NYE COUNTY NUCLEAR WASTE REPOSITORY PROJECT OFFICE

TEST PLAN

TITLE: **Groundwater Sampling and Analysis for The Nye County Tritium Sampling and Monitoring Program**	Revision: **0** Date: **05/19/2016** Page: **1 of 9**
TEST PLAN NUMBER: **TPN-11.8**	SUPERSEDES: **None**

1.0 INTRODUCTION

This test plan (TPN) provides detailed groundwater sampling and analysis instructions specific to Nye County Nuclear Waste Repository Project Office (NWRPO) groundwater sample collection planned for the Nye County Tritium Sampling and Monitoring Program (TSAMP). This TPN supplements work plan (WP) WP-11, *Groundwater Chemistry Sampling and Analysis for the Nye County Tritium Sampling and Monitoring Program* and technical procedure (TP) TP-8.1, *Field Collection and Handling of Water Samples*, identifies the testing laboratory, and provides detailed guidance for the maintenance and preparation of field measurement equipment and sample collection, preservation, storage, and shipping.

2.0 ANALYTICAL LABORATORY

2.1 Radiation Safety Engineering, Inc.

Radiation Safety Engineering, Inc. (RSE), in Chandler, Arizona, will analyze water samples for tritium. The RSE points of contact, mailing address, telephone number, and email address are listed in the following.

Robert Metzger
Radiation Safety Engineering, Inc.
3245 North Washington St.
Chandler, AZ 85225
480-897-9459

2.2 Approval of Laboratory

If necessary the laboratory can be changed during the program, but changes must be approved by the Quality Assurance Officer (QAO) to ensure all Quality Assurance (QA) requirements are satisfied.

3.0 PORTABLE FIELD MEASUREMENT EQUIPMENT MAINTENANCE AND PREPARATION

Instruments for measuring field indicator parameters include the Oakton 300 pH/CON meter and Orion 3 Star Plus Optical Dissolved Oxygen meter or equivalent meter. Manuals or manufacturers' instructions should be available at all times when using this equipment.

3.1 Oakton 300 pH/CON Meter

Before the start of sampling, the Oakton meter will be prepared for use according to the following steps:

- Check all probes for signs of wear and corrosion.
- Perform a calibration check to verify pH, conductivity, and temperature accuracy.

Before the start of sampling calibrate pH range on the Oakton meter using 7.00, 4.00 and 10.00 pH standards then read the standards as samples and record the readings in the scientific notebook. Note: be sure to also place the conductivity probe in the PH calibration solution so that automatic temperature compensation will occur. Also immediately prior to sampling calibrate the conductivity range on the Oakton meter using a 1413 µS/cm standard then read the standard as a sample and record the reading in the scientific notebook. If calibration is successful, proceed with measurement of water sample parameters as water samples are taken. If calibration is unsuccessful, repeat the maintenance and calibration steps as directed. If calibration is still unsuccessful, notify the PI or designee, and contact Oakton Technical Support by phone at 949-757-0353, by fax at 949-757-0363.

3.2 Orion 3 Plus Optical Dissolved Oxygen Meter

The Orion 3 will not be used to analyze field parameters unless required by the Principal Investigator (PI). Before the start of sampling verify the Orion 3 Plus meter calibration by wetting the sponge in the calibration sleeve with distilled water, turn the meter on, and then press the calibrate button. When properly calibrated against water saturated air the meter will read 100.0 % (+/- 0.2%) dissolved oxygen (DO). Calibration of the meter is current for one year at which time the sensor cap must be changed. However, the calibration must be verified prior to use. If

calibration verification is successful proceed with measurement of dissolved oxygen in the water samples as they are taken. If calibration verification is unsuccessful, and repeat maintenance and calibration steps as directed. If calibration problems continue, notify the PI or designee, and contact Geotech sales and service at 800-833-7958, by fax at 303-322-7242.

4.0 LABORATORY AND FIELD ANALYSES

4.1 Laboratory Analyses

Water samples will be analyzed for tritium by an approved lab, with a detection limit of 365 picocuries/liter.

4.2 Water Chemistry Monitoring and Data Collection

Calibrate all portable field equipment before data collection as indicated above.

Monitor field water chemistry parameters and fill out Attachment A: NWRPO Groundwater Sample Collection Form and assess the stability of the measurements relative to the amount of water purged from the well. Electrical conductivity (EC), and pH should stabilize as the well is purged. DO and temperature of the purged water may not stabilize, due to changes in air temperature, atmospheric pressure, or the heating of sampling equipment on the ground surface by radiant energy from the sun.

After purging of a minimum of three well volumes is complete at each well, collect a sample for field measurement of pH, conductivity, temperature and if required, DO. If purging of the well is not possible, field measurements should be taken before the start of sampling.

5.0 SAMPLE COLLECTION

Samples will be collected from each of the wells and analyzed for tritium. In addition, quality assurance (QA) samples will be collected as follows: blind field duplicate samples from approximately once per week, or at a frequency specified by the PI. 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 scientific notebook. Blind field duplicates will be analyzed for tritium.

Table 1 summarizes sample filtration, bottling, and preservation requirements, along with specific bottle type, size, numbers and fill levels. Bottle labeling methods are described in TP-8.1.

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. Use new, clean tubing to fill sample bottles for each well. Ensure that at least two volumes of the sample fluid pass through each new tubing before collecting samples.

Rinse bottles and caps with sample water three times unless bottles have been baked. Fill the bottle to the required level.

6.0 SAMPLE STORAGE

In the field, minimize the exposure of samples to heat and direct sunlight, and transport samples to the NWRPO at the end of each sampling day. When possible, store samples in the field in coolers with ice packs and do not use free ice in the coolers.

When the samples have been transported to the NWRPO, store them as indicated in Table 1.

7.0 SAMPLE SHIPPING

Ship all samples as soon as possible to the appropriate testing laboratory within the holding time of the sample in coolers with NWRPO chain-of-custody forms and any forms required by the lab. Place all samples in the coolers with the caps up; do not place them on their sides. Pack all bottles in packing material. Pad the sides of the cooler with packing material and pack samples so that they are held snugly in place. Use additional packing material to prevent the samples from moving during shipping; pack the top of the cooler with packing material so that samples cannot move vertically.

Pack all refrigerated samples with blue ice or some form of cold pack. Do not use free ice in the coolers; the water from melted ice can wash labels off, contaminate samples, and remove labeling tape. Ensure that coolers are securely closed and will not open during shipping.

Ship all samples by overnight carrier (i.e., Federal Express) to the addresses as indicated in section 2.0. Do not ship samples on Friday.

Table 1
Sample Collection, Storage, and Shipping Information for Tritium Analysis

Sampling Date:		**Notes:** TPN 11-8.1 Rev 0 05-19-16								
Sample Number	**Well Name**	**Filter (Yes/ No)**	**Fill Level**	**Preservative**	**Bottle Type**	**Bottle Size**	**Bottles per Sample**	**Laboratory**	**QA Sample Collected (Yes/No)**	**Storage /Special Shipping Instructions**
		No	To the Neck	No	amber glass	250 ml	1	RSE		Refrigerate and Ship with cold packs.
		No	To the Neck	No	amber glass	250 m	1	RSE		Refrigerate and Ship with cold packs.
		No	To the Neck	No	amber glass	250 m	1	RSE		Refrigerate and Ship with cold packs.
		No	To the Neck	No	amber glass	250 m	1	RSE		Refrigerate and Ship with cold packs.
		No	To the Neck	No	amber glass	250 m	1	RSE		Refrigerate and Ship with cold packs.
		No	To the Neck	No	amber glass	250 m	1	RSE		Refrigerate and Ship with cold packs.
		No	To the Neck	No	amber glass	250 m	1	RSE		Refrigerate and Ship with cold packs.
		No	To the Neck	No	amber glass	250 m	1	RSE		Refrigerate and Ship with cold packs.
		No	To the Neck	No	amber glass	250 m	1	RSE		Refrigerate and Ship with cold packs.
		No	To the Neck	No	amber glass	250 m	1	RSE		Refrigerate and Ship with cold packs.

Attachment A
Groundwater Sample Collection Form

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Well Data

Sheet ____ of ____

Sampling Episode Description	Sandpack Interval(s) (ft bgs)		Depth to Water (ft bgs)	
			Total Depth (ft bgs)	
Well ID	Water Level before Purging (ft bgs)	Water Level After Purging (ft bgs)	Casing Diameter (ID, ft)	
Sampler			Water-filled Casing Volume (ft^3)	Water-filled Casing Volume (gallons)

Purging Data

				Purge Volume Calculations/Measurements				Field Water Quality Parameters			
Initials	Date	Clock Time	Elapsed Time (min, sec)	Pump Rate (gpm)	Purge Volume (gallons)	Number of Casing Volumes	Cumulative Number of Casing Volumes	Temp (°C)	pH	EC (µmhos/ cm)	Comments

Groundwater Sample Collection Data

Initials	Sample Number	Analyte Group	Testing Laboratory	Bottle	Filtered (yes/no)	Preservative	Analyte Group	Testing Laboratory	Bottle	Filtered (yes/no)	Preservative