NYE COUNTY NUCLEAR WASTE REPOSITORY PROJECT OFFICE

WORK PLAN

TITLE:	REVISION: 2
Groundwater Chemistry Sampling and Analysis for the Nye County Tritium Sampling and Monitoring Program (TSAMP)	DATE: 9/30/2016 PAGE: 1 OF 7

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WP-11	Rev. 1, 11-20-08

APPROVAL

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Director Date

CONCURRENCE

10/3/16
Principal Investigator Date

9/30/16
Quality Assurance Officer Date

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1.0 INTRODUCTION

This Work Plan (WP) describes the strategy and procedures for the collection and testing of groundwater chemistry samples as part of the Nye County's Nuclear Waste Repository Project Office (NWRPO) participation in the Department of Energy's Community Environmental Monitoring Program (CEMP). This Work Plan has been prepared in accordance with the provisions of the Nye County NWRPO quality administrative procedure *QAP-5.2, Preparation of Work Plans, Test Plans, and Technical Procedures*.

2.0 PURPOSE

The purpose of this WP is to outline actions to manage the collection and testing of TSAMP groundwater chemistry samples.

Groundwater chemistry sampling and analysis are being conducted to support CEMP objectives, which include monitoring groundwater for tritium at offsite locations downgradient of the Nevada National Security Site (NNSS), at both Distal wells and Community wells, and Distal wells on the NNSS, downgradient of corrective action unit source plumes.

3.0 BACKGROUND

The NNSS is located in Nye County and was historically used to test nuclear weapons. Nye County and public stakeholders are concerned about onsite groundwater contamination due to past testing, and the possibility of offsite migration of that contamination. In support of the CEMP and funded by the Department of Energy (DOE), Nye County will monitor groundwater at locations downgradient of the NNSS at both Distal and Point of Use wells. Sampling locations for inclusion in the County's groundwater monitoring program will be based on proximity to groundwater flow paths, proximity to the boundaries of the NNSS and public water supply systems, and recommendations by stakeholders.

Tritium is the primary analyte of concern, because it is highly mobile in groundwater and can serve as an indicator of contaminant migration from nuclear testing, and is the only radionuclide that exceeds the Safe Drinking Water Act maximum contaminant level (MCL) outside of the nuclear test cavities.

Data from the CEMP water sampling program will provide more information regarding:

- Quality of waters (tritium) adjacent to and downgradient from the NNSS and Nevada Test and Training Range (NTTR)
- Changes in water quality with time (tritium)

4.0 SCOPE OF WORK

The scope of work of this plan applies to groundwater chemistry sampling and analyses in wells that have been completed and developed. This scope of work presents specifics for the following, which are discussed in Sections 4.1 through 4.6:

- Applicable NWRPO quality assurance (QA), quality administrative procedures (QAPs), and technical procedures (TPs)
- Responsibilities and participants for groundwater chemistry sampling and analysis tasks
- A strategy for water sampling and analysis

4.1 Applicable Quality Assurance Plans and Procedures

Groundwater chemistry sampling and analysis after well completion and development will involve well purging, as well as the measurement of field water chemistry indicator parameters during well purging, collection and labeling of samples, shipping of samples to testing laboratories, and laboratory chemical analysis. Procedures for these and related tasks are described in technical procedures TP-8.1, *Field Collection and Handling of Water Samples.* The calibration of equipment used to measure field indicator parameters will be documented in accordance with quality administrative procedure QAP-12.1, *Control of Measuring and Test Equipment.*

Detailed groundwater chemistry sampling and analysis instructions beyond the scope of the associated TP will be specified in a Test Plan (TPN) for each sampling program.

4.2 Responsibilities and Participants

The Principal Investigator (PI) or designee is responsible for the production of this WP and associated TPs, the training of NWRPO personnel and contractors in these QA documents, and the overall supervision of groundwater chemistry sampling and analysis tasks. The PI or designee will submit all original field and laboratory analysis data, together with associated metadata, to the NWRPO QA Records Center (QARC) following review and approval.

Nye County personnel and/or contractors, herein referred to as "NWRPO personnel," are responsible for implementing these QA plans and procedures; the Geoscience Manager or Director of NWRPO is responsible for organizing and implementing technical reviews; and the Project QA Officer is responsible for ensuring/verifying that they contain necessary QA directives, that technical reviews are conducted, that testing laboratories are qualified as vendors, and that the plans and procedures are implemented in the field.

Several agencies separate from the NWRPO will possibly collect groundwater chemistry samples at wellheads during each NWRPO sampling and analysis session. The NWRPO will have the authority to approve access to the well sites and sampling plans for these agencies. The NWRPO will be responsible for pumping water to the ground surface; the other agencies will be responsible for collecting samples at the wellhead. Some agencies that have previously collected groundwater chemistry samples from NWRPO sampling sessions include the University of Nevada at Las Vegas Harry Reid Center for Environmental Studies, the State of Nevada, the U.S. Nuclear Regulatory Commission, Los Alamos National Laboratory, and the U.S. Geological Survey.

4.3 Groundwater Chemistry Sampling and Analysis Plan

Nye County has drilled and installed approximately 45 wells in Amargosa Desert, Amargosa Valley, and Oasis Valley. The location of these well sites can be seen in Figure 1. A subset of the Nye County wells along with other community and private wells located in the Beatty-Amargosa-Lathrop Wells area will be selected to be sampled for tritium. Community Environmental Monitors, Desert Research Institute and DOE staff, and members of the public are all stakeholders in the groundwater monitoring effort, and these stakeholders will identify the wells to be sampled and develop a sampling schedule. It is expected that 10 wells will be sampled the first year of the program in 2015, with a total of 20 wells being sampled each of the next four years.

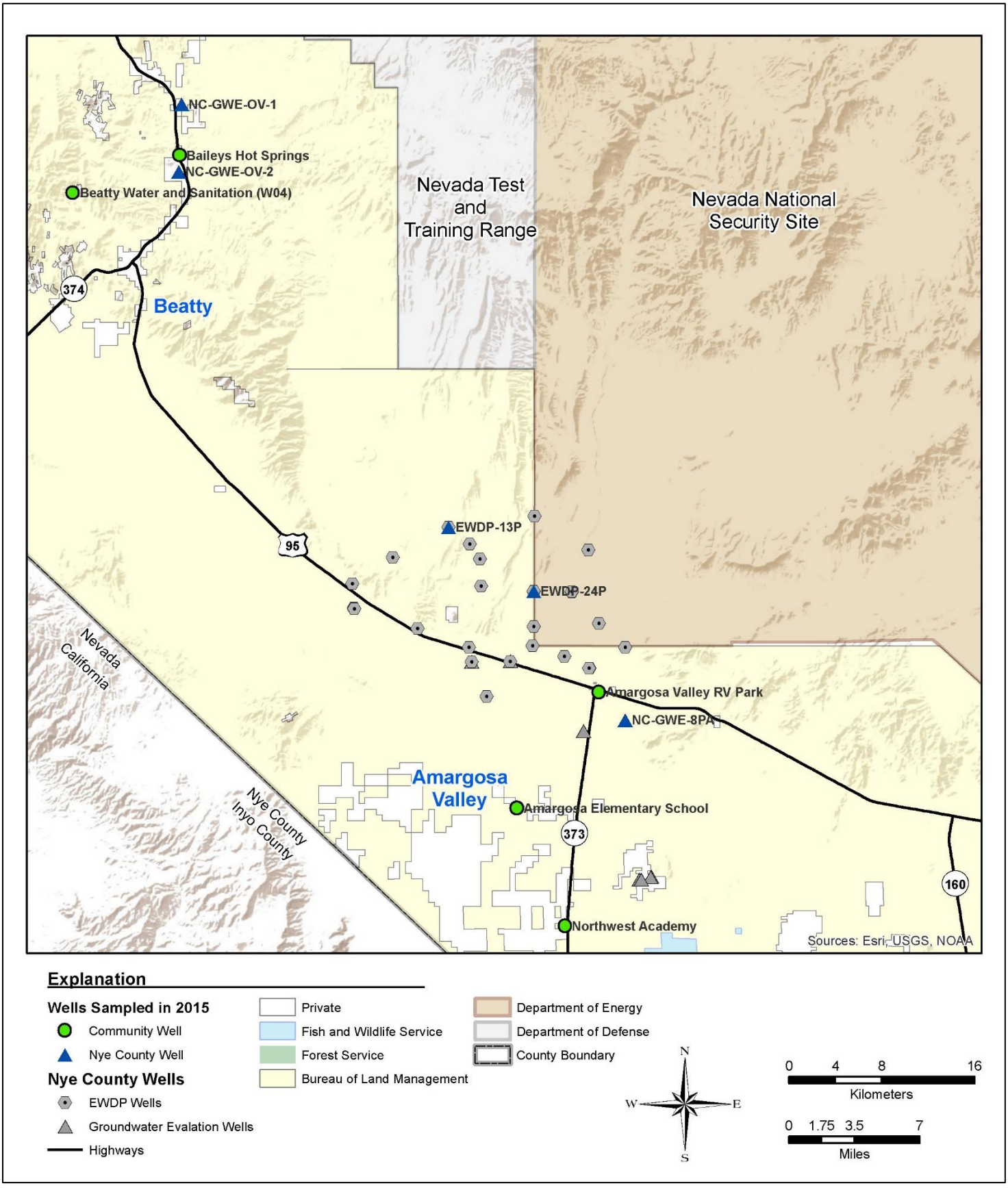
NC-GWE-OV-1
Baileys Hot Springs
NC-GWE-OV-2
Beatty Water and Sanitation (W04)
Nevada Test
and
Training Range
Nevada National
Security Site
374
Beatty
EWDP-13P
95
EWDP-24P
Nevada
California
Amargosa Valley RV Park
NC-GWE-8PA
Amargosa
Valley
Amargosa Elementary School
Nye County
Inyo County
373
160
Northwest Academy
Sources: Esri, USGS, NOAA
Explanation
Wells Sampled in 2015
Community Well
Nye County Well
Nye County Wells
EWDP Wells
Groundwater Evalation Wells
Highways
Private
Fish and Wildlife Service
Forest Service
Bureau of Land Management
Department of Energy
Department of Defense
County Boundary
N
W
E
S
0 4 8 16
Kilometers
0 1.75 3.5 7
Miles

Figure 1

Initial screening of candidate sites was based on the following criteria:

- Proximity to population centers
- Groundwater gradient (flow directions)
- Geology and hydrology
- faults and rock/soil types

Documentation of well selections each year will be submitted to the QARC.

Where possible, the following groundwater chemistry indicator parameters will be measured in the field during and following the purging of each well:

- pH
- Electrical conductivity
- Temperature

Procedures for purging and measuring these parameters are described in TP-8.1. The testing laboratory will measure for tritium, unless the PI specifies different analyses for a particular sampling session. Laboratories, testing methods, and procedures for collecting and shipping samples for specific sampling sessions shall be specified by the PI.

It should be noted that during sampling sessions, the PI may make additional changes to the field and testing laboratory parameter suites presented above. Any changes will be documented in the Scientific Notebook.

4.4 Quality Assurance Samples and Data Validation

TP-8.1 presents types of field and laboratory QA samples and types and sources of error measured for these samples, QA objectives for these samples, and a strategy for collecting field QA samples. The specific type and number of field QA samples required for future sampling sessions may be modified from this procedure by the PI. Modifications to QA sample requirements will be documented in the applicable TP.

The type and frequency of analysis of laboratory QA samples will be specified in the QA procedures of each testing laboratory and the results included in laboratory data reports. Data validation will consist of an evaluation by the PI or designee of the degree to which QA objectives have been met for both field and laboratory QA samples. The PI or designee will prepare a report summarizing the results of this evaluation.

Other methods that analyze groundwater chemistry sample results rather than QA sample results may be used by the PI or designee to assess data quality (i.e., validate data). These methods include: charge balance analyses, a comparison of analytical results for water samples collected at the same time from the same well by different agencies, and an analysis of temporal variations in water chemistry data from a particular screened interval. Charge balance analyses compare the relative amounts of positively and negatively charged ions from each water sample analyzed. Since water is electroneutral, a charge balance other than zero indicates analytical error and/or a significant contribution from “minor” ions not included in the analysis.

Differences in the analytical results from different agencies can be caused by variations in field sample collection, preservation, and processing procedures and/or laboratory testing methods, equipment, or expertise. A high degree of agreement between results from different agencies increases the level of confidence in the data, and great disagreement is indicative of significant field and/or laboratory error and the need for improved procedures.

Finally, an evaluation of variations in analytical data over time from a particular sampling point (i.e., well screen) also helps to support data quality assessment. For example, significant differences in analytical

results from one sampling session to several other sampling sessions suggest that field and/or laboratory error may be responsible for the outlier data.

In summary, the results of all applicable charge balance analyses, interagency comparisons, and temporal evaluations to identify outlier data will be included in the data validation report.

5.0 MANAGEMENT

To ensure that the work described in this work plan will be quality controlled and accomplished in accordance with the scope and objectives of the CEMP, certain responsibilities must be met and tasks performed. Responsibilities of key personnel were described briefly in Section 4.2 and are described in more detail in the following.

Training is a critical management tool and detailed responsibilities in this area are specified as follows. The PI and QAO are responsible for ensuring that all NWRPO personnel performing the tasks described in the above sections will be trained in the plans and procedures specifically applicable to the equipment and methods used before conducting work. At a minimum, NWRPO personnel will document that they have read and understand the applicable QA plans and procedures which include but are not limited to this work plan and the following:

- TP-8.1, *Field Collection and Handling of Water Samples*
- QAP-12.1, *Control of Measuring and Test Equipment*

NWRPO personnel, under the supervision of the PI or designee, are responsible for collecting and processing groundwater chemistry samples according to these procedures. The QA officer is responsible for verifying, via surveillances and audits, that NWRPO personnel follow these procedures.

Quality control in water chemistry testing laboratories is equally important to field quality control. Laboratory analyses of groundwater chemistry samples will be performed by facilities certified to use analytical methods and procedures consistent with industry standards and/or U.S. Environmental Protection Agency approved methods and procedures. The QA officer is responsible for verifying that testing laboratories are appropriately certified, have the necessary QA program in place, and that this QA program is followed while laboratory analyses are conducted.

6.0 REFERENCES

QAP-5.2, *Preparation of Work Plans, Test Plans, and Technical Procedures*, Quality Administrative Procedure: Nye County NWRPO, Pahrump, Nevada.

QAP-12.1, *Control of Measuring and Test Equipment.*

TP-8.1, *Field Collection and Handling of Water Samples*, Technical Procedure: Nye County NWRPO, Pahrump, Nevada.