



August 15, 2011

Dr. Teklewold Ayalew
Regional Water Quality Control Board, Los Angeles Region
320 West Fourth Street, Suite 200
Los Angeles, California 90013

**Subject: Addendum to Pilot Test Work Plan
Remedial Excavation and In-Situ Treatment Pilot Testing
Former Kast Property
Carson, California
Site Cleanup No. 1230, Site ID 2040330**

Dear Dr. Ayalew,

URS Corporation (URS), with technical support and contributions from Geosyntec Consultants, Inc. (Geosyntec), is conducting a series of environmental investigations of the Former Kast Property (Site) in Carson, California on behalf of Equilon Enterprises LLC, doing business as Shell Oil Products US (SOPUS). These investigations are in response to Section 13267 letters issued by the California Regional Water Quality Control Board – Los Angeles Region (RWQCB or Regional Board) on May 8 and November 18, 2008 and Cleanup and Abatement Order (CAO) No. R4-2011-0046 issued by the Regional Board to SOPUS on March 11, 2011.

Among other directives, Section 3.a. of the CAO orders SOPUS to “[d]evelop a pilot testing work plan, which includes: 1) evaluation of the feasibility of removing impacted soils to 10 feet and removal of contaminated shallow soils and reservoir concrete slabs encountered within the uppermost 10 feet, including areas beneath residential houses; and 2) remedial options that can be carried out where site characterization (including indoor air testing) is completed; [and] 3) plans for relocation of residents during soil removal activities, plans for management of excavated soil on-site, and plans to minimize odors and noise during soil removal.” The Pilot Test Work Plan (URS and Geosyntec, May 10, 2011) was prepared to address this directive. The purpose of this Addendum is to provide additional information to clarify certain aspects of the proposed pilot testing in response to comments provided by Tetra Tech, the City of Carson’s consultant. Modifications or clarification to the Pilot Test Work Plan in response to these comments are provided below.

➤ **Section 5.15.1 Import Backfill Material**

- **The second paragraph of this section is modified to read:**

The chemical characterization process for soil will be consistent with the Clean Imported Fill Material Information Advisory, published by the Department of Toxic Substances Control (DTSC) in October 2001. Existing environmental documentation specific to the fill site may be utilized by the remedial excavation contractor’s environmental professional to support the proposed

sampling approach and analytical method, if available. To assess the chemical properties of the backfill sources, samples of clean fill will be collected from the designated borrow area. Samples will be collected and analyzed as close to the import date as practicable; however, the timing of testing will be determined by remedial excavation contractor, and may depend upon availability of fill soil sources. Therefore, a specific number of days before import cannot be specified. A maximum of 90 days will be permissible. Backfill soil samples will be placed in laboratory supplied 4-ounce glass jars and transported under chain-of-custody documentation to a state-certified laboratory for chemical analyses. Import soil will be tested by the remedial excavation contractor in accordance with the DTSC Clean Imported Fill Advisory, and data will be reviewed and compared to applicable regulatory criteria for acceptance by URS prior to use as a backfill source.

- **The following text is inserted prior to the final paragraph of this section:**

Default acceptance criteria for volatile and semi-volatile organics in backfill soils will be “not detected” above their respective laboratory reporting limits. The acceptance criteria for total petroleum hydrocarbons (TPH) in the gasoline range (TPHg) will be 100 milligrams per kilogram (mg/kg), and the limit will be 1,000 mg/kg for total petroleum hydrocarbons in the diesel range (TPHd), and motor oil range (TPHmo). Criteria for metals will be based on California background concentrations and the DTSC arsenic background evaluation. Fill soils will be visually monitored as they are imported and placed. Import backfill material will be monitored onsite for visible and olfactory evidence of impact and with a PID by an environmental engineer/scientist at the time of import and as it is placed.

- **Section 6.0 In-situ Remediation Pilot Testing**

- Note that pilot test locations are continuing to be evaluated, and for in-situ chemical oxidation (ISCO) final locations may depend on results of bench-scale testing as discussed in Section 6.1.4. Following the completion of bench-scale studies, when pilot test locations are selected, maps will be provided. Therefore, showing potential locations for the in-situ testing using ISCO and bioventing are not currently available.

- **Section 6.1.7.2 Ozone Pilot Test**

- **The following text is inserted as the final paragraph of this section:**

As the ozone injection locations are expected to be in unpaved areas, precautions will be taken to avoid daylighting and exposure to ozone. Precautions may include soil vapor extraction at a flow rate slightly in excess of the ozone injection rate, ozone-specific well construction, and ambient air monitoring for ozone both within the ozone production enclosure and pilot test

operations. A HASP addendum will include air monitoring activities and action levels. If an action level is exceeded work will stop, corrective action will be identified and resolved prior to re-starting work.

➤ **Section 6.2.4 Bioventing Pilot Test Location Selection**

- **The following text is inserted prior to the final paragraph of this section:**

Based on our recent evaluation to select properties for pilot testing, the tests will not be co-located where other pilot testing methods are being performed. However, following an evaluation of the pilot study, an evaluation may be performed to evaluate whether combined treatment technologies may be appropriate in certain instances.

➤ **Section C.5.1 Bench Testing**

- **This section is modified in its entirety to read as follows:**

Parameters used to select the soil for bench-scale testing will be visual observations, PID screening in the field, and TPH in excess of 5,000 mg/kg based on Phase II Site investigation results. Soil samples will be collected using a hand auger. Standard protocols for field screening, logging, decontamination, and sample chain of custody will be followed. Soil samples will be collected in 500 mL pre-cleaned, amber, wide mouth jars with septa and minimal headspace. Samples will be inspected at the treatability study laboratory prior to compositing. A soil composite will be prepared from the silty sand material present in the target vertical interval. A baseline sample of the composite sample will be analyzed for the identified TPH carbon-chain ranges using EPA Method 8015M. Approximately five ozone and eight sodium persulfate reactors will be prepared for each bench-scale test. Approximately 200 to 250 grams of soil will be used in the individual reactors.

Persulfate bench-scale testing will be conducted using slurries of Site soil and distilled water. The base demand of the Site soils will be measured before persulfate testing to identify the base dosage to be used. Preliminary estimates of the initial persulfate concentrations are: 35, 20 and 10 percent by weight in the aqueous phase of the slurries. The soil to water ratio will be maintained at approximately 1 to 2. During persulfate testing, pH, persulfate (over time), and oxidation-reduction potential will be monitored.

Ozone bench-scale testing will be conducted using unsaturated soil columns. Ozone gas will be humidified prior to the soil columns to maintain consistent water content in the soil columns during bench-scale testing. Ozone concentrations will be applied to the soil columns at approximately 2 percent by weight in the gas phase and three dosages will be evaluated based on variations in exposure period. The longest duration test will be conducted in duplicate to



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provide two data sets on ozone consumption over 15 days. A control column will be tested with nitrogen to assess losses to volatilization. During ozone testing, moisture content, ozone (influent and effluent), and flow rate will be monitored.

Persulfate and ozone typically do not lead to off-gassing and foaming, nor do they typically increase temperature significantly. Hydration of granular sodium hydroxide is exothermic; safe work procedures utilize aqueous sodium hydroxide. Neither sodium hydroxide nor persulfate will be handled during onsite pilot testing.

Soils from the bench-scale tests will be composited and sampled after 15 days. Compositing soil following the bench-scale testing is required to minimize the variation in TPH content between experimental series (i.e. systems with different oxidant dose). Prior to compositing samples, soil will be chilled to 4°C and then combined in a polyethylene bag at 4°C. Headspace will be minimized prior to mixing. The composite sample will then be sub-sampled back into the 500 mL jars with septa prior to preparing experimental systems. Bench-scale testing will stop at 15 days, which is adequate to evaluate bench-scale objectives and provide a basis for site-specific field pilot-scale testing.

Samples will be analyzed in triplicate for TPHg, TPHd, and TPHmo. Triplicate analysis will support an evaluation of variability in treatment effectiveness under idealized conditions. Analytical testing for TPHg, TPHd, and TPHmo will be performed in accordance with EPA Method 8015M (analyzed in triplicate), SW-846 6010B. No other chemicals of concern (COCs) will be evaluated during the testing. Volatile organic compound (VOC) losses will occur during treatability testing (both during compositing and in control systems). Over 99 percent of the COC mass is TPH as compared to VOCs, therefore VOC losses will have a negligible effect on oxidant consumption. Spiking composited soils with VOCs to replenish VOC content is technically challenging and not recommended. Inclusion of VOCs in the bench-scale testing would confound the data analysis and evaluation of the stated bench-scale testing objectives. Whereas, evaluation of bench-scale testing objectives based on oxidant and TPH as the primary lines of evidence is adequate to meet the bench-scale testing objectives.

META Environmental Inc. of Watertown, MA, a NELAC-certified laboratory, will conduct the bench-scale testing under the technical direction of Geosyntec.

Discrete masses of hydrocarbons have been observed at the Site and pose challenges for ISCO. Bench testing will be conducted to assess the effect of persulfate and ozone on discrete masses of hydrocarbons. Discrete masses of hydrocarbons may vary in size and surface area over a period of exposure to an oxidant. Oxidants may affect the surface of discrete masses of hydrocarbons causing changes in availability of the hydrocarbons to the oxidant and the behavior of hydrocarbons after oxidant has been consumed. For example, hydrocarbon droplets have been shown to form skins after prolonged exposure to the environment (Nelson



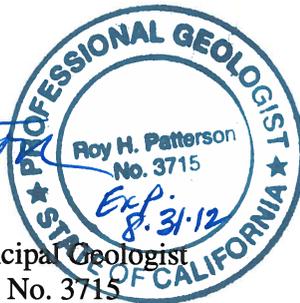
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et al., 1996). Depending on the observed characteristics of impacted soils in the excavations conducted during the pilot tests, additional bench-scale testing may be developed to evaluate the ability of oxidants to penetrate into discrete masses of hydrocarbons.

The preceding modification provides additional details regarding certain aspects of the proposed pilot testing. We look forward to your response to the Pilot Test Work Plan and to this Addendum. If you have any questions, please contact Roy Patterson at 714-433-7699, or Mark Grivetti at 805-979-9135.

Sincerely,
URS Corporation

Roy H. Patterson, P.G.
Vice President and Principal Geologist
Calif. P.G. Registration No. 3715



Geosyntec Consultants

Mark Grivetti, P.G., C.Hg.
Principal

I am the Project Manager for Equilon Enterprises LLC doing business as Shell Oil Products US for this project. I am informed and believe that the matters stated in the Addendum to Pilot Test Work Plan dated August 15, 2011 are true, and on that ground I declare, under penalty of perjury in accordance with Water Code section 13267, that the statements contained therein are true and correct.

Gene Freed
Project Manager
Shell Oil Products US
August 15, 2011



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References:

DTSC, 2001. Information Advisory, Clean Imported Fill Material. Department of Toxic Substances Control, October 2001.

URS and Geosyntec, 2011. Pilot Test Work Plan, Remedial Excavation And In-Situ Treatment Pilot Testing, Former Kast Property, Carson, California (Site Cleanup No. 1230, Site ID 2040330), May 10, 2011.