundwater Sampling/Analysis); and
14. January 30, 2012, DOCC Report, Addendum (7th Round of Groundwater Sampling/Analysis).

The CMS/CMP consists of the following components:

- Section 1: Introduction/Purpose
- Section 2: Description of Current Conditions
- Section 3: Media Cleanup Standards
- Section 4: Identification, Screening and Development of Corrective Measure Alternatives
- Section 5: Evaluation of A Final Corrective Measure Alternative
- Section 6: Recommendation by Respondent for a Final Corrective Measure Alternative
- Section 7: Public Involvement Plan
- Section 8: Proposed Schedule



2.0 DESCRIPTION OF CURRENT CONDITIONS

2.1 Interim Measures Work Completed

In December 2007 to January 2008, an interim measures removal was completed in accordance with a USEPA-approved Work Plan. This removal work consisted of excavation, treatment, and off-site landfill disposal of lead-impacted soil quantity of 527.94 tons. An Interim Measures Completion Report was submitted to USEPA on January 24, 2008.

On July 21 and August 5, 2008 contractors conducted further soil excavation, treatment, and off-site disposal of 91.11 tons of soil at one remaining location of the property where an elevated TCLP lead sample was obtained during the January 2008 interim measures removal work. The location of the soil samples and treatment area are depicted on Figure 2.

2.2 Work Conducted Since 2010 by NorStates Bank

As a result of loan defaults, foreclosure proceedings were completed. A Lake County Sheriff's Foreclosure Sale was held on May 18, 2009. NorStates Bank assumed bank ownership of the property and recorded title in November 2009. LSF continued to occupy the building and operate as a tenant until approximately June 2010, when they were evicted by NorStates Bank for non-payment of rent.

NorStates Bank became concerned with vandalism, theft and trespasser activities at the former LSF plant. LSF left the plant abruptly without removing raw materials, process equipment, and certain hazardous substances. NorStates Bank consulted with Deigan & Associates, LLC to assess potential liability associated with the abandoned plant in its current condition. Continued break-ins and the potential for hazardous substance releases as the building condition deteriorated warranted proper decommissioning and demolition of the property structures. The following approach was managed and implemented to facilitate proper and safe demolition:

- Additional gates and security measures and board-up were conducted to distract vandals.
- A hazardous substance and asbestos survey was conducted throughout the building.
- Specialized hazmat contractors were contracted to remove and treat interior foundry sand and residual dusts.
- Treated foundry sand and dusts were confirmed by analysis to be rendered nonhazardous then transported/manifested as special waste to Veolia ES Zion Landfill. Approximately 108 tons of treated foundry sand and spent sand cores were removed from the building as a further corrective measure.
- Unused or spent petroleum and chemicals were removed and manifested to offsite licensed Treatment, Storage, and Disposal Facilities (TSDFs) for recycling and disposal.



- Asbestos abatement was completed by an Illinois Licensed Asbestos Removal Contractor.
- Salvageable equipment and raw materials were sold or recycled.
- The building was demolished by a qualified demolition contractor.
- The concrete floor slabs and asphalt paved surface areas were not removed during demolition so that they would remain as engineered surface barriers at the site.
- Floor pits were backfilled with crushed stone to eliminate trip or fall hazards.
- A perimeter gate was installed to limit unauthorized vehicle access to the property.

March 4, 2011

As requested by USEPA, an additional round of groundwater sampling and analysis was conducted at the Property on March 4, 2011. A summary table comparing the March 4, 2011 sampling event for total and dissolved metals against the applicable Illinois Class I & II groundwater standards is provided in Appendix A on CD-ROM. The data shows that no Class I & II groundwater standards are exceeded at the four (4) on-site monitoring wells except total copper at MW-02 is reported at 0.74 mg/L, nearly equal to IEPA's groundwater standard of 0.65mg/L.

The prior completed source removal interim measures corrective action work continues to result in improved site groundwater quality trends. Additional source removal was also completed by removing metals-laden foundry sand in interior building floor trenches and pits during the most recent demolition work, as was documented in a correspondence dated February 22, 2011.

April 21, 2011

On April 21, 2011, monitoring well MW-05 was installed at the property to a depth of approximately twenty (20) feet below ground surface. Monitoring well MW-05 was strategically located to demonstrate that the minor concentrations of metals detected in monitoring well MW-02 located near the former foundry building are not migrating towards Lake Michigan. The boring log and monitoring well construction diagram was included in the DOCC Addendum, 6th Round of Groundwater Sampling Analysis previously submitted to the USEPA and provided in **Appendix A** in CD-ROM format.

June 14, 2011

As requested by USEPA, an additional (6th) round of groundwater sampling and analysis was conducted on June 14, 2011. Table 2 provides a summary table comparing the June 14th, 2011 sampling event for total and dissolved metals against the applicable Illinois Class I & II groundwater standards. The data shows that no Class I & II groundwater standards are exceeded at the four (4) on-site monitoring wells (MW-01, MW-03, MW-04 and MW-05). Monitoring well MW-02 which is located near former building source areas, has only slight exceedances of Class I groundwater standards for total cadmium, copper, and lead. Dissolved concentrations of copper and lead do not exceed Illinois Class I groundwater standards. The dissolved concentration of cadmium at MW-02 slightly exceeds the Class I groundwater standard.



Table 1
Comparison to Great Lakes Initiative Chronic Exposure Standards (ppm)
June 14, 2011 Sampling Event

On-site Well	Dissolved Cu (ppm)	Meets GLI Chronic Exposure Std. (Cu) 0.012 ppm	Meets 10X Dilution Exposure Std. of EI (0.12 ppm)
MW-1	0.0028	Yes	Yes
MW-2	0.63	No	No
MW-3	0.15	No	Equivalent
MW-4	0.015	Equivalent	Yes
MW-5	0.0034	Yes	Yes
On-site Well	Dissolved Cd (ppm)	Meets GLI Chronic Exposure Std. (Cd) 0.0027 ppm	Meets 10X Dilution Exposure Std. of EI (0.027 ppm)
MW-1	<0.0020	Yes	Yes
MW-2	0.0067	No	Yes
MW-3	<0.0020	Yes	Yes
MW-4	<0.0020	Yes	Yes
MW-5	<0.0020	Yes	Yes

The additional data provided by MW-5 and its position downgradient of MW-2 support a “yes” determination in the USEPA’s Environmental Indicator Report.

January 18, 2012

On January 18, 2012, as requested by USEPA, an additional (7th) round of groundwater sampling and analysis was conducted at the property. Table 2 provides a summary table comparing the January 18, 2012 sampling event for total and dissolved metals against the applicable Illinois Class I & II groundwater standards. The data shows that no Class I & II groundwater standards are exceeded at the four (4) perimeter on-site monitoring wells (MW-01, MW-03, MW-04 and MW-05). Monitoring well MW-02, which is located near former building contaminant source areas, has only a negligible exceedance of Class I groundwater standard for total cadmium (0.0053 vs. 0.005 mg/L). The dissolved concentration of cadmium at MW-02 does not exceed the Class I groundwater standard. The locations of the monitoring wells and direction of the groundwater flow are depicted on Figure 3.

2.3 Residual Contamination

This section discusses the residual contamination in soil, sediment, surface water and groundwater at the Facility and those media that may need cleanup beyond the Interim Measures, and any areas for which institutional controls would be insufficient.



2.3.1 Soil

No VOCs were detected in the Facility soil samples, as presented in Table E-3 of DOCC Report Addendum. While several SVOCs, primarily PAHs, were detected in soil, no concentrations exceeded IEPA Tier 1 residential, commercial/industrial, and construction worker soil remediation objectives and/or IEPA background levels. None of the metals, except arsenic and lead, in Facility soil exceeded IEPA Tier 1 commercial/industrial soil remediation objectives for the ingestion or inhalation exposure routes (see Table 2 of the Interim Measures Report, Tables E-3 of The DOCC Report Addendum and Table 3 of Interim Measures Completion Report). The average concentration of arsenic in surface soil (0-3 ft bgs) is 7.2 mg/kg, which is less than the IEPA background concentration of 13 mg/kg. The arithmetic average concentration of lead in surface soil (498 mg/kg) throughout the Facility, defined as 0-2 ft bgs, did not exceed the Tier 1 industrial/commercial SRO (800 mg/kg). The dataset used in the averaging included the 16 original investigative sample locations not impacted by the removal (see Table 4 of the Interim Measures Report), the 15 post-excavation locations sampled upon completion of the soil removal (see Table 2 of the Interim Measures Completion Report), and the Supplemental Sampling Results (see Table E-1 of the DOCC Report Addendum). Thus, the data shows no “unacceptable” exposures to “contamination” (i.e., contaminants in concentrations in excess of risk-based levels) in soil. No further cleanup of soil is needed to meet commercial/industrial cleanup levels; cleanup would be needed to meet the unrestricted (residential) cleanup level for lead.

Copper exceeded the Tier 1 construction worker SRO for ingestion (see Table 3 of Interim Measures Completion Report). Worker safety precautions should be implemented to prohibit or limit direct contact exposure to elevated copper levels in soil.

Concentrations of antimony, cadmium, chromium, copper, lead, mercury, nickel, and zinc exceeded IEPA Tier 1 soil migration to groundwater objectives in soil; no other detected chemicals (i.e., VOCs, SVOCs, and the remaining metals) exceed these objectives (see Table 2 of Interim Measures Report, Table 3 of Interim Measures Completion Report and Table E-1 of DOCC Report Addendum). There is a potential for remaining metal concentrations in Facility soils to migrate to groundwater; however, there is no current exposure to groundwater either on the Facility or down gradient of the Facility. The City of Waukegan has enacted a groundwater use restriction ordinance that prohibits groundwater use within the South Lakefront Development area, including the Facility. The completed remediation of TCLP toxicity characteristic lead contamination and backfilling of excavated areas serve to limit leaching of residual contaminants to groundwater.

2.3.2 Sediment

As presented in the DOCC Addendum (2008), sediment samples were collected from the shoreline area immediately north and south of the facility to evaluate the potential for adverse effects to human health and ecological receptors. No VOCs were detected in the beach sediment sample. Several SVOCs, primarily PAHs, were detected in beach



sediment though concentrations did not exceed IEPA Tier 1 residential, commercial/industrial, and construction worker soil remediation objectives. Concentrations of metals did not exceed Tier 1 soil remediation objectives for the ingestion and inhalation exposure routes.

The lead concentration in sediment did not exceed U.S. EPA ecological screening levels (ESLs) for sediment while copper and zinc concentrations in the south sediments exceeded ESLs. However, the maximum concentrations of copper (130 mg/kg) and zinc (360 mg/kg) do not exceed probable effects concentrations (PECs, 150 mg/kg and 460 mg/kg, respectively) developed for sediment (MacDonald, D.D., C.G. Ingersoll, and T.A. Berger. 2000a. "Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems." *Arch. Environ. Contam. Toxicol.* 39:20-31). Probable effects concentrations are an upper effect level at which toxicity to benthic-dwelling organisms are predicted to be probable.

Thus, the sediment data shows no "unacceptable" human and ecological exposures to "contamination" (i.e., contaminants in concentrations in excess of risk-based levels) in sediment. No further cleanup of sediments is needed.

2.3.3 Groundwater/Surface Water

As presented in the February 22, 2011 Update Letter to USEPA, the total lead concentration in MW-2 (0.012 mg/L) exceeded Class I groundwater standard of 0.0075 mg/L during the June 2009 groundwater sampling event. As discussed in Section 2.2, for the March 4 2011 groundwater sample event total copper at MW-02 is reported at 0.74 mg/L, nearly equal to IEPA's groundwater standard of 0.65mg/L. For the June 14th, 2011 sampling event, MW-02 has only slight exceedances of Class I groundwater standards for total cadmium, copper, and lead. Dissolved concentrations of copper and lead do not exceed Illinois Class I groundwater standards while the dissolved concentration of cadmium at MW-02 slightly exceeds the Class I groundwater standard. For the most recent (January 2012) sampling event, MW-02, which is located near former building source areas, has only a negligible exceedance of Class I groundwater standard for total cadmium (0.0053 vs. 0.005 mg/L). The dissolved concentration of cadmium at MW-02 does not exceed the Class I groundwater standard.

There is no current exposure to groundwater on the Facility or downgradient of the Facility. Potable water is supplied by the City of Waukegan. The City of Waukegan has also enacted a groundwater use restriction ordinance that prohibits groundwater use within the South Lakefront Development area, including the Facility (see Appendix B).

Due to the size of the Lake and the proximity of other adjoining contaminated properties, the nature and extent of contamination of the lake attributable to the Facility could not be ascertained through the collection of surface water samples. Dissolved groundwater sampling and analysis was performed to evaluate the contribution of possible site-related and area-wide background contaminants to surface water. During the June 2009 groundwater sampling event, dissolved copper concentrations exceeded the hardness-based surface water quality standard of 0.018 mg/L in MW-2 (0.42 mg/L) and MW-3



(0.22 mg/L) and the dissolved zinc concentration exceeded the hardness-based surface water quality standard of 0.151 mg/L in MW-2 (1.2 mg/L).

During the most recent January 2012 groundwater sampling event, the dissolved copper concentrations exceeded or nearly equaled the IEPA hardness-based water quality standard of 0.018 mg/L in MW-2 (0.45 mg/L) and MW-3 (0.25 mg/L), and MW-4 (0.019 mg/L). The dissolved zinc concentration exceeded or nearly equaled the hardness-based surface water quality standard of 0.151 mg/L in MW-2 (1.4 mg/L), in MW-3 (0.2 mg/L), and in MW-5 (0.29 mg/L). These dissolved concentrations do not exceed or are numerically equal to the IEPA general effluent standards of 0.5 mg/L copper and 1 mg/L for zinc. Effluent standards are the maximum concentrations of various contaminants that may be discharged to the waters of the State (35 IAC 304).

The point of compliance (POC) for meeting the groundwater standards is the subset of wells closest to Lake Michigan (MW-01, MW-04, and MW-05). The dissolved copper concentration in POC well MW-4 does not exceed the water quality standard. The dissolved zinc concentration in POC well MW-5 does not exceed the 10 times the water quality standard; the 10 times factor is used to account for dilution and mixing of groundwater discharging to surface water. Semi-annual monitoring of POC wells is proposed until dissolved copper and dissolved zinc concentrations meet cleanup standards for two successive monitoring events.



3.0 MEDIA CLEANUP STANDARDS

The media cleanup standards proposed for the Facility are the following:

- TCLP lead regulatory limit of 5 mg/L lead set forth in 40 CFR 261.24.
- IEPA's 35 IAC Part 742 TACO Tier 1 industrial/commercial soil remediation objectives for Appendix IX metals/inorganics. Based on the land use of the property, the Agreed Administrative Order (Order) specified the use of risk-based cleanup objectives for an Industrial/Commercial property.
- IEPA's 35 IAC Part 620 Class I groundwater standards. The City of Waukegan Limited-Area Groundwater Use Restriction Ordinance has established a groundwater use restriction for the property. Under 35 IAC Part 742, this institutional control can be used to exclude the groundwater exposure pathway.
- IEPA's 35 IAC 302.504 acute surface water standards for Lake Michigan Basin. Acute standards are concentrations that should not be exceeded at any time. Dissolved groundwater sample results are used to evaluate the contribution of possible site-related contaminants to surface water. Preliminary hardness-based criteria based on hardness of 137 mg/L (Central Lake County Joint Action Water Authority, <http://www.clcjawa.com/faq.html>). Site-specific hardness may also be determined by sampling/analysis.
- IEPA's 35 IAC 302.124 general effluent standards for copper (0.5 mg/L) and zinc (1 mg/L), or 10 times the surface water standard, whichever is lower. Effluent standards are the maximum concentrations of various contaminants that may be discharged to the waters of the State. When a water quality standard is more restrictive than its corresponding effluent standard, 35 IAC 302.102 allows for an opportunity for compliance by mixture of an effluent with its receiving waters. The 10 times factor is used to account for dilution and mixing of groundwater discharging to surface water.
- U.S. EPA Region 5 RCRA ESLs for sediment and PECs for copper and zinc (150 mg/kg and 460 mg/kg, respectively) developed for sediment (MacDonald et al. 2000). Probable effects concentrations are an upper effect level at which toxicity to benthic-dwelling organisms are predicted to be probable.



4.0 IDENTIFICATION, SCREENING, AND DEVELOPMENT OF CORRECTIVE MEASURE ALTERNATIVES

4.1 Identification:

Based on the site investigation results, there were a limited number of COCs identified at the property. Specifically, arsenic, copper, chromium and lead were detected at concentrations exceeding the IEPA TACO Tier 1 direct contact residential soil remediation objectives at several discrete locations. In addition, lead was detected at several locations exceeding the TCLP hazardous toxicity characteristic level.

After performing a risk assessment / averaging calculations, the only constituent of concern at the property necessary to be addressed was lead. Therefore, based on the identified and type of COC (lead) remaining to be addressed, the property was a less complex site and limited to relatively straightforward remedial solutions and an extensive evaluation of a range of corrective measure alternatives was not performed. A limited set of potentially applicable technologies were evaluated as part of this CMS/CMP. The corrective measures alternatives considered for the property included the following:

1. Complete Excavation and Off-site Disposal of Contaminated Soil; and
2. Source Area Excavation, On-site Treatment and Off-site Disposal and Engineered Barriers.

Alternative 1:

In this alternative scenario, all of the contaminated soils exceeding the cleanup objective of 400 mg/kg would be excavated and transported to a permitted landfill facility for proper disposal. Prior to off-site disposal, the contaminated soil exceeding the hazardous levels would have been treated on-site. In addition, the limited-area groundwater ordinance would also be utilized as part of this alternative. Implementation of this alternative will result in the removal of contaminated soil exceeding the unrestricted land use cleanup objectives. Therefore, no restrictions would be necessary for future development and land use under this alternative, except for the limited-area groundwater ordinance.

Alternative 2: The source area soil exceeding the toxicity characteristic hazardous levels was treated on-site and transported to a permitted landfill facility for proper disposal. The residual contaminated soil remaining at the property would be addressed utilizing engineered barriers that eliminate exposure pathways for industrial/commercial or recreational land uses (the existing concrete foundation and placement of three-feet of clean soil fill material or asphalt) and the limited-area groundwater use restriction ordinance.

Groundwater Monitoring

Under either alternative, semi-annual monitoring of the POC wells will occur. The POC is the subset of wells closest to Lake Michigan (MW-01, MW-04, and MW-05). Semi-annual sampling of POC monitoring wells for dissolved copper and dissolved zinc is proposed until groundwater concentrations meet cleanup



standards for two successive monitoring events. Once a POC monitoring well has met the standards for two successive monitoring events, then it will no longer be required to be sampled. Dissolved metals concentrations will be compared to the IEPA general effluent standards or 10 times the IEPA Lake Michigan Basin acute water quality standard, whichever is lower. Once the groundwater data show that there are no longer exceedances, monitoring may cease upon written agreement between U.S. EPA and the facility.

4.2. Screening:

The two corrective measures alternatives were evaluated against the USEPA – prescribed criteria listed in the following table:

Table 6 Potential Remedial Alternatives Screening Lakeshore Foundry -Waukegan, Illinois			
Criteria		Alternative	
		1 – Complete Excavation and Off-site Disposal of Contaminated Soil, GW Use Restriction	2 – Source Area Excavation, Engineered Barriers, GW Use Restriction
Technical			
Performance	Effectiveness – capable of performing intended function	Yes	Yes
	Useful life – can alternative maintain its effectiveness	Yes	Yes
	Toxicity, mobility, and volume reduction	Yes	Yes
Reliability	Is there long-term operation and maintenance	Yes	Yes
	Is there demonstrated and expected reliability	Yes	Yes
Implementability	Constructability / feasibility – relative ease of implementing	No	Yes
	Implementation timeframe (Short or Long)	Short	Short
	Beneficial results timeframe (Short or Long)	Short	Short
Safety			
Is there risk of fire, explosion, or exposure to hazardous substances		Yes	No
Human Health			
Minimization / mitigation of short- and long-term exposure		Yes	Yes
Environmental			
Any adverse effects on environmentally sensitive areas		No	No
Institutional			
Relative ease of addressing institutional issues		Yes	Yes
Cost			
Relative project costs (High, Moderate, or Low)		High	Moderate



Technical

Both alternatives are proven, reliable and effective methods to achieve the cleanup objectives at the property. Both alternatives are capable of providing useful life with long term effectiveness and would reduce the toxicity, mobility and volume of contamination at the property.

Both alternatives have off-site disposal and Institutional Controls. The off-site permitted landfill would provide long-term containment of the excavated and treated soil. Each alternative would utilize the limited-area groundwater ordinance and long-term operation and maintenance would be necessary to ensure the ordinance is in effect. Alternative 2 would also require long-term operation and maintenance to ensure that construction workers safety precaution are implemented, any soil removed from the property in the future is properly characterized and managed for disposal, and the engineered barriers are maintained.

Alternative 1 would not be feasible to implement due to the subsurface soil conditions at the property. The property subsurface consists of concrete rubble fill material that was historically dumped on the lakefront throughout the past century which helped create the overall land mass. Attempting to excavate to deeper depths would potentially affect the overall property integrity and subsurface excavation could not be implemented without considerable difficulties, such as, processing and separation of commingled concrete debris and soil at significant cost of material handling and land disturbance. The magnitude of cost and land disturbance would not be warranted when compared to the incremental risk reduction of contaminant removal.

Alternative 2 can be readily and cost-effectively implemented due to the relatively shallow excavations of source soil above toxicity characteristic hazardous levels. The excavation portion of Alternative 2 was completed within several weeks and the proposed engineered barrier of three-feet of clean soil combined with asphalt/concrete cover is estimated to be able to be implemented and completed within a short-time of approval of this CMS/CMP. Therefore, this corrective measure alternative would achieve their full effectiveness in a relatively short timeframe.

Safety

Both alternatives would have the potential for exposure to the workers during the excavation, treatment and handling of the contaminated soils at the property. The generation of dust during the excavation activities also has the potential for exposure to the workers and off-site receptors. However, Alternative 1 has the potential for exposure to the workers for a longer duration due to a larger volume of contaminated soil to be removed and processed to separate concrete debris. In addition, Alternative 1 would have an increased risk of potential traffic incidents associated with the transport of larger volumes of contaminated soil to a permitted landfill facility due to the extra loading and trucking required.



Human Health

Both alternatives would have the potential for short-term exposure to the workers during the excavation, treatment and handling of the contaminated soils at the property. Both alternatives would utilize the limited-area groundwater ordinance to eliminate the short- and long-term potential exposure to the groundwater contamination. If feasible, Alternative 1 would have removed contaminated soil exceeding the most stringent cleanup objectives, but at higher risk of release during excavation and processing of debris. Since Alternative 2 is leaving acceptable levels of residual contamination in place and utilizing engineered barriers to eliminate the exposure pathway, future maintenance of the cap is required. However, lead (the contaminant of concern) is highly amenable to long-term containment without migration, when capped.

Environmental

Both alternatives do not pose a threat to environmentally sensitive areas that could be affected by the corrective measures considered. Each alternative has short-term effects / risks associated with the excavation, treatment and handling of the contaminated soils including the potential for dust generation and wind erosion during the excavation, treatment and handling of the contaminated soils. Alternative 1, if feasible, would attempt to remove residual contaminated soil and thus, remove potential for residual contaminants to leach into groundwater and migrate to Lake Michigan. However, substantial land disturbance would result for excavations to deeper depths, thereby do not affect the overall integrity of concrete rubble fill and soil and increasing potential for migration into Lake Michigan. Alternative 2 will remove leachable soil concentrations and capping will limit rainwater infiltration and leaching of residual contaminants to groundwater, and thus limit contaminant migration in groundwater to Lake Michigan. Groundwater data has indicated that Alternative 2 as implemented to date has not resulted in contaminant migration to Lake Michigan.

The short-term effects / risks were considered more significant than the long-term effects / risks, which were minimal for both alternatives.

Institutional

Both alternatives would have relative ease in complying with the applicable federal, state, and local environmental safety and public health standards, guidance, or regulations on the implementation of the corrective measures.



Cost

Since implementation of Alternative 1 is not deemed feasible, a detailed cost was not determined for it. However, the order of magnitude cost of Alternative 1 would exceed \$1 million.

The estimate costs associated with implementing Alternative 2 is approximately \$307,000. Long-term operation and maintenance costs are included as part of Alternative 2 cost estimate and a breakdown of the costs are provided in Table 5.

Table 7 Preferred Alternative 2 Corrective Measures Cost Estimate Lakeshore Foundry Waukegan, Illinois			
Task	Units	Unit Cost	Task Total
<i>Tasks that have already been implemented and completed</i>			
1. Mobilization/Site Prep	Estimate	\$2,500	\$2,500.00
2. Soil Excavation, Treatment	619.05 tons	\$53.60	\$33,181.08
3. Pre-disposal TCLP Analysis 3 Day Turnaround Time	5 samples	\$150.00	\$750.00
4. Field Sampling/Field QA/Project Management	Estimate	\$4,500.00	\$4,500.00
5. Post-Excavation Confirmation Sampling and Lab Analysis (TCLP Pb / Total RCRA Metals)	17 samples	\$225.00	\$3,825.00
6. Crushed Recycled Concrete Aggregate Backfill	600 tons	\$12.00	\$7,200.00
7. Building Demolition and Interior Contaminant Removal	Job	\$150,700	\$150,700
8. Reporting to USEPA	Estimate	\$2,500.00	\$2,500.00
9. Corrective Measures Study / Corrective Measures Proposal	Estimate	\$9,500.00	\$9,500.00
Subtotal –Corrective Measures Work Completed to Date			\$215,000
<i>Task to be completed upon USEPA approval of the CMS/CMP</i>			
10. Mobilization/Demobilization – Engineered Barrier	Estimate	\$2,500.00	\$2,500.00
11. Engineered Barrier – 3-feet of Clean Soil or Asphalt Material	2,500 tons	\$18.00	\$45,000.00
12. Field Oversight / Project Management	Estimate	\$5,500.00	\$5,500.00
13. Final Remedy Construction / Implementation Completion Report	Estimate	\$5,500.00	\$5,500.00
14. Development of Operations and Maintenance (O&M) Plan. Long-term O&M Costs including annual groundwater monitoring ⁽¹⁾	Estimate (per year)	\$5,000.00	\$25,000.00
Subtotal—to Complete			\$83,500
10% Contingency			\$8,350
Total Alternative 2 Cost Estimate			\$307,000

(1) Estimated five (5) years of O&M until the property is sold and redeveloped by the new owners.



4.3 Corrective Measure Development:

The following paragraphs provide a description of the feasible corrective measures alternative:

Alternative 2:

For Alternative 2, a combination of remedial technologies would be performed to treat the source areas and to contain (engineered barriers) the residual contamination.

The remedial technologies for source area treatment would consist of excavation, on-site treatment, and off-site landfill disposal of lead-impacted soil exceeding the hazardous levels at a permitted landfill facility. A total of 619.05 tons of lead contaminated soil exceeding the TCLP hazardous levels were excavated, treated on-site, and transported off-site for disposal at a permitted landfill facility. Copies of the waste manifests were previously provided to the USEPA. A total of seventeen (17) confirmatory soil samples were collected to verify the lead contaminated soil exceeding the hazardous levels had been remediated. The laboratory analytical results did not identify lead at concentrations exceeding the hazardous levels in the confirmatory soil samples.

Based on the confirmatory soil samples and the site investigation soil samples results, the identified lead exceeding the hazardous levels has been removed from the property.

The remedial technologies for containment of the residual contamination would consist of engineered barriers (asphalt and concrete pavement and 3-feet of clean fill material) and institutional controls (limited-area groundwater ordinance). Based on the area currently not covered with an engineered barrier, approximately 2,500 tons of clean fill material is planned to be installed in those areas. The proposed locations of the engineered barriers are depicted on Figure 4.

For estimating the costs associated with this alternative, approximately 619.05 tons of contaminated soil were excavated, treated, and disposed of off-site. A total of 3,100 tons of clean fill material will be utilized to backfill the excavation area (600 tons) and to cap the necessary areas with three feet of clean fill material (2,500 tons).

Implementation of this alternative would require institutional controls to protect construction workers, ensure that the engineered barriers are maintained, that any soil removed from the property in the future is properly characterized and managed in accordance with all applicable federal, state, and local regulations, and the limited-area groundwater ordinance is not rescinded in the future.



5.0 EVALUATION OF A FINAL CORRECTIVE MEASURE ALTERNATIVE

Based on the results of the screening evaluation (Table 6), Alternative 2 is the preferred corrective measure alternative for the property. Alternative 1 is not a feasible option to implement at the property.

5.1 Protect human health and the environment.

The overall objectives of the proposed corrective measures are to restrict leaching of contaminants and to prevent direct contact with the residual contamination.

The detected TCLP lead concentrations that exceeded the hazardous waste levels were excavated, treated on-site and transported for off-site disposal at a licensed landfill facility permitted to accept the contaminated soil. The excavated areas were then backfilled with clean crushed concrete aggregate fill and the area was leveled and graded, further limiting exposure to residual contamination and the potential for leaching.

The remaining residual contamination will be addressed by utilizing the existing building concrete slab foundation and the proposed three-feet of clean soil fill material or asphalt as an engineered barrier to eliminate the potential direct exposure / contact to the residual concentrations exceeding the applicable Cleanup Objectives for the ingestion exposure route. The clean fill will also limit infiltration and leaching of residual contaminants.

The areas identified with COCs exceeding the applicable Cleanup Objectives for the construction worker scenario will be addressed by utilizing a precaution construction worker notice attached to the deed.

Seven (7) groundwater sampling events have been performed at the property from June 2008 through January 18, 2012. The results of the groundwater sampling have indicated that the migration of contaminated groundwater above acceptable levels has stabilized at the property.

The limited-area groundwater ordinance will eliminate the potential exposure to the impacted groundwater at the property and surrounding properties. The cap will limit the potential for leaching of residual contaminants to groundwater.

There is no current exposure to groundwater at the property or downgradient of the property. The potable water at the property and surrounding properties is supplied by the City of Waukegan. The City of Waukegan has also enacted a groundwater use restriction ordinance that prohibits groundwater use within the South Lakefront Development area, which includes the entire LSF property. There are no potable wells located on the property or downgradient of the property. Because there is no complete pathway between “contamination” in groundwater and human receptors, this exposure pathway is eliminated from



further consideration. A copy of the limited area groundwater ordinance is provided in **Appendix B**.

With the utilization of the engineered barriers, the construction worker precaution notifications and the limited-area groundwater ordinance, significant or unacceptable exposure to the contaminated media do not exist and the proposed corrective measures will be protective of human health and the environment from all current and future risks associated with the previous releases of hazardous waste or hazardous constituents from the former Facility.

Long-term protectiveness requires compliance with the effective engineered barriers and institutional control and maintenance of all remedy components. An O&M Plan would be developed and include regular inspection of the engineered barrier at the site and annual certification to the EPA that the institutional controls (limited-area groundwater ordinance) are in place and effective.

5.2 Attain media cleanup standards set by the U.S. EPA.

To attain the media cleanup standard of 5.0 mg/L for TCLP lead hazardous levels, excavation, on-site treatment and off-site landfill disposal of the identified lead impacted soil exceeding the TCLP characteristic hazardous levels was performed at the site.

In December 2007 to January 2008, an interim measures removal was completed in accordance with a USEPA-approved Work Plan. This removal work consisted of excavation, treatment, and off-site landfill disposal of lead-impacted soil quantity of 527.94 tons. Excavated soil areas were subject to TCLP and total metals analysis to confirm removal of TCLP hazardous levels and to document remaining levels of total metals for purposes of further risk-based assessment of site conditions. One discrete location (6.1 mg/L TCLP lead at LSF-3R) exceeded the TCLP threshold of 5 mg/L. On July 21 and August 5, 2008 contractors conducted further soil excavation, treatment, and off-site disposal of 91.11 tons of soil in the area of sample LSF-3R.

The excavation, on-site treatment, and off-site disposal of the identified lead exceeding the hazardous levels has already been implemented and closure soil samples have confirmed that the identified lead exceeding the hazardous levels has been removed and has confirmation samples demonstrate that the media cleanup standard of 5.0 mg/L for hazardous levels of Lead has been achieved.

The concrete pavement already exists and the limited-area groundwater use restriction ordinance has already been passed by the City of Waukegan and approved by the Illinois EPA. The only remedial actions needed to be completed is the installation of the three-feet of clean fill material or asphalt as part of the capping on the contaminated soil. It is estimated that once the CMS/CMP is approved, it will take approximately three to six months to implement and complete the capping activities at the property.



5.3 Control the source of releases so as to reduce or eliminate, to the extent practicable, further releases that may pose a threat to human health and the environment.

The LSF operations were discontinued in June 2010 and the building was demolished in August 2010. Currently the property is vacant and there are no activities producing any hazards constituents.

The identified contaminated soil exceeding the hazardous levels was excavated, treated on-site and transported for disposal to a permitted landfill facility. Therefore, the source of the release and any future releases from facility operations has been eliminated.

The Engineered barriers will be utilized as exposure pathway elimination measures for remaining residual contamination. The engineered barriers will consist of concrete pavement (existing) and three-feet of clean fill material or asphalt (proposed). These types of engineered barrier are known to be cost efficient and effective at eliminating pathway exposure to the contaminated soils.

If redevelopment of the property occurs (removal of the engineered barriers), either a new concrete slab foundation, asphalt pavement or three feet of clean fill material will need to be placed in the areas exceeding the ingestion exposure routes. Alternatively, as part of the proposed redevelopment activities, the residual contaminated soil may be managed by excavating and transporting off-site to a licensed landfill facility for proper disposal.

5.4 Comply with any applicable standards for management of wastes.

The excavated soil exceeding the hazardous levels for lead was treated on-site and transported under waste manifests to a permitted landfill facility for disposal. Copies of the signed waste manifests were provided to the US EPA in previously submitted documents. Copies of the previously submitted documents are included on the CD-ROM provided in **Appendix A**.

If during any future redevelopment activities at the property, soil is required to be removed from the property, it will be properly characterized and handled and disposed of in accordance with all applicable federal, state and local regulations.

5.5 Other Factors.

a. Long-term reliability and effectiveness;

The useful life of the concrete foundation slab engineered barriers should typically be effective for 10 -15 years before signs of deterioration and cracks no longer make the concrete foundation slab an impermeable barrier. Concrete has been proven to be reliable engineered barriers for capping contaminated soils and limiting exposure to those soils.



The three-feet of clean soil fill material will be constructed of common natural geologic construction materials that exhibit long-term durability within the natural environment of the property. Alternatively, six-inch compacted asphalt may be utilized.

Routine inspections and long-term maintenance would be performed to ensure the engineered barriers remains intact. An environmental covenant with the current property owner will be established ensuring that the engineered barriers are inspected and maintained.

The limitations of the proposed technology are that the engineered barrier may be removed as part of redevelopment activities and the limited-area groundwater ordinance may be rescinded by the City of Waukegan in the future. However, given the fact that the City of Waukegan obtains its groundwater from Lake Michigan and it just recently passed the limited-area groundwater ordinance, it is unlikely to be rescinded in the near future. Restrictions would need to be placed on the property deed indicating that engineered barriers are required in specific areas in case of future redevelopment at the property and that construction worker precaution notifications would be required during any subsurface work activities at the property.

b. Reduction in the toxicity, mobility or volume of wastes;

The excavation of the lead-contaminated soils exceeding the hazardous levels has reduced the overall volume and substantially reduced the potential for the COCs to impact the environment through toxicity and mobility.

c. Short-term effectiveness;

Excavation of the lead-contaminated soil exceeding hazardous levels resulted in short-term exposure risks during the excavation, on-site treatment, handling, transportation and disposal over the several days that the work was completed. These short-term exposure risks were addressed following a site-specific health and safety plan describing the methods and practices to be utilized for engineering controls, air monitoring, excavation, and personal protective equipment.

d. Implementability.

Alternative 2 was implemented without any delays from the State or local agencies regarding the excavation activities of hazardous levels of lead. The City of Waukegan has already passed the limited –area groundwater use restriction ordinance and it has already been approved by the Illinois EPA.

It is technically feasible to add the three-feet of clean soil fill material or asphalt and, upon approval of this CMS/CMP, this alternative will be implemented and completed within an estimated three to six months. The clean fill material is



readily available in the Chicagoland area and obtaining clean fill material should not delay the project.

The administrative activities needed to implement the corrective measures would be the approval of the railroad company to cross over the existing railroad tracks to gain access to the property by the dump trucks and construction equipment and vehicles. No other permits or administrative activities are necessary at this time.

e. Cost.

The relative cost evaluation for Alternative 2 was based on estimated costs using the design concepts presented in Section 4.3. It was anticipated that the corrective measures for Alternative 2 could be implemented and completed within an estimated three to six months.

It is estimated that Alternative 2 would cost approximately \$300,000.

The cost estimate for Alternative 2 includes the long-term operation and maintenance costs that could be incurred.

A detailed breakdown of the cost estimates for Alternative 2 was provided in Section 4.3.

Since implementation of Alternative 1 is not deemed feasible, a detailed cost was not determined for it. However, the order of magnitude cost of Alternative 1 would exceed \$1 million.



6.0 Recommendation by Respondent for a Final Corrective Measure Alternative

As discussed in Section 4, two corrective measure alternatives were evaluated using the criteria listed in Table 6. Based on the results of the screening evaluation, Alternative 2 is the preferred corrective measure alternative and the majority of this alternative (i.e., source treatment) has already been successfully implemented as an interim measure.

This alternative includes excavation of the source area and Institutional Controls and Engineering Controls.

Alternative 2 is the preferred alternative due to the ease and feasibility of implementation and the relative costs to perform the corrective measures.

Alternative 1 was not selected due to the impracticality of implementation and the potential high costs associated with removing all contaminated soils exceeding the cleanup objectives. The order of magnitude cost of Alternative 1 would exceed \$1 million.



7.0 PUBLIC INVOLVEMENT PLAN

The RCRA 3008h Order at Section V ('Work To Be Performed'), Paragraph I, p. 8 requires that, "U.S. EPA will provide the public with an opportunity to review and comment on its proposed final corrective measures, including a detailed description and justification for the proposal ('Statement of Basis') for at least 45 days. Following the public comment period U.S. EPA will select the final corrective measure(s), and will notify the public of the decision and rationale in a 'Final Decision and Response to Comments' ('Final Decision)'".

Once USEPA issues the Final Decision, all remaining activities required to implement the selected remedy will be completed and a Final Remedy Construction Completion Report will be submitted.

After the CMS/CMP has been performed by Respondent and the USEPA has selected a preferred alternative for proposal in the Statement of Basis, it is the agency's policy to request public comment on the Administrative Record and the proposed corrective measure(s). Changes to the proposed corrective measure(s) may be made after consideration of public comment. U.S. EPA may also require that Respondent perform additional corrective measures studies. If the public is interested, a public meeting may be held. After consideration of the public's comments on the proposed corrective measure, the agency develops the Final Decision and Response to Comments to document the selected corrective measure, the agency's justification for such selection, and the response to the public's comment. Additional public involvement activities may be necessary, based on site-specific circumstances.



8.0 PROPOSED SCHEDULE

The proposed schedule will be discussed with USEPA.



Deigan & Associates, LLC
Environmental Consultants

Figures

CMS/CMP
Revision: 0
December 14, 2012
Lake Shore Foundry
653 Market Street, Waukegan, Lake County, Illinois



Figure 1
Site Location Map
Lake Shore Foundry, Inc.
653 Market St., Waukegan, Lake County, IL. 60085

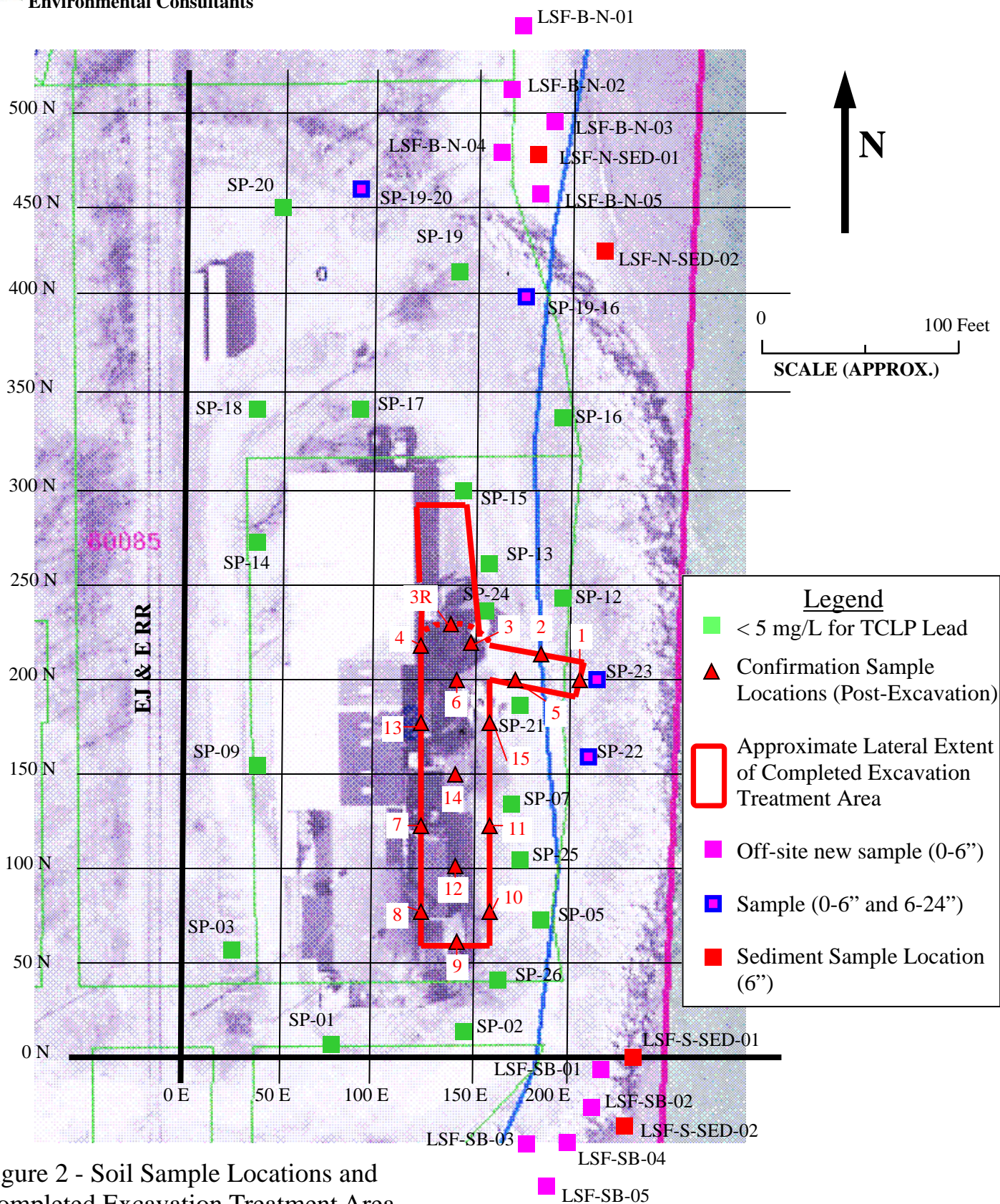


Figure 2 - Soil Sample Locations and Completed Excavation Treatment Area
CMS/CMP
Lake Shore Foundry
Waukegan, IL

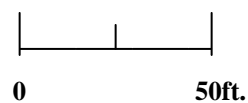


LEGEND

- Monitoring Well
- 580 Groundwater Contour
- Groundwater Elevation

Figure 3
Groundwater Sample Locations and
Groundwater Elevations, January 18, 2012
Former Lake Shore Foundry
Waukegan, IL 60085

Scale (Approx.)



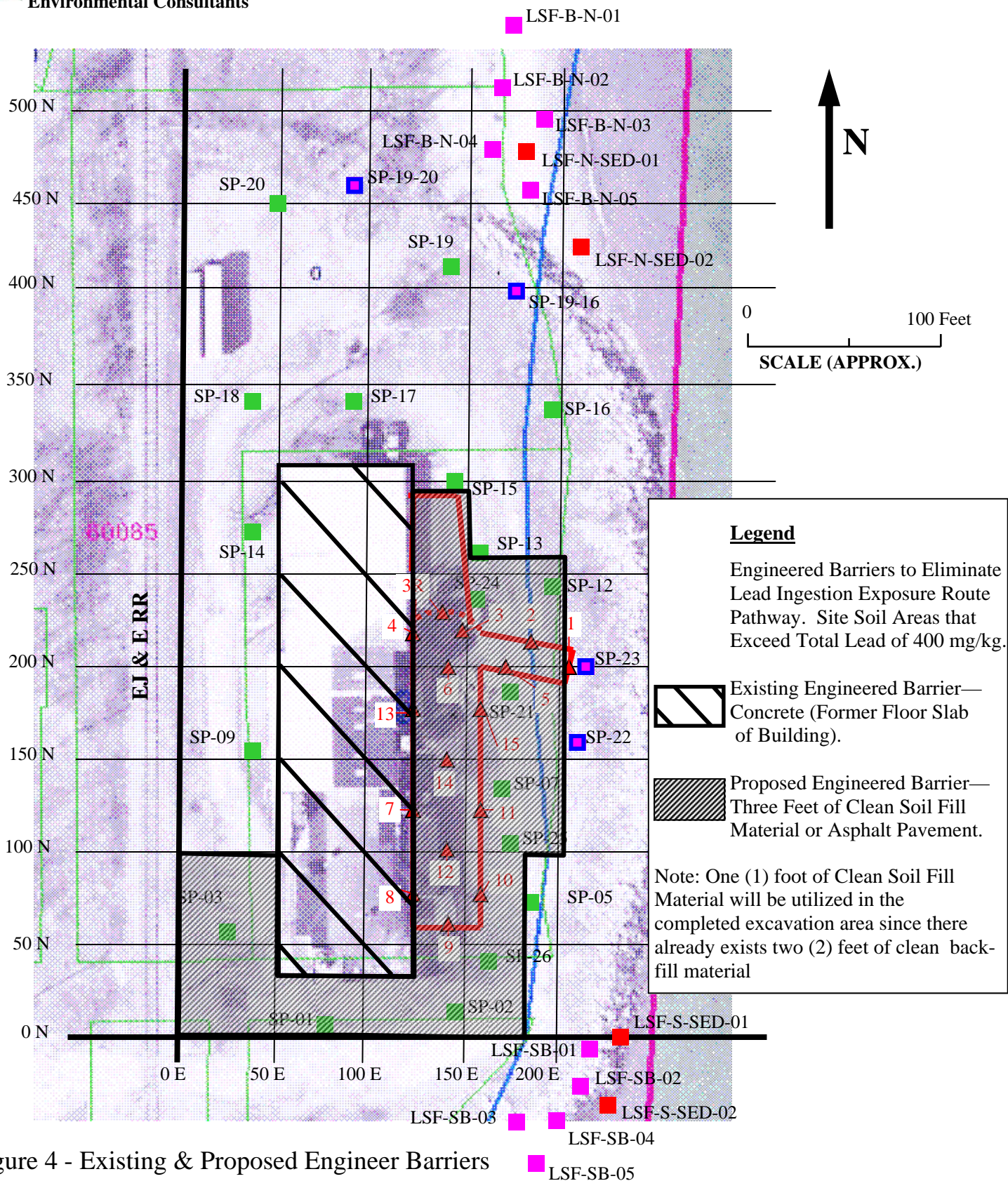


Figure 4 - Existing & Proposed Engineer Barriers
CMS/CMP
Lake Shore Foundry
Waukegan, IL



Deigan & Associates, LLC
Environmental Consultants

Tables

CMS/CMP
Revision: 0
December 14, 2012
Lake Shore Foundry
653 Market Street, Waukegan, Lake County, Illinois

Table 2 - Groundwater Data - Janaury 18, 2012

Customer Deigan & Associates
Project Former Lake Shore Foundry
Sample Date 1/18/2012
Lab Name TestAmerica Chicago
Job Number 500-43776-1

Analytical Results for Water Samples		* Exposure Routes for Specific SROs				Sample ID						
						pH						
		Ingestion	Inhalation	Class I	Class II	LSF-MW-01	LSF-MW-02	LSF-MW-03	LSF-MW-04	LSF-MW-05	EXISTING AMPSKY WELL	
Method	Analyte	mg/L	mg/L	mg/L	mg/L	7.21	7.01	7.48	7.50	7.22	7.10	
010B	Arsenic	NRO	NRO	0.05	0.2	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
010B	Barium	NRO	NRO	2	2	0.085	0.084	0.064	0.059	0.14	0.065	
010B	Beryllium	NRO	NRO	0.004	0.5	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
010B	Cadmium	NRO	NRO	0.005	0.05	<0.0020	0.0053	<0.0020	<0.0020	<0.0020	<0.0020	
010B	Chromium	NRO	NRO	0.1	1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
010B	Cobalt	NRO	NRO	1	1	<0.0050	0.0038	<0.0050	0.00066	0.0011	0.0012	
010B	Copper	NRO	NRO	0.65	0.65	<0.010	0.51	0.27	0.034	0.018	<0.010	
010B	Lead	NRO	NRO	0.0075	0.1	<0.0050	0.0037	0.0023	<0.0050	0.0037	<0.0050	
010B	Nickel	NRO	NRO	0.1	2	<0.010	0.039	0.019	0.0054	0.0051	0.0016	
010B	Selenium	NRO	NRO	0.05	0.05	<0.010	0.0068	0.0025	<0.010	<0.010	<0.010	
010B	Silver	NRO	NRO	0.05	NRO	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
010B	Tin	NRO	NRO	4.2	NRO	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	
010B	Vanadium	NRO	NRO	0.049	0.1	0.0040	0.0048	0.0039	0.0053	0.0053	0.0043	
010B	Zinc	NRO	NRO	5	10	<0.020	1.5	0.20	0.042	0.51	0.0074	
010B-Diss	Arsenic, Diss	NRO	NRO	NRO	NRO	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
010B-Diss	Barium, Diss	NRO	NRO	NRO	NRO	0.071	0.081	0.062	0.052	0.091	0.063	
010B-Diss	Beryllium, Diss	NRO	NRO	NRO	NRO	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
010B-Diss	Cadmium, Diss	NRO	NRO	NRO	NRO	0.00090	0.0059	0.0011	0.0010	0.0011	0.0010	
010B-Diss	Chromium, Diss	NRO	NRO	NRO	NRO	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
010B-Diss	Cobalt, Diss	NRO	NRO	NRO	NRO	<0.0050	0.0035	<0.0050	<0.0050	<0.0050	0.00047	
010B-Diss	Copper, Diss	NRO	NRO	NRO	NRO	<0.010	0.45	0.25	0.019	0.0024	0.0023	
010B-Diss	Lead, Diss	NRO	NRO	NRO	NRO	<0.0050	0.0024	<0.0050	<0.0050	<0.0050	<0.0050	
010B-Diss	Nickel, Diss	NRO	NRO	NRO	NRO	<0.010	0.039	0.019	0.0042	0.0046	0.00090	
010B-Diss	Selenium, Diss	NRO	NRO	NRO	NRO	<0.010	0.0080	0.0053	0.0035	<0.010	<0.010	
010B-Diss	Silver, Diss	NRO	NRO	NRO	NRO	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
010B-Diss	Tin, Diss	NRO	NRO	NRO	NRO	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	
010B-Diss	Vanadium, Diss	NRO	NRO	NRO	NRO	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
010B-Diss	Zinc, Diss	NRO	NRO	NRO	NRO	<0.020	1.4	0.20	0.031	0.29	0.0087	
020	Antimony	NRO	NRO	0.006	0.024	<0.0030	0.0031	0.0014	0.0031	<0.0030	<0.0030	
020	Thallium	NRO	NRO	0.002	0.02	0.00077	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
020-Diss	Antimony, Diss	NRO	NRO	NRO	NRO	<0.0030	0.0027	0.0015	0.0025	<0.0030	<0.0030	
020-Diss	Thallium, Diss	NRO	NRO	NRO	NRO	0.00061	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
470A	Mercury	NRO	NRO	0.002	0.01	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	
470A-Diss	Mercury, Diss	NRO	NRO	NRO	NRO	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	

Exposure Routes for Soil Remediation Objectives (SROs) are based on

EPA 40 CFR Part 742 Tier 1 Appendix B Table E.

Results are mg/L unless otherwise requested.

Note 1: Results that are Bolded and Shaded indicate that the measured concentration exceeds any one of the SROs.

NRO = (No Remediation Objective) was provided in the tables.

The groundwater objective is equal to the Acceptable Detection Limit (ADL) for carcinogens.

NRO/NRO** indicates that pH analysis was not requested and the values for Class I and Class II can not be provided.

For TACO analytes are italicized and limits are based on the Illinois EPA Toxicity Assessment Unit May 1, 2007.

Additional analytes may have been requested to be reported but are not contained in the

on-TACO or TACO Tier 1 tables and are not evaluated.

Estimated results that are reported between the MDL and RL (J flags) may be reported but are not indicated with a flag.

Please refer to the report.

Results may have been achieved by a dilution and are not indicated with a flag. Please refer to the report.

2,4-Methylphenol do not separate analytically on the 8270 columns and are reported as combined analytes.

m,p-Xylenes, Total is a calculated result in TALs by adding the m,p-Xylene and o-Xylene results.

Total PCB is a calculated result in TALs by adding the individual PCB aroclors.

These footnotes are not an all inclusive list from Section 742 Appendix B Tier 1 Tables A through H.

For a complete detailed list see Section 742 Appendix B Tier 1 Tables A through H.

+ Reported according to the proposed amendments to TACO.

Table 3
Site Investigation Soil Sampling Results - Non-Lead Metals in Soil
Lake Shore Foundry
Waukegan, IL

Client ID	Parameter Name	Result	Qualifier	Unit	Tier 1 Residential Soil Remediation Objective					Commercial/Industrial				Construction Worker			
					Background	Ingestion	Inhalation	Class I GW	Ingestion	> CI INH?	Inhalation	>CI INH?	Ingestion	> CW INH?	Inhalation	> CW INH?	
LSF-GP-01(0-6)	Arsenic	19		mg/Kg	13	>BKG	13	>ING	750	31	13	>CI INH?	1200	61	25000		
LSF-GP-01(0-6)	Barium	100		mg/Kg	110	>BKG	5500		690000	2100	140000		910000	14000	870000		
LSF-GP-01(0-6)	Chromium	14		mg/Kg	16.2	>BKG	230		270	28	6100		420	4100	690		
LSF-GP-01(0-6)	Selenium	0.77	J	mg/Kg	0.48	>BKG	390		--	2.4	10000		--	1000	--		
LSF-GP-01(0-6)	Silver	2		mg/Kg	0.55	>BKG	390		--	110	10000		--	1000	--		
LSF-GP-01(0-6)	Cadmium	3.9		mg/Kg	0.6	>BKG	78		1800	430	2000		2800	200	59000		
LSF-GP-01(0-6)	Mercury	0.12		mg/Kg	0.06	>BKG	23		10	8	610		540000	61	52000		
LSF-GP-01(4-5)	Arsenic	1.6		mg/Kg	13		13		750	31	13		1200	61	25000		
LSF-GP-01(4-5)	Barium	5.6		mg/Kg	110		5500		690000	2100	140000		910000	14000	870000		
LSF-GP-01(4-5)	Chromium	3.3		mg/Kg	16.2		230		270	28	6100		420	4100	690		
LSF-GP-01(4-5)	Selenium	0.97	U	mg/Kg	0.48		390		--	2.4	10000		--	1000	--		
LSF-GP-01(4-5)	Silver	0.48	U	mg/Kg	0.55		390		--	110	10000		--	1000	--		
LSF-GP-01(4-5)	Cadmium	0.086	J	mg/Kg	0.6		78		1800	430	2000		2800	200	59000		
LSF-GP-01(4-5)	Mercury	0.01	J	mg/Kg	0.06		23		10	8	610		540000	61	52000		
LSF-GP-02(0-6)	Arsenic	15		mg/Kg	13	>BKG	13	>ING	750	31	13	>CI INH?	1200	61	25000		
LSF-GP-02(0-6)	Barium	250		mg/Kg	110	>BKG	5500		690000	2100	140000		910000	14000	870000		
LSF-GP-02(0-6)	Chromium	24		mg/Kg	16.2	>BKG	230		270	28	6100		420	4100	690		
LSF-GP-02(0-6)	Selenium	0.7	J	mg/Kg	0.48	>BKG	390		--	2.4	10000		--	1000	--		
LSF-GP-02(0-6)	Silver	12		mg/Kg	0.55	>BKG	390		--	110	10000		--	1000	--		
LSF-GP-02(0-6)	Cadmium	2.7		mg/Kg	0.6	>BKG	78		1800	430	2000		2800	200	59000		
LSF-GP-02(0-6)	Mercury	3		mg/Kg	0.06	>BKG	23		10	8	610		540000	61	52000		
LSF-GP-02(4-5)	Arsenic	5		mg/Kg	13		13		750	31	13		1200	61	25000		
LSF-GP-02(4-5)	Barium	400		mg/Kg	110	>BKG	5500		690000	2100	140000		910000	14000	870000		
LSF-GP-02(4-5)	Chromium	18		mg/Kg	16.2	>BKG	230		270	28	6100		420	4100	690		
LSF-GP-02(4-5)	Selenium	1.1	U	mg/Kg	0.48		390		--	2.4	10000		--	1000	--		
LSF-GP-02(4-5)	Silver	0.29	J	mg/Kg	0.55		390		--	110	10000		--	1000	--		
LSF-GP-02(4-5)	Cadmium	0.7		mg/Kg	0.6	>BKG	78		1800	430	2000		2800	200	59000		
LSF-GP-02(4-5)	Mercury	0.41		mg/Kg	0.06	>BKG	23		10	8	610		540000	61	52000		
LSF-GP-03(0-6)	Arsenic	14		mg/Kg	13	>BKG	13	>ING	750	31	13	>CI INH?	1200	61	25000		
LSF-GP-03(0-6)	Barium	94		mg/Kg	110	>BKG	5500		690000	2100	140000		910000	14000	870000		
LSF-GP-03(0-6)	Chromium	17		mg/Kg	16.2	>BKG	230		270	28	6100		420	4100	690		
LSF-GP-03(0-6)	Selenium	1.1	J	mg/Kg	0.48	>BKG	390		--	2.4	10000		--	1000	--		
LSF-GP-03(0-6)	Silver	4.9		mg/Kg	0.55	>BKG	390		--	110	10000		--	1000	--		
LSF-GP-03(0-6)	Cadmium	2.4		mg/Kg	0.6	>BKG	78		1800	430	2000		2800	200	59000		
LSF-GP-03(0-6)	Mercury	0.82		mg/Kg	0.06	>BKG	23		10	8	610		540000	61	52000		
LSF-GP-03(4.5-5.5)	Arsenic	4		mg/Kg	13		13		750	31	13		1200	61	25000		
LSF-GP-03(4.5-5.5)	Barium	14		mg/Kg	110		5500		690000	2100	140000		910000	14000	870000		
LSF-GP-03(4.5-5.5)	Chromium	5.7		mg/Kg	16.2		230		270	28	6100		420	4100	690		
LSF-GP-03(4.5-5.5)	Selenium	1	U	mg/Kg	0.48		390		--	2.4	10000		--	1000	--		
LSF-GP-03(4.5-5.5)	Silver	0.16	J	mg/Kg	0.55		390		--	110	10000		--	1000	--		
LSF-GP-03(4.5-5.5)	Cadmium	0.17	J	mg/Kg	0.6		78		1800	430	2000		2800	200	59000		
LSF-GP-03(4.5-5.5)	Mercury	0.0072	J	mg/Kg	0.06		23		10	8	610		540000	61	52000		
LSF-GP-04(0-6)	Arsenic	7.5		mg/Kg	13		13		750	31	13		1200	61	25000		
LSF-GP-04(0-6)	Barium	320		mg/Kg	110	>BKG	5500		690000	2100	140000		910000	14000	870000		
LSF-GP-04(0-6)	Chromium	16		mg/Kg	16.2		230		270	28	6100		420	4100	690		
LSF-GP-04(0-6)	Selenium	0.71	J	mg/Kg	0.48	>BKG	390		--	2.4	10000		--	1000	--		
LSF-GP-04(0-6)	Silver	3.4		mg/Kg	0.55	>BKG	390		--	110	10000		--	1000	--		
LSF-GP-04(0-6)	Cadmium	2.3		mg/Kg	0.6	>BKG	78		1800	430	2000		2800	200	59000		
LSF-GP-04(0-6)	Mercury	0.57		mg/Kg	0.06	>BKG	23		10	8	610		540000	61	52000		
LSF-GP-04(1.5-2)	Arsenic	4.3		mg/Kg	13		13		750	31	13		1200	61	25000		
LSF-GP-04(1.5-2)	Barium	68		mg/Kg	110		5500		690000	2100	140000		910000	14000	870000		
LSF-GP-04(1.5-2)	Chromium	13		mg/Kg	16.2		230		270	28	6100		420	4100	690		
LSF-GP-04(1.5-2)	Selenium	1	U	mg/Kg	0.48		390		--	2.4	10000		--	1000	--		
LSF-GP-04(1.5-2)	Silver	0.6		mg/Kg	0.55	>BKG	390		--	110	10000		--	1000	--		
LSF-GP-04(1.5-2)	Cadmium	0.68		mg/Kg	0.6	>BKG	78		1800	430	2000		2800	200	59000		
LSF-GP-04(1.5-2)	Mercury	0.24		mg/Kg	0.06	>BKG	23		10	8	610		540000	61	52000		

Table 3
Site Investigation Soil Sampling Results - Non-Lead Metals in Soil
Lake Shore Foundry
Waukegan, IL

Client ID	Parameter Name	Result	Qualifier	Unit	Tier 1 Residential Soil Remediation Objective					Commercial/Industrial				Construction Worker			
					Background	Ingestion	Inhalation	Class I GW	Ingestion	> CI ING?	Inhalation	>CI INH?	Ingestion	> CW ING?	Inhalation	> CW INH?	
LSF-GP-05(0-6)	pH	8.65		SU													
LSF-GP-05(0-6)	Antimony	0.64	J	mg/Kg	4	31	--	5	820		--		82		--		
LSF-GP-05(0-6)	Arsenic	5.7		mg/Kg	13	13	750	32	13		1200		61		25000		
LSF-GP-05(0-6)	Barium	71		mg/Kg	110	5500	690000	2100	140000		910000		14000		870000		
LSF-GP-05(0-6)	Beryllium	1.2	B	mg/Kg	0.6 >BKG	160	1300	8000	4100		2100		410		44000		
LSF-GP-05(0-6)	Chromium	14		mg/Kg	16.2	230	270	24	6100		420		4100		690		
LSF-GP-05(0-6)	Cobalt	6.2		mg/Kg	8.9	4700	--	--	120000		--		12000		--		
LSF-GP-05(0-6)	Nickel	22		mg/Kg	18 >BKG	1600	13000	3800	41000		21000		4100		440000		
LSF-GP-05(0-6)	Selenium	0.49	J	mg/Kg	0.48 >BKG	390	--	1.8	10000		--		1000		--		
LSF-GP-05(0-6)	Silver	0.27	J	mg/Kg	0.55	390	--	110	10000		--		1000		--		
LSF-GP-05(0-6)	Thallium	1.1	U	mg/Kg	0.32	6.3	--	4.4	160		--		160		--		
LSF-GP-05(0-6)	Tin	35	B	mg/Kg	--	47000	--	--	1000000		--		120000		--		
LSF-GP-05(0-6)	Vanadium	17		mg/Kg	25.2	550	--	980	14000		--		1400		--		
LSF-GP-05(0-6)	Zinc	1000	^ B V	mg/Kg	95 >BKG	23000	--	53000	610000		--		61000		--		
LSF-GP-05(0-6)	Cadmium	0.89		mg/Kg	0.6 >BKG	78	1800	430	2000		2800		200		59000		
LSF-GP-05(0-6)	Copper	690		mg/Kg	19.6 >BKG	2900	--	330000	82000		--		8200		--		
LSF-GP-05(0-6)	Mercury	0.13		mg/Kg	0.06 >BKG	23	10	8	610		540000		61		52000		
LSF-GP-05(1.5-2)	pH	8.78		SU													
LSF-GP-05(1.5-2)	Arsenic	5		mg/Kg	13	13	750	33	13		1200		61		25000		
LSF-GP-05(1.5-2)	Barium	79		mg/Kg	110	5500	690000	2100	140000		910000		14000		870000		
LSF-GP-05(1.5-2)	Chromium	16		mg/Kg	16.2	230	270	21	6100		420		4100		690		
LSF-GP-05(1.5-2)	Selenium	1	U	mg/Kg	0.48	390	--	1.3	10000		--		1000		--		
LSF-GP-05(1.5-2)	Silver	0.77		mg/Kg	0.55 >BKG	390	--	110	10000		--		1000		--		
LSF-GP-05(1.5-2)	Cadmium	0.25		mg/Kg	0.6	78	1800	430	2000		2800		200		59000		
LSF-GP-05(1.5-2)	Mercury	0.056		mg/Kg	0.06	23	10	8	610		540000		61		52000		
LSF-GP-06(0-6)	Arsenic	15		mg/Kg	13 >BKG	13	>ING	750	31	13	>CI ING	1200	61		25000		
LSF-GP-06(0-6)	Barium	81		mg/Kg	110	5500	690000	2100	140000		910000		14000		870000		
LSF-GP-06(0-6)	Chromium	16		mg/Kg	16.2	230	270	28	6100		420		4100		690		
LSF-GP-06(0-6)	Selenium	1.3		mg/Kg	0.48 >BKG	390	--	2.4	10000		--		1000		--		
LSF-GP-06(0-6)	Silver	46		mg/Kg	0.55 >BKG	390	--	110	10000		--		1000		--		
LSF-GP-06(0-6)	Cadmium	5		mg/Kg	0.6 >BKG	78	1800	430	2000		2800		200		59000		
LSF-GP-06(0-6)	Mercury	0.063		mg/Kg	0.06 >BKG	23	10	8	610		540000		61		52000		
LSF-GP-06(4-5)	Arsenic	9.2		mg/Kg	13	13	750	31	13		1200		61		25000		
LSF-GP-06(4-5)	Barium	98		mg/Kg	110	5500	690000	2100	140000		910000		14000		870000		
LSF-GP-06(4-5)	Chromium	8.7		mg/Kg	16.2	230	270	28	6100		420		4100		690		
LSF-GP-06(4-5)	Selenium	0.67	J	mg/Kg	0.48 >BKG	390	--	2.4	10000		--		1000		--		
LSF-GP-06(4-5)	Silver	0.49	J	mg/Kg	0.55	390	--	110	10000		--		1000		--		
LSF-GP-06(4-5)	Cadmium	1.2		mg/Kg	0.6 >BKG	78	1800	430	2000		2800		200		59000		
LSF-GP-06(4-5)	Mercury	0.29		mg/Kg	0.06 >BKG	23	10	8	610		540000		61		52000		
LSF-GP-07(0-6)	pH	9.44		SU													
LSF-GP-07(0-6)	Antimony	1.6	J	mg/Kg	4	31	--	5	820		--		82		--		
LSF-GP-07(0-6)	Arsenic	2.9		mg/Kg	13	13	750	33	13		1200		61		25000		
LSF-GP-07(0-6)	Barium	43		mg/Kg	110	5500	690000	2100	140000		910000		14000		870000		
LSF-GP-07(0-6)	Beryllium	1.5	B	mg/Kg	0.6 >BKG	160	1300	8000	4100		2100		410		44000		
LSF-GP-07(0-6)	Chromium	21		mg/Kg	16.2 >BKG	230	270	21	6100		420		4100		690		
LSF-GP-07(0-6)	Cobalt	4.1		mg/Kg	8.9	4700	--	--	120000		--		12000		--		
LSF-GP-07(0-6)	Nickel	43		mg/Kg	18 >BKG	1600	13000	3800	41000		21000		4100		440000		
LSF-GP-07(0-6)	Selenium	0.51	J	mg/Kg	0.48 >BKG	390	--	1.3	10000		--		1000		--		
LSF-GP-07(0-6)	Silver	0.8		mg/Kg	0.55 >BKG	390	--	110	10000		--		1000		--		
LSF-GP-07(0-6)	Thallium	0.99	U	mg/Kg	0.32	6.3	--	4.9	160		--		160		--		
LSF-GP-07(0-6)	Tin	160	B	mg/Kg	--	47000	--	--	1000000		--		120000		--		
LSF-GP-07(0-6)	Vanadium	8.8		mg/Kg	25.2	550	--	980	14000		--		1400		--		
LSF-GP-07(0-6)	Zinc	3900	^ B V	mg/Kg	95 >BKG	23000	--	53000	610000		--		61000		--		
LSF-GP-07(0-6)	Cadmium	4.9		mg/Kg	0.6 >BKG	78	1800	430	2000		2800		200		59000		
LSF-GP-07(0-6)	Copper	2400		mg/Kg	19.6 >BKG	2900	--	330000	82000		--		8200		--		
LSF-GP-07(0-6)	Mercury	0.041		mg/Kg	0.06	23	10	8	610		540000		61		52000		
LSF-GP-07(1.5-2)	pH	9.93		SU													
LSF-GP-07(1.5-2)	Arsenic	5.4		mg/Kg	13	13	750	33	13		1200		61		25000		
LSF-GP-07(1.5-2)	Barium	210		mg/Kg	110 >BKG	5500	690000	2100	140000		910000		14000		870000		
LSF-GP-07(1.5-2)	Chromium	29		mg/Kg	16.2 >BKG	230	270	21	>MGW	6100	420		4100		690		
LSF-GP-07(1.5-2)	Selenium	0.58	J	mg/Kg	0.48 >BKG	390	--	1.3	10000		--		1000		--		
LSF-GP-07(1.5-2)	Silver	1.3		mg/Kg	0.55 >BKG	390	--	110	10000		--		1000		--		
LSF-GP-07(1.5-2)	Cadmium	0.12	J	mg/Kg	0.6	78	1800	430	2000		2800		200		59000		
LSF-GP-07(1.5-2)	Mercury	0.085		mg/Kg	0.06 >BKG	23	10	8	610		540000		61		52000		

Table 3
Site Investigation Soil Sampling Results - Non-Lead Metals in Soil
Lake Shore Foundry
Waukegan, IL

Client ID	Parameter Name	Result	Qualifier	Unit	Tier 1 Residential Soil Remediation Objective					Commercial/Industrial				Construction Worker			
					Background	Ingestion	Inhalation	Class I GW		Ingestion	> CI INH?	Inhalation	>CI INH?	Ingestion	> CW ING?	Inhalation	> CW INH?
LSF-GP-08(0-6)	pH	8.58		SU													
LSF-GP-08(0-6)	Antimony	2.7		mg/Kg	4	31	--	5		820		--		82		--	
LSF-GP-08(0-6)	Arsenic	1.8		mg/Kg	13	13	750	32		13		1200		61		25000	
LSF-GP-08(0-6)	Barium	6.8		mg/Kg	110	5500	690000	2100		140000		910000		14000		870000	
LSF-GP-08(0-6)	Beryllium	0.14	J B	mg/Kg	0.6	160	1300	8000		4100		2100		410		44000	
LSF-GP-08(0-6)	Chromium	8.3		mg/Kg	16.2	230	270	21		6100		420		4100		690	
LSF-GP-08(0-6)	Cobalt	1.8		mg/Kg	8.9	4700	--	--		120000		--		12000		--	
LSF-GP-08(0-6)	Nickel	37		mg/Kg	18	>BKG	1600	13000		3800		21000		4100		440000	
LSF-GP-08(0-6)	Selenium	0.69	J	mg/Kg	0.48	>BKG	390	--		1.8		--		1000		--	
LSF-GP-08(0-6)	Silver	1.7		mg/Kg	0.55	>BKG	390	--		110		--		1000		--	
LSF-GP-08(0-6)	Thallium	1.1	U	mg/Kg	0.32	--	6.3	--		4.4		--		160		--	
LSF-GP-08(0-6)	Tin	140	B	mg/Kg	--	47000	--	--		1000000		--		120000		--	
LSF-GP-08(0-6)	Vanadium	1.9		mg/Kg	25.2	550	--	980		14000		--		1400		--	
LSF-GP-08(0-6)	Zinc	2600	^ B V	mg/Kg	95	>BKG	23000	--		53000		--		61000		--	
LSF-GP-08(0-6)	Cadmium	2.8		mg/Kg	0.6	>BKG	78	1800		430		2800		200		59000	
LSF-GP-08(0-6)	Copper	4900		mg/Kg	19.6	>BKG	2900	>ING		330000		82000		8200		--	
LSF-GP-08(0-6)	Mercury	0.018	J	mg/Kg	0.06	23	10	8		610		540000		61		52000	
LSF-GP-08(1.5-2)	pH	8.84		SU													
LSF-GP-08(1.5-2)	Arsenic	3.8		mg/Kg	13	13	750	33		13		1200		61		25000	
LSF-GP-08(1.5-2)	Barium	78		mg/Kg	110	5500	690000	2100		140000		910000		14000		870000	
LSF-GP-08(1.5-2)	Chromium	13		mg/Kg	16.2	230	270	21		6100		420		4100		690	
LSF-GP-08(1.5-2)	Selenium	0.48	J	mg/Kg	0.48	390	--	1.3		10000		--		1000		--	
LSF-GP-08(1.5-2)	Silver	3.3		mg/Kg	0.55	>BKG	390	--		110		10000		1000		--	
LSF-GP-08(1.5-2)	Cadmium	0.72		mg/Kg	0.6	>BKG	78	1800		430		2800		200		59000	
LSF-GP-08(1.5-2)	Mercury	0.019		mg/Kg	0.06	23	10	8		610		540000		61		52000	
LSF-GP-09(0-6)	Arsenic	10		mg/Kg	13	13	750	31		13		1200		61		25000	
LSF-GP-09(0-6)	Barium	40		mg/Kg	110	5500	690000	2100		140000		910000		14000		870000	
LSF-GP-09(0-6)	Chromium	10		mg/Kg	16.2	230	270	28		6100		420		4100		690	
LSF-GP-09(0-6)	Selenium	0.59	J	mg/Kg	0.48	>BKG	390	--		2.4		10000		1000		--	
LSF-GP-09(0-6)	Silver	0.17	J	mg/Kg	0.55	390	--	110		10000		--		1000		--	
LSF-GP-09(0-6)	Cadmium	0.2	U	mg/Kg	0.6	78	1800	430		2000		2800		200		59000	
LSF-GP-09(0-6)	Mercury	0.027		ug/Kg	0.06	23	10	8		610		540000		61		52000	
LSF-GP-09(2.5-3)	Arsenic	18		mg/Kg	13	>BKG	13	>ING		31		1200	>CI ING	61		25000	
LSF-GP-09(2.5-3)	Barium	120		mg/Kg	110	>BKG	5500	690000		2100		140000		14000		870000	
LSF-GP-09(2.5-3)	Chromium	14		mg/Kg	16.2	230	270	28		6100		420		4100		690	
LSF-GP-09(2.5-3)	Selenium	1.7		mg/Kg	0.48	>BKG	390	--		2.4		10000		1000		--	
LSF-GP-09(2.5-3)	Silver	5.2		mg/Kg	0.55	>BKG	390	--		110		10000		1000		--	
LSF-GP-09(2.5-3)	Cadmium	7.3		mg/Kg	0.6	>BKG	78	1800		430		2800		200		59000	
LSF-GP-09(2.5-3)	Mercury	0.98		mg/Kg	0.06	>BKG	23	10		8		540000		61		52000	
LSF-GP-10(0-6)	Arsenic	2.8		mg/Kg	13	13	750	31		13		1200		61		25000	
LSF-GP-10(0-6)	Barium	23		mg/Kg	110	5500	690000	2100		140000		910000		14000		870000	
LSF-GP-10(0-6)	Chromium	9		mg/Kg	16.2	230	270	28		6100		420		4100		690	
LSF-GP-10(0-6)	Selenium	0.38	J	mg/Kg	0.48	390	--	2.4		10000		--		1000		--	
LSF-GP-10(0-6)	Silver	0.79		mg/Kg	0.55	>BKG	390	--		110		10000		1000		--	
LSF-GP-10(0-6)	Cadmium	3		mg/Kg	0.6	>BKG	78	1800		430		2800		200		59000	
LSF-GP-10(0-6)	Mercury	0.031		mg/Kg	0.06	23	10	8		610		540000		61		52000	
LSF-GP-10(2.2-5)	Arsenic	1.2		mg/Kg	13	13	750	31		13		1200		61		25000	
LSF-GP-10(2.2-5)	Barium	7.5		mg/Kg	110	5500	690000	2100		140000		910000		14000		870000	
LSF-GP-10(2.2-5)	Chromium	6.5		mg/Kg	16.2	230	270	28		6100		420		4100		690	
LSF-GP-10(2.2-5)	Selenium	1	U	mg/Kg	0.48	390	--	2.4		10000		--		1000		--	
LSF-GP-10(2.2-5)	Silver	1.9		mg/Kg	0.55	>BKG	390	--		110		10000		1000		--	
LSF-GP-10(2.2-5)	Cadmium	6.5		mg/Kg	0.6	>BKG	78	1800		430		2800		200		59000	
LSF-GP-10(2.2-5)	Mercury	0.018	U	ug/Kg	0.06	23	10	8		610		540000		61		52000	
LSF-GP-11(0-6)	Arsenic	9.9		mg/Kg	13	13	750	31		13		1200		61		25000	
LSF-GP-11(0-6)	Barium	170		mg/Kg	110	>BKG	5500	690000		2100		140000		14000		870000	
LSF-GP-11(0-6)	Chromium	25		mg/Kg	16.2	>BKG	230	270		28		6100		4100		690	
LSF-GP-11(0-6)	Selenium	1.7		mg/Kg	0.48	>BKG	390	--		2.4		10000		1000		--	
LSF-GP-11(0-6)	Silver	35		mg/Kg	0.55	>BKG	390	--		110		10000		1000		--	
LSF-GP-11(0-6)	Cadmium	2.8		mg/Kg	0.6	>BKG	78	1800		430		2800		200		59000	
LSF-GP-11(0-6)	Mercury	0.033		mg/Kg	0.06	23	10	8		610		540000		61		52000	
LSF-GP-11(3-3.5)	Arsenic	3.3		mg/Kg	13	13	750	31		13		1200		61		25000	
LSF-GP-11(3-3.5)	Barium	27		mg/Kg	110	5500	690000	2100		140000		910000		14000		870000	
LSF-GP-11(3-3.5)	Chromium	7.3		mg/Kg	16.2	230	270	28		6100		420		4100		690	
LSF-GP-11(3-3.5)	Selenium	0.77	J	mg/Kg	0.48	>BKG	390	--		2.4		10000		1000		--	
LSF-GP-11(3-3.5)	Silver	0.33	J	mg/Kg	0.55	390	--	110		10000		--		1000		--	
LSF-GP-11(3-3.5)	Cadmium	0.85		mg/Kg	0.6	>BKG	78	1800		430		2800		200		59000	
LSF-GP-11(3-3.5)	Mercury	0.045		mg/Kg	0.06	23	10	8		610		540000		61		52000	

Table 3
Site Investigation Soil Sampling Results - Non-Lead Metals in Soil
Lake Shore Foundry
Waukegan, IL

Client ID	Parameter Name	Result	Qualifier	Unit	Tier 1 Residential Soil Remediation Objective					Commercial/Industrial			Construction Worker			
					Background	Ingestion	Inhalation	Class I GW	Ingestion	> CI ING?	Inhalation	>CI INH?	Ingestion	> CW ING?	Inhalation	> CW INH?
LSF-GP-12(0-6)	Arsenic	3.5		mg/Kg	13	13	750	31	13		1200		61		25000	
LSF-GP-12(0-6)	Barium	36		mg/Kg	110	5500	690000	2100	140000		910000		14000		870000	
LSF-GP-12(0-6)	Chromium	12		mg/Kg	16.2	230	270	28	6100		420		4100		690	
LSF-GP-12(0-6)	Selenium	0.39	J	mg/Kg	0.48	390	--	2.4	10000		--		1000		--	
LSF-GP-12(0-6)	Silver	0.88		mg/Kg	0.55	>BKG	390	110	10000		--		1000		--	
LSF-GP-12(0-6)	Cadmium	2.7		mg/Kg	0.6	>BKG	78	1800	430	2000	2800		200		59000	
LSF-GP-12(0-6)	Mercury	0.036		mg/Kg	0.06	23	10	8	610		540000		61		52000	
LSF-GP-12(1.5-2)	Arsenic	7		mg/Kg	13	13	750	31	13		1200		61		25000	
LSF-GP-12(1.5-2)	Barium	45		mg/Kg	110	5500	690000	2100	140000		910000		14000		870000	
LSF-GP-12(1.5-2)	Chromium	11		mg/Kg	16.2	230	270	28	6100		420		4100		690	
LSF-GP-12(1.5-2)	Selenium	1.1	U	mg/Kg	0.48	390	--	2.4	10000		--		1000		--	
LSF-GP-12(1.5-2)	Silver	0.23	J	mg/Kg	0.55	390	--	110	10000		--		1000		--	
LSF-GP-12(1.5-2)	Cadmium	0.71		mg/Kg	0.6	>BKG	78	1800	430	2000	2800		200		59000	
LSF-GP-12(1.5-2)	Mercury	0.048		mg/Kg	0.06	23	10	8	610		540000		61		52000	
LSF-GP-13(0-6)	Arsenic	4.8		mg/Kg	13	13	750	31	13		1200		61		25000	
LSF-GP-13(0-6)	Barium	100		mg/Kg	110	5500	690000	2100	140000		910000		14000		870000	
LSF-GP-13(0-6)	Chromium	16		mg/Kg	16.2	230	270	28	6100		420		4100		690	
LSF-GP-13(0-6)	Selenium	0.82	J	mg/Kg	0.48	>BKG	390	--	2.4	10000	--		1000		--	
LSF-GP-13(0-6)	Silver	0.73		mg/Kg	0.55	>BKG	390	--	110	10000	--		1000		--	
LSF-GP-13(0-6)	Cadmium	0.76		mg/Kg	0.6	>BKG	78	1800	430	2000	2800		200		59000	
LSF-GP-13(0-6)	Mercury	0.078		mg/Kg	0.06	>BKG	23	10	8	610	540000		61		52000	
LSF-GP-13(2-2.5)	Arsenic	5.6		mg/Kg	13	13	750	31	13		1200		61		25000	
LSF-GP-13(2-2.5)	Barium	160		mg/Kg	110	>BKG	5500	2100	140000		910000		14000		870000	
LSF-GP-13(2-2.5)	Chromium	26		mg/Kg	16.2	>BKG	230	270	6100		420		4100		690	
LSF-GP-13(2-2.5)	Selenium	0.55	J	mg/Kg	0.48	>BKG	390	--	2.4	10000	--		1000		--	
LSF-GP-13(2-2.5)	Silver	0.6		mg/Kg	0.55	>BKG	390	--	110	10000	--		1000		--	
LSF-GP-13(2-2.5)	Cadmium	0.36		mg/Kg	0.6	78	1800	430	2000		2800		200		59000	
LSF-GP-13(2-2.5)	Mercury	0.042		mg/Kg	0.06	23	10	8	610		540000		61		52000	
LSF-GP-14(0-6)	Arsenic	3.2		mg/Kg	13	13	750	31	13		1200		61		25000	
LSF-GP-14(0-6)	Barium	48		mg/Kg	110	5500	690000	2100	140000		910000		14000		870000	
LSF-GP-14(0-6)	Cadmium	0.11	J	mg/Kg	0.6	78	1800	430	2000		2800		200		59000	
LSF-GP-14(0-6)	Chromium	16		mg/Kg	16.2	230	270	28	6100		420		4100		690	
LSF-GP-14(0-6)	Selenium	0.99	U	mg/Kg	0.48	390	--	2.4	10000		--		1000		--	
LSF-GP-14(0-6)	Silver	0.27	J	mg/Kg	0.55	390	--	110	10000		--		1000		--	
LSF-GP-14(0-6)	Mercury	0.034		mg/Kg	0.06	23	10	8	610		540000		61		52000	
LSF-GP-14(1.5-2)	Arsenic	6.7		mg/Kg	13	13	750	31	13		1200		61		25000	
LSF-GP-14(1.5-2)	Barium	46		mg/Kg	110	5500	690000	2100	140000		910000		14000		870000	
LSF-GP-14(1.5-2)	Cadmium	0.56		mg/Kg	0.6	78	1800	430	2000		2800		200		59000	
LSF-GP-14(1.5-2)	Chromium	8		mg/Kg	16.2	230	270	28	6100		420		4100		690	
LSF-GP-14(1.5-2)	Selenium	0.66	J	mg/Kg	0.48	>BKG	390	--	2.4	10000	--		1000		--	
LSF-GP-14(1.5-2)	Silver	0.31	J	mg/Kg	0.55	390	--	110	10000		--		1000		--	
LSF-GP-14(1.5-2)	Mercury	0.14		mg/Kg	0.06	>BKG	23	10	8	610	540000		61		52000	
LSF-GP-15(0-6)	Arsenic	4.9		mg/Kg	13	13	750	31	13		1200		61		25000	
LSF-GP-15(0-6)	Barium	92		mg/Kg	110	5500	690000	2100	140000		910000		14000		870000	
LSF-GP-15(0-6)	Cadmium	0.74		mg/Kg	0.6	>BKG	78	1800	430	2000	2800		200		59000	
LSF-GP-15(0-6)	Chromium	27		mg/Kg	16.2	>BKG	230	270	6100		420		4100		690	
LSF-GP-15(0-6)	Selenium	1.1	U	mg/Kg	0.48	390	--	2.4	10000		--		1000		--	
LSF-GP-15(0-6)	Silver	0.39	J	mg/Kg	0.55	390	--	110	10000		--		1000		--	
LSF-GP-15(0-6)	Mercury	0.13		mg/Kg	0.06	>BKG	23	10	8	610	540000		61		52000	
LSF-GP-15(1.5-2)	Arsenic	7.4		mg/Kg	13	13	750	31	13		1200		61		25000	
LSF-GP-15(1.5-2)	Barium	42		mg/Kg	110	5500	690000	2100	140000		910000		14000		870000	
LSF-GP-15(1.5-2)	Cadmium	0.36		mg/Kg	0.6	78	1800	430	2000		2800		200		59000	
LSF-GP-15(1.5-2)	Chromium	11		mg/Kg	16.2	230	270	28	6100		420		4100		690	
LSF-GP-15(1.5-2)	Selenium	1	U	mg/Kg	0.48	390	--	2.4	10000		--		1000		--	
LSF-GP-15(1.5-2)	Silver	0.23	J	mg/Kg	0.55	390	--	110	10000		--		1000		--	
LSF-GP-15(1.5-2)	Mercury	0.029		mg/Kg	0.06	23	10	8	610		540000		61		52000	

Table 3
Site Investigation Soil Sampling Results - Non-Lead Metals in Soil
Lake Shore Foundry
Waukegan, IL

Client ID	Parameter Name	Result	Qualifier	Unit	Tier 1 Residential Soil Remediation Objective					Commercial/Industrial				Construction Worker			
					Background	Ingestion	Inhalation	Class I GW	Ingestion	> CI ING?	Inhalation	>CI INH?	Ingestion	> CW ING?	Inhalation	> CW INH?	
LSF-GP-16(0-6)	Arsenic	4.6		mg/Kg	13	13	750	31	13		1200		61		25000		
LSF-GP-16(0-6)	Barium	39		mg/Kg	110	5500	690000	2100	140000		910000		14000		870000		
LSF-GP-16(0-6)	Cadmium	0.21	J	mg/Kg	0.6	78	1800	430	2000		2800		200		59000		
LSF-GP-16(0-6)	Chromium	9.6		mg/Kg	16.2	230	270	28	6100		420		4100		690		
LSF-GP-16(0-6)	Selenium	1.1	U	mg/Kg	0.48	390	--	2.4	10000		--		1000		--		
LSF-GP-16(0-6)	Silver	0.11	J	mg/Kg	0.55	390	--	110	10000		--		1000		--		
LSF-GP-16(0-6)	Mercury	0.071		mg/Kg	0.06	>BKG	23	10	610		540000		61		52000		
LSF-GP-16(1.5-2)	Arsenic	4.8		mg/Kg	13	13	750	31	13		1200		61		25000		
LSF-GP-16(1.5-2)	Barium	53		mg/Kg	110	5500	690000	2100	140000		910000		14000		870000		
LSF-GP-16(1.5-2)	Cadmium	0.61		mg/Kg	0.6	>BKG	78	1800	430		2800		200		59000		
LSF-GP-16(1.5-2)	Chromium	16		mg/Kg	16.2	230	270	28	6100		420		4100		690		
LSF-GP-16(1.5-2)	Selenium	0.99	U	mg/Kg	0.48	390	--	2.4	10000		--		1000		--		
LSF-GP-16(1.5-2)	Silver	0.15	J	mg/Kg	0.55	390	--	110	10000		--		1000		--		
LSF-GP-16(1.5-2)	Mercury	0.1		mg/Kg	0.06	>BKG	23	10	610		540000		61		52000		
LSF-GP-17(0-6)	pH	7.84		SU													
LSF-GP-17(0-6)	Antimony	1.5	J	mg/Kg	4	31	--	5	820		--		82		--		
LSF-GP-17(0-6)	Arsenic	22		mg/Kg	13	>BKG	13	>ING	750		31	>CI ING	1200		61	25000	
LSF-GP-17(0-6)	Barium	28		mg/Kg	110	5500	690000	2100	140000		910000		14000		870000		
LSF-GP-17(0-6)	Beryllium	2.7		mg/Kg	0.6	>BKG	160	1300	8000		4100		2100		44000		
LSF-GP-17(0-6)	Cadmium	4.6		mg/Kg	0.6	>BKG	78	1800	430		2000		2800		59000		
LSF-GP-17(0-6)	Chromium	9.7		mg/Kg	16.2	230	270	28	6100		420		4100		690		
LSF-GP-17(0-6)	Cobalt	7.2		mg/Kg	8.9	4700	--	--	120000		--		12000		--		
LSF-GP-17(0-6)	Copper	35		mg/Kg	19.6	>BKG	2900	--	330000		82000		8200		--		
LSF-GP-17(0-6)	Nickel	33		mg/Kg	18	>BKG	1600	13000	3800		41000		21000		440000		
LSF-GP-17(0-6)	Selenium	0.88	J	mg/Kg	0.48	>BKG	390	--	2.4		10000		1000		--		
LSF-GP-17(0-6)	Silver	0.13	J	mg/Kg	0.55	390	--	110	10000		--		1000		--		
LSF-GP-17(0-6)	Tin	2.3	B	mg/Kg	--	47000	--	--	1000000		--		120000		--		
LSF-GP-17(0-6)	Vanadium	29		mg/Kg	25.2	>BKG	550	--	980		14000		1400		--		
LSF-GP-17(0-6)	Zinc	400	B	mg/Kg	95	>BKG	23000	--	53000		610000		--		61000	--	
LSF-GP-17(0-6)	Thallium	0.96	J	mg/Kg	0.32	>BKG	6.3	--	3.8		160		160		--		
LSF-GP-17(0-6)	Mercury	0.013	J	mg/Kg	0.06	23	10	8	610		540000		61		52000		
LSF-GP-17(1.5-2)	pH	8.35		SU													
LSF-GP-17(1.5-2)	Arsenic	5		mg/Kg	13	13	750	32	13		1200		61		25000		
LSF-GP-17(1.5-2)	Barium	23		mg/Kg	110	5500	690000	2100	140000		910000		14000		870000		
LSF-GP-17(1.5-2)	Cadmium	0.23	U	mg/Kg	0.6	78	1800	430	2000		2800		200		59000		
LSF-GP-17(1.5-2)	Chromium	11		mg/Kg	16.2	230	270	24	6100		420		4100		690		
LSF-GP-17(1.5-2)	Selenium	1.6		mg/Kg	0.48	>BKG	390	--	1.8		10000		--		1000	--	
LSF-GP-17(1.5-2)	Silver	0.57	U	mg/Kg	0.55	390	--	110	10000		--		1000		--		
LSF-GP-17(1.5-2)	Mercury	0.019	J	mg/Kg	0.06	23	10	8	610		540000		61		52000		
LSF-GP-18(0-6)	Arsenic	13		mg/Kg	13	13	750	31	13		1200		61		25000		
LSF-GP-18(0-6)	Barium	81		mg/Kg	110	5500	690000	2100	140000		910000		14000		870000		
LSF-GP-18(0-6)	Cadmium	2.6		mg/Kg	0.6	>BKG	78	1800	430		2000		2800		200	59000	
LSF-GP-18(0-6)	Chromium	23		mg/Kg	16.2	>BKG	230	270	28		6100		420		4100	690	
LSF-GP-18(0-6)	Selenium	2.1		mg/Kg	0.48	>BKG	390	--	2.4		10000		--		1000	--	
LSF-GP-18(0-6)	Silver	0.86		mg/Kg	0.55	>BKG	390	--	110		10000		--		1000	--	
LSF-GP-18(0-6)	Mercury	0.12		mg/Kg	0.06	>BKG	23	10	8		610		540000		61	52000	
LSF-GP-18(1.5-2)	Arsenic	5.4		mg/Kg	13	13	750	31	13		1200		61		25000		
LSF-GP-18(1.5-2)	Barium	15		mg/Kg	110	5500	690000	2100	140000		910000		14000		870000		
LSF-GP-18(1.5-2)	Cadmium	0.65		mg/Kg	0.6	>BKG	78	1800	430		2000		2800		200	59000	
LSF-GP-18(1.5-2)	Chromium	6.8		mg/Kg	16.2	230	270	28	6100		420		4100		690		
LSF-GP-18(1.5-2)	Selenium	1.1	U	mg/Kg	0.48	390	--	2.4	10000		--		1000		--		
LSF-GP-18(1.5-2)	Silver	0.54	U	mg/Kg	0.55	390	--	110	10000		--		1000		--		
LSF-GP-18(1.5-2)	Mercury	0.024		mg/Kg	0.06	23	10	8	610		540000		61		52000		
LSF-GP-19(0-6)	Arsenic	2.7		mg/Kg	13	13	750	31	13		1200		61		25000		
LSF-GP-19(0-6)	Barium	74		mg/Kg	110	5500	690000	2100	140000		910000		14000		870000		
LSF-GP-19(0-6)	Cadmium	0.4		mg/Kg	0.6	78	1800	430	2000		2800		200		59000		
LSF-GP-19(0-6)	Chromium	9.1		mg/Kg	16.2	230	270	28	6100		420		4100		690		
LSF-GP-19(0-6)	Selenium	0.43	J	mg/Kg	0.48	390	--	2.4	10000		--		1000		--		
LSF-GP-19(0-6)	Silver	0.24	J	mg/Kg	0.55	390	--	110	10000		--		1000		--		
LSF-GP-19(0-6)	Mercury	0.06		mg/Kg	0.06	23	10	8	610		540000		61		52000		
LSF-GP-19(4-5)	Arsenic	4.1		mg/Kg	13	13	750	31	13		1200		61		25000		
LSF-GP-19(4-5)	Barium	77		mg/Kg	110	5500	690000	2100	140000		910000		14000		870000		
LSF-GP-19(4-5)	Cadmium	1.8		mg/Kg	0.6	>BKG	78	1800	430		2000		2800		200	59000	
LSF-GP-19(4-5)	Selenium	0.56	J	mg/Kg	0.48	>BKG	390	--	2.4		10000		--		1000	--	
LSF-GP-19(4-5)	Silver	0.4	J	mg/Kg	0.55	390	--	110	10000		--		1000		--		
LSF-GP-19(4-5)	Mercury	0.094		mg/Kg	0.06	>BKG	23	10	610		540000		61		52000		

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Lake Shore Foundry
Waukegan, IL

Client ID	Parameter Name	Result	Qualifier	Unit	Tier 1 Residential Soil Remediation Objective					Commercial/Industrial				Construction Worker			
					Background	Ingestion	Inhalation	Class I GW	Ingestion	> CI ING?	Inhalation	>CI INH?	Ingestion	> CW ING?	Inhalation	> CW INH?	
LSF-GP-20(0-6)	pH	7.05		SU													
LSF-GP-20(0-6)	Antimony	1.6	J	mg/Kg	4	31	--	5		820		--		82		--	
LSF-GP-20(0-6)	Arsenic	10		mg/Kg	13	13	750	29		13		1200		61		25000	
LSF-GP-20(0-6)	Barium	43		mg/Kg	110	5500	690000	1700		140000		910000		14000		870000	
LSF-GP-20(0-6)	Beryllium	1.2		mg/Kg	0.6	>BKG	160	1300		4100		2100		410		44000	
LSF-GP-20(0-6)	Cadmium	1.1		mg/Kg	0.6	>BKG	78	1800		2000		2800		200		59000	
LSF-GP-20(0-6)	Chromium	9.2		mg/Kg	16.2	230	270	36		6100		420		4100		690	
LSF-GP-20(0-6)	Cobalt	5.3		mg/Kg	8.9	4700	--	--		120000		--		12000		--	
LSF-GP-20(0-6)	Copper	89		mg/Kg	19.6	>BKG	2900	--	200000	82000		--		8200		--	
LSF-GP-20(0-6)	Nickel	16		mg/Kg	18	1600	13000	180		41000		21000		4100		440000	
LSF-GP-20(0-6)	Selenium	1.2		mg/Kg	0.48	>BKG	390	--	4.5	10000		--		1000		--	
LSF-GP-20(0-6)	Silver	0.63		mg/Kg	0.55	>BKG	390	--	13	10000		--		1000		--	
LSF-GP-20(0-6)	Tin	6.6	B	mg/Kg	--	47000	--	--		1000000		--		120000		--	
LSF-GP-20(0-6)	Vanadium	23		mg/Kg	25.2	550	--	980		14000		--		1400		--	
LSF-GP-20(0-6)	Zinc	310	B	mg/Kg	95	>BKG	23000	--	7500	610000		--		61000		--	
LSF-GP-20(0-6)	Thallium	0.87	J	mg/Kg	0.32	>BKG	6.3	--	3	160		--		160		--	
LSF-GP-20(0-6)	Mercury	0.038		mg/Kg	0.06	23	10	3.3		610		540000		61		52000	
LSF-GP-20(2-2.5)	pH	8.32		SU													
LSF-GP-20(2-2.5)	Arsenic	1.1		mg/Kg	13	13	750	32		13		1200		61		25000	
LSF-GP-20(2-2.5)	Barium	6.9		mg/Kg	110	5500	690000	2100		140000		910000		14000		870000	
LSF-GP-20(2-2.5)	Cadmium	0.2	U	mg/Kg	0.6	78	1800	430		2000		2800		200		59000	
LSF-GP-20(2-2.5)	Chromium	5.1		mg/Kg	16.2	230	270	24		6100		420		4100		690	
LSF-GP-20(2-2.5)	Selenium	1	U	mg/Kg	0.48	390	--	1.8		10000		--		1000		--	
LSF-GP-20(2-2.5)	Silver	0.51	U	mg/Kg	0.55	390	--	110		10000		--		1000		--	
LSF-GP-20(2-2.5)	Mercury	0.0082	J	mg/Kg	0.06	23	10	8		610		540000		61		52000	

Qualifiers Notation Key

B- Compound was found in blank and sample

J- Result is less than the RL but greater than or equal to the MDL and the concentratin is an approximate value.

V- Serial Dilution exceeds the control limits.

^ ICV, CCV, ICB, CCB, ISA, ISB, CRI, CRA, or MRL standard: Instrument related QC exceeds the control limits.

U- Material Analyzed for but Not Detected

Table 4
Total and TCLP Lead Soil Sampling Results
Lake Shore Foundry
Waukegan, IL

Client ID	Parameter Name	Result	Qualifier	Unit	TCLP Threshold	USEPA R9 PRG
LSF-GP-01(0-6")	Lead TCLP	0.24		mg/L	5	--
LSF-GP-01(0-6")	Lead	260	^ V B	mg/Kg	--	800 ⁽¹⁾
LSF-GP-01(4-5)	Lead TCLP	0.011		mg/L	5	--
LSF-GP-01(4-5)	Lead	14		mg/Kg	--	800
LSF-GP-02(0-6")	Lead TCLP	0.65		mg/L	5	--
LSF-GP-02(0-6")	Lead	2100	^ B V	mg/Kg	--	800 >PRG
LSF-GP-02(4-5)	Lead TCLP	0.018		mg/L	5	--
LSF-GP-02(4-5)	Lead	320	^ B V	mg/Kg	--	800
LSF-GP-03(0-6")	Lead TCLP	0.46		mg/L	5	--
LSF-GP-03(0-6")	Lead	570	^ B V	mg/Kg	--	800
LSF-GP-03(4.5-5.5)	Lead TCLP	0.0069	J	mg/L	5	--
LSF-GP-03(4.5-5.5)	Lead	26	^ B V	mg/Kg	--	800
LSF-GP-04(0-6")	Lead TCLP	55		mg/L	5 >TCLP	--
LSF-GP-04(0-6")	Lead	1800	^ B V	mg/Kg	--	800 >PRG
LSF-GP-04(1.5-2)	Lead TCLP	0.18		mg/L	5	--
LSF-GP-04(1.5-2)	Lead	210	^ B V	mg/Kg	--	800
LSF-GP-05(0-6")	Lead TCLP	0.1		mg/L	5	--
LSF-GP-05(0-6")	Lead	230	^ B V	mg/Kg	--	800
LSF-GP-05(1.5-2)	Lead TCLP	0.053		mg/L	5	--
LSF-GP-05(1.5-2)	Lead	320	^ B V	mg/Kg	--	800
LSF-GP-06(0-6")	Lead TCLP	16		mg/L	5 >TCLP	--
LSF-GP-06(0-6")	Lead	12000	^ B V	mg/Kg	--	800 >PRG
LSF-GP-06(4-5)	Lead TCLP	0.15		mg/L	5	--
LSF-GP-06(4-5)	Lead	270	^ B V	mg/Kg	--	800
LSF-GP-07(0-6")	Lead TCLP	0.56		mg/L	5	--
LSF-GP-07(0-6")	Lead	640	^ B V	mg/Kg	--	800
LSF-GP-07(1.5-2)	Lead TCLP	0.037		mg/L	5	--
LSF-GP-07(1.5-2)	Lead	1100	^ B V	mg/Kg	--	800 >PRG
LSF-GP-08(0-6")	Lead TCLP	19		mg/L	5 >TCLP	--
LSF-GP-08(0-6")	Lead	750	^ B V	mg/Kg	--	800
LSF-GP-08(1.5-2)	Lead TCLP	12		mg/L	5 >TCLP	--
LSF-GP-08(1.5-2)	Lead	1400	^ B V	mg/Kg	--	800 >PRG
LSF-GP-09(0-6")	Lead TCLP	0.0075	U	mg/L	5	--
LSF-GP-09(0-6")	Lead	35	^ B	mg/Kg	--	800
LSF-GP-09(2.5-3)	Lead TCLP	0.046		mg/L	5	--
LSF-GP-09(2.5-3)	Lead	190	^ B	mg/Kg	--	800
LSF-GP-10(0-6")	Lead TCLP	0.92		mg/L	5	--
LSF-GP-10(0-6")	Lead	540	^ B V	mg/Kg	--	800
LSF-GP-10(2-2.5)	Lead TCLP	14		mg/L	5 >TCLP	--
LSF-GP-10(2-2.5)	Lead	1400	^ B V	mg/Kg	--	800 >PRG
LSF-GP-11(0-6")	Lead TCLP	5.3		mg/L	5 >TCLP	--
LSF-GP-11(0-6")	Lead	3300	^ B V	mg/Kg	--	800 >PRG
LSF-GP-11(3-3.5)	Lead TCLP	0.0075	B	mg/L	5	--
LSF-GP-11(3-3.5)	Lead	92	^ B	mg/Kg	--	800
LSF-GP-12(0-6")	Lead TCLP	0.26	B	mg/L	5	--
LSF-GP-12(0-6")	Lead	610	^ B	mg/Kg	--	800
LSF-GP-12(1.5-2)	Lead TCLP	0.0064	J B	mg/L	5	--
LSF-GP-12(1.5-2)	Lead	200	^ B	mg/Kg	--	800
LSF-GP-13(0-6")	Lead TCLP	0.0075	U	mg/L	5	--
LSF-GP-13(0-6")	Lead	280	^ B	mg/Kg	--	800
LSF-GP-13(2-2.5)	Lead TCLP	0.0075	U	mg/L	5	--
LSF-GP-13(2-2.5)	Lead	1300	^ B	mg/Kg	--	800 >PRG

Table 4
Total and TCLP Lead Soil Sampling Results
Lake Shore Foundry
Waukegan, IL

Client ID	Parameter Name	Result	Qualifier	Unit	TCLP Threshold		USEPA R9 PRG	
LSF-GP-14(0-6")	Lead TCLP	0.0077		mg/L	5		--	
LSF-GP-14(0-6")	Lead	24		mg/Kg	--		800	
LSF-GP-14(1.5-2)	Lead TCLP	0.031		mg/L	5		--	
LSF-GP-14(1.5-2)	Lead	150		mg/Kg	--		800	
LSF-GP-15(0-6")	Lead TCLP	0.0075	U	mg/L	5		--	
LSF-GP-15(0-6")	Lead	180		mg/Kg	--		800	
LSF-GP-15(1.5-2)	Lead TCLP	0.013		mg/L	5		--	
LSF-GP-15(1.5-2)	Lead	58		mg/Kg	--		800	
LSF-GP-16(0-6")	Lead TCLP	0.0075	U	mg/L	5		--	
LSF-GP-16(0-6")	Lead	170		mg/Kg	--		800	
LSF-GP-16(1.5-2)	Lead TCLP	0.0077		mg/L	5		--	
LSF-GP-16(1.5-2)	Lead	150		mg/Kg	--		800	
LSF-GP-17(0-6")	Lead TCLP	0.038	U	mg/L	5		--	
LSF-GP-17(0-6")	Lead	36		mg/Kg	--		800	
LSF-GP-17(1.5-2)	Lead TCLP	0.0075	U	mg/L	5		--	
LSF-GP-17(1.5-2)	Lead	8.1		mg/Kg	--		800	
LSF-GP-18(0-6")	Lead TCLP	0.041		mg/L	5		--	
LSF-GP-18(0-6")	Lead	290		mg/Kg	--		800	
LSF-GP-18(1.5-2)	Lead TCLP	0.019		mg/L	5		--	
LSF-GP-18(1.5-2)	Lead	70		mg/Kg	--		800	
LSF-GP-19(0-6")	Lead TCLP	0.0075	U	mg/L	5		--	
LSF-GP-19(0-6")	Lead	79		mg/Kg	--		800	
LSF-GP-19(4-5)	Lead TCLP	0.0075	U	mg/L	5		--	
LSF-GP-19(4-5)	Lead	160		mg/Kg	--		800	
LSF-GP-20(0-6")	Lead TCLP	0.013		mg/L	5		--	
LSF-GP-20(0-6")	Lead	76		mg/Kg	--		800	
LSF-GP-20(2-2.5)	Lead TCLP	0.0075	U	mg/L	5		--	
LSF-GP-20(2-2.5)	Lead	7.5		mg/Kg	--		800	
SP-21, 0-0.5	Lead TCLP	0.011		mg/L	5		--	
SP-21, 1.5-2	Lead TCLP	0.21		mg/L	5		--	
SP-22, 0-0.5	Lead TCLP	0.0064	J	mg/L	5		--	
SP-24, 0-0.5	Lead TCLP	0.0098		mg/L	5		--	
SP-24, 2.5-3	Lead TCLP	0.21		mg/L	5		--	
SP-25, 1-1.5	Lead TCLP	0.026		mg/L	5		--	
SP-26, 0-0.5	Lead TCLP	0.29		mg/L	5		--	
SP-26, 2-2.5	Lead TCLP	0.025		mg/L	5		--	

Qualifiers Notation Key

B- Compound was found in blank and sample

J- Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

V- Serial Dilution exceeds the control limits.

^~ ICV, CCV, ICB, CCB, ISA, ISB, CRI, CRA, or MRL standard: Instrument related QC exceeds the control limits.

(1) - Soil Remediation Objective for Ingestion Pathway for Industrial/Commercial Properties.

Table 5
Summary of Total Lead in Site Soil
Lake Shore Foundry
Waukegan, IL

Client ID	Total Lead Result (mg/kg)	Qualifier
Investigation Samples		
LSF-GP-01(0-6")	260	^ V B
LSF-GP-02(0-6")	2100	^ B V
LSF-GP-03(0-6")	570	^ B V
LSF-GP-04(1.5-2)	210	^ B V
LSF-GP-05(0-6")	230	^ B V
LSF-GP-05(1.5-2)	320	^ B V
LSF-GP-07(0-6")	640	^ B V
LSF-GP-07(1.5-2)	1100	^ B V
LSF-GP-09(0-6")	35	^ B
LSF-GP-12(0-6")	610	^ B
LSF-GP-12(1.5-2)	200	^ B
LSF-GP-13(0-6")	280	^ B
LSF-GP-14(0-6")	24	
LSF-GP-14(1.5-2)	150	
LSF-GP-15(0-6")	180	
LSF-GP-15(1.5-2)	58	
LSF-GP-16(0-6")	170	
LSF-GP-16(1.5-2)	150	
LSF-GP-17(0-6")	36	
LSF-GP-17(1.5-2)	8.1	
LSF-GP-18(0-6")	290	
LSF-GP-18(1.5-2)	70	
LSF-GP-19(0-6")	79	
LSF-GP-20(0-6")	76	
Confirmation Samples		
LSF-1	510	
LSF-2	310	
LSF-3	740	
LSF-3R	760	
LSF-4	34	
LSF-5	770	
LSF-6	110	
LSF-7	1500	
LSF-8	1700	
LSF-8R (average of duplicates)	1050	
LSF-9	880	
LSF-10	530	
LSF-11 (average of duplicates)	745	
LSF-12	900	
LSF-13	1800	
LSF-14	1900	
LSF-15	1200	

Table 5
Summary of Total Lead in Site Soil
Lake Shore Foundry
Waukegan, IL

DOCC Samples		
LSF-SP-19-20 (0-6")	130.0	
LSF-SP-19-20 (6-24")	100.0	
LSF-B-N-01	17.0	
LSF-B-N-02	95.0	
LSF-B-N-03	16.0	
LSF-B-N-04	15.0	
LSF-B-N-05	12.0	
LSF-N-SED-01	4.0	
LSF-N-SED-02	9.8	
LSF-B-N-03 DUP	33.0	
LSF-SB-01	11.0	
LSF-SB-02	2.7	
LSF-SB-03	66.0	
LSF-SB-04	5.8	
LSF-SB-05	3.7	
LSF-SB-05 DUP	30.0	
LSF-S-SED-01	28.0	
LSF-S-SED-02	30.0	
SP-22, 0-6"	100.0	
SP-22, 6"-2'	51.0	
SP-23, 0-6"	190.0	
SP-23, 6"-2'	200	
SP-19-16,0-6"	250	
SP-19-16,6"-2'	98	

Qualifiers Notation Key:

B - Result is less than the CRDL/RL, but greater than or equal to the IDL/MDL.

^ - ICV,CCV,ICB,CCB,ISA,ISB,CRI,CRA,MRL: Instrument related QC exceed the upper or lower control limits.

V - Serial dilution exceeds the control limits.



Deigan & Associates, LLC
Environmental Consultants

Appendix A – CD ROM format of previously submitted Reports and Addendums

CMS/CMP
Revision: 0
December 14, 2012
Lake Shore Foundry
653 Market Street, Waukegan, Lake County, Illinois



Deigan & Associates, LLC
Environmental Consultants

Appendix B – City of Waukegan South Lakefront Groundwater Use Restriction Ordinance

CMS/CMP
Revision: 0
December 14, 2012
Lake Shore Foundry
653 Market Street, Waukegan, Lake County, Illinois

Run Date :10/13/2011

DLC Assignment Form

Assignment ID :8057
Subject :Waukegan/Northern State Community Development
Subject Type :Ordinance Review
DLC In Date :10/13/2011
DLC File No. :
Correspondence No. :R11101304

DLC Completed Date. :

Assigned Staff:

Wight, Mark Attorney
Gross, Todd Bureau Requestor

Project Details:

Status Issued Date: 10/13/2011 Due Date: 11/14/2011
Please review ordinance #11-O-64 for City of Waukegan

Comments:

CERTIFICATION

STATE OF ILLINOIS
COUNTY OF LAKE
CITY OF WAUKEGAN

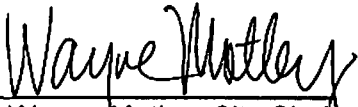
I, Wayne Motley, City Clerk of the City of Waukegan, County of Lake and the State of Illinois, do hereby certify that as such official of the said City of Waukegan, I am the keeper and custodian of the records, files, proceedings, books, papers, ordinances and reports of said City and that the forgoing is a true and correct copy of:

1. Ordinances: 11-O-64
2. Minutes:
3. Other:

Presented on the 6th day of June 2011 and that the same was approved by the Mayor and Council of the said City on the 6th day of June A.D. 2011.

I do further certify that the original, of which the forgoing is a true and correct copy, is entrusted to me as the Clerk of said City for safekeeping and that the original thereof is now on file in my office as such Clerk.

IN WITNESS WHEREOF I have hereunto set my hand and affixed the Corporate Seal of said City this 6th day of October A.D. 2011


Wayne Motley, City Clerk
of the City of Waukegan
County of Lake, State of
Illinois

ORDINANCE NO. 11-0-64

**AN ORDINANCE PROHIBITING THE USE OF GROUNDWATER
AS A POTABLE WATER SUPPLY BY THE INSTALLATION OR
USE OF POTABLE WATER SUPPLY OR BY ANY OTHER
METHOD WITHIN A DESIGNATED RESTRICTED
GROUNDWATER ZONE**

WHEREAS, certain properties in the City of Waukegan, Illinois have been used over a period of time for commercial/industrial purposes; and

WHEREAS, because of said use, concentrations of certain chemical constituents in the groundwater beneath the City may exceed Class I groundwater quality standards for potable resources groundwater as set forth in 35 Illinois Administrative Code 620 or Tier 1 remediation objectives as set forth in 35 Illinois Administrative Code 742; and

WHEREAS, the City of Waukegan desires to limit potential threats to human health from groundwater contamination while facilitating the redevelopment and productive use of properties that are the source of said chemical constituents;

**NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE
CITY OF WAUKEGAN, ILLINOIS**

Section 1: Prohibition.

On and after the effective date of this Ordinance, no Person shall use or attempt to use as a potable water supply groundwater from within an area designated as a Restricted Groundwater Zone, within the corporate limits of the City of Waukegan, as a potable water supply, by the installation or drilling of wells or by any other method.

Section 2: Restricted Groundwater Zone.

The following area shall be designated a Restricted Groundwater Zone:

- i) Western Boundary: a line paralleling the western boundary of the parcel of land identified by Permanent Index Number 08-28-400-044, and set a distance of 400 feet west of said western parcel boundary;
- ii) Southern Boundary: the southern boundary of the Waukegan City Limits;
- iii) Northern Boundary: the centerline of Water Street extended; and
- iv) Eastern Boundary: the Lake Michigan waterline;

all as more specifically depicted in the attached diagram.

Section 3: Definitions.

For purposes of this Ordinance the following definitions shall apply:

1. "Person" is any individual, partnership, co-partnership, firm, company, limited liability company, corporation, association, joint stock company, trust, estate, the City of Waukegan and any of its or their legal representatives, agents or assigns.
2. "Potable Water" is any water used for human or domestic consumption, including. But not limited to, water used for drinking, bathing, swimming, washing dishes, preparing foods, watering lawns, or watering gardens in which produce intended for human consumption is grown.
3. "Restricted Groundwater Zone" is that areal extent of "groundwater," within the City limits, and around the "source" of a "release" of petroleum," "pesticides" or "regulated substance," as those words are defined in the Illinois Environmental Protection Act, 415 ILCS 5/1, et seq., ("the Act"), which has been designated by the City Council by this Ordinance. That area shall extend, at a minimum, to any area within the measured and modeled extent of groundwater contamination above what would otherwise be the applicable Tier 1 groundwater remediation objectives at 35 Ill.Admin.Code 742.

Section 4: Penalties.

Any person violating the provisions of this Ordinance shall be subject to a fine of up to \$750.00 for each violation. Each day of the continued existence or use of a prohibited well shall be considered a separate violation.

Section 5: Repealer.

All ordinances, resolutions, orders, or parts thereof, which conflict with the provisions of this Ordinance, to the extent of such conflict, are hereby repealed.

Section 6: Severability.


If any section, paragraph, clause or provision of this Ordinance is held invalid, the invalidity of such section, paragraph, clause or provision shall not affect any of the other provisions of this Ordinance.

Section 6: Effective Date.

This ordinance shall be in full force and effect from and after its passage, approval and publication as provided by law.


MAYOR ROBERT G. SABONJIAN

ATTEST:


WAYNE MOTLEY, City Clerk

Presented and read at a regular meeting of the Waukegan City Council on the 6th day of
June, 2011.

Passed and approved at a regular meeting of the Waukegan City Council on the 6th day of
June, 2011.

ROLL CALL: Aldermen Rivera, Cunningham, Koncan, Moisio, Beadling, Newsome,
TenPas, May, and Valko

AYES: Aldermen Rivera, Cunningham, Koncan, Moisio, Beadling, Newsome,
TenPas, May, and Valko

NAYS: None

ABSENT: None

ABSTAIN: None



**City of Waukegan
South Lakefront
Groundwater Use
Restriction Ordinance Area**

**(East-West: Lake Michigan to 400
ft. West of Market St.)
(North -South: Water St. to 10th St.)**