April 17, 2009

Via Electronic Mail

Mr. Sean Sheldrake
U.S. Environmental Protection Agency
1200 Sixth Avenue
Suite 900, M/S ECL-110
Seattle, Washington 98101

Subject: Revisions to the Arkema EE/CA Geotechnical Program
U.S. EPA Region 10 Docket No. CERCLA 10-2005-0191

Dear Mr. Sheldrake:

In response to your April 8, 2009 email, this letter provides a summary of the proposed revision to the geotechnical program for the Arkema Engineering Evaluation/Cost Analysis (EE/CA). As mentioned in my April 7, 2009 email, the proposed plan includes replacing some of the geotechnical boreholes with cone penetration tests (CPTs) as well as other revisions to the geotechnical plan that are summarized in this letter. The details of these proposed revisions will be included in the revised Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP), which are due to EPA on May 15, 2009.

Geotechnical Field Investigation Program

The geotechnical field investigation presented in the previous EE/CA Field Sampling Plan indicated that 18 geotechnical hollow-stem auger borings would be drilled over the water using a barge-mounted drill rig. This geotechnical investigation program will be modified as follows:

1. The geotechnical investigation program will consist of 3 mud-rotary sediment borings and 13 CPTs performed from a barge. The exploration locations are shown on Figure 2-1. The drilling technique was changed from hollow-stem auger drilling to mud-rotary drilling because the drilling mud used for mud-rotary drilling prevents soil heave in the borehole. Soil heave would otherwise obscure the results of standard penetration testing (SPT).

2. The 3 borings will be collocated with 3 of the CPTs to allow development of site-specific correlations between CPT parameters and parameters based on sampling and laboratory testing. The co-located explorations were selected strategically based on existing subsurface information. They were selected such that correlations for both cohesive and granular soils can be established. During the CPT, tip resistance, sleeve friction, and pore

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pressure are measured. These parameters are then used to estimate the soil behavior type, which typically correlates well with stratigraphy obtained from drilling and sampling. CPT parameters will also be correlated with other important soil parameters used in geotechnical analysis and design such as soil/sediment shear strength. No samples will be taken during the CPT.

3. Each of the explorations will be advanced to bedrock. Based on existing basalt surface information for the site, bedrock will be encountered at relatively shallow depths. The sediment cover between the shoreline and the existing docks is on the order of 20 to 40 feet. The sediment cover in the channel is only on the order of 2 to 10 feet. Sediment cover is important for the feasibility of installing sheet pile structures.

4. Rock coring will be performed to 20 feet below the bedrock contact elevation in one of the borings (SPT-1; Figure 2-1) to determine the quality of the rock. The constructability of certain structures may depend on the "rippability" of the bedrock at the site. Therefore, the quality and strength of the rock needs to be assessed.

5. Standard penetration tests (SPTs) will be performed in the borings continuously or at 2.5-foot intervals for the first 20 feet of drilling and at 5-foot intervals thereafter. The SPT is an in-situ testing technique that is used to estimate soil density of granular material and consistency of cohesive material. Correlations of SPT results with soil parameters are used in geotechnical analysis and design.

6. Disturbed split spoon samples will be collected for visual soil/sediment classification during standard penetration testing. Laboratory testing consisting of index property testing for soil/sediment classification will be conducted on selected split spoon samples (refer to Geotechnical Laboratory Testing Program below).

7. Relatively undisturbed, thin-wall tube samples (Shelby tubes) will be collected for advanced laboratory testing (consolidation and shear strength testing) and index property testing on selected samples.

8. Shelby tubes will be collected using a piston sampler (Osterberg or Gregory Undisturbed Sampler) to ensure proper sample recovery and minimization of sample disturbance. Shelby tubes will be handled with utmost care so as to minimize further sample disturbance after retrieval. Sample disturbance can obscure the results of advanced geotechnical testing including shear strength and consolidation parameters.

9. Shelby tubes may need to be collected in separate offset borings after SPT sampling. Ideally, CPT is performed at that location prior to drilling. If the CPT is performed first,

the stratigraphy at the boring location is already known at the time of drilling and the depths for Shelby tube sampling can be targeted more easily and possibly without the use of a separate boring. Shelby tubes will only be collected in cohesive material (i.e., silt and clay). Based on existing subsurface information, relatively thick deposits of cohesive material are expected to be encountered in borings SPT-1 and SPT-3. Shelby tube sampling will therefore likely be focused on these two borings.

Geotechnical Laboratory Testing Program

The EE/CA Field Sampling Plan indicates that a laboratory testing program will be performed that will include index property testing and advanced testing on relatively undisturbed samples (i.e., sediment shear strength and consolidation testing). The EE/CA Field Sampling Plan will be modified as follows:

1. The previous EE/CA Field Sampling Plan indicated the types and number of tests that would be performed in each boring. It is not practical to determine exactly which tests will be performed prior to start of the field investigation. The type of testing that should be performed depends on the type of soil/sediment that is encountered in the borings. Generally, the types of tests appropriate for cohesive as opposed to granular soils/sediments are different. It is therefore important to retain sufficient flexibility in selecting the tests for the samples collected in the field. Tests will be assigned by a geotechnical engineer at the end of the field investigation based on conditions encountered during the field program in conjunction with engineering judgment.

2. The following laboratory testing program and estimated number of samples will be used for the EE/CA:

Table 1: Estimated Number of Laboratory Tests

Test	ASTM Method	Estimated Number of Tests
Moisture Content Determination	D 2216	50
Grain Size Distribution (Sieve only)	D 422	10
Atterberg Limits	D 4318	14
Bulk Density	(from Shelby tube cuttings)	
Specific Gravity	D 854	4
Shelby Tube Sample Extrusion	--	10
Consolidation	D 2435 (Method B)	4
UU Triaxial	D 2850	4
CU Triaxial	D 4767	9

Unconfined Compressive Strength (Rock)	D 7012	3
Point Load Index (Rock)	D 5731	5
Hydraulic Conductivity	D 5084	3

3. Drained shear strength of granular soils will be estimated based on SPT and CPT results. Direct shear testing is not typically used for determination of the in-situ shear strength of granular soils. Therefore, direct shear testing was removed from the EE/CA Field Sampling Plan.

4. Unconfined compressive strength and point load index testing of rock samples were added to the EE/CA geotechnical program to assess the strength of the rock for the purpose of subsequent constructability assessments.

Please contact me at (610) 594-4430 if you have any questions about or wish to discuss any of these revisions to the EE/CA geotechnical investigation and testing program.

Sincerely,

Legacy Site Services LLC


for

J. Todd Slater
Manager, Environmental Technologies
And Remedial Procurement

cc: (electronic) James M. Anderson, Oregon DEQ
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Pete Wakeland, Confederated Tribes of the Grand Ronde Community of Oregon
Tom Downey, Confederated Tribe of the Siletz Indians
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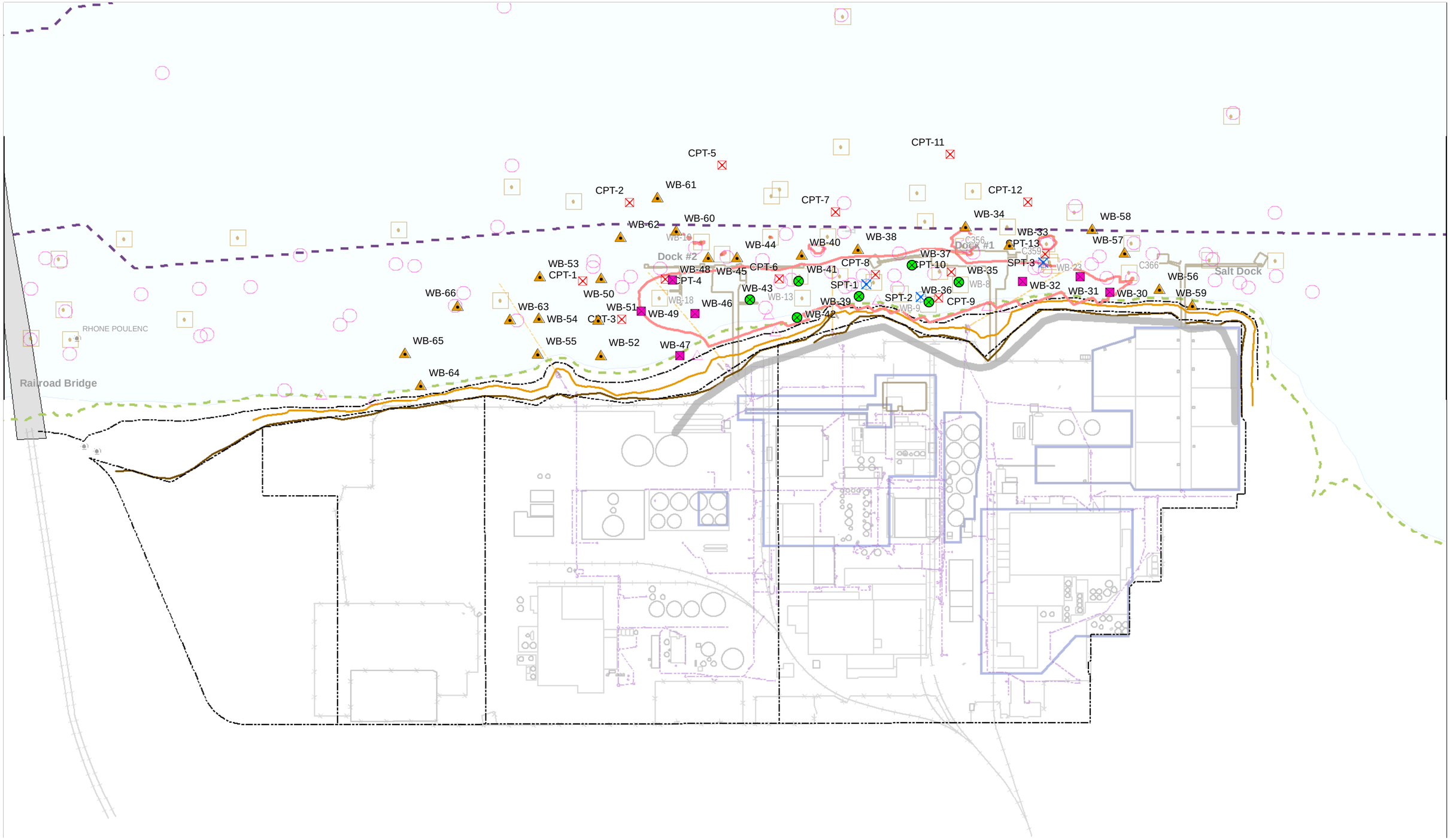

200 100 0 200 Feet

FEATURE SOURCES:
Bathymetric Information: Multibeam bathymetric survey conducted by David Evans and Associates, Inc. from February 6 - March 6, 2004.
Contours were derived from a Digital Terrain Model (DTM) based on a three-foot grid of multibeam data.
Vertical Datum: North American Vertical Datum of 1988(NAVD88).
Horizontal Datum: North American Datum of 1983 - 91 adjusted (NAD83/91), State Plane Coordinate System (SPCS), Oregon North Zone.
Units: International Feet.
Basemap: Basemap features updated in 2006 by David Evans and Associates. Ordinary high water line, top of bank, and other site features surveyed in April 2006.
Most buildings and structures on the Arkema site have been demolished or removed.
OHW and Top of Slope lines were created from the April 2006 DEA survey, the +12ft contour line was derived from the combined lidar/bathymetry grid.
Lot Lines: Created by importing pdf file from ERM, georeferencing to CAD lines (RMS error = 2.3042) and heads-up digitizing the lot lines.

- E-Sewer-L
- Storm Drain
- 12ft Contour
- Bridges
- Navigation Channel
- River
- Outfalls

Figure 2-1
Arkema EE/CA
Proposed Sediment Sampling Locations