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26 June 2007

Ms. Lisa Pearson
Project Manager
Toxics Cleanup Program
Washington State Department of Ecology
Southwest Regional Office
P.O Box 47775
Olympia, Washington 98504-7775

Subject: Revised Work Plan for Treating Lead-Containing Soil Materials
Former Tacoma Metals Site – Tacoma, Washington
K/J 996098.00

Dear Ms Pearson:

This revised work plan, prepared on behalf of Portland Avenue Associates, describes treatment, sampling, and offsite disposal procedures proposed for lead-containing soil stored within a Temporary Containment Unit (TCU) located at the Former Tacoma Metals site at 1919 Portland Avenue, in Tacoma, Washington (site). The objective of work described herein is to treat soil in the TCU such that it no longer exhibits the dangerous waste (DW) toxicity characteristic for lead and may be disposed of offsite at an approved Resource Conservation and Recovery Act (RCRA) Subtitle D solid waste disposal facility. The initial version of this work plan was submitted to the Washington State Department of Ecology (Ecology) on 22 September 2006. Ecology responded to the work plan in a letter dated 31 May 2007.

^ most recently

This work plan was prepared in accordance with Washington State Department of Ecology (Ecology) Technical Information Memorandum (TIM) *Treatment by Generator* (TBG), (Publication 96-412, revised May 2004) and Ecology Document TBG Treatment-Specific Guidance: *Solidification* (Publication Number 96-416, revised December 2002).

## BACKGROUND

In June 2005, the City of Tacoma (City) encountered debris-containing soil adjacent to the northern boundary of the site while implementing the Puyallup River Side Channel construction project (Side Channel Project). A description of the soil and preliminary laboratory analytical results provided by the City suggested that the debris originated from the same source as materials located on adjacent, unpaved areas of the site and that the soil contained elevated concentrations of lead. Total lead concentrations in the City's samples ranged from 7.93 to 2,860 milligrams per kilogram (mg/kg), and leachable concentrations ranged from 0.0393 to

17.4 milligrams per liter (mg/l). Additional analysis of the soil conducted by Kennedy/Jenks Consultants in August 2005, using the toxicity characteristic leaching procedure (TCLP), indicated leachable concentrations ranging from 0.68 mg/l to 230 mg/l. Some of the samples collected by both the City and Kennedy/Jenks Consultants contained leachable lead concentrations, which exceed the Ecology Dangerous Waste Regulations toxicity characteristic for lead of 5.0 mg/l [Washington Administrative Code (WAC) 1273-303-090].

On 1 June 2005, Kennedy/Jenks Consultants, on behalf of Portland Avenue Associates, sent an email to Ecology providing a proposed design for construction of a TCU to store the Side Channel Project soil. An Ecology letter dated 9 June 2005 provided Portland Avenue Associates with conditional approval to construct the TCU as proposed and indicated that Ecology would grant final approval to operate the TCU pending submittal of a Work Plan addressing Ecology's comments provided in the same letter. On 14 June 2005, Kennedy/Jenks Consultants submitted a letter to Ecology providing the proposed Work Plan for construction of the TCU and responses to Ecology's 9 June 2005 comments. In general, the comments addressed construction design criteria (techniques and materials), operational procedures, post-operation and closure activities, and final disposition of the waste material. The Work Plan for the TCU was approved by Ecology in an email dated 16 June 2005, and the TCU was constructed in late June 2005 in accordance with the design details provided in the Work Plan and as shown on Figure 1.

## TEMPORARY CONTAINMENT UNIT

Based on our understanding of Ecology's *Dangerous Waste Regulations* (WAC 173-303-040), the TCU meets the definition of a tank and, therefore, may be used to store and treat the soil consolidated therein, as described in this work plan. WAC 173-303-040 states *"Tank" means a stationary device designed to contain an accumulation of dangerous waste, and which is constructed of primarily non-earthen materials to provide structural support.* Procedures and materials used to construct the TCU are summarized below and shown on Figure 1.

- The ground surface was cleared of debris and sharp objects and graded.
- Interlocking concrete blocks, placed end to end and two high, were used to form the rectangular structural perimeter, which is approximately 39 feet wide, 308 feet long, and 5.6 feet high.
- Three 15-foot-wide sheets of puncture resistant Geotextile fabric (Mirafi 500X®) were placed on the soil surface within the concrete block perimeter, overlapping each other by 3 feet. An underliner composed of 0.020-inch-thick (20 mil), polyvinyl chloride (PVC) film was placed on top of the geotextile fabric and draped carefully over the top of the concrete block perimeter such that no voids were present beneath the liner where the concrete blocks form a right-angle with the ground surface. Seams in the HDPE liner material were then welded to form a liquid-tight seal.

- Approximately 3,100 cubic yards of the Side Channel Project soil were consolidated in the TCU, with the top of the soil pile arched in the center at a maximum height of approximately 9 feet. The soil pile occupies the southern 4/5 of the TCU leaving an approximately 1,600 square foot area vacant at the northern end.
- The TCU was covered with a heavy-duty 16 mil Duraskrim® string-reinforced plastic tarpaulin secured in place with sand bags.

## SOIL TREATMENT

The following describes how soil stored in the TCU will be treated to decrease its lead toxicity characteristic below the DW standard using a proprietary phosphate-induced metals stabilization (PIMS) reagent. This process is consistent with "stabilization" as described in Ecology's Treatment-Specific Guidance: *Solidification* (Publication Number 96-416), which briefly addresses and defines stabilization as "A technique that chemically limits the hazard potential of dangerous waste by converting the constituents into a less soluble form." Although the guidance document focuses primarily on solidification of wastes which contain free liquids, its inclusion of stabilization makes it applicable to treatment of a relatively dry, lead-containing soil (<20% moisture content) using PIMS techniques because PIMS reduces the mobility and toxicity (also bioavailability) of lead. It should also be noted that the PIMS technique involves only a light application of waterborne, non-toxic phosphate minerals to soil and does not constitute a more complex physical, chemical, or industrial treatment process such as many of those addressed in the TBG guidance.

### PIMS Technology

Portland Avenue Associates and Kennedy/Jenks Consultants have selected Sevenson Environmental Services (Sevenson) to treat soil contained in the TCU using their patented form of PIMS reagent called MAECTITE®. This reagent contains non-toxic phosphate minerals, which bond naturally with native lead, lead complexes, and other heavy metals forming non-leachable mineral forms in the apatite and barite mineral groups. Because this chemical process relies on the natural tendency of native lead and lead cations to bond strongly with phosphates, the lead in soil is chemically altered permanently and is not just temporarily immobilized as part of a mixture (e.g., cements, pozzolans, silicates, hydroxides). Therefore, after treatment, the resulting non-leachable barite and apatite minerals remain indefinitely, even if exposed to physical forces and/or changes in pH.

In 1992, Sevenson's MAECTITE® process was accepted into the EPA Superfund Innovative Technology Evaluation (SITE) program and, as a technology approved under EPA's Pre-Qualified Offers Procurement System (PQOPS), was made available to project coordinators and emergency response teams without the need for technical evaluation on EPA funded projects. The process was patented in March 1993 for lead-containing soil and solid waste and in 1995 for chromium contaminated materials. Since the early 1990s, the process has been used to treat metals-containing soils in 18 states and all 10 U.S. Environmental Protection Agency (EPA) Regions. The process has also been used to treat sludge and aqueous wastes from numerous manufacturing processes.

## PIMS Application in the TCU

PIMS reagent application in the TCU will be a relatively simple process. Currently, the TCU "tank" encompasses approximately 3,100 cubic yards of soil, stockpiled toward the southern end, and approximately 350 cubic yards of vacant, PVC-lined space toward the northern end. To mix the soil and treatment reagent, an excavator will be used to push soil from the stockpile into the vacant space while an approximately 2.5 percent solution of MAECTITE® is sprayed onto and mixed with each scoop of soil that is moved. Initially, an approximately 6-inch-thick lift will be moved into the vacant space to protect the PVC underliner. Each scoop of soil used to form the protective layer will be kept very small and will be sprayed with reagent as it is dropped into place. Using very small scoops will ensure adequate contact between the reagent and soil. After the protective layer is emplaced, larger scoops of soil will be moved, and the excavator bucket will be used to stir the soil and reagent. This process will be continued, advancing the excavator in a southerly direction, until the entire soil stockpile has been shifted from the southern end of the TCU to the northern end. If practical, the excavator used to push soil northward will be staged alongside the TCU, thus minimizing contact between equipment and soil. Likewise, reagent application equipment (i.e., supply tank, pump, hose, and spray nozzle) will be staged and operated outside of and alongside the TCU to minimize the need for equipment decontamination following treatment.

Prior to PIMS application, the integrity of the PVC underliner in the vacant part of the tank will be evaluated. If necessary, new underliner will be installed and welded to the existing liner to ensure a liquid-tight seal. It might also be necessary to modify the northern walls of the TCU to increase the amount of vacant space available. If such expansion is deemed necessary, additional concrete blocks, geotextile, and PVC underliner will be added in a northerly direction in accordance with design criteria used to construct the original unit (Figure 1). In addition, if it is necessary to operate the excavator inside the TCU, from atop the stockpiled soil, a ramp will be constructed outside of and adjacent to the TCU such that the structure is not disturbed by the excavator tracks during ingress/egress.

Sevenson Environmental Services will mobilize equipment, personnel, materials, and MAECTITE® reagents to the site. A Kennedy/Jenks Consultants technician will remain onsite during treatment activities to observe and document the process, collect post-treatment confirmation samples (described below), and confirm that requirements of the Work Plan are followed. MAECTITE® liquid reagent will be applied to the soil by means of a chemical delivery pump from drums, totes, a bulk storage tank, or a tanker trailer. The reagent delivery pump will be equipped with a meter to monitor the quantity of reagent applied.

## Runoff Controls and Dust Suppression

### Runoff Controls

The TCU was constructed with a liquid-tight underliner to minimize the potential for runoff of liquids to underlying and adjacent soil, thus additional runoff controls (e.g., a silt fence around the work site) will not be constructed. Also, as mentioned above, it is typically necessary to apply only a small quantity of waterborne MAECTITE® reagent to achieve complete stabilization. This will increase the soil's moisture content only slightly and will not result in

accumulation of free liquids within the soil or in the bottom of the TCU. Thus, runoff controls will not be necessary as a result of the PIMS application process. Because treatment is scheduled for mid-summer 2007, the potential for stormwater accumulating in the TCU is very low. However, in the event of heavy rainfall, application activities will be temporarily suspended, and the TCU will be covered. The TCU will also be covered nightly during application activities and during the post-treatment confirmation sample analytical period. As treatment is performed, the protective cover will be rolled back as necessary to expose only that soil which will be immediately treated and moved.

### Dust Suppression

Because PIMS treatment involves spraying soil with a waterborne reagent, the treatment process doubles as a dust suppression technique. In addition, because the TCU's protective cover will be only partially removed at any given time, exposing only that soil which is being treated immediately, the potential for dust generation will be further reduced. However, if during application, ambient weather conditions contribute to dust generation, additional dust management practices will be implemented. The onsite Kennedy/Jenks Consultants technician will observe and document site conditions throughout the process, and if visible dust is generated, Sevenson personnel will be directed to apply a water mist to the soil stockpile and reagent application zone. Water will be applied as necessary until no visible airborne dust is present.

## TREATABILITY STUDIES AND RESULTS

Prior to full-scale application of MAECTITE®, a limited bench-scale test is required to identify the optimum reagent concentration for site-specific soil characteristics. In May 2006, Kennedy/Jenks Consultants provided Sevenson with a bulk soil sample collected from the TCU for treatability testing as described in the testing plan provided in Attachment A. In general, the study proceeded as follows:

- Analysis was conducted on the untreated sample to measure total and leachable lead concentrations using EPA 6000/7000 series and 1311 Methods.
- Varying concentrations of treatment reagent (1 to 3 percent solutions based on the soil mass) were applied to three different soil aliquots derived from the original untreated sample.
- Post-treatment analysis was conducted as in step 1.

Total and leachable lead concentrations in the pre-treatment sample were 17,300 mg/kg and 210 mg/l, respectively. Following application of the reagent, concentrations of leachable lead were 10.9 mg/l for the 1-percent treatment solution, 2.32 mg/l for the 2-percent solution, and 0.948 mg/l for the 3-percent solution. Based on these results, the 2-percent and 3-percent MAECTITE® reagent concentrations are capable of reducing leachable lead in the TCU soil to concentrations below the DW toxicity characteristic for lead of 5 mg/l.

## CONFIRMATION SAMPLING/WASTE ANALYSIS PLAN

Ecology's TBG TIM states: *"The generator must develop a Waste Analysis Plan (WAP) for onsite treatment in tanks or containers not subject to permit requirements if the treatment is for the purpose of meeting the Land Disposal Restriction (LDR) standards or to make the waste non-hazardous."*

Throughout the treatment process, Kennedy/Jenks Consultants will collect and analyze 40 confirmation samples of the treated soil for total and leachable lead using EPA Methods 6010 and 1311. Because the proposed treatment process is nearly instantaneous, the samples will be collected as soil is moved from the untreated mass, sprayed with MAECTITE®, and consolidated in the initial and each subsequent vacant portion of the TCU (as described above). Based on the total yardage and proposed number of samples, one sample will be collected after each 75 cubic yards of soil is treated and moved. Using this approach will maximize the potential for collecting a sample set that is representative of the entire soil mass.

In addition to the 40 samples collected for lead analyses, two samples will be collected randomly for disposal profiling purposes. These two samples will be analyzed for moisture content, pH, paint filter liquids using EPA Method 9095, volatile organic compounds (VOCs) using EPA Methods 5035 and 8260, semivolatile organic compounds (SVOCs) using EPA Method 8270, and metals (8 RCRA) using EPA 6000/7000 Series Methods.

After each 75 cubic yard mass of soil is moved and treated, the onsite technician will direct the excavator operator to grab an aliquot of soil randomly from the treated mass, using the excavator bucket. The technician will then transfer the soil from the excavator bucket to a pre-cleaned, laboratory-provided, 4-ounce, glass sample container using a plastic or stainless steel spoon. Prior to each collection event, the spoon will be decontaminated using phosphate-free detergent and distilled water.

Each confirmation and disposal profiling sample will be assigned a unique identification number, and its location in the treated stockpile will be plotted on a site plan. Samples will be submitted to TestAmerica of Bothell, Washington, for analysis under standard chain-of-custody protocol. Upon receipt of analytical results, data will be reviewed to ensure all portions of the soil mass no longer exhibit the DW characteristic. If not, treatment and confirmation sampling will be repeated as necessary.

In addition to confirmation sampling of the treated soil, surface soil samples will be collected from the footprint of the TCU after site closure (described below). Six surface soil samples will be collected from randomly selected locations (using a grid and random number generator technique), and three samples will be collected from surface soil beneath the former locations of seams in the TCU underliner. These samples will be submitted to TestAmerica for analysis of total and leachable lead using EPA Methods 6010 and 1311.

## OFFSITE DISPOSAL OF TREATED SOILS

Following treatment and receipt of analytical results demonstrating that leachable lead concentrations in the TCU soil are below the DW characteristic of 5 mg/l, the soil will be profiled for disposal acceptance at an approved RCRA subtitle D landfill (e.g., the Rabanco facility in Roosevelt, Washington). Soil will be loaded into trucks using an excavator and transported either directly to the landfill or to a rail transfer station.

Trucks will be loaded while parked alongside the TCU. Any soil spilled outside of the TCU during loading will be scraped from the ground surface immediately and returned to the TCU stockpile. Prior to exiting the loading zone, each truck will be observed for the presence of soil spilled outside of the truck bed, and any such soil will be removed and placed into the TCU stockpile. All full truck trailers will be covered prior to exiting the site and throughout transport to the disposal facility. Copies of weigh-tickets for each truckload of soil deposited at the facility will be retained by truck drivers and submitted to Kennedy/Jenks Consultants for inclusion in a final report.

## EQUIPMENT DECONTAMINATION AND SITE CLOSURE

During mobilization of equipment to the site, a temporary equipment decontamination pad will be constructed next to the northern end of the TCU. The pad will be encircled with a small soil berm and lined with 20 mil HDPE. Following soil treatment and truck loading operations, the excavator bucket and tracks, and any other equipment as necessary, will be swept to remove large soil particles and rinsed (if necessary) while positioned on the decon-pad. Residue collected in the decontamination pad and the HDPE liner will be disposed of in the final soil transport truck leaving the site. It is not anticipated that large quantities of decontamination water will be generated. If decontamination water does accumulate in the pad, it may be used as dust control during truck loading.

After soil removal, the TCU will be decommissioned, and its components will be disposed of or recycled in accordance with applicable requirements of WAC 173-303-640. The TCU underliner, protective cover, and geotextile fabric will be removed and disposed of along with the treated soil in the final soil transport truck leaving the site. The concrete blocks used to construct the TCU perimeter will remain onsite for future construction purposes or will be sold.

After the TCU is removed, surface soil samples from the tank footprint will be collected as described above in the Confirmation Sampling/Waste Analysis Plan section above.

## GENERAL PERFORMANCE AND SAFETY STANDARDS

TBG guidance states that performance standards of WAC 173-303-283 (3) apply to all generators that treat waste onsite. Each of these performance standards to "prevent" degradation of the environment and endangerment of human health is addressed as follows:

- Degradation of groundwater quality will be prevented because the TCU is constructed with a liquid-tight underliner, and free liquids will not be generated. These characteristics of the TCU and treatment process, as well as the inherent low mobility of lead in soil, preclude downward migration of lead from the TCU to underlying groundwater.

- Degradation of air quality will be prevented through use of dust suppression techniques as described above in the Dust Suppression section above.

- Degradation of surface water quality will be prevented because the TCU is constructed with an underliner for containing soil and treatment reagents and is kept covered to preclude contact between stormwater runoff and the lead-containing soil.

- Destruction or impairment of flora or fauna outside the active portion of the facility will be prevented because PIMS application activities will be confined to the TCU.

- Excessive noise will be prevented through use of mufflers on treatment equipment. It is not anticipated that operation of a small excavator will result in noise greater than ambient noise in the surrounding industrial community.

- Negative aesthetic impacts will be prevented because the TCU is relatively hidden from view with respect to nearby public thoroughfares and adjacent properties.

- Preventing destabilization of hillsides is not applicable.

- Prevention of the use of processes that do not treat, detoxify, recycle, reclaim, and recover waste material to the extent economically feasible will be accomplished using MAECTITE® which, based on the results of treatability studies, will reduce lead leachability to below the DW toxicity characteristic standard.

- Preventing endangerment of the health of employees or the public near the facility will be accomplished through implementation of engineering controls such as dust suppression, prevention of offsite soil tracking by vehicles, and by covering all truckloads of soil transported offsite. Based on Kennedy/Jenks Consultants' experience, observations, and the results of personnel air monitoring conducted at other similar sites, the PIMS application process within the TCU will not result in ambient air dust/lead concentrations exceeding worker protection standards.

Additional performance standards cited in the TBG guidance are addressed as follows:

- The MAECTITE® treatment process does not generate extreme heat, pressure, fire or explosion, or a violent reaction.

- The proposed treatment process does not produce uncontrolled toxic mists, fumes, or gasses in sufficient quantities to threaten human health or the environment. As described above, dust generation will be minimized through use of engineering controls.
- The proposed treatment process does not produce uncontrolled flammable fumes or gasses.
- The proposed treatment process will not damage the structural integrity of the TCU or through other means threaten human health or the environment.

A performance standard will also be applied to the treatment process/contractor imposing a condition that all post-treatment confirmation samples collected from the TCU will exhibit a leachability concentration less than 5.0 mg/l based on the results of TCLP analysis. In the event one or more samples exceed the standard, the contractor will apply additional PIMS reagent to the soil, at no additional cost, and confirmation sampling will be repeated.

## RECORD KEEPING AND REPORTING

As described above, an onsite technician will observe treatment, soil loading, and site closure activities and will collect confirmation soil samples. Observations and any pertinent measurements required during treatment will be documented in a weather resistant field notebook or on standard field logging forms as appropriate. Chain-of-custody forms associated with sampling will be prepared in triplicate, and a field copy will be retained by the technician. Chain-of-custody forms signed by the receiving laboratory will also be retained in the project file. The technician will also collect daily field reports from the treatment contractor and weigh tickets from soil transport truck operators. All field documentation and forms will be maintained in the project file at Kennedy/Jenks Consultants office in Federal Way, Washington. Copies of selected field documentation (e.g., weigh tickets from the disposal facility) will be submitted to Ecology with a final report.

A report will be prepared and submitted to Ecology after treatment, disposal, and site closure activities are complete. The report will include the following information:

- A summary of soil treatment and closure activities.
- Treatment performance monitoring results (i.e., confirmation sample analytical results), including copies of laboratory analytical reports.
- A statistical analysis of the performance monitoring data to confirm that post-treatment cleanup levels were achieved in accordance with WAC 173-340-740(7)(e).
- Analytical results for soil samples collected from the footprint of the TCU after closure.
- Analytical results for disposal profiling samples.

- Conclusions regarding the effectiveness of the remedial action.
- Appendices, including photographs of the final treatment process, treatment logs, waste soil treatment documentation, and analytical reports of final soil sample analyses.

## PERSONNEL TRAINING, PREPAREDNESS AND PREVENTION, CONTINGENCY PLAN, AND EMERGENCY PROCEDURES

All personnel working at the site will have completed Occupational Safety and Health Administration (OSHA), 40-hour, Hazardous Waste Operations and Emergency Response (HAZWOPER) training and be current with respect to 8-hour refresher training prior to mobilization. Both Kennedy/Jenks Consultants and Sevenson will prepare site-specific health and safety plans (HASPS), including an assessment of site hazards, descriptions of engineering controls to be used for airborne dust, a map describing routes to the nearest hospital, etc. Personnel working at the site will don Level D personal protective equipment (PPE).

Applicable requirements of WAC 173-303-330 through 173-303-360 will also be followed during site activities. Although these codes primarily address permanent TSD facilities, certain requirements such as classroom training for emergency preparedness will be adapted to meet site-specific requirements. For example, in lieu of classroom training, daily safety briefings during performance of site activities will address pertinent safety procedures. Applicable safety devices required by these codes will also be maintained onsite (e.g., a cellular phone or two-way radio and fire extinguishers).

## CLEANUP STANDARDS

As stated in TBG guidance, cleanup standards will apply only in the event of releases from the TCU that pose a threat to human health and the environment. Because dangerous waste contained in the TCU consists of lead-containing soil, as opposed to a liquid material, releases are not anticipated. In the event of minor spillage of soil outside the TCU perimeter, cleanup will include scraping the soil from the ground surface. (Note: After treatment, when soil is being loaded into transport trucks, the soil will no longer exhibit the DW characteristic for lead.)

## LAND DISPOSAL RESTRICTION STANDARDS

Applicable land disposal restriction requirements cited in the TBG guidance, including those promulgated under 40 CFR 268, will be followed for soil in the TCU. The requirement to develop a WAP is addressed in the Confirmation Sampling/Waste Analysis Plan section above.

We look forward to discussing this work plan with Ecology. If you have any questions regarding the information provided, please call us at (253) 874-0555.

Very truly yours,

KENNEDY/JENKS CONSULTANTS

Galen C. Davis

Galen Davis
Geologist

Ty C. Schreiner

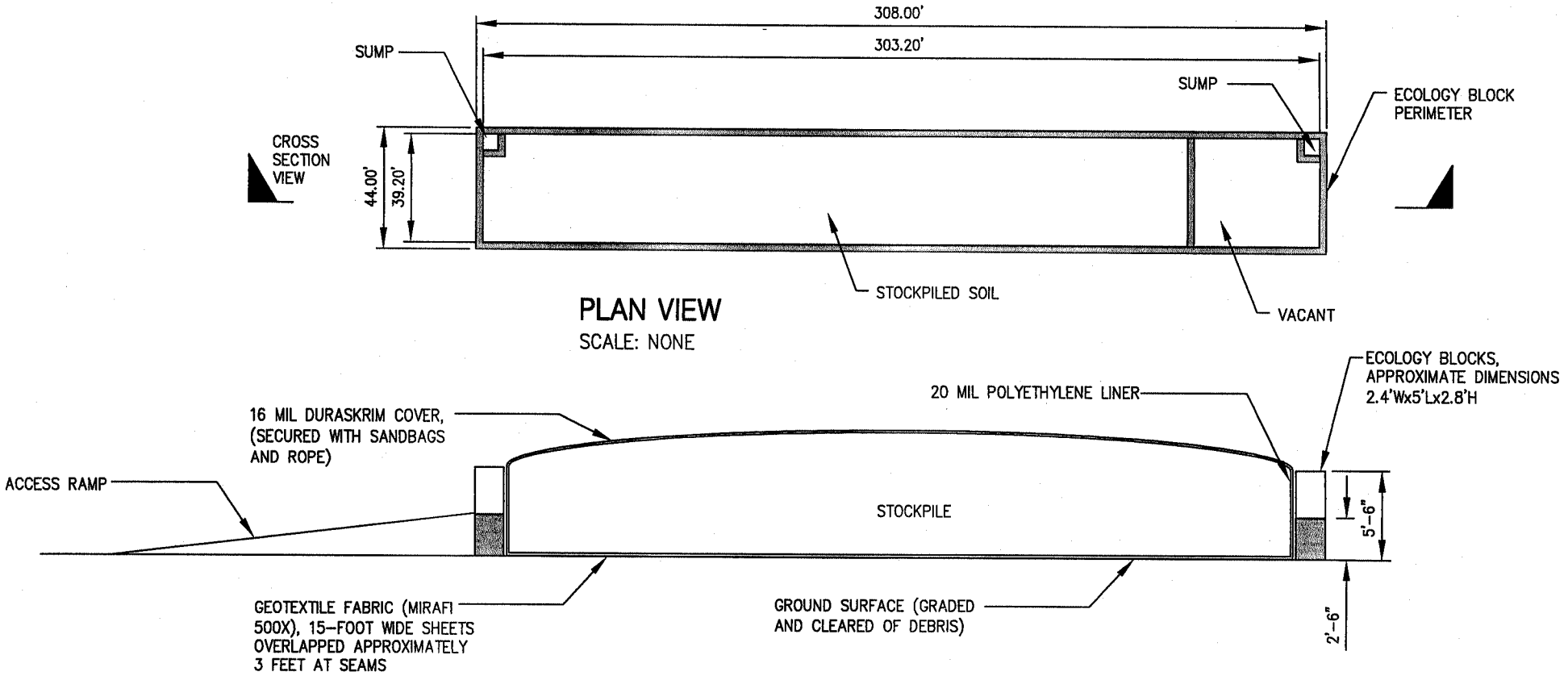
Ty C. Schreiner
Vice President

by NG

Attachment

cc: Mr. Guy Sternal, Eisenhower & Carlson

# Figure




**Kennedy/Jenks Consultants**

FORMER TACOMA METALS FACILITY
TACOMA, WA

**CONSTRUCTION DETAILS**
**TEMPORARY CONTAINMENT UNIT (TCU)**
**FOR OFFSITE SOIL MATERIALS**

996098.00/TCU DRAWING

**FIGURE # 1**

# Attachment A

Treatability Study Work Plan
Prepared by Sevenson Environmental Services, Inc.

# TREATABILITY STUDY WORK PLAN

Tacoma Metals Site

Tacoma, Washington

*Prepared For:*

Kennedy/Jenks Consultants

Federal Way, WA

*Prepared By:*

Sevenson Environmental Services, Inc.

Midwest Division

April 2006

## TABLE OF CONTENTS

## 1.0 INTRODUCTION

Sevenson Environmental Services, Inc. (Sevenson) presents this treatability study work plan for the stabilization of soil from the Tacoma Metals Site located in Tacoma, Washington. The plan presents the treatability study objectives, the treatability study facility and analytical laboratory location, a sample collection plan, a description of the treatability testing and the treatability study schedule.

## 2.0 TREATABILITY STUDY OBJECTIVES

The objective of the treatability study are to select a treatment mix design that will:

1. Achieve a TCLP Lead value of less than 5 mg/l.

## 3.0 TREATABILITY STUDY AND ANALYTICAL LABORATORY FACILITY

Sevenson proposes to use its wholly-owned subsidiary, Waste Stream Technology, Inc. (WST) of Buffalo, New York, to perform the treatability testing, including all analytical testing. WST is located at the following address:

Waste Stream Technology, Inc.
302 Grote Street
Buffalo, NY 14207
Phone: (716) 876-5290

Facility Director: James Hyzy, Ph.D.
Treatability Study Director:
Chris Rice
Phone : (219) 756-4686

WST has the following accreditations:

U.S. Army Corps of Engineers

New York State Department of Health

New Jersey Department of Environmental Protection and Energy

USEPA Region II - approved PCB R&D Treatability Laboratory

The laboratory is capable of analyzing multi-media samples that include soil (surface and subsurface), aqueous (ground and surface waters), drum content screening, compatibility and characterization testing, and analysis of sludges and other materials.

## 4.0 SAMPLE COLLECTION PLAN

Upon approval of the Treatability Study Work Plan, Kennedy/Jenks Consultants will mobilize to the Tacoma Metals Site to collect samples necessary to perform the treatability study. The objective of the sampling event will be to collect material which is representative of site contamination. Forty-five to fifty-five pounds of sample will be collected.

Sample location will be determined by Kennedy/Jenks Consultants , and will be collected by Kennedy/Jenks Consultants personnel. The sample will be collected with a soil trier composed of a stainless steel coring tube, a stainless steel bucket auger, or trowel from material excavated from a test pit with a tracked excavator. Sampling instruments will be decontaminated prior to sample collection.

Sample will be composited into one (1) container. Kennedy/Jenks Consultants will utilize decontaminated polypropylene 5-gallon containers fitted with a rubber-sealed locking lids. Sevenson

anticipates that (1) 5-gallon container filled with forty-five to fifty-five pounds will be a sufficient volume of material to complete the treatability study. The material will be mixed to apparent homogeneity in the field with a shovel prior to being sealed with the locking lid. Alternatively, sample may be homogenized upon receipt at WST.

The bulk sample, designated as "Sample S-1", will be shipped under chain-of-custody by common carrier to WST. The chain-of-custody form that accompanies the sample will indicate whether homogenization will be required by WST laboratory personnel.

## 5.0 TREATABILITY TESTING

Treatability testing will be performed on soils from the project site in accordance with the contract documents. Treatability testing will consist of the following general steps:

1. Phase I - Initial soil characterization.
2. Phase II - soil treatments.
3. Analysis of Phase II soil treatments.

### 5.1 Phase I -Initial Soil Characterization

Upon receipt at WST the sample will be logged and weighed. The container will then be opened and, if necessary, the contents will be thoroughly mixed to apparent homogeneity. Aliquots of material will be removed from the 5-gallon pails as needed for both characterization and treatability mix design preparation. The bulk sample will be mixed prior to removal of any aliquot. After sub samples are removed for analysis or preparation of a mix design, the 5-gallon sample container will remain sealed. Initial characterization parameters and methods are listed in Table 1.

| Table 1<br>Initial Soil Characterization Test Methods | |
|---|---|
| **Parameter** | **Method** |
| Total Chromium | USEPA SW-846 Method 6010B |
| Total Lead | USEPA SW-846 Method 6010B |
| TCLP Extraction | USEPA SW-846 Method 1311 |
| RCRA Metals in Extraction Fluid | USEPA SW-846 Method 6010B |

Other observations that will be made during the initial soil characterization will include a physical description of the soil sample, any handling problems or heterogeneity of the material.

### 5.2 Phase II - Soil Treatments

WST will investigate the use of various concentrations of MAECTITE reagent in order to determine the most technically feasible and cost-effective regimen. Specifically, three dosage rates of MAECTITE reagent will be evaluated (Table 2).

| Table 2<br>Stabilization Mix Design Formulations to be Evaluated | | |
|---|---|---|
| Reagent Types | Dosage (% mass) | Reaction Time (hours) |
| MAECTITE reagent | 1.0 | 3 |
| MAECTITE reagent | 2.0 | 3 |
| MAECTITE reagent | 3.0 | 3 |

Preparation of treatability samples will consist of removing a 100 gram aliquot from the bulk sample container for every treatment mixture to be evaluated. The material is then transferred to a polypropylene mixing vessel where reagents and water are added to the sample. The sample is mixed within the mixing basin by a technician using a wooden spatula until the treatment chemical is incorporated fully into the soil/water admixture. Test samples will then be allowed to cure in at ambient conditions for the specified curing time prior to analysis.

### 5.3 Analyses of Phase II Soil Treatments

Phase II analyses will assess the conversion of lead to insoluble mineral forms over time for each reagent dosage rate and reaction interval as required. Treated soil characterization parameters and methods are listed in Table 3.

Table 3

Treated Soil Characterization Test Methods

| Parameter | Method |
|---|---|
| TCLP Extraction | USEPA SW-846 Method 1311 |
| Cr and Pb in Extraction Fluid | USEPA SW-846 Method 6010B |

Other observations that will be made during the treated soil characterization will include a physical description of the soil sample, any handling problems, physical and chemical uniformity of the material. The results of the phase II analyses will be provided to Kennedy/Jenks Consultants for review and approval.

## 6.0 TREATABILITY STUDY SCHEDULE

Initial soil characterization will proceed upon receipt of the soil sample from the site. It is expected that the soil treatments and analyses will take place over a period of 1 to 2 weeks.
Scheduled testing that falls on weekends or holidays would take place on the earliest day before or after the scheduled day.

A Treatability Study Report will be submitted to Kennedy/Jenks Consultants no longer than 5 calender days after completion of the treatability study.