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Subject: Analysis of Brownfields Cleanup Alternatives (ABCA) of the Former Army Aviation and Troop Command (ATCOM) Facility for the Land Reutilization Authority, St. Louis, Missouri

Dear Mr. Howell:

SCS Engineers (SCS) is pleased to submit this Analysis of Brownfields Cleanup Alternatives (ABCA) for the Former Army Aviation and Troop Command (ATCOM) Facility. This ABCA is required under the United States Environmental Protection Agency's (USEPA's) Brownfields program prior to conducting cleanup actions with USEPA Brownfields funds. Conducted as part of Cleanup Planning under the cleanup grant, the ABCA must be signed by an authorized representative of the recipient (Land Reutilization Authority).

The ABCA is required by the USEPA's Brownfields program to include the following:

- Information about the site and contamination issues (e.g., exposure pathways, identification of contaminant sources, etc.), cleanup standards, applicable laws, alternatives considered, and the proposed cleanup.

- Effectiveness, implementability, and the cost of the proposed cleanup.

- An analysis of reasonable alternatives including no action. For cleanup of petroleum-only sites, an analysis of cleanup alternatives must include considering a range of proven cleanup methods including identification of contaminant sources, exposure pathways, and an evaluation of corrective measures. The cleanup method chosen must be based on this analysis.

This ABCA has been prepared consistent with the "abbreviated format" suggested by USEPA Region 7.

SUMMARY OF THE SITE

Prior to construction of the St. Louis Ordnance Plant (SLOP) in approximately 1941, the site contained single-family residences. Sanborn maps indicate that development of the single-family residences began prior to 1920. Residences were located at the site until construction of the underground firing range, also known as the ATCOM facility, was completed. The property

contains approximately 3.5 acres of land which were utilized for small arms munitions (.30 and .50 caliber) testing during World War II. The site was transferred to private ownership in 1966, and remained in private ownership until the SLDC Land Reutilization Authority acquired the former ATCOM site through a tax foreclosure in 1997. Since 1997, two limited environmental assessments have been completed; however, funds have not been available to perform clean-up or redevelopment of the property.

Community Relations and Public Involvement

Previous and on-going outreach has occurred relative to the ATCOM site. The SLDC implements a community relations process for all sites in the Brownfields process. The process has included a public meeting held on October 23, 2008. Another meeting will be held prior to requesting public bids for cleanup. SLDC is in the process of developing a Community Relations Plan (CRP) to encourage citizen participation in the cleanup planning and implementation process. The final design remedy will further incorporate community feedback from outreach activities.

Future Use

The immediate area around the ATCOM site is primarily industrial and has gone through multiple phases of redevelopment. Future plans for the Goodfellow corridor in the vicinity of the ATCOM site currently include retail and commercial development. The Land Reutilization Authority's intended use of the property is for industrial, commercial, or office space utilization.

Source Area Characterization

Brownfields Targeted Assessment (BTA) Report for Former ATCOM Parcel, St. Louis, Missouri prepared by Ecology and Environment, Inc. for the U.S. Environmental Protection Agency (EPA) Region 7 Superfund Division, September 7, 1999. The BTA report included a walk-through inspection, a historical review, a review of local, state, and federal agencies records, and interviews with persons knowledgeable about the site. Ecology and Environment, Inc. stated that the property consists of approximately 3.5 acres of land and contains a vacant one-story building in very poor condition. The building appears to have been used as a firing range for testing ammunition and has several underground tunnels. Limited sampling of building materials, paint, and surface and subsurface soil was completed. Analysis indicated that hazardous substances exist at the site. Hazardous substances identified at the site include asbestos, lead-based paint, and lead in subsurface soil.

A total of three building material samples were collected and analyzed for the presence of asbestos. A sample of sprayed-on insulation identified within the tunnels and test firing rooms was found to contain 60 percent Crocidolite, and a sample of pipe wrap found in a hallway was found to contain 5 percent Chrysotile and 5 percent Amosite. A total of six surface and ten subsurface soil samples were collected and analyzed for arsenic, barium, beryllium, cadmium, chromium, lead, mercury, nickel, vanadium, volatile organic compounds (VOCs), and explosives. With the exception of lead identified in one subsurface soil sample, none of the metals exceeded the Missouri Soil Target Concentration (STARC) Scenario C (industrial land use) concentrations used for comparison. The concentration of lead identified in subsurface soil

Sample 104 was 2,070 mg/kg, greater than the STARC Scenario C concentration of 660 mg/kg. Sample 104 was collected at a depth of 6 to 12 inches below ground surface (bgs) near the southeast corner of the site. Neither explosives nor VOCs were identified in the surface or subsurface soil samples collected. One paint chip sample was collected from the eastern hallway within the former proof house. Laboratory analysis indicated that the concentration of lead in the paint chip sample was 6,990 mg/kg. Based on the laboratory analytical data, the paint is considered to be lead-based (greater than 5,000 mg/kg lead); however, no federal or state clean-up levels have been established for this material. Ecology and Environment, Inc. recommended further sampling to delineate the extent of lead contamination on the property; a full asbestos inspection to estimate the quantity of asbestos containing material (ACM) present; and further inspection of the tunnels for lead and other contaminants associated with firing ranges.

Phase II Brownfields Environmental Site Assessment St. Louis Ordnance Plant Ex-Army Underground Firing Range Parcel ID #43500000910, St. Louis, Missouri prepared by the Missouri Department of Natural Resources (MDNR) dated July 7, 2005. The report states that contaminants of concern at the site include lead paint, asbestos, heavy metals, explosives, and pesticides. Six paint chip samples were collected, and laboratory analysis indicated that lead concentrations ranged from 11,500 mg/kg to 186,000 mg/kg. Asbestos was identified in six out of eight samples collected. Pipe wrap, transite siding, sprayed-on insulation, and floor tile were identified as ACM. Lead was identified in excess of STARC Scenario C at a concentration of 1,390 mg/kg in one subsurface sample collected from 8-12 feet bgs near a former bullet trap. Surface wipes collected within the firing tunnels identified elevated levels of metals (copper, iron, lead, magnesium, and zinc) on interior surfaces. Lead concentrations ranged from 110,000 µg/100 cm^2 to 26,000,000 µg/100 cm^2, well in excess of the highest allowable clearance criterion for lead dust within the confines of a building (Scenario C for window wells 800 µg/ft^2). Explosives were not detected in wipe samples collected within the firing tunnels. One surface soil sample collected near the foundation of the former proof house contained chlordane at a concentration of 1,730 mg/kg, in excess of the STARC Scenario C limit of 30 mg/kg.

MDNR stated all interior painted surfaces can be assumed to contain high levels of lead. MDNR also stated that due to the poor condition of the structures, ACM is being exposed to the elements and should be considered as posing a threat of release to the environment and also a danger to human health of persons that enter the site. Soil surrounding the building foundations is anticipated to be impacted with high levels of chlordane, and subsurface soil near the former bullet trap is impacted with lead.

Site Reconnaissance

Representatives from SCS and potential subcontractors performed a walk-through of the site on February 10, 2009. SCS gained access to the site through unlocked gates, and several large holes in the chain link fence were noted. The site consists of a heavily wooded parcel containing a two-story wood frame building with partial basement; a small ammunition storage building within a cast-in-place concrete bunker; five underground firing range tunnels; and 12 aboveground test firing stations. The main floor footprint of the former proof house covers approximately 19,100 square feet, and the former ammunition storage building contains approximately 100 square feet. The buildings are in poor condition, and roofs have begun to collapse into the interior of the buildings. Presumed asbestos containing materials were identified throughout the former proof

house and within the former ammunition storage building. These included transite siding, thermal system insulation, window glazing, door caulk, anti-static flooring, floor tile, mastic, and sprayed-on insulation. Additionally, other suspect asbestos containing materials including roofing materials, tar paper, gaskets, ceiling tile, fireproof doors, etc. were also identified during the site visit.

The firing tunnels and test firing stations are primarily intact. Original plan and as-built drawings were utilized to estimate firing tunnel lengths. The drawings indicate that the two northern-most firing tunnels were the longest of the five firing tunnels, each approximately 600 feet in length. However, a cell tower was constructed on the northwest corner of the site in the early 1990s, and it is assumed that portions of the firing tunnels were removed or filled during construction. When comparing the location of the firing tunnels, as shown on the plan drawings, with the location of the area occupied by the cell tower, it appears that construction of the cell tower could have affected up to 100 feet of both firing tunnels. These firing tunnels can be accessed at the eastern end (within the former proof house) and from a stairwell access, located approximately 300 feet to the west of the former proof house. Two relatively short firing tunnels are located immediately to the south of the long firing tunnels. These firing tunnels measure approximately 140 feet in length and extend from the former proof house to a relatively intact bullet trap and lead core handling area. These firing tunnels can be accessed at the eastern end and from stairwell access points near the bullet traps. The southern-most firing tunnel is approximately 490 feet in length, and extends from the former proof house onto property owned by the 88th Regional Support Command (RSC). The portion of the firing tunnel that is located on property owned by the 89th RSC, a distance of approximately 275 linear feet, is partially covered by paved parking lot (installed between 1953 and 1965) and a building that was constructed in approximately 1947. The southern-most firing tunnel can only be accessed from within the former proof house. During the site visit SCS was allowed access to the basement of the building occupied by the 88th RSC, and it was verified that a block wall had been constructed over the west end of the southern-most firing tunnel, as detailed on original 1947 construction drawings.

Firing tunnel diameters range from approximately five feet, for the two northern most tunnels, to approximately seven feet, for the three southern-most tunnels. The interior surfaces of all tunnels are coated with sprayed-on insulation that is in a highly friable form. The sprayed-on insulation, and the soil cover on over the exterior of the tunnels, is believed to have been applied in an effort to soundproof test firing operations.

Cleanup Standards

The site is enrolled in the MDNR's Brownfields/Voluntary Cleanup Program (B/VCP) under the over-sight of an MDNR Project Manager. Soil cleanup of the site will be to applicable Missouri Risk Based Cleanup (MRBCA) risk based target levels developed using the procedures of the B/VCP. Asbestos abatement will be performed based on MDNR, OSHA, and EPA requirements. Remaining impact, if any, will be compared to these RBTLs for closure.

Cleanup Alternatives Considered

The following describes the analysis of Brownfield cleanup alternatives for the site. The cleanup alternatives evaluated include:

1. The scenario if no action were conducted (do nothing)
2. Cleanup using risk-based closures including deed restrictions
3. Remediation to unrestricted risk-based site cleanup goals
4. Remediation to background (naturally occurring) concentrations

This analysis is summarized in a matrix evaluation included as Table 1.

No Action Approach

"No action," an alternative required by the USEPA for evaluation, was considered, but it does not protect human health or the environment based on the project needs of providing a potential redevelopment site for future use. The structures at the site have deteriorated with collapsing roofs and walls. Friable asbestos is evident in the rubble and is subject to the elements. In addition, the concrete structures and firing tunnels are lined with asbestos and may potentially become a health hazard if they are not removed.

If no abatement of the asbestos-containing materials (ACM) and no remediation of other miscellaneous wastes (if present) are conducted, the necessary "certificate of completion" from the B/VCP could not be obtained for the site, nor could the facility be licensed for its proposed use. Thus, proposed project redevelopment could not be accomplished. For these reasons, the grantee is unable to implement a "no action" alternative.

Risk-Based Closures Approaches

Risk-based approaches for remediation of the site can be completed using the MDNR and federal asbestos regulations. Using these regulations, risk-based strategies include evaluating site cleanup goals based on site use (residential, commercial and industrial). In addition, the regulations include options for leaving asbestos on-site through the use of engineered barriers or through deed restrictions.

Advantages to using these risk-based approaches include a likely lower remediation cost and the ability to receive a "certificate of completion" from the B/VCP within the project timeframe. Disadvantages to using these risk-based approaches to remediation for this project include management of ACM during future construction activities, restricted site development options, long-term operations and maintenance plans, and long-term costs associated with maintaining these proposed restrictions.

Remediation to Unrestricted Risk-Based Site Cleanup Goals

Abatement/remediation to unrestricted risk-based site cleanup goals can be completed using Federal and MDNR regulations in order to receive a "certificate of completion" from the B/VCP. Advantages to using these risk-based approaches include ultimately handing over an unrestricted site for development and the ability to receive a "certificate of completion" from the B/VCP within the project timeframe. Disadvantages for this approach include moderately high costs associated with remediation. It should be noted, however, that while remediation costs are likely to initially be moderately high relative to other risk-based approaches listed above, there would

be no additional development costs associated with this approach and no need for long-term monitoring costs.

Remediation to Background (Naturally Occurring) Concentrations

This remedial approach is similar to that of the unrestricted risk-based site cleanup goals and could ultimately produce a "certificate of completion". This approach could also provide future unrestricted site use. However, this remedial approach would be more costly and threaten the project timetable due to additional remediation beyond risk-based site cleanup goals.

Alternatives Range of Modeled Cost

Remediation to Background Concentrations	**$1,000,000 - $2,000,000**
Remediation to Unrestricted Risk-Based Standards	**$750,000 - $1,250,000**
Risk-Based Management	**$250,000 - $500,000**

Based on effectiveness of protecting human health and the environment, implementability, and cost, the recommended cleanup alternative was **Remediation to Unrestricted Risk-Based Standards.**

Cleanup recommendations for this site include:

- Work Plan development
- Collection of subsurface soils samples,
- Asbestos Survey,
- Removal and disposal of impacted soils,
- Removal and disposal of asbestos containing materials,
- Demolition and disposal of the wood frame building,
- Demolition and recycling of concrete structures,
- Preparation of a Final Cleanup Report.

It is estimated there are approximately 200 cubic yards of contaminated soil to be removed at the site. Estimated asbestos quantities include: Estimated quantities of ACM within the proof house and ammunition storage include the following:

- 19,000 square feet ($ft^{2)}$ of sprayed-on insulation in test firing stations within the proof house
- 1,500 linear feet (lf) of pipe wrap
- 250 ft^2 thermal system insulation
- 7,000 ft^2 of transite siding
- 2,000 ft^2 of anti-static flooring
- 4,000 ft^2 of 9" X 9" floor tile and mastic
- 10,000 ft^2 of asbestos contaminated debris
- 15 doors
- 25 windows

Estimated quantities of other suspect ACM identified during reconnaissance of the site include the following:

- 19,100 ft^2 of roofing materials
- 7,000 ft^2 of tar paper
- 4,000 square feet of ceiling tile
- 10 fireproof doors

Estimated quantities of ACM that were identified within the firing tunnels include the following:

- 41,370 ft^2 of sprayed-on insulation

Thank you for the opportunity to provide our services. If you have any questions regarding it, please contact us at your convenience at (913) 451-7510.

Sincerely,

David E. Brewer, P.G.
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