FINAL REPORT
RESPONSE ACTION DOCUMENTATION
LITE YARD PROPERTY AND
HENNEPIN COUNTY REGIONAL RAILROAD AUTHORITY PARCEL
EAST 28TH STREET
MINNEAPOLIS, MINNESOTA

JULY 29, 2005

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1.0 INTRODUCTION

Peer Engineering, Inc. (Peer), on behalf of CMC Heartland Partners (**CMC**), has prepared this report summarizing the cleanup activities completed at the Lite Yard Property and at the Hennepin County Regional Railroad Authority (**HCRRA**) Parcel. For the purposes of this report, cleanup activities completed at the Lite Yard Property and HCRRA Parcel are discussed separately, where applicable. In circumstances where the Lite Yard Property and HCRRA Parcel are discussed jointly, they are referred to as the "**Site**".

The cleanup activities were conducted in accordance with response action plan documents (**RAP Documents**) and amendments thereto, that were approved by the Minnesota Department of Agriculture (**MDA**).

2.0 BACKGROUND INFORMATION

2.1 SITE LOCATION AND DESCRIPTION

The Site is a triangular shaped parcel approximately 7.2 acres in size and is located at the northwest intersection of East 28th Street and State Highway 55 in the City of Minneapolis (City), County of Hennepin, State of Minnesota. The Site is located in part of the southwest ¼ of Section 36, Township 29 North, Range 24 West. **Figure 1** shows the location of the Site.

The Lite Yard Property is approximately 4.9 acres in size and is located on the eastern side of the Site. The Lite Yard Property was originally part of a 7.7-acre parcel (**Original Parcel**), which included an area that extended approximately 100-feet east and parallel to the current eastern property boundary. In May 1998, the Minnesota Department of Transportation (**MnDOT**) acquired the easternmost approximately 2.8 acres of the Original Parcel, and subsequently redeveloped it as part of the Hiawatha Corridor reconstruction project. The HCRRA Parcel encompasses the western edge of the Site, with the Roof Depot building beyond. The HCRRA Parcel is a 100-foot wide former railroad right-of-way, and is approximately 2.3 acres in size.

To the east of the Site is State Highway 55 (also known as Hiawatha Avenue), with a multi-tenant office/warehouse building and buildings occupied by Pro Floor Inc. and by DC Sales beyond. To the south of the Site is a 10-foot wide City right-of-way and East 28th Street, followed by the South HCRRA Corridor (also a former railroad right-of-way) and beyond by buildings for John Dalsin & Sons Roofing and Sheetmetal, Jadco Supply & Equipment and The Green Institute; the Smith Iron Foundry is located immediately southwest of the Site across East 28th Street. To the north of the Site is the City asphalt plant and State Highway 55, with the Allweather Roof building beyond. A site diagram is presented as **Figure 2**.

2.2 SITE HISTORY

Peer's historical research indicates the Lite Yard Property had been developed as a railroad yard from at least 1885 through the early 1970's. **Figure 3A** shows historical land use features of the Property. Information indicates former leaseholder, Reade Manufacturing, then sublease holder, U.S. Borax, operated an agricultural chemical facility on the south-central portion of the Lite Yard Property at 2100 East 28th Street. Arsenical-based herbicides were mixed and produced at this location as early as 1940 through 1963. Reade Manufacturing was the initial operator of the agricultural chemical business. U.S. Borax, Inc. (**U.S. Borax**) operated the business for two or three years between 1963 and 1968. Two former bulk storage facilities were also previously located on the south-central portion of the Lite Yard Property. One of the storage facilities was operated by Rollins Oil Company (the 2000 East 28th Street Building) from as early as 1933 through the mid-1980s. The Rollins facility operated up to 5 ASTs and one UST containing petroleum products. A second storage facility (Reade Manufacturing, then U.S. Borax) was located immediately east of the Rollins facility and contained up to 14 ASTs at various times between 1912 and the early 1970s. This facility was apparently used by Reade Manufacturing from no later than 1940 until 1963. U.S. Borax used the facility for two or three years between 1963 and 1968. Use of the storage tanks prior to Reade Manufacturing operations is not known.

A soil berm approximately 5 to 6 feet high by 20 to 25 feet wide previously existed along the southeastern edge of the Lite Yard Property along East 28th Street (**South Berm**). Bituminous Roadways reportedly constructed the South Berm in 1994 with clean mineral fill obtained from off-site sources.

Historically up to seventeen active ground water monitoring wells were on the Lite Yard Property. Currently two active monitoring wells are located on the Lite yard Property, both of which are owned by CMC (the current property owner). Fourteen of the seventeen ground water monitoring wells were abandoned in-place and one was removed. A diagram of historic and existing monitoring well locations is presented as **Figure 3B**.

2.3 REGULATORY CASE FILES AND LEAKSITE IDENTIFICATION

2.3.1 Minnesota Department of Agriculture

Peer reviewed the MDA Website for information pertaining to the Site. The MDA is the lead state agency for the cleanup of agricultural chemicals, defined as pesticides and fertilizers, and is directing the investigation and cleanup at the Site. The Site is currently being managed under the MDA's Incident Response Unit Comprehensive Facility Investigation Program. Based on correspondence Peer has received from MDA staff, MDA has assigned the following case numbers relating to the Site:

MDA Case File No.	Site Description
94-99	MnDOT project (former eastern portion of the Original Parcel)
95-0100A	South HCRRA Parcel, across 28th Street
95-0100B	CMC Lite Yard Site (this case file relates to investigation and cleanup activities being conducted by the RPs, and off-site impacts attributed to the Property)
95-0100C	CMC Enron. Broadband Services (this case file relates to a No Association Determination issued to a utility company for installation of a fiber optic line on the HCRRA Right-of-Way Parcel in 2001)
95-0100D	West HCRRA Parcel (HCRRA Right-of-Way Parcel that adjoins the Property on the west)
95-0100E	Ryan/2800 Hiawatha, LLC development project

2.3.2 Minnesota Pollution Control Agency

Peer reviewed the Minnesota Pollution Control Agency (**MPCA**) Leaking Underground Storage Tank inventory. The following two listings were identified for the Lite Yard Property:

- **Vacant Property, 2016-2100 East 28th Street.** This petroleum tank release was reported on December 13, 1995 (Leak #9035). The file regarding this release was "closed" by the MPCA on January 9, 1996.

- **Chicago-Milwaukee Corp/Rollins, 2000-2020 East 28th Street.** This petroleum tank release was reported on August 29, 1989 (Leak #1583). The file regarding this release was "closed" by the MPCA on October 10, 1997.

2.4 ENVIRONMENTAL INVESTIGATIONS

A number of environmental investigations were completed on the Lite Yard Property and HCRRA Parcel beginning in November 1991. Based on the investigation results, the MDA placed the Lite Yard Property on the Minnesota Permanent List of Priorities (**PLP**) in early 2002. MDA files contain all documentation regarding previous environmental investigations completed at the Site.

2.5 APPROVED RESPONSE ACTIONS

2.5.1 Approved RAP Documents

A RAP dated March 12, 2004 (**March 2004 RAP**) was prepared by Exponent, Inc. (**Exponent**) to address arsenic and lead contamination at the Lite Yard Property. The March 2004 RAP summarized previous investigation activities, known soil and ground water conditions, remedial alternatives and proposed cleanup actions for the Lite Yard Property. MDA issued initial approval and comments regarding the March 2004 RAP in letters dated March 10, 2004, March 15, 2004 and April 23, 2004; with final approval granted in a letter dated April 29, 2004. The April 29, 2004 MDA approval letter requested that supplemental information regarding implementation of the March 2004 RAP be submitted in a "Response Action Design and Implementation Plan (**RAD/IP**)".

Peer prepared the RAD/IP dated June 21, 2004, which was subsequently submitted to and approved by the MDA, with comments, in a letter dated July 28, 2004 (**July 2004 RAD/IP Approval Letter**). The RAD/IP included proposed response actions for cleanup of arsenic and lead impacts at the Lite Yard Property and the adjoining HCRRA Parcel. Peer prepared a response letter dated August 27, 2004 to address the MDA comments included in the July 2004 RAD/IP Approval Letter. Peer also prepared a Project Manual dated August 23, 2004 with associated addenda that were used to select a remediation contractor for response action implementation. The reports and regulatory approval letters identified above are collectively referred to as the "**Approved RAP Documents**". Copies of the RAP approval letters are included in **Appendix A**.

2.5.2 Modifications to the Approved RAP Documents

Additional documents were prepared and submitted to the MDA and MPCA during cleanup implementation to reflect changed conditions from those contemplated within the Approved RAP Documents. In general, requests for modifications to the Approved RAP Documents were made in the following situations:

- If a specific contractor or disposal facility was added or changed.
- If an issue or situation was encountered which was not specifically addressed in the Approved RAP Documents.
- If an issue or situation was addressed in the Approved RAP Documents, but an alternative and better solution was identified.

These additional documents were submitted to and approved by the MDA and MPCA, and were incorporated into the Approved RAP Documents. Documentation related to modifications of the RAP Documents is included in **Appendix B**. The following paragraphs summarize the issues addressed in the additional documents.

Reuse of Layback Soil

An email from Peer to MDA on November 19, 2004 requested reuse of Layback soil as backfill in the Hot Spot excavation. Peer proposed reusing Layback soil from stockpiles SP-45-1, SP-45-2, SP-46 and SP-47, which had arsenic concentrations slightly above the approved reuse standard of 200 milligrams per kilogram. A confirmation email from MDA approving Peer's request was received on November 23, 2004.

Excavation of Geotechnically Poor Soil

Peer prepared a RAD/IP Addendum dated December 7, 2004 that addressed completion of excavation during response action implementation to accommodate removal of geotechnically unsuitable soils from beneath the footprint of the proposed future building at the Lite Yard Property. MDA gave final approval to the RAD/IP and related Addenda in a letter dated December 15, 2004.

Sampling and Disposal of the South Berm

Peer prepared an Impacted Soil Disposal Request letter dated March 29, 2005 that addressed sampling and disposal of the South Berm. MPCA gave final approval of the request on April 6, 2005.

Reduction of Imported Fill Sampling

An email from Peer to MDA on April 22, 2005 requested a modification to the imported fill sampling frequency from one sample per 2,000 cubic yards (**CY**) to one sample per 5,000 CY. MDA gave final approval of the request on April 26, 2005.

2.6 PROPOSED DEVELOPMENT

2800 Hiawatha, LLC intends to purchase the Lite Yard Property and, with Ryan Companies US, Inc. (**Ryan**) as its general contractor, to develop the Property with a single story, slab-on-grade building for use as a commercial office/warehouse with related improvements, including a storm water retention pond. Proposed development plans are included in **Appendix C**. Finished floor slab elevation is planned to be 844 feet National Geodetic Vertical Datum (**NGVD**). The building will be supported by standard spread footings, which extend to a depth of four feet below the floor slab. A bituminous paved, recessed loading dock area will be located on the west side of the building, which ranges in finished elevation from 840 feet to 843 feet. Bituminous paved parking and drive areas would surround the building and range in elevation from 841 feet to 843 feet. An unlined, on-site storm water retention pond is planned at the north end of the Property, with finished elevations ranging from 829 feet to 840 feet. Other unpaved areas of the Property would be landscaped. Access to the Property will be off 28th Street East, from the southwest corner of the Property.

Storm water lines and associated catch basins will be located beneath the loading dock and paved parking/drive areas and will discharge to the on-site storm water retention pond. Invert elevations for the storm water lines would range from approximately 833 feet to 837 feet. The sanitary sewer service would run from the east side of the building and connect to the sanitary main in East 28th Street. Elevations for the sanitary sewer line would range from approximately 835 feet to 836 feet. The building will have two water service connections, with a continuous loop water line that encircles the building and ties into the water main located in East 28th Street. The water line would be located a minimum of 7.5 feet below finished grade.

Hennepin County's plan for development of the HCRRA Parcel includes construction of the Midtown Greenway Bike and Pedestrian Paths (**Paths**). Construction of the Paths also includes installation of a proposed bridge to allow for pedestrian traffic over Hiawatha Avenue. The proposed bridge construction will raise grades significantly on the northernmost sections of the HCRRA Parcel.

3.0 RESPONSE ACTION IMPLEMENTATION

3.1 CLEANUP OVERVIEW

Peer was retained by CMC as the general contractor for cleanup implementation. Carl Bolander and Sons, Inc., of St. Paul, Minnesota (**Bolander**) was the remediation contractor retained by CMC to implement the approved response actions. Cleanup activities were completed between October 2004 and July 2005. No cleanup activities occurred in the months January, February and March 2005 because of winter weather and frozen soil conditions. The following response actions were completed at the Site:

- Removal of miscellaneous debris and concrete building slabs.
- Abandonment of selected monitoring wells as necessary for Site remediation.
- Excavation and stabilization (using ferric sulfate and magnesium oxide) of the identified "Hot Spot" located near the south central portion of the Lite Yard Property.
- Excavation and stabilization (if necessary) of remaining surface soil to achieve four-foot separation depth from finished site grades.
- Stockpiling excavated soil at designated staging areas prior to off-site disposal or on-site placement of backfill.
- On-site use of excavated soils meeting established re-use criteria.
- Off-site disposal of contaminated soil and debris not meeting site reuse criteria.
- Air monitoring.

The following sections describe procedures used during cleanup implementation, and summarize analytical results obtained during implementation of the Approved RAP Documents.

3.2 CLEANUP STANDARDS

Risk-based, site specific cleanup standards for total arsenic and total lead were developed for both the Lite Yard Property and HCRRA Parcel by the MDA. The standards were selected based on available toxicological data for the respective compounds and future use of the Lite Yard Property as industrial/commercial and the HCRRA Parcel as recreational.

Soil cleanup standards for the Lite Yard Property were established at 20 milligrams per kilogram (**mg/kg**) total arsenic and 525 mg/kg total lead. Soil cleanup standards for the HCRRA Parcel were established at 12 mg/kg total arsenic and 525 mg/kg total lead. As specified in the Approved RAP Documents, these cleanup standards applied to soil within the upper four feet of planned development grades (**four-foot separation requirement**).

3.3 MOBILIZATION AND SITE PREPARATION

Strict site control procedures were implemented during cleanup implementation. Specifically, site control involved limiting access to contaminated portions of the Site to qualified and safety trained personnel, setting up appropriate work zones, and establishing procedures and requirements for personnel/equipment entering and exiting the Site. Mobilization and site preparation activities were initiated prior to cleanup implementation. The activities completed included monitoring well abandonment, establishing survey control, setup of erosion control features, removal of vegetation and surface debris, and setup of work zones.

3.3.1 Monitoring Wells

Prior to the start of the cleanup implementation, monitoring wells MW-1, MW-2, MW-4, MW-4A, MW-13, MW-14, and MW-15 were abandoned on October 9, 2004. Monitoring wells MW-25D and MW-25E were abandoned on April 4, 2005. Monitoring well MW-10 was abandoned by excavation on May 6, 2005. These monitoring wells were abandoned according to Minnesota Department of Health (**MDH**) regulations. Monitoring wells MW-22 and MW-26D were protected during cleanup implementation and currently remain active at the Lite Yard Property. Copies of monitoring well sealing records are included in **Appendix D**.

3.3.2 Survey Control

Prior to implementation of excavation activities, horizontal control was established for the purpose of documenting site cleanup activities. Hakanson Anderson Associates, Inc., a registered land surveyor, staked the Site boundaries and control points for a 50-foot by 50-foot grid system. The Site grid system is presented in **Figure 4**.

3.3.3 Erosion and Sediment Control Features

Erosion and sediment control features were installed according to the Storm Water Pollution Prevention Plan developed by Peer for CMC. Features included the installation of silt fencing, catch basin sediment traps, street sweeping, and rock placement at vehicle entrances and exits.

3.3.4 Surface Debris Consolidation

Surface debris consisting of pieces of concrete, loose metal, wood, lumber, former building foundations and other miscellaneous non-hazardous materials was consolidated into stockpiles of similar material types. These materials were removed and disposed of at a permitted local industrial waste landfill. In addition, a concrete foundation pad for the former 2000 East 28th Street Building and associated footings were removed and disposed off-site (see **Figure 3A**).

3.3.5 Vegetation Removal

All vegetation present on the Site was cut to provide access to the underlying contaminated materials. For this task, vegetation was defined as brush, stumps, trees and other organic matter that existed above the ground surface. All vegetation was cut within two inches of the ground surface using chain saws and edge trimmers. The cut materials were collected and stockpiled. These materials were removed and disposed of at a permitted local industrial waste landfill.

3.3.6 Work Zones

The following four work zones were established at the Site: 1) Exclusion Zone, 2) Contaminant Reduction Zone, 3) Support Zone, and 4) Staging Areas. The work zone locations are shown on **Figure 5**.

Exclusion Zone

The Exclusion Zone encompassed the entire Site. The Exclusion Zone was surrounded by 6-foot high chain link fence and buildings of the adjacent Roof Depot site. Only authorized project personnel with appropriate safety training were allowed within the Exclusion Zone during cleanup implementation.

Contaminant Reduction Zone

The Contaminant Reduction Zone (**CRZ**) consisted of both equipment/vehicle and personnel decontamination areas. Water for decontamination activities was obtained from a City of Minneapolis hydrant located on 28th Street.

The personnel CRZ consisted of a portable decontamination trailer, boot wash station, personnel protective equipment removal area, and hand wash station. The personnel CRZ area was initially set up on the HCRRA Parcel during cleanup of the Lite Yard Property, and was relocated to the Lite Yard Property during cleanup of the HCRRA Parcel. Equipment/vehicle decontamination was completed, as necessary, within the CRZ to avoid tracking of contaminants off-site.

Support Zone

The Support Zone was set up on the central portion of the HCRRA Parcel. The Support Zone consisted primarily of a field office, parking area, and project management headquarters. The common work area was utilized by both Bolander and Peer personnel as an extension of the field offices, and was utilized for safety meetings, strategic project planning and scheduled breaks.

Staging Areas

During cleanup activities, the HCRRA Parcel was the primary temporary staging area for stockpiled Site materials. All stockpiled materials were placed on and covered with 10-mil reinforced polyethylene sheeting. Treatment chemicals utilized during cleanup activities were also staged on the HCRRA parcel. The staging areas were constructed of concrete jersey barriers and 10-mil polyethylene sheeting.

3.4 AIR MONITORING

An air monitoring program was implemented to ensure protection of both the general public and site workers during the cleanup activities. In general, the air monitoring program included the following elements:

- Perimeter monitoring
- Worker monitoring
- Daily reporting

Air monitoring and sampling was conducted during the excavation of potentially contaminated soil, handling of that soil on site, and placement of fill soil.

3.4.1 Exposure Standards

The Approved RAP Documents established short-term time-weighted averages (TWAs) for total particulates, arsenic, and lead. The established limits were:

Parameter	Established Limit
Total Particulates (real-time dust monitoring)	1.6 milligrams per cubic meter (**mg/m^3**)
Total Arsenic (laboratory testing)	0.01 mg/m^3
Total Lead (laboratory testing)	0.05 mg/m^3

The above established limits were used to trigger action criteria related to airborne contaminants. Adherence to the established limits was assessed through a combination of real-time air monitoring of particulates, and laboratory analysis of air samples collected at designated locations and intervals.

Additional information concerning the established exposure standards are presented in the Approved RAP Documents.

3.4.2 Perimeter Monitoring

Real-Time Measurements

Six perimeter air monitoring locations were established at the locations shown on **Figure 6**. The monitoring locations were spaced to provide reasonable coverage of the air in all directions from the Site. The monitoring locations were identified as P-40, P-120, P-200, P-250, P-300, and P-355. Whereas "P" represents a perimeter monitoring location and the "40" represents the direction to the monitoring location in degrees from the center of the proposed Hot Spot excavation. Each monitoring location was equipped with a MIE DataRAM aerosol monitor capable of monitoring and recording the average short-term exposure limit (**STEL**) and maximum concentration of particulates over the entire day. The aerosol monitor was capable of measuring particulates in the range from 0.001 to 400 mg/m^3.

The concentration of air-borne contaminants at the Site boundary was determined each day as follows:

1. The current wind direction was measured and recorded in degrees relative to true north (0^{o}).

2. The concentration of air-borne particulates was measured at the perimeter monitoring location closest to the upwind direction of the Site. This was considered the background particulate concentration.

3. Particulate concentrations were measured at the three downwind locations. The highest observed particulate concentration from those measurements was identified.

4. The background particulate concentration was subtracted from the highest downwind particulate concentration, and the resulting concentration was compared to the 1.6 mg/m^3 total particulate standard established for the Site.

In summary, the real-time monitoring detected no instances where the established particulate standard of 1.6 mg/m^3 was exceeded during any work day.

Sampling for Laboratory Analysis

A MIE Active Sampling Conversion kit was used to collect daily particulate samples for laboratory analysis. The particulate samples were collected in mixed cellulose ester (**MCE**) filters, housed in plastic cassettes. The filters were 37 mm in diameter and had a 0.8 micron pore size. Each sample collected represented approximately 500-liters of air taken over a 125-minute time period. To ensure that the air flow was properly measured, the active sampler was calibrated daily.

The air samples for laboratory analysis were collected on the downwind side of the Site, as determined by a portable weather station. The air sampling for laboratory analysis was conducted as follows:

1. The current wind direction was measured and recorded in degrees relative to true north (0^{o}).

2. An air sample was collected along the downwind Site perimeter as determined by the weather station monitoring. The sample was collected over a 125-minute period as necessary to obtain a sample from 500 liters of air.

3. The filter was sealed and transferred to the laboratory under Chain-of-Custody procedures.

4. The filter was analyzed for arsenic and lead by NIOSH method 7300.

5. The analytical results for arsenic and lead, in units of mg/m^3, were reported to Peer within 48-hours of submittal.

The analytical results for the air samples are presented in **Section 3.6.4**. In summary, no arsenic or lead were detected at concentrations above laboratory reporting limits in the air samples collected at the Site.

Data Management and Reporting

The monitoring results were maintained by Peer. At the end of the day the Peer collected, calculated and analyzed the day's results. The results included:

- Wind speed and direction recorded at regular intervals.
- Daily average, STEL, and maximum particulate readings from each of the six perimeter monitoring stations.
- Calculated daily highest potential arsenic and lead concentration in air.

At the end of the next work day after collection of the monitoring results and/or receipt of analytical test results, Peer compared the particulate, arsenic and lead concentrations to the appropriate standards. The following results were made available to the designated MDA representative via email.

- Hours of operation during the preceding work day.
- Average wind speed and direction during each hour of operation.
- Daily average, STEL and maximum particulate concentration from each of the six monitoring locations.
- Calculated arsenic and lead concentration at the perimeter.

- Results of analysis of air samples collected on preceding days, but made available on the previous day.
- Comparison of observed, calculated and laboratory analyzed particulate, arsenic, and lead concentrations to standards.
- Actions taken to mitigate air borne contaminants, if any.
- Recommended future actions or changes in operation, if any.

3.4.3 Worker Monitoring

Two workers were monitored for particulate concentrations within the work zone during all hours of operation. The monitoring was conducted with a MIE pdm-3 Miniram aerosol monitor capable of monitoring and recording particulate concentrations from 0.01 to 100 mg/m^3. The aerosol monitors were carried with the workers or placed on vehicles in use within the work zone in an appropriate position to monitor the air within the work zone. The monitors were set to alarm when the particulate concentrations exceeded the established limit of 1.6 mg/m^3. If the established limit was exceeded at any time, the source of the elevated particulate concentrations was evaluated and appropriate actions were taken to remedy the situation (e.g., applying water to working surfaces to suppress dust).

3.5 SITE EXCAVATION

Bolander was retained to complete the contaminated media excavation work related to response action implementation. The excavation work proceeded in an orderly manner to allow for completion of required environmental monitoring and sampling. All excavated materials were placed on and covered with 10-mil reinforced polyethylene sheeting until disposition options were evaluated. Horizontal and vertical control was maintained during all excavation activities. Specific site excavations are discussed in the following sections.

3.5.1 Hot Spot Area and Layback Excavations

Approximately 23,000 CY of soil was excavated from the Hot Spot Area and associated Layback between October 8, 2004 and November 12, 2004. Of the 23,000 CY excavated, 13,000 CY from the Hot Spot was subjected to in-situ stabilization procedures, with the remaining 10,000 CY of the Layback soil being excavated, stockpiled, and sampled prior to disposition.

Hot Spot

The Hot Spot excavation and related in-situ stabilization were completed using the following general procedures:

- The surface area of the Hot Spot was divided into three sections. Test pits were then advanced within each section so that X-Ray Fluorescence (**XRF**) screening could be conducted. Following review of XRF screening results, stabilization chemical application ratios were calculated for removal of 1½-foot lifts from each of the three sections (each lift excavated had an approximate volume of 200 CY.)

- The stabilization chemical was mixed in 1½-foot thick lifts of in-place soil using a track-mounted backhoe. The stabilization chemical was thoroughly mixed throughout the entire lift. Mixing continued until the treatment chemical and soil appeared to be well mixed based on visual criteria.

- After thorough mixing, the stabilized soil was excavated and transported to the designated Temporary Staging Area for stockpiling and verification sampling. Samples of the staged treated materials were collected for laboratory analysis to verify that the stabilization activities effectively achieved the established treatment criteria for arsenic and lead.

The above procedures were repeated within each lift of the Hot Spot until all soil was removed to the depth of ground water (818 NGVD). All 13,000 CY of the excavated and stabilized soil was disposed as industrial waste. Approximate elevations of the Hot Spot after excavation are presented in **Figure 7**.

Layback

Layback soil was excavated, as necessary, to maintain a 1:1 working slope for the Hot Spot excavation as the depth increased. The Layback soil was excavated in two-foot lifts, stockpiled on-site, and sampled to determine disposition options. Of the 10,000 CY of soil excavated from the Layback, approximately 900 CY required chemical stabilization and off-site disposal, 6,150 CY was disposed off-site without stabilization, and 3,250 CY was approved by MDA for use as backfill in the Hot Spot. Approximate elevations of the Layback after excavation are presented in **Figure 7**.

3.5.2 Shallow Soil Excavation

Two stages of shallow soil excavation were implemented upon completion of the Hot Spot and Layback removal activities. The stages included an Excavate and Stockpile Stage, and a Direct Load Stage. The following sections describe the procedures used to complete the respective shallow excavation stages.

3.5.2.1 Excavate and Stockpile Stage

The Excavate and Stockpile Stage included all areas of the Site that required excavation, stockpiling and sampling prior to off-site disposal. In general, two types of excavations were completed in this stage, a Four-Foot Separation Excavation and a Pre-Determined Depth Excavation. **Figure 8** documents areas of the Site where the Excavation and Stockpiling Stages were completed. Approximate elevations of shallow soil after excavation in the Excavate and Stockpile Stage are also presented in **Figure 8**. A description of each type of excavation is as follows:

Four-Foot Separation Excavation

Based on previous analytical testing results completed at the Lite Yard Property, selected areas of shallow soil were targeted for immediate excavation to the four-foot separation requirement. This type of excavation was implemented in selected areas because arsenic concentrations at depths below the four-foot separation requirement were known to exceed the established cleanup standard.

Pre-Determined Depth Excavation

Pre-Determined Depth Excavations consisted of utilizing analytical data to pre-determine the depth of the shallow soil excavations. The analytical data included results from previous investigations, test pits completed during 2004 response actions and from an additional 24 test pits that were completed on March 31, 2005 (prior to resuming response actions). This type of excavation was implemented in selected areas where moderate levels of arsenic were identified, and where documentation samples were thought to have a good chance of meeting the established cleanup standards.

General procedures completed as part of the Excavation and Stockpile Stage consisted of the following elements:

- Shallow soil was screened with an XRF and removed in one-foot lifts until the four-foot separation requirement from development grades was achieved or confirmation samples documented that the Site cleanup standards had been achieved (see **Section 3.2** for Site-specific cleanup standards).

- Excavated soil was then transported to the Temporary Staging Area for stockpiling and verification sampling. Samples were collected for laboratory analysis to determine if stabilization would be required.

- If samples identified Toxicity Characteristic Leaching Procedure (**TCLP**) arsenic or lead concentrations above the 5.0 milligram per liter (**mg/L**) treatment requirement, stabilization chemical was added to the staged soil within the Temporary Staging Area. Mixing continued until the treatment chemical appeared to be well mixed with the stockpiled material.

- After thorough mixing, the stabilized soil was re-sampled for laboratory analysis to verify that stabilization activities achieved the established criteria.

3.5.2.2 Direct Load Stage

The Direct Load Stage consisted of utilizing analytical data to pre-profile shallow soil for direct loading and disposal. The analytical data included results from previous investigations, test pits completed during 2004 response actions, and from an additional 24 test pits that were completed on March 31, 2005. This type of excavation was implemented to expedite off-site removal of low-level impacted soil that would not fail TCLP testing.

In general, the pre-profiling targeted shallow soil (0-2 feet from beneath the existing asphalt cap) from areas of the Site that had similar soil characteristics to that of other shallow soil located at the Site (soil that had previously been analyzed for TCLP arsenic and lead). A copy of the pre-profile disposal request letter is included in **Appendix E**. Areas of the Site excavated during the Direct Load Stage are presented in **Figure 8**. Approximate elevations of shallow soil after excavation are also presented in **Figure 8**.

General procedures completed as part of the Direct Load Stage consisted of the following elements:

- Shallow soil targeted for direct load was screened with an XRF and removed in one-foot lifts until the four-foot separation requirement from development grades was achieved or confirmation samples documented that the Site cleanup standards had been achieved (see **Section 3.2** for Site-specific cleanup standards).

- Excavated soil was then directly loaded onto tractor-trailer end dumps for transport and disposal.

- Environmental monitoring was conducted during all Direct Load Stage excavation activities to verify that the excavated soil had similar characteristics to those previously identified during 2004 response actions and test pits completed in March 2005. If significant differences in soil characteristics were noted (i.e. staining, odors, debris, ash), the soil was stockpiled and subjected to analytical testing prior to disposal.

3.5.3 Miscellaneous Material Excavations

In conjunction with response actions for arsenic and lead, miscellaneous materials were encountered and addressed during response action implementation. The miscellaneous materials included an out-of-service 560-gallon UST, contaminated South Berm soils, a buried wooden utility structure, buried battery casings, missing monitoring well MW-10, railroad tracks and ties, geotechnically unsuitable soil below the proposed building location, and a buried limestone block and concrete foundation. **Figure 9** identifies the approximate location of the miscellaneous materials encountered. The following sections provide additional information concerning the miscellaneous materials. Disposal information for the miscellaneous materials is discussed in **Section 3.7**.

3.5.3.1 Underground Storage Tank

An out-of-service 560-gallon heating oil UST (associated with the former building located at 2100 East 28th Street) was uncovered on November 24, 2004. This UST was removed by Bolander (MPCA Certified UST Closure Contractor No. 89.), on November 24, 2004, and the UST and associated contents (20-gallons of oily water/sludge) were subsequently removed from the Lite Yard Property and disposed of by Determan Brownie, Inc. Because the UST was used to store heating oil on-site and was less than 1,100 gallons in size, the tank was exempt from MPCA registration requirements. A copy of information related to the 560-gallon UST removal is included in **Appendix F**.

3.5.3.2 South Berm Soils

Bituminous Roadways reportedly constructed the South Berm in 1994 with clean mineral fill obtained from off-site sources. Initial sampling and testing of the South Berm soils identified elevated concentrations of arsenic and mercury in some samples. In conjunction with the MPCA, a sampling plan was developed in an attempt to delineate the extent and magnitude of contamination in the South Berm and to determine appropriate disposition options for the material. A copy of the sampling plan and related MPCA correspondence is included in **Appendix B**.

3.5.3.3 Buried Wooden Utility Structure

A buried wooden utility structure was identified in the southeast corner of Grid 5 on April 20, 2005. The wooden utility structure appeared to be an access shaft to a former water utility line. The wooden utility structure was approximately 4-feet wide, by 8-feet long by 10-feet deep. An access ladder was present on the inside of the structure which led to what appeared to be gate valve on a 6-inch cast iron line. The line was observed to be cut at both ends, apparently taken out of service and left in-place at a previous time. As part of cleanup implementation, the buried wooden utility structure was partially removed within the upper four feet of development grade, and the remainder of the structure was left in place.

3.5.3.4 Buried Battery Casings

Approximately 60 CY of battery casings were excavated from the northeast corner of Grid 8 on April 29, 2005. The excavation of the battery casings extended from about 4-feet below ground surface (**bgs**) to 10-feet bgs. The majority of the casings were broken, although some were intact and filled with soil. The internal cell components of the batteries were not present.

3.5.3.5 Missing Well

DRPA Environmental (**DPRA**), as part of the Rollins Oil investigation, installed monitoring well MW-10 on May 26, 1992. On May 28, 2003 DPRA submitted a letter to the City of Minneapolis stating that monitoring well MW-10 was not located during routine ground water monitoring that was conducted in December 1998. DPRA returned in the spring of 1999 in attempt to locate MW-10. DPRA noted that additional excavation and grading had taken place, and that MW-10 had possibly been demolished. DPRA proceeded to complete a 40-foot by 40-foot by 6-foot deep excavation in attempt to located MW-10. Pieces of concrete were identified, but the well was not located. DPRA submitted a "Well and Boring Sealing Record" form (which was not signed) to MDH.

Peer completed a search for missing well MW-10 on May 6, 2005. The well was identified, excavated to groundwater, and abandoned by excavation. A copy of the MDH sealing record is included in **Appendix D**.

3.5.3.6 Railroad Tracks and Ties

Abandoned railroad tracks and ties were uncovered along the southwestern most portion of the HCRRA Parcel. The tracks extended approximately 200-feet to the north, where it was cut off and covered with asphalt. The tracks and ties were disposed off-site under contract with Hennepin County.

3.5.3.7 Geotechnical Soil

Approximately 1,890 CY of geotechnically poor soil was encountered below the proposed building footprint on the Lite Yard Property. Although this soil was located below the four-foot separation requirement from development grades, CMC agreed to remove the geotechnically poor soil during cleanup activities while it was easily accessible. The MDA approval letter for the additional excavation is included in **Appendix B**.

3.5.3.8 Buried Limestone Block and Concrete Foundation

During cleanup implementation, a buried limestone block and concrete foundation was encountered on the southeast portion of the Property in Spring 2005 (see **Figure 9**). Because of its size and depth, the limestone block and concrete foundation were left in-place.

3.6 ANALYTICAL TESTING RESULTS

Various media were sampled and tested during response action implementation. This section summarizes the various types of samples collected and analytical testing performed. The field procedures used to collect, prepare, and transport the samples are provided in **Appendix G**. A table of contents and subsequent laboratory analytical reports are provided on compact disk in **Appendix H**.

All samples collected by Peer during response action implementation were submitted to one of the following analytical laboratories:

- Braun Intertec of Minneapolis, Minnesota
- Pace Analytical Services of Minneapolis, Minnesota

3.6.1 Stockpile Samples

Representative soil samples were collected from each of the 158 stockpiles generated during response actions at the Site. The stockpiles ranged in size from 80 CY to 2,000 CY, with multiple samples from stockpiles greater than 250 CY. The stockpile samples were submitted for a combination of total arsenic and lead, and TCLP arsenic and TCLP lead using standard EPA methods.

Additional information pertaining to the disposition of the stockpiles in included in **Section 3.7**. The following sections identify the types of stockpiles that were sampled and the location of the Site from which they were generated.

3.6.1.1 Lite Yard Property

Treated Soil Stockpiles

Analytical results for treated soil stockpile samples are presented in **Table 1**. The following observations are provided regarding the results:

- A total of 68 stockpiles were generated, stabilized, and sampled. Of the 68 stockpiles, 57 were from the Hot Spot, 6 were from the Layback and 5 were from shallow soil on the periphery of the Hot Spot.
- All analytical testing results collected from the stabilized stockpiles passed TCLP testing for arsenic and lead (i.e. <5.0 mg/L) on the first attempt.
- All of the treated material stockpiles were disposed as industrial waste.

Untreated Soil Stockpiles

The analytical results for these samples are presented in **Table 2**. The following observations are provided regarding the results:

- A total of 69 untreated soil stockpiles were generated and sampled. Of the 69 stockpiles, 59 were from shallow soil and 10 were from the Layback soil.

- Analytical testing results determined that the 69 stockpiles required off-site disposal as industrial waste, with the exception of the following:

  - Stockpile SP-11 was generated from the shallow Layback soil and had an approximate volume of 1,000 CY. Four samples, identified as SP-11N, SP-11C, SP-11S and SP-11 Center Deep, were collected from this stockpile. Analytical results from these samples identified an average total arsenic concentration of 227 mg/kg and an average total lead concentration of 56 mg/kg. Based on these results, stockpile SP-11 was targeted for off-site disposition as alternative daily cover.

  - During the Layback slope excavation, stockpiles SP-45, SP-46 and SP-47 were generated from the 10 to 16-foot interval. The approximate volumes of the stockpiles were 1,900 CY, 350 CY, and 1,000 CY, respectively. Eleven samples were collected from the three stockpiles. The average total arsenic concentration of the samples was calculated at 285 mg/kg, and the average total lead concentration was 4.4 mg/kg. Based on these results, the MDA approved all three Layback soil stockpiles for use as backfill within the Hot Spot. The following summarizes the analytical testing results for the eleven Layback soil stockpile samples:

Stockpile Identifier	Volume (CY)	Sample Identifier	Total Arsenic (mg/kg)	Total Lead (mg/kg)
SP-45	1,900	SP-45-1-1	227	4.9
		SP-45-1-2	130	ND (5.9)
		SP-45-1-3	184	7.8
		SP-45-2-1	394	6.8
		SP-45-2-2	104	ND (5.0)
		SP-45-2-3	534	8.6
SP-46	350	SP-46-1	17.1	8.7
		SP-46-2	31.9	6.8
SP-47	1,000	SP-47-1	389	4.8
		SP-47-2	617	ND (5.3)
		SP-47-3	511	ND (5.3)

ND (nn) = Not detected at or above laboratory reporting limit indicated in parenthesis.

- Stockpile SP-77 was generated from the 4.5 to 6-foot interval in grids 22 and 23 and had an approximate volume of 300 CY. One sample identified as SP-77 was collected from this stockpile and had a total arsenic concentration of 17.8 mg/kg and a total lead concentration of 11.3 mg/kg. Based on these results, the soil from SP-77 was used as general backfill in grid 75.

- Stockpile SP-106 was generated from the additional geotechnical excavation in grids 103 and 104 and had an approximate volume of 500 CY. Three samples identified as SP-106-1, SP-106-2 and SP-106-2A (duplicate of SP-106-2) were collected from this stockpile. Soil sample SP-106-2 had a total lead concentration of 11.5 mg/kg and total arsenic was not detected. Duplicate sample SP-106-2A had a total arsenic concentration of 13.8 mg/kg and a total lead concentration of 29.8 mg/kg. Based on these results, the soil from SP-106-2 was used as general backfill in the proposed green space area on the southeast corner of the Lite Yard Property. The material represented by sample SP-106-1 was disposed off-site as industrial waste.

Asphalt Stockpiles

The analytical results for these samples are presented in **Table 3**. The following observations are provided regarding the results:

- A total of eight asphalt stockpiles were generated and sampled.

- Analytical testing results determined that the eight asphalt stockpiles required off-site disposal as industrial waste, with the exception of the following:

  - The asphalt that comprised stockpile SP-89 was excavated from grids 76, 77, 85, 86, 94, 95, 96, 105 and 106 and had an approximate volume of 1,000 CY. Samples identified as SP-89-1, SP-89-2, SP-89-3 and SP-89-4 were collected from this stockpile. Asphalt sample SP-89-1 did not meet the reuse criteria, and the material representing this sample was disposed off-site at a permitted facility. The remaining samples did meet the reuse criteria and were used as general backfill in the proposed green space area on the southeast corner of the Lite Yard Property.

- The asphalt that comprised stockpile SP-96 was excavated from grids 55, 56, 61, 62, 77, 78, 84, 85 and 87 and had an approximate volume of 750 CY. Three samples identified as SP-96-1, SP-96-2 and SP-96-3 were collected from this stockpile. Asphalt sample SP-96-1 did not meet the reuse criteria, and the material representing this sample was disposed off-site at a permitted facility. The remaining samples did meet the reuse criteria and were used as general backfill in the proposed green space area on the southeast corner of the Lite Yard Property. The following table identifies analytical results for all of the asphalt samples collected form SP-89 and SP-96:

Stockpile Identifier	Volume (CY)	Sample Identifier	Total Arsenic (mg/kg)	Total Lead (mg/kg)
SP-89	1,000	SP-89-1	93.3	24.8
		SP-89-2	12.8	8.5
		SP-89-3	14.1	8
		SP-89-4	ND (9.0)	6.3
SP-96	750	SP-96-1	489	286
		SP-96-2	16.8	26
		SP-96-3	15.5	33.6

ND (nn) = Not detected at or above laboratory reporting limit indicated in parenthesis.

3.6.1.2 HCRRA Parcel

Based on previous analytical testing results and additional test pit sampling conducted during response actions, total arsenic and total lead concentrations present on the HCRRA Parcel were significantly less than that of the Lite Yard Property. Due to these conditions, soil removal from the HCRRA Parcel consisted primarily of direct load and haul methods as described in **Section 3.5.2.2**. Soil stockpiling was only conducted in areas where elevated concentrations of total arsenic and total lead had been identified. These areas were segregated, stockpiled and sampled for TCLP arsenic and lead prior to off-site disposal. None of the stockpiles from the HCRRA Parcel required chemical stabilization.

Untreated Soil Stockpiles

The analytical results for these samples are presented in **Table 4**. The following observations are provided regarding the results:

- A total of ten stockpiles were generated and sampled.
- Analytical testing results determined that all ten stockpiles did not require chemical stabilization and were disposed as industrial waste.

Asphalt Stockpiles

The analytical results for these samples are presented in **Table 5**. The following observations are provided regarding the results:

- A total of three stockpiles were generated and sampled.
- Analytical testing results determined that the three asphalt stockpiles met the approved criteria for reuse on the HCRRA Parcel with the exception of the following:
  - The asphalt, which comprised stockpile SP-152, was excavated from grids 13, 14, 15, 16, 17, 18, 42, 43, 44, 46 and 47, and had an approximate volume of 500 CY. Two samples identified as SP-152-1 and SP-152-2 were collected from this stockpile. Asphalt sample SP-152-2 did not meet the reuse criteria. The remaining sample did meet the reuse criteria and the asphalt representing this sample was replaced on the HCRRA Parcel.

- The following table identifies the analytical results for all of the asphalt samples collected from the HCRRA Parcel:

Stockpile Identifier	Volume (CY)	Sample Identifier	Total Arsenic	Total Lead
SP-150	500	SP-150-1	0.52	14.1
		SP-150-2	0.77	3.1
SP-152	500	SP-152-1	ND (0.45)	4.7
		SP-152-2	138	13.2
SP-153	500	SP-153-1	ND (0.41)	5.7
		SP-153-2	12	12.6

ND (nn) = Not detected at or above laboratory reporting limit indicated in parenthesis.

3.6.2 Miscellaneous Material Samples

Several miscellaneous samples were collected from various innocuous materials during response actions and are discussed below. With the exception of the South Berm, all analytical testing results of the miscellaneous materials are presented in **Table 6**. Analytical testing results of the South Berm are presented in **Table 7**.

3.6.2.1 Underground Storage Tank

Following removal of the 560-gallon heating oil UST, organic vapor screening was conducted using a photoionization detector (**PID**) with an 11.8 eV lamp on soil samples from the sidewalls and base of the excavation. No elevated PID readings were detected in the samples collected. One soil sample was obtained from the base of the excavation for analytical testing. The sample identified as B-1 (6') was submitted for analysis of diesel range organics (**DRO**). Analytical testing results identified a DRO concentration of 17.2 mg/kg.

3.6.2.2 South Berm

The South Berm, which was located along the southeastern edge of the Lite Yard Property along East 28th Street, was sampled on four occasions. The first sampling event on October 29, 2004 was completed to verify verbal reports that the soil present in the South Berm was from clean off-site source. Three samples (identified as South Berm-West, South Berm Center, and South Berm-East were collected for analysis of the following parameters:

- Volatile Organic Compounds (**VOCs**) by EPA Method 8260.
- Semi-volatile organic compounds (**SVOCs**) by EPA 8270 (base-neutral fraction).
- 8 RCRA Metals by EPA methods 6010/7421.
- Polychlorinated biphenyls (**PCBs**) by EPA Method 8082.
- TCLP 8 RCRA Metals by EPA 6010/7421

The following observations are provided regarding results of the three samples collected on October 29, 2004:

- Total arsenic and total mercury were identified above their respective MPCA residential soil reference values (**SRVs**) in all three samples collected from the South Berm. Total arsenic concentrations ranged from 121 mg/kg to 273 mg/kg. Total mercury concentrations ranged from 1.6 mg/kg to 4.2 mg/kg. For comparison purposes, the residential SRVs for total arsenic and total lead are 10 mg/kg and 0.7 mg/kg, respectively. In addition, Minnesota regulations do not allow in-state landfill disposal of soils containing mercury at concentrations exceeding 4.0 mg/kg.

- Arsenic, barium, cadmium, and lead were detected in the TCLP analysis. All concentrations were below the hazardous waste criteria for the respective compounds.

- Twelve SVOCs and two VOCs were identified in the South Berm samples. None of the compounds were detected at a concentration above an established residential SRV.

- The sample identified as South Berm Center detected Aroclor 1254 (a PCB compound) at a concentration of 0.10 mg/kg. No other PCBs were identified in the samples. SRVs are not established for individual Aroclor compounds. The Residential SRV for total PCBs is 1.0 mg/kg.

- Based on these results, the soil from the South Berm required off-site disposal.

Due to the elevated concentrations of total mercury, a second composite sample of the entire South Berm was requested from the proposed disposal facility. The sample identified as South Berm Composite was collected on November 18, 2004 and was submitted for analysis of total mercury and TCLP mercury. The sample identified a total mercury concentration of 11.1 mg/kg and a TCLP result of non-detect. Due to the elevated total mercury concentration, a sampling plan was developed in coordination with the MPCA to delineate specific sections of the South Berm requiring out-of-state disposal. A copy of the sampling plan and related MPCA correspondence is included in **Appendix B**.

In summary, ten additional samples and one duplicate sample was collected from the South Berm on December 7, 2004. Approximately one sample was collected for each 100 CY of soil and was submitted for analysis of total arsenic, total lead and total mercury. Upon review of the totals analysis results, additional TCLP testing was completed on various samples. The following observations are provided regarding the results:

- Arsenic, lead and mercury were detected in all ten additional samples collected from the South Berm.

- All ten samples identified total arsenic above the residential SRV of 10 mg/kg. Total arsenic concentrations ranged from 10.9 mg/kg in sample South Berm-5 to 5,460 mg/kg in sample South Berm-4.

- All ten samples identified total mercury above laboratory reporting limits, seven of which had total mercury concentrations above the residential SRV of 0.7 mg/kg. Total mercury concentrations ranged from 0.17 mg/kg in sample South Berm-1 to 49.4 mg/kg in sample South Berm-3A. South Berm-3A was a duplicate sample of South Berm-3.

- All ten samples identified total lead above laboratory reporting limits. Total lead concentrations ranged from 23.9 mg/kg in sample South Berm-1 to 400 mg/kg in sample South Berm-4. None of the samples exceeded the residential SRV for lead of 400 mg/kg.

- Seven of the samples were analyzed for additional TCLP analysis. Seven of the samples were analyzed for TCLP arsenic, seven samples for TCLP lead, and six for TCLP mercury.

- All samples analyzed for TCLP mercury was not detected at or above laboratory reporting limits.

- Analytical results for TCLP lead were identified above laboratory reporting limits in five of the seven samples submitted. TCLP results ranged from 0.018 mg/L to 0.15 mg/L. For comparison purposes, the TCLP criterion for hazardous waste determination of lead in soil is 5.0 mg/L.

- Of the seven samples analyzed for TCLP arsenic, one sample identified as South Berm-4 did not meet the 5.0 mg/L hazardous waste criteria. Specifically, the sample identified as South Berm-4 had a TCLP arsenic result of 8.5 mg/L. TCLP results from the other six samples ranged from non-detect above laboratory reporting limits to 2.2 mg/L.

- South Berm-4 was treated on-site by stabilization to render the soil non-hazardous. Following treatment of the soil, a confirmation sample identified as South Berm-4-1 was collected on June 6, 2005 to verity that the stabilization criterion for arsenic was achieved. TCLP arsenic was not detected at or above the laboratory reporting limit in the confirmation sample.

In summary, the soil in the three sections of the South Berm (identified as South Berm-2, South Berm-3 and South Berm-4) exceeded the mercury disposal criteria for landfills in Minnesota and was disposed at an out-of-state facility.

3.6.2.3 Buried Wooden Utility Structure

Upon partial removal of the buried wooden utility structure, one soil sample identified as "Timber Pit" was collected from the bottom of the structure. The sample was analyzed for total arsenic and total lead. Analytical testing results identified a total arsenic concentration of 3.1 mg/kg and a total lead concentration of 5.3 mg/kg. Both samples met the 20 mg/kg cleanup standard for arsenic at the Lite Yard Property.

3.6.2.4 Battery Pile

Approximately 60 CY of battery casings were excavated from the northeast corner of Grid 8. One soil sample (identified as Battery Basin) was collected from the bottom of the excavation and analyzed for total arsenic and total lead. Results from the analytical testing identified a total arsenic concentration of 1.2 mg/kg and a total lead concentration of 2.9 mg/kg. The sample was below the Site cleanup standard for lead of 525 mg/kg. For disposal purposes, an additional sample (SP-146) was collected from the 60 CY stockpile and was analyzed for TCLP metals (8 RCRA metals). The analytical results for this sample confirmed that all metals were below hazardous waste criteria with the exception of TCLP lead. The TCLP lead result for SP-146 was 30.0 mg/L, six times higher than the established TCLP lead standard of 5.0 mg/L.

Stockpile SP-146 was treated on-site to render the soil as non-hazardous waste. Following treatment of the soil, a confirmation sample identified as SP-146-1 was collected to verify that stabilization was achieved. Analytical testing results identified a TCLP arsenic result of not-detected at or a above the laboratory reporting limit in the confirmation sample.

3.6.2.5 Missing Well

Abandonment by excavation of the missing monitoring well identified as MW-10 resulted in a re-excavation of soil located in grids 22 and 23. Following abandonment excavation, and replacement of soil, a re-confirmation sample was collected from the upper four feet of soil representing grids 22 and 23. The re-confirmation sample, identified as Grids 22 & 23 RC identified a total arsenic and total lead concentration of 2.2 mg/kg. Both samples were below the Site cleanup standard.

3.6.3 Documentation Samples

The following sections summarize the final documentation sampling results for total arsenic and total lead. The Hot Spot and Layback documentation sampling was completing by collecting representative post-excavation base and sidewall samples. Shallow soil documentation sampling was conducted by collecting composite samples from 50-foot by 50-foot grids. A map depicting the site-wide grid layout for the final documentation soil sampling is provided as **Figure 4**.

All sampling was completed in a manner consistent with the Approved RAP Documents. Standard operating procedures related to locating soil samples, sample collection, sample handling and shipping, and analytical testing are presented in **Appendix G**.

3.6.3.1 Hot Spot and Layback Documentation Sampling

Documentation Sample Collection

Soil samples were collected upon completion of the Hot Spot and Layback excavation activities to document the contamination levels remaining in-place after excavation. Grab samples were collected from the base of the Hot Spot and from sidewalls of the Layback to represent the upper four-inches of soil at the respective locations. The samples were submitted for laboratory analysis of total arsenic and total lead. The post-excavation sampling and testing performed for the Hot Spot and Layback were utilized to document the concentrations of total arsenic and total lead that remain in-place at the Lite Yard Property, and to provide data for developing the appropriate institutional controls.

Analytical Result Summary

The analytical results for the Hot Spot and Layback documentation samples are summarized in **Table 8**. The sample locations and analytical results are depicted relative to the Site grid system on **Figure 10**. In summary, 12 samples were collected from the Hot Spot and 24 samples were collected from the Layback soil. Total lead was identified in four of 36 documentation samples, ranging in concentration from 6.2 mg/kg to 30.5 mg/kg. Total arsenic was identified above laboratory reporting limits in 32 of 36 documentation samples. General observations regarding the analytical data for total arsenic are presented below:

Description	Hot Spot	Layback
Lowest Arsenic Concentration (mg/kg)	95.1 (Grid 63)	23.2 (Grid 63)
Highest Arsenic Concentration (mg/kg)	1,590 (Grid 37)	2,370 (Grid 36)
Mean/Median Arsenic Concentrations (mg/kg)	457.5/173.5	561.8/327.5

3.6.3.2 Shallow Soil Documentation Sampling

Shallow soil documentation samples were collected upon completion of the Site excavation activities to document that the Site cleanup standards had been achieved within four-feet of development grades (i.e., four-foot separation requirement). In general, final documentation sampling was conducted in accordance with a systematic sampling approach, based on composite samples collected from 50-foot by 50-foot grids established across the Site. The grids included all portions of the Site that were excavated during the response action implementation.

Documentation Sample Collection

The samples consisted of four equal volume portions representing the 0 to 6-inch depth interval of the respective grid unit after cleanup. The samples were submitted for laboratory analysis of total arsenic and total lead. Sample collection methods and procedures are presented in **Appendix G.**

Re-Excavation and Re-Sampling

The analytical results for shallow soil documentation samples were reviewed immediately upon receipt to determine if the Site cleanup standards were achieved for each grid analyzed. If arsenic or lead concentrations were detected above the Site cleanup standards, the respective grid was targeted for additional excavation and re-sampling. This process continued until one of the following criteria was achieved:

- Total arsenic concentrations achieved the Site cleanup standard of 12 mg/kg total arsenic on the HCRRA Parcel and 20 mg/kg on the Lite Yard Property, and total lead concentrations achieved the 525 mg/kg standard for the entire Site.

- A four-foot separation from final development grades was achieved.

Analytical Results Summary – Lite Yard Property

The analytical results for the shallow soil documentation samples collected at the Lite Yard Property are summarized in **Table 9**. The sample analytical results are depicted relative to the Site grid system on **Figure 11**.

In summary, 129 shallow documentation soil samples (twelve from the 28th Street Right of Way, twelve from outside the silt fence along Hiawatha Avenue, and 101 from the Lite Yard Property) were collected during response action implementation. General observations regarding the analytical data for total arsenic are presented below:

Arsenic Summary	**Lite Yard Property**
Total Number of Documentation Samples	129
Range of Arsenic Concentrations Detected (mg/kg)	ND to 593
Number of Samples with Arsenic < 20 mg/kg	99
Number of Samples with Arsenic > 20 mg/kg	30
Number of Samples > 20 mg/kg within Upper Four-Feet	0
Mean/Median Arsenic Concentrations for all Samples (mg/kg)	43.8/10.6

ND = Not detected at or above laboratory reporting limit.

Lead Summary	**Lite Yard Property**
Total Number of Documentation Samples	129
Range of Arsenic Concentrations Detected (mg/kg)	ND to 846
Number of Samples with Lead < 525 mg/kg	128
Number of Samples with Lead > 525 mg/kg	1
Number of Samples > 525 mg/kg within Upper Four-Feet	0
Mean/Median Arsenic Concentrations for all Samples (mg/kg)	26/9.7

ND = Not detected at or above laboratory reporting limit.

The analytical results demonstrate that soil remaining within four-feet of final development grades at the Lite Yard Property achieved the cleanup standards for total arsenic (20 mg/kg) and total lead (525 mg/kg).

Analytical Results Summary – HCRRA Parcel

Complete analytical results for documentation samples collected from the HCRRA Parcel are summarized in **Table 10**. The sample analytical results are depicted relative to the Site grid system and are presented in **Figure 12**.

In summary, 57 shallow documentation soil samples were collected from the HCRRA Parcel during response action implementation (three of which were collected from the 28th Street Right-of-Way). General observations regarding the analytical data for total arsenic are presented below:

Arsenic Summary	HCRRA Parcel
Total Number of Documentation Samples	57
Range of Arsenic Concentrations Detected (mg/kg)	ND to 205
Number of Samples with Arsenic < 12 mg/kg	27
Number of Samples with Arsenic > 12 mg/kg	30
Number of Samples > 12 mg/kg Within Upper Four-Feet	0
Mean/Median Arsenic Concentration for all Samples (mg/kg)	21.3/9.2

ND = Not detected at or above laboratory reporting limit.

Lead Summary	HCRRA Parcel
Total Number of Documentation Samples	57
Range of Arsenic Concentrations Detected (mg/kg)	ND to 20.9
Number of Samples with Lead < 525 mg/kg	57
Number of Samples with Lead > 525 mg/kg	0
Number of Samples > 525 mg/kg Within Upper Four-Feet	0
Mean/Median Arsenic Concentration for all Samples (mg/kg)	7.8/5.3

ND = Not detected at or above laboratory reporting limit.

The analytical results demonstrate that soil remaining within four feet of final development grades) at the HCRRA Parcel achieved the cleanup standards for total arsenic (12 mg/kg) and total lead (525 mg/kg).

3.6.3.3 Imported Fill Documentation Sampling

Approximately 45,400 CY of clean structural fill was imported to the Site from one fill source (the SKB Industrial Waste Facility) to reach required development grades. A total of twenty samples were collected from the imported fill and obtained as follows:

- Between October 20, 2004 and April 26, 2005, one sample was collected for every 2,000 CY of imported fill delivered to the Site (approximately 35,000 CY).

- Between April 26, 2005 and June 8, 2005, one sample was collected for every 5,000 CY if imported filled delivered to the Site (approximately 10,400 CY). The change to the sampling frequency was approved by MDA (see **Section 2.4.3** for RAP Modification Approvals).

The imported fill samples were tested for the following parameters:

- VOCs by EPA Method 8260.
- SVOCs by EPA 8270 (base-neutral fraction).
- 8 RCRA Metals (EPA methods 6010/7421).
- PCBs by EPA Method 8082.

The analytical testing results for the imported fill samples are presented in **Table 11**. In summary, all detected compounds in imported fill samples were at concentrations less than MPCA residential SRVs. Based on these results, the imported fill was considered acceptable for use on the Site.

3.6.4 Air Particulate Samples

A total of 93 air samples were collected on the downwind side of the Site during response action implementation (see **Section 3.4.2**). The arsenic air sample results are presented in **Table 12,** and the lead air sample results are presented in **Table 13**.

In summary, no arsenic or lead were detected above laboratory reporting limits in any of the samples collected. It is noted that the laboratory reporting limits for lead and arsenic increased slightly for the samples collected in 2005 (compared to the results for air samples collected in 2004). This change in reporting limits was due to a recent internal evaluation of the analytical method by the laboratory. In all cases, the reporting limits for arsenic and lead in the air samples were less than the established standards for the Site.

3.6.5 Quality Assurance Quality Control

Twenty duplicate soil samples were collected during documentation sampling for quality assurance/quality control (QA/QC) purposes. Methods and procedures for QA/QC sample collection are presented in **Appendix G**. The results of the duplicate samples are identified on the corresponding analytical tables.

In summary, the QA/QC sample results were generally consistent with those from the original samples. Differences in the results are attributed primarily to the physical limitations in obtaining an exact duplicate or split of a heterogeneous soil mixture.

3.7 DISPOSITION DOCUMENTATION

Excavated media disposition was determined following review of analytical testing data, geotechnical quality, and landfill acceptance criteria. Media that did not meet the approved reuse criteria was disposed off-site at an appropriate off-site facility. Media that did achieve the reuse criteria was used as backfill on-site at pre-approved locations. **Table 14** summarizes the disposition of media during response action implementation. The following sections provide additional information for the general categories of disposition utilized.

3.7.1 Off-Site Disposal

Contaminated media requiring off-site disposal was manifested and hauled to a permitted industrial waste facility for disposal as industrial waste or alternative daily cover, as appropriate. The specific off-site disposal facilities were selected based on facility requirements; waste and daily cover acceptance criteria, location, potential long-term liability, and cost. The following general procedures were used for loading, hauling and disposing of the media excavated from the Site:

- Following receipt of analytical testing results, the analytical data was sent to the appropriate landfill for review and approval.
- Following landfill approval, the media was loaded directly into trucks.
- A uniform non-hazardous waste manifest was filled out and signed for each truck. The manifest included the generator's name and address, site address, waste description, waste code, transporter information and disposal facility information.
- A tarp was placed over the truck bed and secured.

The following summarizes various facilities used for off-site media disposition. Waste manifest summaries are included on a CD in **Appendix H**.

3.7.1.1 SKB Industrial Landfill – Rosemount, Minnesota

Industrial Waste

The following materials were disposed off-site as industrial waste at the SKB Industrial Landfill in Rosemount, Minnesota:

- Treated soil
- Soil with elevated arsenic and lead concentrations
- Seven sections of the South Berm
- Buried battery casings
- Buried wooden utility structure
- Metal piping components
- Railroad ties
- Concrete and brick
- Stumps
- Miscellaneous debris

The total quantity of contaminated media disposed as industrial waste was 72,733 tons.

Alternative Daily Cover

Contaminated soil-like and finer grained materials with low levels of arsenic and lead were targeted for disposal as alternative daily cover. The total quantity of alternative daily cover hauled to the landfill was 10,349 tons.

3.7.1.2 Seven Mile Creek Landfill, Eau Claire, Wisconsin

Media with mercury concentrations greater than 4.0 mg/kg required disposal at an out-of-state facility. Specifically, three sections of the South Berm (approximately 396 tons of soil) contained elevated mercury and were disposed at Seven Mile Creek Landfill in Eau Claire, Wisconsin. No other soil from the Site required out-of-state disposal.

3.7.2 On-Site Reuse

Analytical testing results of soil and asphalt stockpiles were reviewed to determine if the media was suitable for on-site use as restricted and unrestricted backfill. This was done by directly comparing the analytical results from each stockpile to the cleanup standards established for the upper four feet at the Site. The sampled materials were considered suitable for on-site use as unrestricted backfill if they met the established cleanup standards and were geotechnically suitable for the intended use.

The Approved RAP Documents also provided an alternative for restricted on-site use at depths greater than four-feet from development grades. This alternative was specific to soil containing total arsenic at concentrations between 20 mg/kg and 200 mg/kg, and applied to soils placed at depths between of four to twenty feet within the Hot Spot Area.

Based on the sampling and testing results presented in **Section 3.6.1**, the following soil from the Site was deemed suitable for on-site reuse:

Layback Soil and South HCRRA Stockpiles

Approximately 3,250 CY of the Layback excavation soil was used as backfill in the Hot Spot Area. The layback soil approved for reuse had an average arsenic concentration of 264 mg/kg, with total arsenic concentrations ranging from 17.1 mg/kg to 617 mg/kg. Specific approval to reuse this material was requested and granted by the MDA. A copy of the MDA approval letter is included as **Appendix B**.

In general, the Layback soil was blended with soil from the South HCRRA stockpiles and placed in to the Hot Spot Area excavation at an elevation between 831 to 833 NGVD (approximately 12 to 14 feet below the proposed finish grade on the Lite Yard Property). The South HCRRA stockpiles were placed on the Lite Yard Property by Hennepin County during cleanup activities of the South HCRRA property. Sample results of the South HCRRA stockpiles were provided to Peer by Hennepin County and are included in **Appendix I**. In summary, the analytical results indicated the stockpiled South HCRRA soils were suitable for use as backfill within the Hot Spot Area.

Geotechnically Poor Soil

Geotechnically poor soil was encountered below the proposed building footprint on the Lite Yard Property. Although this soil was located below the four-foot separation requirement, CMC agreed to remove the geotechnically poor soil during cleanup activities while it was easily accessible. One stockpile of approximately 300 CY of geotechnically poor soil met the reuse criteria for the Lite Yard Property. The corresponding 300 CY was placed in the proposed green space area on the southeast corner of the Lite Yard Property. The remaining geotechnically poor soil (approximately 2,950 CY) was disposed off-site.

Asphalt

Approximately 2,610 CY of removed asphalt from the Site was suitable for reprocessing and reuse. Of the 2,610 CY of asphalt that met the reuse criteria, 1,250 CY was from the Lite Yard Property and 1,360 CY was from the HCRRA Parcel. The 1,250 CY from the Lite Yard Property was reprocessed and placed in the proposed green space area on the southeast corner of the Lite Yard Property. Ryan intends to use the asphalt as sub-base for asphalt paving. The 1,360 CY of asphalt from the HCRRA Parcel was reprocessed and re-placed in a four-inch lift along the majority of the HCRRA Parcel.

3.8 DEMOBILIZATION AND SITE GRADING

Following completion of the Site cleanup activities, all temporary facilities, structures and controls were removed from the Site. This included removal of Site trailers, portable toilets, generators, and other related equipment and materials. After completion of all cleanup actions and collection of all final documentation samples, additional grading activities were completed at the Site. The Lite Yard Property was rough graded to Ryan's proposed hold down grade and the HCRRA Parcel was returned to existing grade on the west with a 0.5% slope towards the Lite Yard Property. This slope was requested to reduce the potential for surface water drainage into the Roof Depot Building.

3.9 PHOTOGRAPHIC DOCUMENTATION

Photographs taken during response action implementation are included in **Appendix J**. The photographs were selected to provide a general overview of the various cleanup activities and site control elements.

4.0 ADDITIONAL REQUIRED ACTIONS

The following additional actions are required for the Site by MDA as part of the Approved RAP Documents:

- Institutional Controls in the form of an Affidavit Concerning Real Property and a Restrictive Covenant are required for the Lite Yard Property. Institution controls may also be required for the HCRRA Parcel depending on MDA's review of the response action documentation for that property. The purpose of the institutional controls is to address residual contamination remaining in-place at depths below four-feet from development grades after response action implementation. The respective Institutional Control instruments need to be approved by the MDA, and recorded in the office of the County Recorder, Hennepin County, Minnesota.

- A Post-Cleanup Groundwater Monitoring Plan needs to be prepared and submitted to the MDA. The Post-Cleanup Plan should include recommendations for additional wells to be installed at the Site, a schedule and listing of wells to be sampled for anticipated future monitoring events.

- Additional environmental actions will be required during future redevelopment of the Lite Yard Property and potentially the HCRRA Parcel to address residual soil contamination remaining at depths below four-feet from development grades. Any impacted soil disturbed by redevelopment will need to be addressed in an appropriate manner in accordance with plans approved by MDA.

The Approved RAP Documents required the designation of a Special Well Construction Area for a portion of the City of Minneapolis that includes the Site. The Special Well Construction Area designation was subsequently prepared by the MDH and became effective April 1, 2005. The designation applies to the construction, repair and sealing of all wells in the Special Well Construction Area and will remain in effect until further notice.

5.0 SUMMARY AND CONCLUSIONS

Environmental response actions have been completed at the Lite Yard Property and HCRRA Parcel in accordance with the Approved RAP Documents. The sampling and analytical testing completed during response action implementation have demonstrated that the cleanup standards established for arsenic and lead in soil within four-feet of the Site development grades have been achieved for the entire Site. The following recommendations are provided regarding remaining actions to be taken at the Site to meet the requirements of the Approved RAP Documents:

- ***No Further Action Letters:*** Based on the response actions completed to date at the Site, it is requested that the MDA issue No Further Action Letters for arsenic and lead in soil for the Lite Yard Property and HCRRA Parcel. Separate letters for each property are requested.

- ***Institutional Controls***: The Institutional Control instruments discussed in **Section 4.0** should be prepared and filed for the Lite Yard Property (and potentially the HCRRA Parcel) after approval by MDA.

- ***Post-Cleanup Ground Water Monitoring:*** The Post-Cleanup Ground Water Monitoring Plan discussed in **Section 4.0** should be prepared for review and approval by MDA. Additional monitoring wells should be installed at the Site and ground water monitoring should be completed as required by the approved plan.