



July 8, 2014

Mr. Weiquan Dong, PE  
Bureau of Corrective Actions, Special Branch Projects  
Nevada Department of Environmental Protection  
2030 E. Flamingo Rd., Suite 230  
Las Vegas, Nevada 89119

Subject: AP-5 Sediment Characterization Sampling and Analysis Plan (Revised)

Project: Nevada Environmental Response Trust Site;  
Henderson, Nevada (Facility ID # H-000539), Henderson, Nevada

Dear Mr. Dong:

Tetra Tech, Inc. (Tetra Tech) appreciates the opportunity to facilitate the closure of the AP-5 pond (AP-5) at the Nevada Environmental Response Trust (NERT or the "Trust") site in Henderson, Nevada. On behalf of the Trust, this AP-5 Sediment Characterization Work Plan (Work Plan) has been developed to present planned sampling operations at the former AP-5 pond. This plan is the second of three work plans required to complete all closure activities associated with AP-5.

This plan describes sampling and testing to better characterize the upper layer of solids with the former AP-5 pond from both a chemical and geotechnical perspective. Figure 1 shows AP-5 and the planned sampling locations. Testing will include the collection of samples from within the pond and analysis for perchlorate as well as basic physical parameters such as grain size.

## Background

AP-5 is an on-site, dual high density polyethylene (HDPE) lined, surface impoundment that was used in the manufacturing process for ammonium perchlorate. AP-5 contains residual ammonium perchlorate solids, sodium chloride and other solids. The closure of AP-5 was addressed in the Administrative Order on Consent dated April 12, 2005 (2005 AOC). The 2005 AOC specified that an additional bioreactor be designed, purchased, and installed to allow for treatment of the ammonium perchlorate residuals from AP-5 in the groundwater extraction and treatment system (GWETS). The additional reactor was installed, and treatment of the AP-5 residuals was conducted between 2006 and 2012.

Following cessation of the flushing program, ENVIRON, on behalf of the Trust, submitted a work plan for performing characterization of the pond solids, the work plan was approved and samples collected after the residual solids were allowed to partially dry. ENVIRON completed the report on the characterization program on March 31, 2014 (Characterization Report).

The Characterization Report showed that there are two distinct layers of solids. The upper layer is 2 to 2.5 feet thick and is composed of light brown, silty sand. The lower layer was under the silty sand layer and was described as "partially cemented, white granular crystals" and was dry at the surface, becoming increasingly wet with depth. The lower layer has a thickness of 0.5 to 1 foot and was wet to saturated. The conclusion of the Characterization

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Report is that the solids could not be cost-effectively excavated and disposed due to the reactive nature as determined by the DOT/UN tests.

## AP-5 Data Gaps

Since the previous composite samples that were collected for chemical analysis included a mixture of both the upper and lower layers, the amount of perchlorate contained in the upper layer is unknown. Tetra Tech believes that these solids may contain significantly lower concentrations of perchlorate such that they can be disposed of as a solid waste following removal of the ammonium perchlorate salts. In addition, data regarding the particle size and density of the upper layer solids is required to design the recirculation system to ensure that these solids are suspended to allow dissolution of the ammonium perchlorate layer.

## Sampling and Analysis

A total of five locations have been identified within the pond for collecting samples (Figure 1). A total of eight samples will be collected from the upper two feet and sent to an analytical laboratory for chemical analysis. Based on the visual characteristics of the samples as observed during the sampling effort, we anticipate up to four samples of the sediment will also be sent to a geotechnical laboratory for gradation and density testing. It is assumed that the lower layer is ammonium perchlorate crystals and will not be sampled.

One random location will be selected in each quadrant and one sample from the center of the pond. Samples will be obtained at a depth of 0.5 – 1.0 feet below the sediment surface at each location. A sample will also be obtained from a depth interval of 1.0 – 2.0 feet below the sediment surface at three locations (SP-1, SP-4 and SP-5) to provide a more comprehensive vertical profile of the pond sediment. Samples will be collected using a plastic shovel, scoop and/or trowel. Samples will be placed in a container provided by the state certified laboratory. The specific sampling tool will be selected to assure comparability, obtain adequate sample volume, and limit the degree of hazard during sample collection. Care will be taken to not impact or damage the underlying liner while sampling. All work is anticipated to be performed in Level D Modified personal protective equipment (PPE) and will follow all guidelines outlined in the Site-Specific health and safety plan (HASp) to be prepared for the work.

All sample containers will be clearly labeled with the following information:

- Client name, project title, project number
- Sample location
- Sample identification number
- Date and time of collection
- Type of sample
- Initials of sampler
- Container number (i.e. "Container \_ of \_ ")

After labeling, each sample will be sealed in a Ziploc-type plastic bag and refrigerated or placed upright in a cooler. Wet ice in double Ziploc-type bags will be placed in the cooler with the samples to maintain a temperature of 4 degrees Celsius (CC)  $\pm$  2°C prior to and during transport to the laboratory.

The samples will be initially analyzed for perchlorate (EPA Method 6860). If the samples are found to be non-hazardous the samples will then be submitted for particle size distribution analysis (ASTM D2487).

Standard chain-of-custody (COC) procedures will be used to maintain and document sample integrity during collection, transportation, storage, and analysis. Laboratory services will be provided by Test America

Laboratories, Inc., a Nevada-certified laboratory located in Irvine, California. Samples will be analyzed using a standard turnaround time (TAT) of 10 days.

## Reporting

A description of the sampling method, a tabular summary of the analytical results, a sample location map, findings and a discussion of results and conclusions will be presented in a technical report. Supporting information such as laboratory results and Chain of Custody documentation will be provided as appendices to the report.

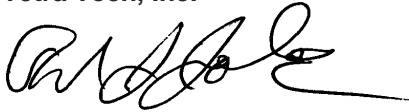
## Schedule

Tetra Tech will conduct sampling within one week of approval of this Sampling and Analysis Plan. Analytical Laboratory results are expected within three weeks of submittal to the laboratory. Analysis of the physical properties is anticipated to be completed within two weeks of receipt by the geotechnical laboratory. A summary report will be generated within one week of receipt of the results.

We appreciate your consideration of this revised Sampling and Analysis Plan. I can be reached at 720-931-9372 or via email at [frank.johns@tetrattech.com](mailto:frank.johns@tetrattech.com).

Sincerely,

**Tetra Tech, Inc.**



Frank J Johns, II, PE  
Vice President and Principal Engineer



Steven Bradley, CEG, CEM 1333  
Principal Engineering Geologist

Attachment



PROPOSED AP-5 POND SEDIMENT  
SAMPLE LOCATION MAP

NEVADA ENVIRONMENTAL RESPONSE TRUST SITE  
FACILITY ID # H-000539  
HENDERSON, NEVADA

**Legend**

 Proposed Sediment Sample Location with Location ID

JULY  
2014



**FIGURE  
1**

Map Source: Source: ESRI, i-cubed, USDA FSA, USGS, AEX,  
GeoEye, Getmapping, AeroGrid, IGP