Phase II Environmental Site Assessment

Old Sutherland Lumber

601-641 East Broadway Boulevard
Sedalia, Missouri

March 2009

BARR

STATE OF MISSOURI
Jeremiah W. (Jay) Nixon, Governor • Mark N. Templeton, Director
DEPARTMENT OF NATURAL RESOURCES
www.dnr.mo.gov

April 15, 2009

Mr. Keith Riesberg
City of Sedalia
200 South Osage Avenue
Sedalia, MO 65301

RE: Old Sutherlands Lumber, 637, 641 and 601 East Broadway, Sedalia, MO
Phase II Environmental Site Assessment

Dear Mr. Riesberg:

To facilitate environmental due diligence for the above-referenced property, the City of Sedalia submitted an application to the Missouri Department of Natural Resources' Brownfields/Voluntary Cleanup Section (BVCP) for a Brownfields Assessment. Barr Engineering Company, the department's contractor, conducted Phase II activities under a department approved work plan to investigate recognized environmental conditions (RECs) at the property that may need to be addressed prior to reuse. Enclosed, please find your copy of the completed Phase II Environmental Site Assessment (ESA) report.

Findings of the Phase II ESA report are summarized below:

- Benzo(a)pyrene and chlorotoluene were detected in soil above the residential target level near the former petroleum businesses in the southern boundary of the site.
- High levels of lead and arsenic were detected in the surface soil samples collected across the site. The higher levels of these metals were found adjacent to the track or spur that may be attributed to the ballast material used in the construction of the railroad tracks. The arsenic levels are within the natural background concentrations in Pettis county. Lead levels were high at all locations except the east side of the site.
- In the center portion of the site near the former maintenance and painting area, lead in surficial soil was above the non-residential target levels. No volatile organic compounds were above the residential target levels in this area.
- Shallow groundwater is not suitable for human consumption due to high lead content.

The BVCP reviewed the report and concurs with Barr Engineering Company's conclusions and findings. Based on the findings of the assessment, the BVCP recommends the following:

Due to the high levels of lead and arsenic, Barr does not recommend use of the site for residential homes without additional cleanup. Virtually all surface soils (0-12') across the site would probably have to be excavated and properly disposed if residential use is being considered. For a non-residential development the city can incorporate revegetation, paved parking areas, building floors, or other methods of reducing human exposure to metals into the redevelopment plan.

The shallow metals contamination across the site should stay covered to minimize human exposure. The city should not disturb the land surface without a plan in place to prevent exposure to the contamination.

The BVCP recommends the city consider placing a groundwater use restriction in the property chain of title that prohibits private groundwater use since human ingestion standards have been exceeded by the detected levels of groundwater contamination.

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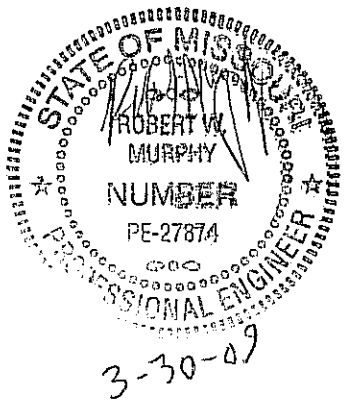

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Phase II Environmental Site Assessment

March 2009

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1.0 Introduction

1.1 Purpose

At the request of the Missouri Department of Natural Resources (MDNR) Brownfields/Voluntary Cleanup Program (BVCP), Barr Engineering Company (Barr) performed a Phase II Environmental Site Assessment on three parcels of land located within the city limits of Sedalia, Missouri (site). The Union Pacific Railroad Company currently owns the site, and the City of Sedalia is interested in purchasing it. Most of the vacant site lies on the east side of a former major railroad line that is now part of MDNR's Katy Trail. The site most recently has been used as a lumberyard operated by Sutherland Lumber, and historically had been operated as a railroad maintenance yard. There were also at least six separate oil companies operating gas stations or bulk petroleum storage tanks along Broadway Boulevard after the rail yard closed. The City of Sedalia applied for a Brownfields Assessment and was awarded both a Phase I and Phase II Environmental Site Assessment by BVCP. The objective of this Phase II investigation is to confirm the possible presence of metals and petroleum-related contamination in surface soils, subsurface soils, and groundwater at the site, and determine the magnitude and extent. If any of the parcels are redeveloped by the city, new structures may be constructed. As such, Barr has developed the fieldwork to ensure that the vapor intrusion human exposure pathway can be evaluated to ensure both construction worker and future occupant safety during and after redevelopment. Barr is not intending for this report to serve as a complete Missouri Risk-Based Corrective Action (MRBCA) Tier 1 site assessment. However, many of the elements of such an assessment may be found in this report or developed from the data derived during the site investigation. There are currently no operations going on at any of the parcels. There are no structures remaining at the site, as all were demolished prior to 2005.

1.2 Special Terms and Conditions

BVCP awarded Barr the Phase II Environmental Site Assessment by letter dated February 11, 2009. Barr submitted the *Phase II Environmental Site Assessment Work Plan* to BVCP on February 18, 2009, and BVCP gave written approval of the work plan on March 4, 2009. This Phase II report was developed in accordance with the guidance described in the Statewide Services Contract Number C306086003 (Barr -Vendor Number 41-09059950 0) (OA, 2006) and ASTM E-1903, *Standard Guide for Environmental Site Assessments: Phase II Environmental Site Assessment Process.*

2.0 Background

2.1 Site Description and Features

The subject study area consists of three parcels of land owned by Union Pacific Railroad since 1870. Figure 1 outlines the locations of these three parcels. The parcels are located at 601, 637, and 641 East Broadway Boulevard on its north side, with a portion of the site stretching across East 5th Street to the north near the historic Katy Trail depot. The study area is located in downtown Sedalia in Pettis County, Missouri, and consists of approximately 16.4 acres of land. A small portion of the site lies across the Katy Trail on its west side that is adjacent to residential backyards, and the southeast corner of the site stretches east to Hancock Avenue.

The land surface at the northernmost portion of the site is basically flat and consists primarily of a parking area for the historic Katy Trail depot museum operated by MDNR. The interior portion of the site has been filled and sits approximately eight feet above the southeast corner of the site and Broadway Boulevard. The southeast portion of the property is much lower than the rest of the site, not having any fill material on it. There are remnants of three of the oil company structures on this lower southeast portion of the site. The old Sutherland Lumber structure's footprints are visible in the south-central portion of the site. There is what appears to be a cistern-like structure remaining in the north-central portion of the site near the historic roundhouse, but little other building evidence that the site had been a rail yard. The site at one time had numerous railroad tracks and spurs crossing it, though just the Katy Trail on the west, one spur north by the museum, and one rail line on the east remain visible.

Access to the site is either up a paved ramp leading north from Broadway Boulevard or south from East 5th Street on dirt/gravel paths. The northern interior and western portions of the site have vegetation where there are no apparent building footprints. There was one dump site located along the eastern boundary near the location of surface soil sample S-5, and another pile of building debris on the east side of the Katy Trail on the southwest portion of the site.

2.2 Physical Setting

Most of the site is elevated well above Broadway Boulevard such that drainage is towards the south. However, the southeast portion, lying at least eight feet below the rest of the site, appears to collect surface water from areas to the north. This portion of the site sits level with Broadway Avenue and

was very marshy during the Phase II fieldwork. The elevation of most of the site is approximately 910 feet above mean sea level, while the southeast portion lies at 900 feet above mean sea level. Local surface water drainage is expected to flow to the southeast towards a small tributary of the Lamine River.

2.3 Site History

Terranext prepared a *Phase I Environmental Site Assessment* for the "Old Sutherland Lumber" site during December 2008. Most of the background information for the site can be found in this assessment.

Initial development of the site as a railroad maintenance yard began around 1870, and Union Pacific and its predecessors have owned the site ever since. Historic Sanborn insurance maps identified numerous railroad tracks, spurs, turntables, a roundhouse, paint shop, and maintenance shop at the site up until about 1900. The 1908 map shows railroad operations winding down at the site, with separate coal storage operations and a heating plant operating at the site. Between 1925 and at least 1963, various oil companies operated along the southern portion of the site. These operations included retail service stations and bulk storage of gas and heating oil. Names associated with these companies include Grand Oil, White Eagle Oil, Texas Oil Company, Mid-Continent Petroleum, Hudson Oil Company, Cities Service Oil, Socony Mobil, and DX-Sunray. Both Hudson Oil and Cities Service appear to have operated service stations in the extreme southeast corner of the site along Broadway Boulevard.

Barr is uncertain of the exact dates, but it appeared that Sutherland Lumber redeveloped the southern portion of the site for lumber sales and storage sometime during the 1970s. 1990s-era photographs indicate that the lumberyard was still in operation, while a 2005 figure shows that it had closed. During the 1990s, two petroleum underground storage tanks (USTs) were removed from the closed Hudson Oil Company service station. This closure included excavation and disposal of 1,731 tons of contaminated soil. Follow-up closure actions included installation and sampling of four monitoring wells, and additional excavation and disposal of 1,817 tons of contaminated soil. A corrective action report was submitted to the MDNR Tanks Section in 1999, and an "NFA" letter was issued in November 1999 by MDNR.

2.4 Adjacent Property Land Use

Barr bases the following description of properties near the site on observations during the Phase II fieldwork and the Terranext descriptions in its Phase I site inspection report.

North: Katy Trail State Park parking area and historic train depot museum.

South: Residential housing across Broadway Boulevard.

East: Commercial businesses including a medicine store, dentist office, Family Dollar, an automotive repair facility, and the City of Sedalia Fire Department.

West: Residential housing across the Katy Trail.

2.5 Summary of Previous Assessments

The Terranext *Phase I Environmental Site Assessment* (December 2008) and the leaking UST investigation of the closed Hudson Oil station are the only known assessments of the site. Since the MDNR Tanks Section issued an NFA letter for the Hudson Oil portion of the site, Barr does not consider it a recognized environmental condition (REC) that requires further investigation. A review of the conclusions from the Terranext assessment led Barr to conclude that the following (RECs) at the site require additional investigation:

- The former use of the site as a railroad maintenance yard that included operation of a paint room, maintenance shed, and roundhouse, which could lead to solvent and fuel-related contaminants in the surface and subsurface.
- The former use of portions of the site for coal storage, which could result in near surface soil contamination with metals and PAHs.
- The former use of the southern portion of the site for bulk petroleum storage and retail sales of gasoline, which could result in surface and subsurface contamination with lead and petroleum.
- The former presence of numerous railroad tracks, spurs, and loading areas that could result in widespread surface soil contamination.

3.0 Phase II Activities

3.1 Scope of Assessment

3.1.1 Sampling Plan

Barr developed the sampling plan to target any soil or groundwater contamination resulting from each of the four RECs identified during the Phase I assessment. The most likely historical source of subsurface contamination would be from former USTs at the southern and southeastern portion of the site, though any historical fuel storage areas or paint-related operations could result in contaminants migrating into subsurface soils and groundwater. Surface soil contamination would tend to be focused on railroad operations and coal storage, which did not occur on the lower southeastern portion of the site. As such, the sampling plan focused largely on shallow surface soil sampling across the interior of the former railroad yard (not the southeast corner) and subsurface soil and groundwater testing were the primary focus of the investigation at the former maintenance shed, paint shop, and three of the petroleum businesses. Barr did not target a boring at the former Hudson Oil Company (between B-1 and B-2) since the MDNR Tanks Section had closed this site.

The hand-dug surface soil samples collected from the site are identified with an "S" designation, while the borings have a "B" designation. The surface soil samples collected were largely in a grid pattern, though Barr did specifically target several land surface depressions where metals could accumulate over time and two separate small dump areas. Sample location S-5 targeted a small trash dump on the eastern site boundary, and S-6 targeted a building debris pile on the east side of the Katy Trail.

Boring B-1 targeted the former location of the Cities Service Oil Company, B-2 targeted an area between the former Mid-Continent and Texas Company petroleum storage complexes, and B-3 targeted the former White Eagle petroleum business and southern end of historical railroad painting operations. B-4 was placed near the assumed northern edge of the railroad paint shop, while B-5 targeted the assumed location of the railroad maintenance shop. Surface soil, subsurface soil, and groundwater intervals were targeted for sampling from these five borings.

3.1.2 Chemical Testing Plan

The testing plan was developed to ensure that all potential chemicals of concern in the surface soils, subsurface soils, and groundwater were part of the analyses. The plan for the site-wide surface soil

sampling grid called for testing shallow soils for arsenic and lead using EPA Test Method 6010. The surface soils from the five borings were also collected for analyses of arsenic and lead (Test Method 6010), TPH-DRO/ORO/PAHs (Test Method 8270) to account for coal pile storage issues and fuel oil components, and the full VOC list (Test Method 8260) to account for a wide range of potential volatile contaminants due to petroleum, paints, cleaners, and solvents. Barr collected duplicate surface soil samples for analyses of metals and PAHs, and one duplicate sample from the subsurface for analyses of the full VOC scan. All five subsurface soil samples collected from the borings were also analyzed for the full VOC list using EPA Test Method 8260.

Collected groundwater samples were analyzed for total lead using EPA Test Method 6010 and the full VOC list using EPA Test Method 8260. A trip blank originating from Teklab was brought to the site in the sample cooler and later analyzed for the same VOC list.

3.1.3 Deviations from Work Plan

There were no major deviations from the Phase II site assessment work plan, with the exception of adding a rinsate sample. Barr considered this sample necessary for quality control since Barr cleaned the equipment (shovel and steel spoon) between each hand-dug surface soil sampling location. One boring (B-3) was dry after setting a temporary well screen, so no groundwater sample could be collected. The retrieved soil cores from B-3 were also dry at the bottom of the boring, so Barr felt that allowing a greater time for water to enter the wellbore would not yield sufficient water for testing. There were no other deviations from the work plan, other than slightly adjusting some sample collection locations due to utilities and to be closer to likely contaminant source locations.

3.2 Field Exploration and Methods

Rob Murphy, P.E., and Adam Nanney, field engineer from Barr Engineering, arrived at the property at 7:30 a.m. on Thursday, March 12, 2009 to locate where Dig-Rite representatives had marked the buried utility locations. The temperature was in the lower 30s and it was a sunny day. Aaron Sense from PSA Environmental, the Geoprobe operator, arrived at the site at 9:00 a.m. to start drilling.

All five borings were continuously sampled until the depth of refusal, which were all above the planned 20-foot depth with the exception of B-4. The location of B-4 was topographically the highest on the site, with this portion of the site being filled in well above Broadway Boulevard. Refusal was not yet encountered at the 20-foot depth in B-4, but the core samples were saturated so Barr instructed the driller to stop. Barr obtained a representative Photoionization Detector (PID)

reading from each four-foot section of retrieved cores. Since the temperature was cold and there was little PID response directly on the cores on the pickup bed, Barr placed the soil samples in a Ziploc bag and placed them inside the heated pickup truck on the dashboard to ensure a better PID response to headspace vapors. After a period of 15-20 minutes, a PID reading was taken from the headspace inside the Ziploc bag and recorded.

After completion of the five borings and soil sampling, each was converted into a temporary well by advancing a five-foot long PVC well screen to the total boring depth. Barr collected groundwater samples from four of the five borings after allowing them to fill with groundwater for at least an hour or more. There was sufficient groundwater volume for both purging and sampling in every boring except B-3. PSA abandoned all five borings in accordance with Missouri well construction rules, as all boreholes were filled with granular bentonite.

Barr collected soil samples from the subsurface (6-10 feet) in each of the five borings. Normally, the subsurface sample depths would be chosen by Barr based on a combination of observations regarding type of material present (discoloring) or signs of petroleum odor. There was only one stain observed at the 6- to 7-foot depth in B-3 (it was sampled), but obvious petroleum odors and PID responses were observed in borings B-1, B-3, and B-4.

The surface soil samples across the site were collected by first removing any vegetation layer and/or rocky gravel material from the surface with a shovel. Barr then collected a sample with a stainless steel spoon and placed the soil material in the sample jars. The shovel and spoon were cleaned with an Alconex solution and rinsed with distilled water between the collections of each sample. Barr collected a water sample of fluid poured over the cleaned sampling equipment and labeled it as a rinsate sample.

3.3 Sampling and Chemical Analyses Methods

As each Geoprobe was advanced, soils were collected continuously by advancing a macro-core soil sampler (48-inches long by 2-inches in diameter) encapsulating 4-foot samples within an acetate liner. The macro-core sampler was withdrawn to the surface retaining the soil sample in the acetate liner. Soils recovered from the direct-push sampler were examined by a field engineer for unusual staining, incidental odors, sheen, and other signs of contamination. Each macro-core sampler of soils recovered was also screened for the presence of total organic vapors using a PID. Barr obtained a representative PID reading from each retrieved liner. Once the field screening process was completed, a soil sample was chosen based on PID response and olfactory observations of

contamination. Sample collection Method 5035 was utilized by Barr to collect the soil samples for VOCs. The metals and PAH samples were collected in 4 oz. jars, including those collected by hand near the surface away from the Geoprobe borings. Each sample was placed in a cooler on ice.

One subsurface soil sample was collected from each of the five Geoprobe borings, with the exception of a duplicate VOC sample collected from B-5. Barr also collected a duplicate surface soil sample from B-5-SS for PAHs/DRO/ORO and a duplicate surface soil sample at S-5 for analyses of arsenic and lead.

Barr followed the originally proposed chemical testing plan from the work plan, with the exception of adding a rinsate sample. The rinsate sample was collected from pouring distilled water over the shovel and spoon following cleanings between sampling for surface soils. This sample was analyzed for lead and arsenic. Barr collected a duplicate groundwater sample for VOCs and lead from boring B-2 since it yielded the most groundwater. Following sampling, three coolers were dropped off at the Federal Express shipping facility in Sedalia, Missouri and later shipped to the Teklab analytical laboratory in Collinsville, Illinois for analysis. Teklab used SW-846 methodology to analyze the samples. A trip blank accompanied the sample cooler and was analyzed for VOCs with Test Method 8260.

4.0 Evaluation and Presentation of Results

4.1 Surface/Subsurface Conditions

4.1.1 Soil

Barr has completed boring logs for each of the five continuously sampled borings, copies of which are provided in Appendix A. It should be noted that the recovery of the soil samples was generally poor in borings B-2, B-3, and B-5, such that many of the 4-foot acetate liners only contained 3 feet of soil in them. This could be attributed to fill presence and large rock fragments that blocked full recovery inside the acetate liner during retrieval.

Barr noted a wide variety of materials in the soils, ranging from gravel, silts and clays, from brown to gray in color. Most material consisted of silty clays and clays, though sandy silt was observed right above bedrock in B-3. The other borings typically had rock fragments immediately above the depth of refusal. The only observed stained interval was from 6-7 feet in boring B-3. Bedrock, assumed to be a shale or limestone, was found at depths of only 9-12 feet in the southeast portion of the site where there is no significant amount of fill material. Refusal was encountered at greater depths on the former railroad portion of the site that had been filled. Refusal was not encountered in B-4 and was at a 16-foot depth in B-5.

Barr noted the top few inches of surface material in each of the surface soil sample locations. Away from the site interior that had historic structures, surface material typically consisted of grass and topsoil. Most of the site interior was covered with broken concrete, small gravel, or compacted soil. When collecting surface soil samples, Barr dug under this material to collect soil samples more representative of what metals were deposited during the railroad operations.

4.1.2 Groundwater

Most of the retrieved cores appeared wet at varying depths, while B-3 appeared dry throughout its depth. Barr has included measured groundwater depths in four of the borings on the boring logs and in Table 4. Barr measured the static water level in each well prior to sampling. The measured depths ranged from 1.1 feet below ground in B-2 within the lowest area of the site, and 18.1 feet below ground in B-4 at the topographically highest point on the site. B-2 was located in a marshy area that received drainage both from the rest of the site and from upgradient commercial sites to the north. Due to the clayey content of the saturated intervals and the relatively short time allowed for fluids to

enter the temporary well screens, Barr cannot be sure that these were stabilized water levels. B-1 had a measured water depth of 8 feet below ground and B-5 had it measured at 9 feet below ground.

Locally, the shallow groundwater is expected to follow the topography of the land surface and flow southeast towards a small creek flowing southeast of Sedalia.

4.2 Analytical Data

4.2.1 Soil Sampling Results

The analytical results from the site-wide surface soil sampling are summarized in Table 1 of this report. The analytical results of the surface soil sampling from the borings are summarized in Table 2 of this report. The analytical results of the subsurface soil sampling from the borings are summarized in Table 3 of this report. A copy of the complete laboratory analytical data printout from Teklab is provided in Appendix B. The tables also provide a comparison between the contaminant detections and Missouri Risk-Based Corrective Action (MRBCA) Tier 1 Target Levels for sandy soils (Type 1) for residential and non-residential future property use. Though analyses of the soils in the borings indicated that most soils are silts (soil Type 2) or clays (soil Type 3), Barr has used a more conservative comparison with soil Type 1 target levels. The tables also provide a comparison between the contaminant detections and target levels protective of a construction worker. Barr has included residential target levels in the comparison to help determine the degree of institutional controls that may be required if the city were to acquire the site and later enroll the property into the BVCP.

The site-wide surface soil samples each have an "S" prior to the corresponding location designation. The Geoprobe boring locations are designated with a "B."

SITE-WIDE SURFACE SOILS

Table 1 provides the results from the site-wide surface soil sampling for arsenic and lead that Barr performed across the site. Barr targeted obvious areas of dumping, land surface depressions, former railroad structures, and former railroad track/spur locations. Every sample had a detection of arsenic above MRBCA residential Tier 1 target levels, and all but S-3, S-4, S-5, and S-6 had arsenic levels above non-residential target levels. The highest levels of arsenic were detected from samples collected adjacent to the railroad tracks. These include S-1 and S-10 near the Katy Trail museum spur and Katy Trail former track, respectively.

Every sample had a detection of lead above MRBCA residential Tier 1 target levels with the exception of S-3, S-4, and S-5. The lead levels of 733 mg/kg in S-7, 1490 mg/kg in S-8, and 1580 mg/kg in S-11 are also above non-residential target levels.

SURFACE SOILS IN BORINGS

Table 2 provides the results from the surface soil sampling from the five borings for arsenic and lead, PAHs, and VOCs that Barr performed along the southern site boundary and interior. Again, all arsenic levels exceeded MRBCA surface soil residential Tier 1 target levels, but only the surface sample from B-5 exceeded non-residential target levels for arsenic. Lead levels in B-1 and B-2 met residential target levels, while lead in samples from B-3, B-4, and B-5 exceeded both residential and non-residential target levels. The level of benzo-(a)-pyrene (0.581 mg/kg) in the surface soil sample from B-3 slightly exceeded the residential Tier 1 target level of 0.62 mg/kg but did not exceed the non-residential target level. B-3 was collected from an obvious area of diesel/heating oil contamination based on observed odors during drilling. All of the other PAHs, TPH-DRO, and TPH-ORO were either non-detect or below residential target levels.

Barr collected the surface soil samples for subsequent VOC analyses from the depth interval of 2-3 feet below ground. Anything shallower would tend not to have volatiles present for any length of time due to volatilization near the surface. Trace amounts of VOCs were detected in surface soil samples from B-1, B-2, B-4, and B-5. B-3, which exhibited a strong diesel odor during drilling, had higher detections of common VOCs associated with petroleum. However, none of these higher detections came close to exceeding applicable MRBCA surface soil residential Tier 1 target levels.

SUBSURFACE SOIL SAMPLING FROM BORINGS

Barr placed five borings to target any petroleum releases from the former storage/retail gasoline sales businesses along the southern site boundary and any volatile releases associated with railroad operations along the site interior. Table 3 shows the subsurface soil sampling results. Copies of the boring logs provided in Appendix A contain the results of PID field screening for organic vapor presence. Boring B-1 near a former gas station had PID hits at depth, indicative of a possible former UST. B-2 had a PID response near the surface, possibly indicative of spills from the aboveground tanks indicated on old Sanborn maps. B-3 had high PID hits throughout the boring and a strong diesel odor. This boring was near both former railroad operations and a former heating oil storage facility. Borings B-4 and B-5 had little response to the PID, as they were not close to any former petroleum tanks.

The first page of Table 3 shows the common VOC results for all borings. The sample from B-3 also had minor detections of a wide-range of VOCs, so Barr has included these results on the second page of Table 3. None of the common VOC detections from any of the borings came close to exceeding MRBCA subsurface soil residential Tier 1 target levels. As with the surface soil sampling results, the sample from B-3 that had the strong diesel odor had the highest detections of VOCs. The other VOC detections from B-3 are listed on the second page and show a detection of 4-chlorotoluene at 0.202 mg/kg, which is slightly above the MRBCA residential Tier 1 target level of 0.177 mg/kg. However, Barr has used conservative comparisons with target levels for Type 1 soils (sandy) throughout this Phase II assessment and in the summary tables. The Type 2 soil (silts) residential target level is 0.343 mg/kg, which is above this detection. Comparisons with Type 2 soil target levels may be more appropriate when performing a human health risk assessment for this site.

4.2.2 Shallow Groundwater Sampling Results

The analytical results of the groundwater sampling are summarized in Table 4 of this report. Table 4 provides a comparison between the groundwater contaminant detections and MRBCA Tier 1 Target Levels considered safe for the exposure pathway of human ingestion, the lower criteria between indoor air inhalation and dermal contact for both a resident and non-resident, and dermal contact for a construction worker. The site is connected to the city public water supply so ingestion of groundwater is not considered as a likely human exposure pathway. Again, a comparison was provided to determine the need for possible future institutional controls implemented at the site. There were low groundwater contaminant detections for the volatile contaminants of TPH-GRO in B-1 and B-2, which were located near former petroleum storage businesses. All groundwater samples had trace amounts of xylenes and tri-methyl benzene, as did the trip blank, which makes these low detections suspect. Trace amounts of ethyl benzene and toluene were detected in B-4, while B-5 had a trace amount of ethyl benzene. None of these VOCs was above human ingestion standards or residential target levels protective of dermal contact or indoor air inhalation exposure pathways.

The detected levels of total lead in all borings are above drinking water standards, while levels in B-2 (3640 ug/l), B-4 (1190 ug/l), and B-5 (25,500 ug/l) greatly exceed levels considered safe for human ingestion of the groundwater (15 ug/l). However, these samples were for total lead and they were not filtered prior to analyses. Barr did purge the groundwater until the sample had little visual turbidity in an attempt to not bias the lead due to lead actually adhering to the particles instead of analyzing dissolved lead. As such, Barr feels that most of the lead detected is representative of shallow groundwater quality, and groundwater-use restrictions should be considered for the property.

4.3 Data Quality

The analytical data collected during the Phase II Environmental Site Assessment were evaluated in general conformance with the procedures detailed in the U.S. EPA National Functional Guidelines for Organic/Inorganic Data Review and Barr's Standard Operating Procedures for Routine Data Validation. In general, the areas covered are: evaluation of EPA-recommended holding times, laboratory control sample (LCS) results, matrix spike and matrix spike duplicate (MS/MSD) blank sample results (lab and trip), field duplicate results and overall assessment.

The samples were analyzed by Teklab using approved EPA methodologies. The laboratory met all applicable EPA-recommended holding times for sample preparation and analysis. There were two positive concentrations of target compounds present in the trip blank sample. Xylenes were detected at 2.4 ug/l and tri-methyl benzene at 1.1 ug/l. These compounds were both detected at similar levels in all five groundwater samples. The trip blank sample was placed in a cooler containing all five groundwater samples. Barr feels that the laboratory analytical equipment may have had trace amounts of these two contaminants, possibly biasing all groundwater sample results.

Teklab analyzed groundwater matrix spike duplicate (MSD) samples that had xylenes, chlorobenzene, ethyl benzene, and toluene above the acceptable recovery range. A spiked soil sample had detected lead above the accepted range, and a soil MSD sample had TPH-DRO above the accepted recovery range. Barr would consider any of the soil and groundwater sampling results showing just trace amounts of tri-methyl benzene, ethyl benzene, toluene, and xylenes as suspect. Very low-level detections of methylene chloride and acetone are also typically suspected as an artifact of laboratory contamination.

Field duplicate results are evaluated by calculating the relative percent difference (RPD) for compounds where both the sample and duplicate had positive concentrations reported. Sample S-5 served as the field duplicate sample for the arsenic/lead analysis. Both arsenic and lead levels were very close between the primary and duplicate sample. B-5-SS served as the field duplicate for the PAH, TPH-DRO, and TPH-ORO analysis. The primary sample did not have any detections of TPH or PAHs, while the duplicate did detect a few PAHs at very low levels. B-5-6' served as the field duplicate for subsurface soil testing of VOCs. Toluene, methylene chloride, and xylenes were detected in both samples at trace amounts, while acetone was detected in the duplicate sample at a low level but not detected in the primary sample. The groundwater sample from B-2 served as the duplicate for both total lead and VOC analyses. The groundwater VOC results were in relatively

close agreement between the two samples, with close comparisons between the xylenes and tri-methyl benzene detections. The total lead detections were 3640 ug/l and 4550 ug/l.

The sample Barr collected as a rinsate sample resulted in both arsenic and lead analyzed as non-detect. This would appear to indicate that Barr did a proper job of cleaning the non-dedicated sampling equipment between sampling during the site-wide surface soil sample collection points.

Barr considers the trace amounts of some volatiles detected in soil and groundwater samples as suspect. Since all of these levels are well below applicable residential target levels, this would not change the conclusions/recommendations of our assessment. All other data are considered useable as reported and qualified as presented in Teklab's data summary tables.

5.0 Discussion of Findings and Conclusions

Barr performed this Phase II Environmental Site Assessment during March 2009 in conformance with ASTM E 1903 and Barr's *Phase II Environmental Site Assessment Work Plan.* There were no major deviations from the Phase II site assessment work plan, with the exception of adding a rinsate sample for arsenic and lead analyses. The assessment revealed the following information with regard to the RECs in connection with the site:

Former Petroleum Businesses along the Southern Boundary: Barr feels as though all volatile contaminant levels near the former locations of the three businesses near B-1 and B-2 are well below any levels that could be considered as a threat to human health for any future property use. The residential target levels exceedance of benzo-a-pyrene at B-3-SS could be a result of heating oil storage by a petroleum business or a diesel fuel release from earlier railroad operations. The 4-chlorotoluene exceedance of the residential target level at B-3-7' means that a specific area may not be suitable for a private residence without a cleanup. A commercial or industrial property near this location should be allowable from a vapor intrusion human exposure pathway standpoint. In addition, the lead and arsenic levels at B-1 and B-2 meet non-residential cleanup criteria. As such, Barr sees no reason that the southern property cannot be redeveloped for non-residential use.

Former Presence of Railroad Tracks and Spurs: The surface soil sampling Barr conducted across the site revealed high levels of arsenic and lead. Both of these contaminants may be attributed to the ballast material used in the construction of the railroad tracks. The higher levels of these metals were found adjacent to a track or spur, while samples collected near the two dump sites had low metal levels. The Geochemical Survey of Missouri (Tidball – 1984) lists typical background arsenic levels in Pettis County, Missouri at 10-20 mg/kg. As such, Barr feels that the range of arsenic detected from samples collected at S-1, S-2, S-8, S-10, and S-12 (38-90 mg/kg) are related to historical railroad operations. Each of these locations except S-12 is located adjacent to a historical track. However, all of these samples were collected under well-vegetated surface material at a 6- to 12-inch depth. Lead levels were also high at all locations except along the eastern site boundary (S-3 through S-5). The potential for human exposure to these metals would appear to be minimized by the presence of grass. However, if the land surface is to be disturbed, great care should be taken by the city to prevent private residences along the western boundary from coming into contact with these metals due to inhalation or ingestion.

Former Use of the Property for Maintenance and Painting: Boring B-3 was placed both near a former petroleum business and near the former railroad painting operations. Soil sample results from this boring are indicative of both a heavier petroleum release and a possible paint-related release (acetone). The chlorotoluene detection could be a result of creosotes on railroad ties or pesticide application, both likely contaminant sources at any rail yard. The levels of volatile contaminants at B-3 are low enough that Barr sees no reason that this parcel cannot be redeveloped for non-residential use without any cleanup due to vapor intrusion issues. However, lead levels are above non-residential standards so this area should be remediated or covered prior to redevelopment with occupied structures. B-4 was also located near the former painting operations, but did not have any significant volatile contaminant detections. Lead is above non-residential target levels at the surface, so this will need to be addressed during any redevelopment. There were no volatile contaminant detections above residential target levels at B-5, which was located in the site interior near railroad maintenance operations. As such, Barr feels that this portion of the site is safe from vapor intrusion for redevelopment. Again, levels of lead and arsenic are above non-residential target levels, so this area will need to be cleaned up or capped during redevelopment.

Former Coal Storage: Barr did not uncover any widespread issues due to coal storage at the site, though contaminants associated with coal such as arsenic are also associated with railroad track ballast, and PAHs are associated with coal and heavy petroleum that may be associated with railroad ties, diesel, or bulk heating oil storage. Based on Barr's experience with sampling at other large coal volume storage sites, Barr feels that the metals/PAH contaminants detected at the site are a result of the other RECs.

In addition to the separate areas of investigation, shallow groundwater site-wide is not suitable for human consumption due to high lead content. The city should consider prohibiting private use of the groundwater at the site for human consumption. The low volatile contaminants detected in shallow groundwater were not at levels considered a threat due to vapor intrusion for any future use of the site.

6.0 Recommendations

Barr does not recommend any further surface soil, subsurface soil, or groundwater testing at the property until a plan for redevelopment is drafted by the city. Future land use will largely determine what may need to be done at the site to protect human health and the environment. Due to the high levels of lead and arsenic, Barr does not recommend use of the site for residential homes without a possibly costly cleanup. Virtually all near surface soils (0-12 inches) across the site would probably have to be excavated and properly disposed of offsite if residential use is being considered. For a non-residential property development, the city can incorporate revegetation, paved parking areas, building floors, or other methods of reducing human exposure to metals into the redevelopment plan without having to perform a costly remediation.

This investigation has led Barr to make the following additional recommendations:

(1) The shallow metals contamination across the site should stay covered to minimize human exposure. Most of the site is covered with grass or hard surfaces, and the areas of highest metals contamination are covered with grass. As such, the site does not appear to be an imminent human health threat if access is controlled and there is no land disturbance. The city should not disturb the land surface without having a plan in place to prevent exposure to this contamination.

(2) Barr recommends that the city consider placing a groundwater-use restriction in the property chain of title that prohibits private groundwater use since human ingestion standards have been exceeded by the detected levels of groundwater contaminants.

7.0 References

ASTM International, 1997. ASTM E-1903, *Standard Guide for Environmental Site Assessments: Phase II Environmental Site Assessment Process,* December 1997.

Barr Engineering Company, 2009. *Phase II Environmental Site Assessment Work Plan,* February 2009.

Geoprobe Systems, 2001. "Geoprobe® Screen Point 15 and Screen Point 16 Groundwater Samplers," Technical Bulletin No. 95-1500, October 1995, Revised April 2001.

MDNR, 2006. *Draft Missouri Risk-Based Corrective Action (MRBCA) Guidance Document,* Missouri Department of Natural Resources, June 2006.

Office of Administration, 2006. "Statewide Contract: Environmental Assessment Service," State of Missouri, Office of Administration, Division of Purchasing and Materials Management, August 2006.

Ronald Tidball, 1984. *Geochemical Survey of Missouri,* Geological Survey Professional Paper 954-H, I, 1984.

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Tables

TABLE 1

Surface Soil Sampling Results

March 12, 2009

SAMPLE ID	SAMPLE LOCATION COMMENT	Arsenic	Lead
S-1	Next to railroad spur by Katy Trail depot	**90.5**	**595**
S-2	South of depot next to 4th Street	**53.5**	**334**
S-3	In a drainage area/depression along eastern boundary	**14.0**	237
S-4	In a drainage area/depression along eastern boundary	**5.37**	50.9
S-5	North side of a small dump area	**6.2**	16.6
S-5 DUP	North side of a small dump area	**6.86**	16.8
S-6	On southwest side of site north of a large rubble pile	**20.4**	**570**
S-7	Extreme southwest corner of site next to Katy Trail overpass	**16.1**	**733**
S-8	Near a back residential yard on west side of Katy Trail	**55.0**	**1490**
S-9	Drainage area on west side of Katy Trail	**17.0**	**516**
S-10	Junction of Katy Trail with 4th Street	**87.5**	**277**
S-11	North central interior portion of the former rail yard	**21.1**	**1580**
S-12	South central interior portion of the former rail yard	**38.3**	**668**
MRBCA Construction Worker		654	NA
MRBCA RESIDENT		**3.89**	**260**
MRBCA NON-RESIDENT		15.9	660

All results in mg/kg

MRBCA Tier 1 Surface Soil Target Levels for type 1 soils, June 2006

"ND" indicates constituent was below the detection limit. Detection limits are found in Appendix B

"NA" indicates cleanup level not published.

Bold indicates detection exceeds residential criterion.

TABLE 2

Surface Soil Sampling Results from the Borings

March 12, 2009

VOCs-Metals

SAMPLE ID	TPH GRO	Benzene	Ethyl Benzene	MtBE	Naphthalene	Toluene	Tri-Methyl Benzene	Xylenes	Methylene Chloride	Arsenic	Lead
B-1-SS	ND	ND	0.0014	ND	ND	0.0024	0.0033	0.006	0.0033	**11.2**	65.6
B-2-SS	0.17	ND	ND	ND	ND	ND	0.0028	0.0028	0.0026	**8.39**	55.2
B-3-SS	246	0.719	1.19	ND	3.94	0.241	9.57	6.62	0.050	**13.3**	**1020**
B-4-SS	0.280	ND	ND	ND	ND	0.0024	0.0026	0.0042	0.0039	**7.66**	**2700**
B-5-SS	ND	ND	ND	ND	ND	0.0021	0.0022	0.0025	0.0046	**58.8**	**686**
MRBCA Construction Worker	>10E6	1820	58,100	165,000	215	138,000	432	7210	24,600	654	NA
MRBCA RESIDENT	354,000	177	7450	3450	36.3	6210	749	7830	842	**3.89**	**260**
MRBCA NON-RESIDENT	4.65 E6	763	97,500	14,900	119	81,100	10,100	104,000	3700	15.9	660

All results in mg/kg

MRBCA Tier 1 Surface Soil Target Levels for type 1 soils, June 2006

"ND" indicates constituent was below the detection limit. Detection limits are found in Appendix B.

Bold indicates contaminant above residential Target Level.

TABLE 2 (Continued)
Surface Soil Sampling Results from the Borings
March 12, 2009

PAHs

SAMPLE LOCATION	Acenaph-thene	Anthracene	Benzo (a) Anthracene	Benzo (a) Pyrene	Benzo (b) Fluoranthene	Benzo (k) Fluoranthene	Chrysene	Fluoran-thene	TPH DRO	TPH ORO	Pyrene
B-1-SS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B-2-SS	ND	ND	ND	ND	ND	ND	ND	0.0691	ND	13	0.0587
B-3-SS	0.042	0.129	0.467	**0.581**	0.665	0.279	0.523	1.01	12	30.1	0.910
B-4-SS	0.112	0.171	0.216	0.201	0.242	0.0818	0.217	0.570	9	8	0.500
B-5-SS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B-5-SS DUP	ND	ND	0.0555	0.0481	0.0617	ND	0.0598	0.145	ND	ND	0.121
MRBCA RESIDENT	3130	15,700	6.2	**0.62**	6.19	62	599	2280	1.4E5	1.24E5	1710
MRBCA NON-RESIDENT	30,700	154,000	21.1	2.11	21	211	1990	21,800	1.41E6	1.25E6	16,400

All results in mg/kg

MRBCA Tier 1 Surface Soil Target Levels for type 1 soils, June 2006

"ND" indicates constituent was below the detection limit. Detection limits are found in Appendix B.

Bold indicates contaminant above residential Target Level.

TABLE 3

Subsurface Soil Sampling Results from Borings

March 12, 2009

Common VOCs

Sample Location	Depth	Tri-Methyl Benzene	TPH GRO	Benzene	Ethyl Benzene	MtBE	Naphthalene	Toluene	Xylenes	Methylene Chloride	Acetone
B-1	8'	0.0023	ND	ND	0.00098	ND	ND	0.0014	0.0042	0.0019	ND
B-2	9'	0.0048	ND	ND	0.0025	ND	ND	0.0041	0.0118	0.0018	0.044
B-3	7'	0.441	115	0.0594	0.157	ND	0.100	0.038	0.451	ND	0.570
B-4	9'	0.00096	ND	ND	ND	ND	ND	0.001	0.0014	0.0033	ND
B-5	6'	0.001	ND	ND	ND	ND	ND	0.0014	0.0016	0.0031	ND
B-5 DUP	6'	0.0015	ND	ND	ND	ND	ND	0.0011	0.0021	0.0042	0.012
TIER 1 RBTL RESIDENTIAL[1] SUBSURFACE		2.25	385	0.378	193	21.6	25.9	499	24.7	2.86	1830
TIER 1 RBTL NON-RESIDENT[1] SUBSURFACE		18.1	3100	1.98	1550	113	136	4010	199	15	14,700
TIER 1 RBTL CONSTRUCTION[1]		431	1.22 E6	1820	58,100	165,000	215	138,000	7210	24,600	208,000

[1] June 2006 Missouri Risk-Based Corrective Action Tier 1 - Soil Type 1 Cleanup Criteria.

All units are mg/kg (ppm) dry weight.

Bold indicates contaminant exceeds residential Target Level.

TABLE 3 (Continued)
Subsurface Soil Sampling Results from Borings
March 12, 2009

Other VOCs

Sample Location	2-Butanone	2-Chloro Toluene	4-Chloro Toluene	Isopropyl Benzene	n- Butyl Benzene	sec- Butyl Benzene	n-Hexane	Propyl Benzene	Isopropyl Toluene
B-3-7'	1.81	0.354	**0.202**	0.161	0.371	0.134	0.23	0.343	0.030
TIER 1 RBTL RESIDENTIAL[1] SUBSURFACE	3880	37.5	**0.177**	10.5	118	65.2	1.92	39.9	1100
TIER 1 RBTL NON-RESIDENT[1] SUBSURFACE			1.42						

[1] June 2006 Missouri Risk-Based Corrective Action Tier 1 - Soil Type 1 Cleanup Criteria.

All units are mg/kg (ppm) dry weight.

Bold indicates contaminant exceeds residential Target Level.

TABLE 4

Groundwater Sampling Results

March 12, 2009

Sample Location	Ground water Depth	Lead	Benzene	Ethyl Benzene	MtBE	Naphthalene	Toluene	Xylenes	TPH GRO	Tri-Methyl Benzene
B-1	8'	**28**	ND	ND	ND	ND	ND	1.8	260	1.4
B-2	1.1'	**3640**	ND	ND	ND	ND	ND	1.8	160	1.3
B-2 DUP	1.1'	**4550**	ND	ND	ND	ND	ND	2.5	ND	1.1
B-4	18.1'	**1190**	ND	1.1	ND	ND	1.0	4.7	ND	2.0
B-5	9.1'	**25,500**	ND	1.1	ND	ND	ND	4.6	ND	1.9
Trip Blank		NA	ND	ND	ND	ND	ND	2.4	ND	1.1
Ingestion Standards		**15**	5	700	128	1.09	1000	10,000	18,100	7.05
TIER 1 RBTL RESIDENTIAL[1]		Not Published	292	6340	23,500	20.6	8580	11,800	20,800	556
TIER 1 RBTL NON-RESIDENT[1]		Not Published	1060	35,100	85,800	75.1	47,600	94,900	167,000	4470
TIER 1 RBTL CONSTRUCTION[1]		Not Published	14,800	97,600	5,960,000	5210	132,000	328,000	80,900	23,800

[1] June 2006 Missouri Risk-Based Corrective Action Tier 1 - Soil Type 1 Cleanup Criteria, lower between vapor intrusion & dermal contact.

All contaminant levels reported in ug/L (ppb). "ND" Denotes the analyte was not detected at the detection limits, which are provided in Appendix B. "NA" denotes that the chemical was not included in the analysis.

Bold indicates contaminant level was above ingestion standard.

Figures

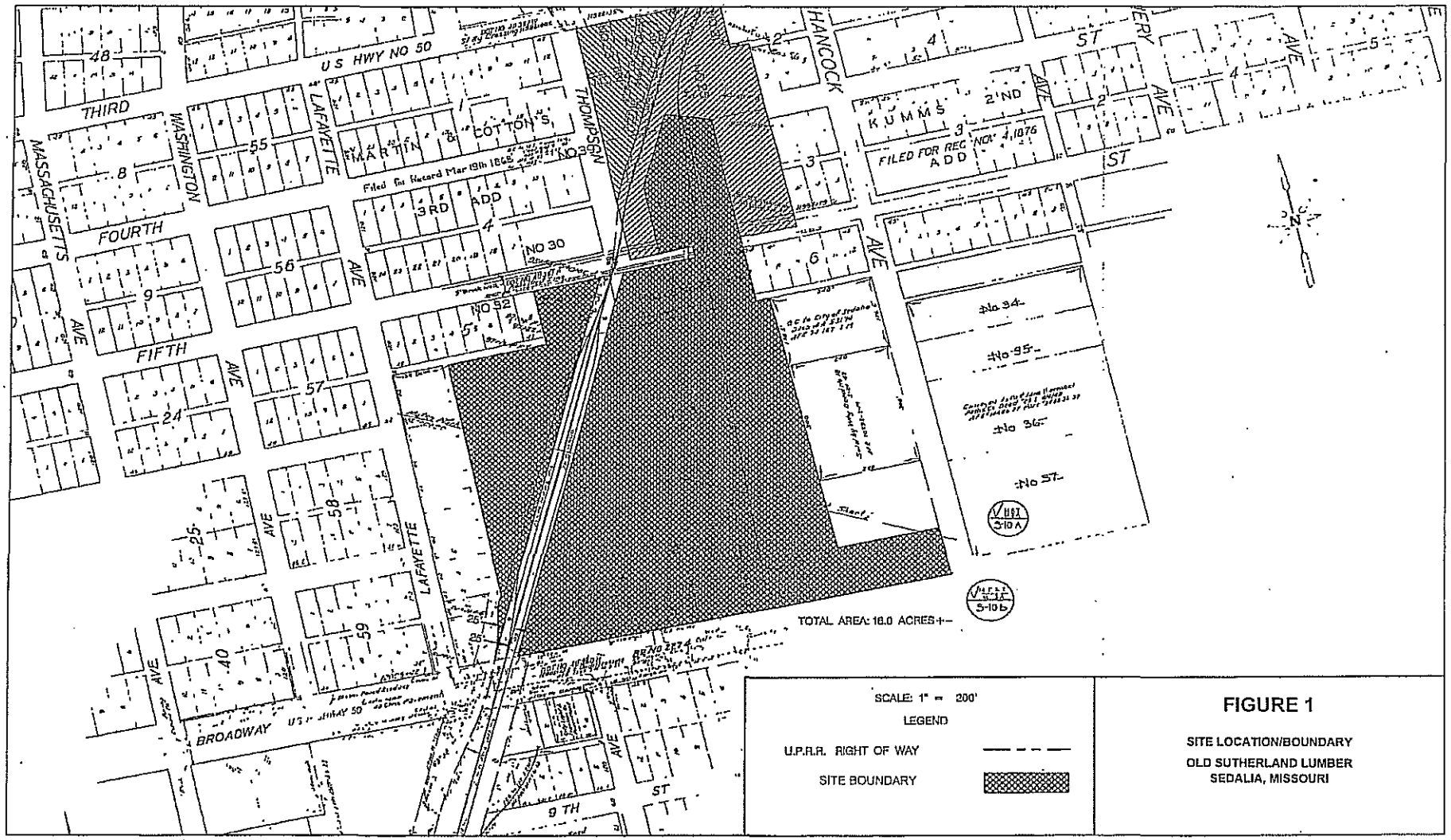

FIGURE 1

SITE LOCATION/BOUNDARY
OLD SUTHERLAND LUMBER
SEDALIA, MISSOURI

Barr Fooler: Date: 3/23/2009 4:00:01 PM File: I:\Projects\25\715\Sutherland.mxd User: ams2

Legend

- ▲ Soil Boring
- ● Surface Sample

N

Feet
500 0 500

Meters
100 0 100 200

BARR

Figure 2

SAMPLE LOCATIONS
Old Sutherland Lumber
Phase II Assessment
Sedalia, Missouri

Appendices