SCI ENGINEERING, INC.
CONSULTANTS IN DEVELOPMENT,
DESIGN AND CONSTRUCTION
GEOTECHNICAL
ENVIRONMENTAL
NATURAL RESOURCES
CULTURAL RESOURCES
CONSTRUCTION SERVICES

September 6, 2012

Mr. Tom Pickel
Garden District Commission
2759 Russell Boulevard
St. Louis, Missouri 63104

RE: Analysis of Brownfield Cleanup Alternatives
2232 Thurman Avenue
ST# 9638
St. Louis, Missouri
SCI No. 2012-0247.28

Dear Mr. Pickel:

INTRODUCTION

SCI Engineering, Inc. (SCI) is pleased to provide this Analysis of Brownfield Cleanup Alternatives (ABCA) for the above referenced site. As you are aware, four underground storage tanks (USTs) have been identified at this property which is associated with a former on-site service station. Three of the USTs are located on the northern portion of the site, while the fourth is located on the southern portion of the site, adjacent to the building.

SCI understands that the vacant subject site will be redeveloped into a catering business. The future usage will be considered non-residential.

According to the historical research performed for the site, three of the USTs formerly contained gasoline. Their size and installation date are not known, however SCI estimates that the gasoline USTs are 4,000 gallons in size. SCI estimates that the waste oil UST is 500-gallons in size.

An ABCA is required by the Environmental Protection Agency (EPA) prior to using funds allocated for cleaning up Brownfield properties. The purpose of the ABCA is to discuss alternative cleanup options that may be applicable to a known or potential threat to public health or the environment. This ABCA outlines the objective of the site cleanup and compares the effectiveness, implementability, and costs of the various cleanup options. This document and the recommendations presented below are based on the site specific conditions, technical feasibility, environmental risk, and a preliminary cost/benefit analysis.

SITE HISTORY

In preparation of this ABCA, SCI reviewed a Phase One Environmental Site Assessment, dated February 2011, prepared by Barr Engineering. This report identified the three above-referenced gasoline USTs, and one waste oil UST. SCI also reviewed a Phase Two Environmental Site Assessment report, also prepared by Barr Engineering dated May 2011. The Phase Two report detailed subsurface investigative activities which included soil and groundwater sampling, and identified petroleum-impacted

soil and groundwater above the MDNR Default Target Levels (DTLs) and/or the Tier One Risk Based Target Levels (RBTLs) in the area of the gasoline UST pit and pump islands.

SCI also visited the site prior to preparing this ABCA. During the site visit, SCI was able to gain access to the gasoline USTs. One of the gasoline USTs was empty, one had a small quantity of water or fuel, and one was completely filled with water. SCI did not have access to the waste oil UST.

OBJECTIVE

The objective of this ABCA is to evaluate options to for the proper closure of the on-site USTs. The most common remedial action used for UST closure is removal. The removal process generally includes the removal of residual UST contents followed by the excavation of the UST's piping, pump islands, and other ancillary components. In some instances UST removal is not feasible based on site specific conditions, such as the USTs proximity to buildings or sensitive utilities. When conditions are not favorable for UST removal, in-place closure (which would include sample collection via soil borings) is the recommended method for evaluating site conditions and risks associated with abandoned USTs. Regardless of the method used to pursue closure, all UST closure activities should be performed in accordance with the Missouri Department of Natural Resources (MDNR) Risk Based Corrective Action (RBCA) protocol. The MDNR issues "No Further Remedial Action" letters for USTs once a UST closure is performed and meets the regulatory closure criteria.

SCI has evaluated three environmental cleanup options/alternatives in response to the USTs. These alternatives include the following:

1. Alternative A – UST Removal and Source Removal
2. Alternative B – UST In-Place Closure
3. Alternative C – No Action

A discussion of each alternative is outlined below.

Alternative A – UST Removal

Alternative A includes the conventional methods of UST removal and closure. The contents of the USTs, would be sampled, characterized, and disposed of off-site. After the contents are removed, the USTs would be excavated, cut open, and cleaned prior to being rendered scrap and disposed of off-site. The underground product lines, would also be drained and excavated accordingly. During the excavation process, the backfill/overburden surrounding the USTs piping would be field screened for evidence of impact and representative samples collected for laboratory analysis. Multiple samples are collected from directly beneath the USTs, product lines, and pump islands for laboratory analysis. The results of the sample analyses may be used to justify the need for soil excavation should impact be present above the applicable RBCA Risk Based Target Levels (RBTLs).

Alternative B – In-Place UST Closure

Alternative B includes the in-place closure of the UST system. In-place closure is typically used when UST removal is not a remedial option based on conditions such as the USTs proximity to on-site structures or utilities. The removal and disposal of the UST contents is similar to Alternative A. Typically, the methods used to perform in-place UST closure are less destructive than UST removal; however, the overburden over the top of the USTs is still required to be excavated, to the extent possible.

Once the top of the USTs is accessible, the USTs are cut open, cleaned out, and filled with a flowable, inert fill material. The piping associated with the UST system is also drained, to the extent possible, and filled to prevent future use.

This closure method does not provide an open excavation to evaluate the presence of a release beneath the UST system. Therefore, confirmation soil samples would be collected via soil borings which are advanced adjacent to each side of the USTs, product lines, and pump island. Likewise, this method would not allow for the excavation of free-phase saturated fill material or soil immediately around or beneath the USTs. As with Alternative A above, the results of the soil sample analysis would be compared to the applicable RBCA RBTLs and used in a future risk assessment. However, if recommended later, source removal via excavation beneath the USTs would not be feasible due to the presence of the USTs which would have been filled with an inert solid material. Cleanup methods, other than excavation, would be required to address soil impact beneath the USTs, if necessary, once they are closed in-place.

Alternative C - No Action

Alternative C would not include any efforts to maintain or close the existing UST system. This alternative does not have any costs associated with it; however, the potential liabilities are the greatest. The MDNR will not provide a "No Further Remedial Action" or "Certificate of Completion" if no UST closure efforts are made. Furthermore, the alternative of taking no action would not include the collection/analysis of soil samples to evaluate the potential threat to human health or the environment.

COST ANALYSIS

The following table provides a summary of potential costs associated with the options outlined above. These costs are only estimates and the actual costs for closure would be dependent on the conditions encountered during closure activities. As many of the site conditions are unknown and can vary, this table considers the best and worst case scenarios. These costs should be used for comparison purposes only and actual fees should be negotiated with a contractor prior to beginning work.

Estimated Fees

Alternatives	Low Range Estimate	High Range Estimate
Alternative A (UST Removal)	$22,000.00	$52,000.00
Alternative B (In-Place Closure)	$26,500.00	$56,500.00
Alternative C (No Action)	$0.00	$0.00

Costs associated with UST removal are typically less than in-place closure due to the fact that a drill rig would need to be mobilized to collect closure samples and UST cleaning would likely require confined space entry during in-place closure. However, the price range for UST removal (Alternative A) shown above includes source removal. UST removal alone would be less expensive than in-place closure.

While there does not appear to be site restrictions that would require shoring or bracing efforts, during UST removal in-place closure should be evaluated as a viable option should shoring/bracing be necessary to remove the UST system. The costs associated with shoring or bracing structures, utilities, streets, or other improvements can be costly and warrant in-place closure rather than removal. As mentioned above, shoring/bracing does not appear to likely be needed to perform UST removal at this site.

As outlined above, no action would be the least costly alternative. However, no action does not address the risk to human health or the environment. The next least costly alternative would be in-place closure; however, should the USTs be closed in-place, excavation of impacted material around the USTs would not be feasible with this option. UST removal is less expensive than in-place closure. Removal of the USTs will allow excavation of impacted soils, if necessary.

DISCUSSION

As mentioned above, UST removal is the most commonly practiced method for closing a UST system. The removal method is preferred primarily because there is typically less liability with complete removal compared to leaving the USTs in place. By removing the UST system the underlying soil conditions can be thoroughly evaluated and the excavation can be backfilled simultaneously or following UST removal activities with few restrictions. UST removal is also preferred based on the fact that future development, including improvements such as buildings and utilities, will not be interrupted by the presence of the USTs. Based on the excavation activities and sampling methods used during the removal process, removal is a more conservative approach to closing a UST system. Lastly, the fees associated with UST removal and closure are typically less than those associated with an in-place closure, unless structural shoring or bracing is required for removal.

The primary advantage to using the in-place closure method is that deep excavation near or within buildings or other sensitive areas is not required. By leaving the USTs in place the potential of structural failure during closure is limited and shoring or bracing of structures is typically not required. Another advantage to performing an in-place closure is the property damage and the excavation required to perform closure activities is typically less than that of performing UST removal. However, an in-place closure does not provide the same ability to evaluate the soil conditions beneath the UST system as would be possible during UST removal. This is due to the fact that during in-place closure, soil samples are collected along the sides of the UST system by drilling soil borings. Furthermore, alternative methods would be necessary to address impacted soils. Typically, alternative cleanup methods would be more costly or take longer than excavation. Fees associated with an in-place closure are typically greater than a UST removal based on the fact that additional care must be taken with working inside a UST during the cleaning process as this may be considered a confined space. Additionally, there are additional costs associated with performing soil borings when compared to using on-site excavation equipment to collect the required samples. Although not applicable to all sites, deed notices and/or land use restrictions may also be required if USTs are closed in-place.

While either UST removal or in-place closure is acceptable, owners, operators, and regulatory agencies typically prefer a UST system be removed once no longer used, due to the ongoing issues/potential restrictions and higher costs associated with an in-place closure.

RECOMMENDATION

SCI recommends that the USTs located on this property be addressed by removal and closure (Alternative A). This recommendation is based on the ability to allow excavation and disposal of impacted soil, if needed, which would be beneficial to address potential risk to human health and the environment.

Alternative B (in-place closure), outlined above, would not be as favorable as it would prevent the ability to excavate impacted soil around the UST system, the likely higher cost, possibility of impeding future construction and the potential need for deed notices/restrictions.

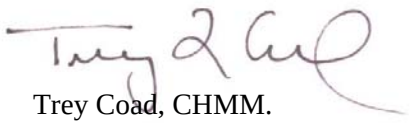
Alternative C (No Action), is not recommended due to the fact that it does not address the potential risk to human health or the environment.

Regardless of the method used, SCI recommends all closure activities be performed in accordance with the MDNR ABCA protocol mentioned above.

We appreciate the opportunity to be of service to you on this project. If you have any questions or comments, please contact us.

Respectfully,

SCI ENGINEERING, INC.



Trey Coad, CHMM.
Project Scientist

TLC/kae/rah

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