NYE COUNTY NUCLEAR WASTE REPOSITORY PROJECT OFFICE

TEST PLAN

TITLE: **Groundwater Sampling and Analysis of WT Wells, April 2005**	**REVISION: 0** **DATE: 04-19-05** **PAGE: 1 OF 6**
TEST PLAN NUMBER: **TPN-11.2**	**SUPERSEDES:** **New Document**
APPROVAL 4-20-05 **David Swanson, Interim Project Manager Date**	**CONCURRENCE** 4/20/05 Ed Dix for Dale Hammermeister **Dale P. Hammermeister, Date** **On-Site Geotechnical Representative** Ed Dix for John Walton 4/20/05 **John Walton, Principal Investigator Date** 4/20/05 **Doug Davis, Date** **Project Quality Assurance Officer**

1.0 INTRODUCTION

This test plan (TPN) provides detailed groundwater sampling and analysis instructions specific to a Nye County Nuclear Waste Repository Project Office (NWRPO) groundwater sample collection session planned for 3 WT wells scheduled for April 2005. Proposed wells include: USW WT-1, UE-25 WT #17, and UE-25 WT #3. This TPN supplements work plan WP-11, *Groundwater Chemistry Sampling and Analysis* and technical procedure TP-8.1, *Field Collection and Handling of Water Samples*. This TPN identifies testing laboratories and provides detailed guidance for sample collection, preservation, storage, and shipping.

2.0 ANALYTICAL LABORATORIES

2.1 ACZ Laboratories

ACZ Laboratories (ACZ) in Steamboat Springs, Colorado, will analyze all groundwater samples, referred to in this plan as water samples, for indicator parameters, major anions and cations, and

nutrients (i.e., nitrate plus nitrite, phosphate, and ammonium). The ACZ point of contact, mailing address, telephone number, and email address are listed below.

Tony Antalek, Project Manager
ACZ Laboratories, Inc.
2773 Downhill Dr.
Steamboat Springs, CO 80487
970-879-6590 ext. 107
TonyA@acz.com

2.2 Coastal Science Laboratories, Inc.

Coastal Science Laboratories, Inc. (CSL) in Austin, Texas, will analyze all water samples, except equipment rinsate and field blanks as defined in Section 4.0, for the stable isotope ratio analysis (SIRA) of oxygen and hydrogen in water. The CSL point of contact, mailing address, telephone number, and email address are listed below.

Richard Anderson
Coastal Science Laboratories, Inc.
6000 Mountain Shadows Dr.
Austin, TX 78735
512-288-5533
csl@ccsi.com

2.3 Beta Analytic, Inc.

Beta Analytic, Inc (Beta) in Miami, Florida, will analyze all water samples, except equipment rinsate and field blanks as defined in Section 4.0, for SIRA of carbon in total dissolved inorganic carbon and radiocarbon 14 (C-14). The Beta point of contact, mailing address, telephone number, and email address are listed below.

Darden Hood, President
Beta Analytic, Inc.
4895 SW 74 Court
Miami, FL 33155
305-667-5167
dhood@radiocarbon.com

3.0 LABORATORY AND FIELD ANALYSES

3.1 Laboratory Analyses

A summary of water chemistry analyses to be conducted on samples from the April 2005 sampling session is presented in Table 1. No new analytes were added for this sample session, however a number analytes in previous sessions were not selected for this session. Water samples will be collected using a bailer and therefore the amount of water that will be available for samples is not known at this time. Priority of analyses is as follows:

1) Major Ions and Indicator Parameters

2) SIRA of oxygen and hydrogen in water

3) SIRA of dissolved inorganic carbon and radiocarbon dating (C-14)

3.2 Water Chemistry Monitoring and Data Collection

Due to the nature of bailed samples, we will not be recording water quality indicator parameters. Effort will be made to evacuate as much water as possible from the wells before collecting samples. Notes will be made in the EWDP Field Geochemistry Scientific Notebook regarding quality of sample and amount of water evacuated before sampling.

4.0 SAMPLE COLLECTION

Bailed samples will be collected from wells USW WT-1, UE-25 WT#17 and UE-25 WT#3 for the laboratory analyses listed in Table 1. If possible, quality assurance (QA) samples will be collected during the sampling session as follows: one blind field duplicate sample, one equipment rinsate sample from the bailer, and one field blank sample. The PI or designee will determine the specific well to be sampled for QA samples. Detailed QA sample collection instructions will be given in the field by the PI or designee and recorded in the geochemistry scientific notebook.

The blind field duplicate will be analyzed for all analytes listed in Table 1; equipment rinsate and field blank samples will be analyzed only for major ions and indicator parameters.

5.0 SAMPLE FILTERING, BOTTLING, AND PRESERVATION

Table 2 summarizes sample filtering, bottling, and preservation requirements for major analyte groups. Filtering and bottle labeling methods are described in TP-8.1. Specific bottle type, size, and quantities are listed in Table 2. The sampling work area (i.e., table or bench tops) should be thoroughly cleaned before sampling and kept as clean as possible during sample collection to minimize sample contamination. When filling sample bottles, note sources of contamination and minimize these sources when possible. When possible, use new, clean tubing with the peristaltic pump to fill sample bottles for each well to minimize contamination.

Rinse bottles with small amounts of the water sample three times, fill the bottle with the required amount, and add preservatives when required, ensuring that all preservative is added. Adding preservatives as a last step helps to ensure that the work area is not contaminated with acids and that the sample is preserved properly. Process samples requiring preservatives last to minimize the chance of contaminating gross chemistry and nutrient samples with acids. Have one person add preservatives and put on new gloves before changing preservative types. It is important to handle preservatives carefully to ensure that they are not spilled in the work area. Preservatives pose a potential safety risk and can easily contaminate samples with nitrate, sulfate, or other ions. If acid preservatives are spilled on the work area, neutralize the acid with a solution of water and sodium bicarbonate, rinse with bottled tap water, and wipe the area dry with paper towels.

6.0 SAMPLE STORAGE

In the field, minimize the exposure of samples to heat and direct sunlight, and transport samples to the NWRPO office at the end of each sampling day. When possible, store samples in the field in coolers with ice packs. In the NWRPO office, store samples in a cool, dry place out of the sun. For samples being sent to Beta, place a tape seal around the cap/bottle joint to help insure the lack of exchange or loss of CO_2 from the water.

7.0 SAMPLE SHIPPING

Ship all samples to the appropriate testing laboratory within 7 days of sampling in boxes or coolers with NWRPO chain-of-custody forms. Place all samples in the boxes or coolers with the caps up; do not place them on their sides. Pad the sides of the box or cooler with bubble wrap and pack samples so that they are held snugly in place. Use additional bubble wrap to prevent the samples from moving during shipping; pack the top of the box or cooler with bubble wrap so that samples cannot move vertically. Make sure that boxes or coolers are securely closed and will not open during shipping. If boxes are used, label box sides with arrows pointing upward towards the box top and clearly label with "THIS SIDE UP".

Ship samples from analyte groups 1, 2, and 4 to ACZ with ice packs, group 3 to CSL, and group 5 to Beta (refer to Table 2). To minimize the chance of contamination if a bottle breaks open, place samples with added preservatives into separate containers, to the extent reasonably possible. Ship all samples by Federal Express to the addresses listed below. Do not ship samples on Friday.

ACZ: ACZ Laboratories
c/o Tony Antalek
2773 Downhill Dr.
Steamboat Springs, CO 80487

CSL: Coastal Laboratories
c/o Richard Anderson
6000 Mountain Shadows Dr.
Austin, TX 78735

Beta: Beta Analytic
c/o Darden Hood
4895 SW 74 Court
Miami, FL 33155

Table 1
Water Chemistry Analyses

Parameter	Method	Detection Limit
Alkalinity as CaCO3	SM2320B – Titration	2 mg/L[a]
Bromide	M300.0 - Ion Chromatography	0.1 mg/L
Chloride	M325.2 - Colorimetric	1 mg/L
Conductivity @25C	M120.1 – Meter	1 umhos/cm[d]
Fluoride	SM4500F-C	0.1 mg/L
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	0.02 mg/L
Nitrogen, ammonia	M350.1 - Automated Phenate	0.05 mg/L
pH (lab)	M150.1 - Electrometric	0.1 units
Phosphorus, total	M365.1 - Auto Ascorbic Acid	0.01 mg/L
Sulfate	M375.3 - Gravimetric	10 mg/L
TDS	Calculation	Calculation
Radiocarbon (C-14)	AMS radiocarbon dating	300 μg C/L as DIC[e]
SIRA[b] of Carbon in TDIC[c]	AMS radiocarbon dating	300 μg C/L as DIC
SIRA of Oxygen and Hydrogen in Water	N/A	N/A

[a] Milligrams per liter.
[b] Stable isotope ratio analysis
[c] Total dissolved inorganic carbon.
[d] Micromhos per centimeter.
[e] Detection limit of total carbon in the groundwater to obtain both 14C and 13C/12C

Table 2
Sample Collection, Storage, and Shipping Information

Analyte Group	Sample Type	Filter (Yes/No)	Fill Level	Preserve with HNO_3[a] (Yes/No)	Preserve with H_2SO_4[b] (Yes/No)	Preserve with NaOH (Yes/No)	Bottle Type	Bottle Size (milliliters)	Bottles per Sample	Type of Storage	Lab
1	Alkalinity, EC, pH	No	to the neck	No	No	No	HDPE[c]	500	1	Cool, dry, and unexposed to sunlight	ACZ
2	Cl, F, TDS, SO4, Br	Yes	to the neck	No	No	No	HDPE	250	1	Cool, dry, and unexposed to sunlight	ACZ
3	SIRA[d] of oxygen and hydrogen in water	No	to the neck	No	No	No	HDPE	125	1	Cool, dry, and unexposed to sunlight	CSL
4	N-NH3, NO3-NO2, P-T	No	to the neck	No	Yes	No	HDPE	250	1	Refrigerate / ship with ice packs	ACZ
Change Gloves											
5	SIRA of carbon in total dissolved inorganic carbon; radiocarbon (C-14)	No	to the neck	No	No	Yes	HDPE	1000	1	Cool, dry, and unexposed to sunlight	Beta

[a] Nitric acid.
[b] Sulfuric acid.
[c] High density polyethylene.
[d] Stable isotope ratio analysis.