

Nevada
Environmental
Management
Operations Activity

DOE/NV--1494



Underground Test Area Fiscal Year 2012 Annual Quality Assurance Report Nevada National Security Site, Nevada

Revision No.: 0

January 2013

UNCLASSIFIED

/s/ Joseph P. Johnston, N-I CO 01/14/2013

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U.S. Department of Energy
National Nuclear Security Administration
Nevada Site Office

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**UNDERGROUND TEST AREA
FISCAL YEAR 2012
ANNUAL QUALITY ASSURANCE REPORT
NEVADA NATIONAL SECURITY SITE, NEVADA**

U.S. Department of Energy, National Nuclear Security Administration
Nevada Site Office
Las Vegas, Nevada

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FISCAL YEAR 2012
ANNUAL QUALITY ASSURANCE REPORT
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Approved by:

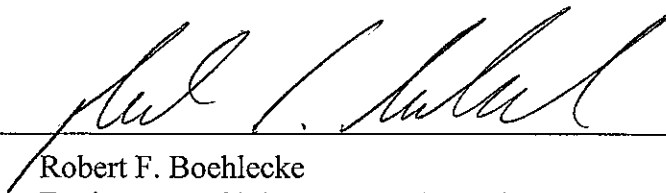


Bill R. Wilborn
Underground Test Area Activity Lead

Date:

1/14/13

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List of Acronyms and Abbreviations

ACTS	Assessment and Condition Tracking System
ALS	ALS Laboratory Group
Am	Americium
AR	Activity ratio
ARS	American Radiation Services, Inc.
ASA	Activity safety analysis
BMP	Borehole Maintenance Program
C	Carbon
CAIP	Corrective action investigation plan
CAU	Corrective action unit
CEMP	Community Environmental Management Program
CFR	<i>Code of Federal Regulations</i>
Cl	Chlorine
Co	Cobalt
COC	Contaminant of concern
Cs	Cesium
DOE	U.S. Department of Energy
DRI	Desert Research Institute
ERA	Environmental Resources Associates
Eu	Europium
FAWP	Field activity work package
Fe	Iron
FEHM	Finite Element Heat and Mass Transfer code
FFACO	<i>Federal Facility Agreement and Consent Order</i>
FY	Fiscal year
H	Hydrogen

List of Acronyms and Abbreviations (Continued)

HFM	Hydrostratigraphic framework model
I	Iodine
LANL	Los Alamos National Laboratory
LLNL	Lawrence Livermore National Laboratory
MAPEP	Mixed Analyte Performance Evaluation Program
MDL	Method detection limit
mg/L	Milligrams per liter
Mn	Manganese
N/A	Not applicable
Nb	Niobium
NDEP	Nevada Division of Environmental Protection
Ni	Nickel
N-I	Navarro-Intera, LLC
NNSA/NSO	U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office
NNSS	Nevada National Security Site
NSSAB	Nevada Site Specific Advisory Board
NSTec	National Security Technologies, LLC
O	Oxygen
OAA	Operational awareness activity
pCi/L	Picocuries per liter
PEP	Performance evaluation program
PHA	Preliminary hazard analysis
PI	Program Integration
Pu	Plutonium
QA	Quality assurance
QAP	Quality Assurance Plan

List of Acronyms and Abbreviations (Continued)

QAPP	Quality Assurance Project Plan
QC	Quality control
RPD	Relative percent difference
RREMP	Routine Radiological Environmental Management Program
RTC	Resource Technology Corporation
SA	Subject area
SBMS	Standards-Based Management System
SOP	Standard operating procedure
SOW	Statement of work
Sr	Strontium
Tc	Technetium
TCA	Tiva Canyon aquifer
TDIC	Total dissolved inorganic carbon
TDR	Technical Data Repository
Th	Thorium
TREDS	Technical Research, Engineering, and Development Services
TSA	Topopah Spring aquifer
U	Uranium
UGTA	Underground Test Area
USGS	U.S. Geological Survey
Zn	Zinc
µg/L	Micrograms per liter

1.0 Introduction

This report is mandated by the Underground Test Area (UGTA) Quality Assurance Project Plan (QAPP) and identifies the UGTA quality assurance (QA) activities for fiscal year (FY) 2012. All UGTA organizations—U.S. Department of Energy (DOE), National Nuclear Security Administration Nevada Site Office (NNSA/NSO); Desert Research Institute (DRI); Lawrence Livermore National Laboratory (LLNL); Los Alamos National Laboratory (LANL); Navarro-Intera, LLC (N-I); National Security Technologies, LLC (NSTec); and the U.S. Geological Survey (USGS)—conducted QA activities in FY 2012. The activities included conducting assessments, identifying findings and completing corrective actions, evaluating laboratory performance, revising the QAPP, and publishing documents. In addition, processes and procedures were developed to address deficiencies identified in the FY 2011 QAPP gap analysis.

FY 2011 assessment corrective actions tracked in FY 2012 are summarized in [Appendix A, Table A-1](#). The FY 2011 QAPP gap analysis corrective actions continued in FY 2012 and served as the annual assessment requirement in the QAPP.

UGTA participants also conducted 16 assessments (management, shadow, operational awareness) on topics including Yucca Flat model status, and safety and health during drilling operations. These activities are summarized in [Section 2.0](#) and detailed in [Appendix A, Table A-2](#).

Laboratory performance was evaluated based on three approaches: (1) established performance evaluation programs (PEPs), (2) interlaboratory comparisons, or (3) data review. The results of the laboratory performance evaluations are summarized in [Section 3.0](#), and interlaboratory comparison results are presented in [Appendix B](#).

The UGTA Activity published five public documents in FY 2012. The titles, dates, and main authors are identified in [Section 4.0](#).

The Contract Managers, Corrective Action Unit (CAU) Leads, Preemptive Review Committee members, and Topical Committee members are listed by name and organization in [Section 5.0](#). Other activities that affected UGTA quality and notable achievements are discussed in [Section 6.0](#).

2.0 Assessments, Corrective Action Schedules

The UGTA QAPP implementation process had four steps: (1) identify gaps in compliance, (2) plan and schedule strategies to fill the gaps, (3) implement the strategies, and (4) evaluate the implementation. The first step was completed at the end of FY 2011. Step 2 finished in FY 2012. The final two steps began in FY 2012 and will continue through FY 2013. Assessments will continue throughout the UGTA Activity as part of normal operations. FY 2011 assessment corrective actions tracked in FY 2012 are summarized in [Appendix A, Table A-1](#). FY 2012 assessments and corrective actions are described in [Appendix A, Table A-2](#).

2.1 Gap Analysis Corrective Actions and QAPP Revision

Corrective actions from the QAPP gap analysis continued in FY 2012 and served as the annual assessment requirement. The procedure matrix provided in [Appendix B, Table B-1](#) closes the gap analysis corrective actions. Those procedures not finalized in FY 2012 (see [Appendix B, Table B-1](#)) will be identified as issues, tracked using the N-I Assessment and Condition Tracking System (ACTS), and statused in the FY 2013 Annual Report.

The gap analysis identified three subject areas—Modeling and Software, Laboratory Analysis, and Data Management—where all participants needed to develop or improve implementing procedures. Committees were established with the following goals:

- Share existing procedures
- Standardize and streamline implementation
- Recommend revisions to the QAPP

The committees (see [Table 5-4](#) for committee membership) developed forms and processes to fill the implementation gaps. These processes are not mandatory but give the participants options for QAPP compliance. The participants' processes and procedures for QAPP implementation are presented in [Appendix B, Table B-1](#).

The UGTA QAPP was revised to address implementation and clarification suggestions from the gap committees. The UGTA QAPP was also revised to require laboratories to be certified by the State of Nevada or approved by the Nevada Division of Environmental Protection (NDEP) Bureau of Federal

Facilities for analysis of groundwater and soil samples. Documentation, verification, and validation requirements are now consistent for all UGTA laboratories. Requirements were previously dependent on whether analyses were for regulatory or non-regulatory purposes. The revision, renamed the UGTA Quality Assurance Plan (QAP), was issued the first week of FY 2013.

2.2 Nevada Site Office

NNSA/NSO conducted two shadow assessments, one joint assessment, and operational awareness activities (OAAs). Shadow assessments evaluate participant assessments, and OAAs are documented day-to-day management activities. NNSA/NSO shadowed an NSTec assessment of Well ER-20-11 operations and an N-I assessment of hazard analyses. The joint assessment reviewed 8 of 11 UGTA FY 2011 initiatives for lessons learned. No findings or corrective actions were identified (see [Appendix A, Table A-2](#)).

2.3 Desert Research Institute

DRI closed one FY 2011 corrective action, and two remain open (see [Appendix A, Table A-1](#)). DRI conducted three assessments. The assessments resulted in eight corrective actions regarding procedures reflecting work, training, and procedure control (see [Appendix A, Table A-2](#)).

2.4 Lawrence Livermore National Laboratory

LLNL closed all FY 2011 corrective actions (see [Appendix A, Table A-1](#)).

2.5 Los Alamos National Laboratory

LANL closed all FY 2011 corrective actions. LANL also participated in the N-I Yucca Flat model status assessment. No findings or corrective actions were identified (see [Appendix A, Table A-2](#)).

2.6 National Security Technologies, LLC

NSTec conducted two assessments on drilling operations. No findings or corrective actions were identified (see [Appendix A, Table A-2](#)).

2.7 *Navarro-Intera, LLC*

N-I closed six of the seven FY 2011 corrective actions. The seventh was completed in September 2012, but the corrective action was not verified and closed until October 2, 2012. This last corrective action resulted in a new record finding in FY 2013. The three outstanding FY 2011 non-conformances were closed, and the health and safety causal analysis corrective actions were completed (see [Appendix A, Table A-1](#)).

In FY 2012, N-I conducted four assessments. The assessments resulted in two corrective actions in procedural compliance and hazard analysis review (see [Appendix A, Table A-2](#)).

2.8 *U.S. Geological Survey*

USGS conducted one assessment on collecting water-level data for Pahute Mesa. The assessment resulted in one procedural corrective action (see [Appendix A, Table A-2](#)).

2.9 *Lessons Learned*

The following subsections describe the identified UGTA lessons learned.

2.9.1 *Preemptive Reviews*

The preemptive review process during document review was refined and streamlined. The new process is focused and better documented, and includes the following efficiencies:

- Establishing review questions before the review begins
- Selecting up to 10 highest-priority comments
- Documenting review per QAPP requirements
- Using SharePoint as a repository for information and documentation
- Ensuring adequate review time

2.9.2 Model Documentation

New approaches were implemented during Yucca Flat unclassified radionuclide inventory and hydrologic source term (HST) conceptual model development, which resulted in significant efficiencies. The process requires the following:

- Documenting model development in the early stages
- Identifying non-direct data sources
- Identifying transferred data

Identified data are used in preliminary drafts and model data packages submitted for internal and preemptive review; however, data must be accepted and/or transferability documented before review by NDEP and final production.

2.9.3 Code Testing

The need for more robust code testing was identified during the Yucca Flat flow and transport modeling effort. Appropriate test problems must be designed and implemented that will reveal errors or inconsistencies in code results. Code testing should be documented during code acceptance and when new versions are released. Results should be reviewed for reasonableness and internal consistency, and corroborative analyses are recommended for comparison. Additionally, it is critical to document version control and cite which code version was used, as some models are built over several years.

Code testing is an UGTA-wide need and was therefore assigned to the modeling QA committee, which developed a standardized process with forms to address this lessons learned.

3.0 Performance Evaluation Programs

Laboratories that provide analytical data for the UGTA Activity are ALS Laboratory Group (ALS); American Radiation Services, Inc. (ARS); DRI; LANL; LLNL; and USGS. All data reported by ALS and ARS (both NDEP certified) met the contractor's Statement of Work (SOW) compliance criteria. The UGTA QAPP requires that laboratories performing analysis for the UGTA Activity evaluate performance by participating in PEPs. The availability of established PEPs is limited; therefore, laboratory performance is also assessed through interlaboratory comparisons and data reviews. The results of these evaluations are presented within this section.

3.1 Established PEPs

The laboratories participated in the following established PEPs as stated in UGTA QAPP (Rev. 0), Attachment 2, Table 2-1:

- Environmental Resources Associates (ERA)
- Mixed Analyte Performance Evaluation Program (MAPEP)
- Sigma-Aldrich, Resource Technology Corporation (RTC)

The PEP reports are business proprietary information and will be provided to NDEP upon request. These reports must be treated as Official Use Only information. With a few exceptions, laboratory results were within the acceptable limits. If consecutive failures occur, data users for the failed analytes were notified or data were rejected. The following summarizes the unacceptable results:

- In one MAPEP round, unacceptable results were reported for iodine-129 (^{129}I), iron-55 (^{55}Fe), and nickel-63 (^{63}Ni) in water. In the second round, these radionuclides were reported within acceptance ranges with a flagged warning for ^{129}I , as it was reported with a bias greater than 20 percent.
- In both MAPEP rounds, unacceptable results (this is known as consecutive failures) for cobalt-57 (^{57}Co) were reported for one laboratory. All ^{57}Co data for this laboratory were rejected and not entered into the UGTA Geochemistry Database. This does not impact the UGTA Activity, because ^{57}Co is not included in the Bowen et al. (2001) source-term inventory and is therefore not considered a contaminant of concern (COC). Additionally, unacceptable results were reported for ^{60}Co , manganese-54 (^{54}Mn), and zinc-65 (^{65}Zn). In the second round, these radionuclides were reported within acceptance ranges.

- Unacceptable results were reported for lithium by EPA 200.7, *Determination of Metals and Trace Elements in Water and Wastes by Inductively Coupled Plasma-Atomic Emission Spectrometry*, in the first RTC round; and for fluoride by EPA 300.0, *Determination of Inorganic Anions by Ion Chromatography*, in the second RTC round.

Although LLNL participation in MAPEP for major cations and trace elements is listed in the UGTA QAPP (Rev. 0), they did not participate in this program. Also, International Atomic Energy Agency results are classified and are not available for evaluating performance. Instead, performance was evaluated using interlaboratory comparisons (see [Section 3.2](#)).

3.2 Interlaboratory Comparisons

The second approach for evaluating laboratory performance is by comparing analytical results from independent laboratories with respect to established acceptance criteria ([Appendix C, Table C-1](#)). The acceptance criteria are presented in Table 2-1, Attachment 2 of the UGTA QAPP (Rev. 0). Samples collected from two new UGTA wells are included in this comparison. One well (ER-20-4) was sampled in September 2011, and the other well (ER-20-8) sampled two hydrostratigraphic units: one in June 2011 (Tiva Canyon aquifer [TCA]) and the other in August 2011 (Topopah Spring aquifer [TSA]). These samples were selected for comparison because the analyses are mostly complete, and the results are reported in the UGTA Geochemistry Database. Three additional wells (U-3cn #5, ER-20-5 #1, and ER-20-5 #3) and an N-Tunnel vent hole (U12n vent hole #2) were sampled by LANL and LLNL in the same time frame. These samples were collected for the hot-well program, and only LANL and LLNL have historically provided analyses for this program. Because analyses were not performed by multiple independent laboratories, the interlaboratory comparison approach could not be applied.

The following lists the interlaboratory comparisons for ALS, DRI, LANL, LLNL, and USGS:

- **ALS.** Inorganic anions (chloride, bromide, fluoride, sulfate), inorganic cations (calcium, magnesium, potassium, and sodium), trace elements, ^{14}C , iodine-129 (^{129}I), plutonium-239/240 ($^{239/240}\text{Pu}$), gamma emitters, and tritium.
- **DRI.** Aluminum, iron, and isotopes of hydrogen ($\delta^2\text{H}$), carbon ($\delta^{13}\text{C}$), and oxygen ($\delta^{18}\text{O}$).
- **LANL.** Tritium, $^{239/240}\text{Pu}$, and gamma emitters.

- **LLNL.** Inorganic anions and cations; trace elements; total dissolved inorganic carbon (TDIC); $\delta^2\text{H}$, $\delta^{13}\text{C}$, and $\delta^{18}\text{O}$; ^{14}C , ^{129}I , strontium-87 ($^{87}\text{Sr}/^{86}\text{Sr}$), uranium-234 ($^{234}\text{U}/^{238}\text{U}$) activity ratio (AR), and tritium.
- **USGS.** Trace elements, $^{87}\text{Sr}/^{86}\text{Sr}$, and $^{234}\text{U}/^{238}\text{U}$ AR.

The results of the interlaboratory comparison are presented in [Appendix C, Table C-1](#). Although the performance evaluation requirement for ALS is, in general, satisfied by established programs ([Section 3.1](#)), their results are included for the comparisons. ARS did not analyze ER-20-4 and ER-20-8 samples. Field duplicate samples were analyzed by ALS, and the results for both analyses are presented. The average of the duplicates are used for the comparisons. In some cases, an analysis was performed by three labs. For these, all combinations of the analyses were compared and the range of results presented unless otherwise noted. Absolute differences are reported for $\delta^2\text{H}$, $\delta^{13}\text{C}$, $\delta^{18}\text{O}$, $^{87}\text{Sr}/^{86}\text{Sr}$, and $^{234}\text{U}/^{238}\text{U}$ AR; and relative percent differences (RPD) are reported for all others.

ALS and LLNL anion and cation results were all within the 25 percent acceptance criteria. With the exception of bromide and magnesium, which were below at least one of the laboratory's method detection limits (MDLs), the RPDs ranged from 0.8 to 22 percent.

Select trace elements were analyzed by ALS, DRI, LLNL, and USGS (see [Appendix C, Table C-1](#)). The majority of the results were within the acceptance criteria, although many of the elements (antimony, beryllium, cadmium, chromium, cobalt, cesium, copper, iron, lead, nickel, selenium, silver, and zinc) were near the MDL. Because of the presence of an analytical interference, DRI reported that they could not measure aluminum and iron. LLNL and USGS aluminum results do not meet the acceptance criteria for ER-20-8 samples. These discrepancies may be due to the presence of colloidal aluminum. These results are flagged in the UGTA Geochemistry Database. Aluminum was below the MDL for the commercial laboratories.

The DRI and LLNL results for $\delta^2\text{H}$, $\delta^{13}\text{C}$, and $\delta^{18}\text{O}$ were outside the acceptance criteria in several cases. This has been formally identified as an issue, and corrective action development and implementation are in progress.

The LLNL and USGS $^{87}\text{Sr}/^{86}\text{Sr}$ and $^{234}\text{U}/^{238}\text{U}$ AR results were well within the 0.0005 and 0.02 criteria.

Only the radioisotopes included in the Bowen et al. (2001) source-term inventory—thus potentially COCs—are included in the interlaboratory comparison (see [Appendix C, Table C-1](#)). Tritium was analyzed by ALS, LLNL, and LANL. Concentrations were below the MDL for the ER-20-4 sample. Only LLNL analysis of the ER-20-8 sample from the TSA completion resulted in a tritium concentration above the MDL. All tritium analyses of the ER-20-8 sample from the TCA completion were within the acceptance criteria (RPD ranged from 0.8 to 3.0). A considerable difference in the commercial laboratory and LLNL MDLs precluded conducting an interlaboratory comparison of ^{14}C , ^{36}Cl , and ^{129}I . LLNL uses highly specialized instrumentation for these analyses and, subsequently, the MDLs are several orders of magnitude below those of ALS. A blind sample approach is being evaluated for these analytes in accordance with the revised QAP. The remaining radioisotopes were below the MDLs.

3.3 Data Evaluation

Data reviews may be performed for analytes not included in an established PEP or interlaboratory comparison. Data reviews must include a review of the standard operating procedures (SOPs) as well as a review of laboratory quality control (QC) sample, calibration standard, and data verification and validation results. This is presently the approach used for commercial laboratory analysis of ^{14}C and ^{36}Cl . Data verification and validation were performed in accordance with the UGTA QAPP. Data were evaluated for quality in accordance with company-specific procedures, analytical industry standard methodologies, and the UGTA QAPP. The data were reviewed and evaluated to ensure that all required samples were appropriately collected and analyzed, and that the results met data validation criteria.

4.0 Published Documents (Revision 1 and Public Released) with List of Authors

4.1 Publications by UGTA Activity

Andrews, R.W., T.R. Birdie, B. Mukhophadhay, and W.R. Wilborn. 2012. *Approaches to Quantify Potential Contaminant Transport in the Lower Carbonate Aquifer from Underground Nuclear Testing at Yucca Flat, Nevada National Security Site, Nye County, Nevada*, DOE/NV-1468, Waste Management Symposium, Phoenix, AZ.

Huckins-Gang, H.E., and M.J. Townsend. 2012. *Geology and History of the Water Containment Ponds at U12n, U12t, and U12e Tunnels, Rainier Mesa, Nevada National Security Site*, DOE/NV/25946-1364. Las Vegas, NV.

Krenzien, S.K., and I.M. Farnham. 2012. *Underground Test Area Fiscal Year 2011 Annual Quality Assurance Report*, DOE/NV--1471. Las Vegas, NV.

Ruskauff, G.J., N.A. Bryant, I.M. Farnham, and E.M. Kwicklis. 2012. *Pahute Mesa Well Development and Testing Analyses for Wells ER-20-7, ER-20-8 #2, and ER-EC-11*, N-I/28091-037. Las Vegas, NV.

Ruskauff, G.J., N.A. Bryant, I.M. Farnham, and E.M. Kwicklis. 2012. *Pahute Mesa Well Development and Testing Analyses for Wells ER-20-8 and ER-20-4, Nevada National Security Site, Nye County, Nevada*, N-I/28091-061. Las Vegas, NV.

Wurtz, J.A., S.P. Hopkins, M.P. Pitterle, S.L. Drellack, J.M. Mercadante, L.B. Prothro, and J.L. Gonzales. 2012. *Frenchman Flat Model Evaluation Wells Drilling and Completion Criteria*, N-I/28091-051. Las Vegas, NV.

4.2 Other Publications by UGTA Authors

Abdel-Fattah, A., D. Zhou, H. Boukhalfa, S. Tarimala, S. Ware, and A. Keller (LANL authors). 2012. "Stability and Electrokinetic Properties of Intrinsic Plutonium Colloids: Implications in Subsurface Transport." Journal article was submitted to *Environmental Science & Technology*.

Cronkite-Ratcliff, C., G.A. Phelps, and A. Boucher. 2012. *A Multiple-Point Geostatistical Method for Characterizing Uncertainty of Subsurface Alluvial Units and Its Effects on Flow and Transport*, Open-File Report 2012-1065. 28 pp. Reston, VA: U.S. Geological Survey.

Elliott, P.E., and J.M. Fenelon. 2012. *Database of Groundwater Levels and Hydrograph Descriptions for the Nevada Test Site Area, Nye County, Nevada*: Data Series 533, Version 3.0. 24 pp. Reston, VA: U.S. Geological Survey.

- Fenelon, J.M., D.S. Sweetkind, P.E. Elliott, and R.J. Laczniak. 2012. *Conceptualization of the Predevelopment Groundwater Flow System and Transient Water-Level Responses in Yucca Flat, Nevada National Security Site, Nevada*, Scientific Investigations Report 2012-5196. 72 pp. Reston, VA: U.S. Geological Survey.
- Garcia, C.A., K. Halford, and J. Fenelon (USGS authors). 2012. “Detecting Drawdowns Masked by Environmental Stresses with Water-Level Models.” Journal article was accepted for publication by *Groundwater* on 4 October.
- Garcia, C.A., J.M. Fenelon, K.J. Halford, S.R. Reiner, and R.J. Laczniak. 2011. *Assessing Hydraulic Connections Across a Complex Sequence of Volcanic Rocks—Analysis of U-20 WW Multiple-Well Aquifer Test, Pahute Mesa, Nevada National Security Site, Nevada*, Scientific Investigations Report 2011-5173. 34 pp. Reston, VA: U.S. Geological Survey.
- Paces, J.B., P.E. Elliott, J.M. Fenelon, R.J. Laczniak, and M.T. Moreo. 2012. *Transient Effects on Groundwater Chemical Compositions from Pumping of Supply Wells at the Nevada National Security Site, Nye County, Nevada, 1951–2008*, Scientific Investigations Report 2012-5023. 124 pp. Reston, VA: U.S. Geological Survey.

5.0 Key Personnel

5.1 Contract Managers

Each organization assigns a Contract Manager responsible for managing the participant's tasks.

Table 5-1 lists each manager by organization.

**Table 5-1
 Contract Managers by Organization**

Name	Organization
Chuck Russell	DRI
Naomi Becker	LANL
Walt McNab	LLNL
Sam Marutzky	N-I
Ken Ortego	NSTec
Bonnie Thompson	USGS

5.2 CAU Leads and Science Advisor

A CAU Lead is assigned for each UGTA CAU. Each CAU Lead is responsible for identifying and coordinating CAU-specific technical scope and priorities, coordinating with other CAU Leads to maintain consistency between CAUs, coordinating technical reviews, evaluating and prioritizing data needs, providing technical oversight to the CAU team, focusing Preemptive Review Committee reviews, and communicating progress. Table 5-2 lists the CAU Leads and their respective organizations.

**Table 5-2
 CAU Leads by Organization and CAU**

Name	Organization	CAU
Chuck Russell	DRI	Rainier Mesa/Shoshone Mountain
Greg Ruskauff	N-I	Frenchman Flat
Gayle Pawloski	LLNL	Central and Western Pahute Mesa
Ed Kwicklis	LANL	Yucca Flat/Climax Mine

The Science Advisor, Bruce Crowe of N-I, acts as an independent advisor for technical topics, activity strategies, and conceptual-model development; application of flow and transport models; uncertainty and sensitivity analyses; compliance with environmental standards; and data collection. He is also a member of every preemptive review committee.

5.3 Preemptive Review Committee Members

The CAU-specific Preemptive Review Committees provide internal technical review of ongoing work throughout the CAU life cycle. [Table 5-3](#) lists the members by organization.

Table 5-3
Preemptive Review Committee Membership
 (Page 1 of 2)

Name	Organization
CAU 97, Yucca Flat/Climax Mine	
Matt Reeves	DRI
Chuck Russell	DRI
Gayle Pawloski	LLNL
Andy Tompson, Chair	LLNL
Mavrik Zavarin	LLNL
Britt Jacobson, ex-officio	NDEP
Bruce Crowe, Science Advisor	N-I
Keith Halford	USGS
CAU 98, Frenchman Flat	
Jenny Chapman	DRI
Dan Levitt	LANL
Andy Tompson	LLNL
Christine Andres, ex-officio	NDEP
Bruce Crowe, Science Advisor	N-I
Margaret Townsend	NSTec
Joe Fenelon, Chair	USGS

Table 5-3
Preemptive Review Committee Membership
 (Page 2 of 2)

Name	Organization
CAU 99, Rainier Mesa/Shoshone Mountain	
Kay Birdsell	LANL
Dave Finnegan, Co-chair	LANL
Gayle Pawloski	LLNL
Andy Tompson	LLNL
Mavrik Zavarin, Co-chair	LLNL
Britt Jacobson, ex-officio	NDEP
Bob Andrews	N-I
Bruce Crowe, Science Advisor	N-I
Margaret Townsend	NSTec
Joe Fenelon	USGS
CAUs 101 and 102, Central and Western Pahute Mesa	
Karl Pohlmann	DRI
Elizabeth Keating	LANL
Walt McNab	LLNL
Tim Rose	LLNL
Mark McLane, ex-officio	NDEP
Bob Andrews	N-I
Bruce Crowe, Science Advisor	N-I
Margaret Townsend	NSTec
Wayne Belcher, Chair	USGS
Jim Paces	USGS
Geoffrey Phelps	USGS

5.4 Topical Committee Members

Topical Committees (formerly standing subcommittees of the Technical Working Group [TWG]) may be formed on an *ad hoc* basis to address items such as non-CAU-specific issues, questions, concerns, and readiness. The committees may be disbanded when their scope is complete. The Frenchman Flat Model Evaluation committee was added in FY 2012. [Table 5-4](#) lists the current committees and membership.

Table 5-4
Topical Committee Membership
 (Page 1 of 2)

Name	Organization
Hydrology/Well Development and Testing	
Chuck Russell, Chair	DRI
Velimir Vesselinov	LANL
Mavrik Zavarin	LLNL
Rick Beauheim	N-I
Bruce Crowe, Science Advisor	N-I
John Londergan	N-I
Joe Fenelon	USGS
Keith Halford	USGS
Modeling	
Matt Reeves	DRI
Ed Kwicklis	LANL
Andy Tompson, Chair	LLNL
Bob Andrews	N-I
Bruce Crowe, Science Advisor	N-I
Keith Halford	USGS
Frenchman Flat Model Evaluation	
Greg Ruskauff, Chair	N-I
Nicole DeNovio	Golder
Sig Drellack	NSTec
Ed Kwicklis	LANL
Mavrik Zavarin	LLNL
Modeling/Software QA	
Sig Drellack	NSTec
Irene Farnham, Chair	N-I
Bimal Mukhopadhyay	NSO
Jenny Chapman	DRI
Chuck Russell	DRI
Wayne Belcher	USGS
Walt McNab	LLNL
Naomi Becker	LANL

Table 5-4
Topical Committee Membership
 (Page 2 of 2)

Name	Organization
Laboratory Analyses QA	
Sig Drellack	NSTec
Jenny Chapman	DRI
Ron Hershey	DRI
Irene Farnham, Chair	N-I
Kevin Cabble	NSO
Bill Dam	USGS
Mavrik Zavarin	LLNL
Naomi Becker	LANL
Data Management QA	
Lance Prothro	NSTec
Jenny Chapman	DRI
Chuck Russell	DRI
Tiffany Lantow	NSO
Matt Knop, Chair	N-I
Bill Dam	USGS
Gayle Pawloski	LLNL
Naomi Becker	LANL

5.5 Drilling Advisory Committees

Drilling advisory teams make real-time decisions to facilitate meeting well objectives and completing wells. Currently, only the Pahute Mesa drilling committee is active. [Table 5-5](#) contains the membership list.

**Table 5-5
Drilling Advisory Committee Membership**

Name	Organization
Pahute Mesa	
Chuck Russell	DRI
Ed Kwicklis	LANL
Gayle Pawloski, Chair	LLNL
Mavrik Zavarin	LLNL
Mark McLane	NDEP
Bruce Crowe, Science Advisor	N-I
Greg Ruskauff	N-I
Jeff Wurtz	N-I
Sig Drellack	NSTec
Ken Ortego	NSTec
Joe Fenelon	USGS

6.0 Other Activities

6.1 Technical Data Repository

The Technical Data Repository (TDR) is the new UGTA data management system that provides processes to control databases; and to capture, control, and retrieve information and data. The repository provides the following services:

- Traceable data pedigrees
- Storage, accessibility, and retrievability in a secure manner
- Consistent indexing
- Configuration management for data, information, and documents

6.2 Nevada Site Specific Advisory Board

The UGTA NNSA/NSO representative attended four Nevada Site Specific Advisory Board (NSSAB) meetings. The board received presentations on tritium detected off the Nevada National Security Site (NNS), the 2014 budget, FY 2012 accomplishments, Frenchman Flat response plan development, and remedial alternatives. The NSSAB recommended continuing the current groundwater strategy of intrinsic remediation and institutional controls.

6.3 Groundwater Open House

On September 18, 2012, NNSA/NSO UGTA representatives hosted the Fourth Annual Groundwater Open House in Amargosa, Nevada. The open house shared updates on the extensive work being done by UGTA. The open house had a hands-on approach, including interactive stations on monitoring, drilling, sampling, modeling, radiation facts, and communication. In addition to UGTA federal and contractor staff, other participants included Nye County, NDEP, the Nevada Division of Water Resources, and the NSSAB.

6.4 Sampling Plan

Development of the UGTA Sampling Plan started in FY 2012. This plan will provide a comprehensive, integrated approach for collecting and analyzing groundwater samples and water levels, while ensuring compliance with the QAP and *Federal Facility Agreement and Consent Order*

(FFACO). Coordination with the Routine Radiological Environmental Management Program (RREMP), Community Environmental Management Program (CEMP), and the Borehole Maintenance Program (BMP) will be required. It will reduce duplication, eliminate unnecessary activities, and minimize costs. The UGTA Sampling Plan will also provide a basis of estimate for the lifecycle baseline and support a seamless transition to long term monitoring. The plan is scheduled to be completed in FY 2013.

6.5 Awards

Dan Levitt, Zhiming Lu, and Zhenxue Dai of LANL received Los Alamos Achievement Program Awards for Outstanding Work in providing overlap coverage for retiring staff and technical writing.

7.0 Conclusion

The UGTA Activity participants have made considerable progress in applying the QAPP requirements. Implementation processes were developed by subject matter committees to close the UGTA-wide gap analyses corrective actions. The committees also provided feedback into the QAPP revision to better reflect their processes. There is a heightened QA and feedback awareness.

8.0 References Not Included in Section 4.0

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U.S. Environmental Protection Agency. 1993. *Method 300.0: Determination Of Inorganic Anions By Ion Chromatography*, Rev. 2.1. Cincinnati, OH: Environmental Monitoring Systems Laboratory, Office of Research and Development.

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Appendix A

Corrective Actions Tracked and Assessments Conducted in FY 2012

Table A-1
FY 2011 Corrective Action Status
 (Page 1 of 8)

Type	Date	Findings	Corrective Actions	Due Date	Actions Completed and/or Closure Date
DRI					
Internal	10/01/2010	Management assessments have only recently been instituted by DRI. Management assessments were not conducted before FY 2010. As a result, conditions adverse to quality may have been perpetuated for longer periods of time than what would otherwise have been the case.	Implement routine management assessments (a minimum of two per year).	10/01/2011	Routine management assessments have been implemented. Closed 10/01/2011.
		Data qualifiers have not been assigned to data generated by DRI in the past. As such, determination of the quality by external organizations relied upon detailed discussion with the principal investigators who collected the data or with the Program Manager of the project in which the data were collected, rather than relying upon standardized flags associated with the data that indicate the quality of the data.	Retroactively review all DRI data, and assign flags for quality and completeness as specified in UGTA QAPP, Rev. 4, Section 5.1.	10/01/2012	This action was implemented in two parts. Projects initiated in FY 2011 and later are being documented and assessed in complete accordance with the UGTA QAP and DRI procedures. Assignment of flags for quality and completeness are being assigned as data documentation packages are being completed. Assignment of data quality flags to historical records is pending completion of the compilation of these records into the appropriate project files. Assignments of flags for quality and completeness will be assigned at that time. This corrective action remains open.

Table A-1
FY 2011 Corrective Action Status
 (Page 2 of 8)

Type	Date	Findings	Corrective Actions	Due Date	Actions Completed and/or Closure Date
Internal DRI_UGTA_ FY2011_02	10/01/2010	<p>The DRI Project Manager and the UGTA participants have intermittently and inconsistently transferred project records to the records filing system over the lifetime of the project. Multiple records have been stored in offices and file cabinets in and around DRI. As a result, numerous UGTA project files are incomplete. If this situation is not remedied, then assessment of the completeness of the data documentation for a given project will be lower relative to the case where all available documentation has been compiled and cataloged (UGTA QAPP, Rev. 4, Section 5.1.1).</p>	<p>DRI UGTA project management will conduct a complete search of all relevant computers and file cabinets within DRI to identify and compile existing UGTA records. DRI UGTA project management will perform a data documentation evaluation to assess the completeness of the documentation for all ongoing and previous UGTA projects once all records have been compiled for a given project. This data documentation evaluation flag will be permanently assigned to the data documents and transmitted to DOE, project participants, and authorized parties when the data are requested. A records management specialist will be hired to assist in the documentation recovery and data evaluation effort, and to ensure all UGTA documents from this point forward are routinely compiled and archived according to DRI procedures.</p>	10/30/2012	<p>A records management specialist has been hired. Procedures for compiling and archiving records in accordance with UGTA QAP requirements have been implemented. Records generated for all projects implemented since FY 2011 are being archived in accordance with these procedures. Records associated with projects completed before 2011 have been secured. 80% of these records have been compiled into official project documentation files. Compilation of the remaining 20% of records is ongoing. The compilation process is expected to be completed by 03/30/2013. Assignment of data documentation evaluation flags will occur once all records have been compiled.</p> <p>This corrective action remains open.</p>

Table A-1
FY 2011 Corrective Action Status
 (Page 3 of 8)

Type	Date	Findings	Corrective Actions	Due Date	Actions Completed and/or Closure Date
LLNL					
Internal	03/2011	Inadequate software and hardware QA procedures.	Develop QA procedure(s) for the development, execution, testing, and documentation of research codes.	02/28/2012	The following QA procedure was developed: "Quality Assurance and Control Requirements for Employing Numerical Simulation Codes Supporting Underground Test Area Project Hydrologic Source Term Models at Lawrence Livermore National Laboratory." LLNL will be using the forms and procedures supplied and implemented by N-I. Closed 02/04/2012.
		Inadequate model assumption documentation.	Prepare and internally review a record package of the Frenchman Flat steady-state HST calculations.	02/28/2012	A record package for the Frenchman Flat Steady-State Hydrologic Source Term calculations was prepared and reviewed by LLNL. The package includes results for 50 replicate steady groundwater flow fields and associated radionuclide mass transport simulations for each flow replicate, as described in the associated report (Tompson et al., 2005). Closed 09/28/2012.
Internal	03/2011	Insufficient software validation/verification.	Use test codes to support Frenchman Flat steady-state HST calculations in accordance with newly developed LLNL procedure.	07/29/2012	The following lists method documentation and validation/verification for the ParFlow code: <ul style="list-style-type: none"> • Maxwell et al., 2009 • Kollet and Maxwell, 2006 • Jones and Woodward, 2001 • Tompson et al., 1997 • Ashby and Falgout, 1996 Closed 02/23/2012.

Table A-1
FY 2011 Corrective Action Status
 (Page 4 of 8)

Type	Date	Findings	Corrective Actions	Due Date	Actions Completed and/or Closure Date
LANL					
Internal	03/2011	Documentation of the Central Testing Area transport models is incomplete.	Prepare record package for the Central Testing Area transport models.	02/28/2012	A record package for the Frenchman Flat Central Testing Area Flow and Transport Model was prepared by LANL and submitted to N-I. The package describes the modeling process, and includes input and output files for the sub-CAU models, Finite Element Heat and Mass Transfer Code (FEHM) model-related information, and the codes developed for pre- and post-processing the model inputs and outputs. Closed 02/16/2012.
		Documentation of the geochemical analysis of ¹⁴ C ages and groundwater travel times is incomplete.	Prepare record package for the geochemical analysis of ¹⁴ C ages and groundwater travel times.	02/28/2012	A record package for the Frenchman Flat Geochemistry Analysis was submitted to N-I. The package describes the analysis process and the geochemical data used. The geochemical modeling (i.e., PHREEQC) output files and spreadsheets developed for the analysis are included. Closed 02/16/2012.

Table A-1
FY 2011 Corrective Action Status
(Page 5 of 8)

Type	Date	Findings	Corrective Actions	Due Date	Actions Completed and/or Closure Date
Internal	10/01/2010– 09/30/2011	The FEHM particle-tracking module sprtr was discovered to have issues under a particular set of conditions.	LANL developed a new particle-tracking code, Walkabout, to replace sprtr.	12/12/2011	LANL developed replacement code, Walkabout, because (1) the individual who had performed the initial sprtr coding was unavailable for debugging and code modifications, (2) a number of code patches had been implemented during the development and testing of sprtr that made it difficult to identify appropriate fixes, and (3) the new algorithm to be coded in Walkabout was believed to be more robust and flexible handling variable gridding options. N-I received Walkabout V1.0 on 04/12/2011. N-I initiated verification tests. To address additional issues identified during testing, Walkabout V1.1 was provided on 10/11/2011 and Walkabout V1.2 was provided on 11/21/2011. Walkabout V1.2 is the current (March 2012) version under software configuration management control. Closed 03/12/2012.
		The code PLUMECALC had implementation issues in certain algorithms. PLUMECALC post-processor did not work properly under all conditions.	Debugged PLUMECALC and issued Version 2.3.3.	12/12/2011	PLUMECALC v2.3.3 was issued for public release. Closed 04/11/2012.
		Particle-tracking code ptrk produces unacceptable numerical dispersion when grid and flow fields are not aligned.	Expanded the type-curve range. Recommended to user to either design the grid to minimize the dispersion, or accept the numerical dispersion. Recommended use of mptr (FEHM module) for highly transient flow conditions.	12/12/2011	FEHM V3.10 issued 01/04/2012. Closed 01/04/2012.

Table A-1
FY 2011 Corrective Action Status
 (Page 6 of 8)

Type	Date	Findings	Corrective Actions	Due Date	Actions Completed and/or Closure Date
N-I					
Internal Management Assessment 413	12/30/2010	Procedures do not identify responsible personnel for all tasks.	The UGTA procedures will be revised to include designated personnel for each step, consistent titles and roles, and new requirement implementation.	01/30/2012	UGTA procedures revised. Closed 03/01/2012.
		Determine appropriate titles and roles for personnel.	Appropriate titles and roles will be determined for UGTA personnel. The UGTA procedures will be updated with consistent titles and responsibilities.	01/30/2012	Titles standardized when procedures revised. Closed 01/04/2011.
Internal Management Assessment 418	03/2011	The data packages for the Frenchman Flat model do not contain sufficient detail to reconstruct the work product.	Record packages supporting the final contaminant boundary calculations will be reviewed and revised as necessary to allow reconstruction and traceability of the contained work product.	02/28/2012	Corrective actions completed 9/28/2012. Closed 10/02/2012. New finding 0.940 was issued in FY 2013 against non-retrievable or missing electronic files.
		No formal process exists within the UGTA Sub-Project for transmitting information, professional judgment, data, code, models, or inputs among participants.	A Data Information/Management Plan for UGTA participants will be developed to establish a formal process for transmitting information, professional judgment, data, code, models, and inputs among participants.	01/30/2012	The UGTA information/data management plan and implementation corrected this deficiency. Closed 02/09/2012.

Table A-1
FY 2011 Corrective Action Status
 (Page 7 of 8)

Type	Date	Findings	Corrective Actions	Due Date	Actions Completed and/or Closure Date
Internal Management Assessment 426	03/31/2011	Pertinent records were not submitted to Central Files.	The current procedure, UM-QPP-1, is too prescriptive and does not reflect current practices or the requirements of Title 36, <i>Code of Federal Regulations</i> (CFR), Chapter XII, National Archives and Records Administration, Subchapter B, "Records Management" (36 CFR 1220 through 1239). The procedure will be revised to reflect these requirements.	12/30/2011	Procedure UM-QPP-1, "Updating, Maintaining and Using N-I UGTA Databases," was revised and issued 01/01/2012. Closed 02/07/2012.
		Several of the UGTA databases do not have data quality flagging.	The requirement to maintain data quality flags in UGTA databases has been eliminated with the 2011 revision of the UGTA QAPP. Data quality flags should be addressed in the analysis documentation rather than in the databases. Requirements regarding documenting data quality will be added to the data analysis/model development procedure (UM-MDP-4) and removed from the database procedure (UM-QPP-1).	01/30/2012	
		Several of the UGTA databases do not have mature processes controlling the flow into and out of the databases.	The procedure UM-QPP-1 will be revised to reflect the UGTA QAPP, Rev. 0, requirement to document data input and output processes. These processes will be further addressed in the UGTA Data/Information Management Plan milestone due 01/30/2012.	01/30/2012	

Table A-1
FY 2011 Corrective Action Status
 (Page 8 of 8)

Type	Date	Findings	Corrective Actions	Due Date	Actions Completed and/or Closure Date
NCR 0.672	06/21/2011	Five issues with the spr algorithm in FEHM were identified.	N-I received a proposed replacement code from LANL and is in the process of testing the proposed replacement code.	01/30/2012	N-I received Walkabout V1.0 on 04/12/2011. N-I initiated verification tests. To address additional issues identified during testing, Walkabout V1.1 was provided on 10/11/2011, and Walkabout V1.2 was provided on 11/21/2011. Walkabout V1.2 is the current (March 2012) version under software configuration management control. Closed 03/12/2012.
NCR 0.673	06/08/2011	PLUMECALC Version 2.3.2 overpredicts concentrations when sub-gridding is used for simulations with dispersion.	Proposed to use as is with conditions (restrict the use of sub-grid version). N-I received a proposed replacement code, PLUMECALC Version 2.3.3, from LANL.	01/06/2012	PLUMECALC v2.3.3 was issued and, after testing, three use constraints were added to the code custodian log. Closed 01/05/2012.
NCR 0.687	07/22/2011	The ptrk macro reports erroneous fracture and matrix concentrations for dual permeability simulations, and transfer function file parameter checking is not performed correctly.	DOE conducted briefing on the code issue. Work on the Shoshone Mountain model was stopped, and information was sent to the code developer (LANL) to allow further assessment.	02/28/2012	On 01/04/2012, updated version of FEHM V3.10 received from LANL. After testing, five use constraints were included in the code custodian log. Closed 02/07/2012.
Finding 463	08/02/2011	Staff member suffered a needle-puncture injury in the right palm while conducting groundwater sample collection. Noncompliance with procedure. Unauthorized resumption of work. Work not performed in accordance with the field activity work package (FAWP).	A hazard safety analysis was performed. The procedure was revised; tested through a mock-up; underwent a thorough review by technical, safety, QA, and management personnel; and approved. Safety training was presented by Occupational Medical. A readiness review was performed, and field training was completed before resampling. In addition, the FAWP has been revised to reflect an updated Activity Safety Analysis (ASA) and additional training requirements.	01/11/2012	The root cause for the 06/27/2011 needle-puncture event was an organizational failure to assess and address needle-puncture hazards, and to effectively implement corrective actions. Closed 03/06/2012.

Table A-2
FY 2012 Assessments Results
 (Page 1 of 4)

Type	Date	Scope	Findings	Corrective Actions	Due Date
NNSA/NSO					
OAA	Every 2 weeks	Modeling Updates (CAU Leads)	Action items posted to SharePoint site.	N/A	N/A
OAA	Every 2 weeks	Contract Managers	Action items posted to SharePoint site.	N/A	N/A
OAA	Every 2 weeks	Integration (N-I Manager)	N/A	N/A	N/A
Shadow ASRP-AMSS-7.26.20 12-454452/ ASM-AMSS-10.7.201 1-386575	07/26/2012	Implementation of Health and Safety Requirements within UGTA, Soils/Industrial Sites and Program Integration Organizations	See N-I 509.	N/A	N/A
Shadow ASRP-AMEM-9.27.20 12-468442/ ASM-AMEM-10.7.201 1-386514	09/05/2012	NSTec Environmental Restoration MA-12-H000-0005, ER Health & Safety Plan Implementation at Well ER-20-11	See NSTec management assessment of same date.	N/A	N/A
Joint	09/25/2012	Review Eight 2011 UGTA Initiatives for Lessons Learned	Lessons learned identified.	N/A	N/A
DRI					
Management UGTA-FY12-1	08/15/2012	Pahute Mesa Flow Logging Operations	Unofficial SOPs were developed without formal updates to the SOPs being initiated.	SOPs will be revised to reflect improved processes and ensure data are being archived as required.	12/31/2012
			Formal reviews of forms and procedures were not conducted at the end of every field effort to ensure forms and field activity log books were being correctly filled out.	A training session will be conducted with all applicable parties on new SOPs.	
			No procedure existed for controlling programs used during flow logging exercises.	A procedure for controlling and disseminating the correct programs/spreadsheets for flow logging will be developed and implemented.	

Table A-2
FY 2012 Assessments Results
(Page 2 of 4)

Type	Date	Scope	Findings	Corrective Actions	Due Date
Management UGTA-FY12-2	08/15/2012	Maintenance of the Timber Mountain Precipitation Monitoring Station	The activities conducted at the site were not recorded in accordance with SOP.RLFA.	Additional training will be provided to all personnel involved. The training will review the requirements for the Recording Field and Laboratory Activities, as specified in SOP.RLFA. The training will be documented, and attendees will sign an attendance sheet.	12/31/2012
			Water samples were not collected in accordance with SOP.SCGW.	Additional training will be provided to all personnel involved. The training will review the requirements for collecting, controlling, and shipping relevant samples as specified in SOP.SCGW and the Timber Mountain Precipitation Monitoring Station Data Management and Field Activity Plan. The training will be documented, and recipients will sign an attendance sheet.	
			Response to root cause: Maintenance personnel for Timber Mountain Field site were not scheduling a sufficient amount of time to adequately prepare for site visits. This was compounded by the fact that these personnel must travel to Las Vegas in order to conduct field visits. Tight travel schedules did not encourage field personnel to thoroughly prepare for each visit.	Governing SOPs, applicable forms, and approved equipment and supplies will be organized by Las Vegas personnel and made collectively available in one location before each activity. Checklists will be created to ensure field personnel conduct all activities as specified.	
Management UGTA-FY12-3	08/15/2012	Aquifer Test Support at ER-EC-12 and ER-EC-13	Laboratory analyses were conducted with interim procedures. Interim procedures may not be consistent with requirements in UGTA QAPP until procedures are finalized.	Review, revise, and finalize laboratory procedures to ensure they meet current QAPP or QAP requirements.	12/31/2012
			Interim procedures were used without formal process to finalize procedures.	Establish process for tracking and disseminating final SOPs and for tracking changes to SOPs to ensure they occur in a timely fashion.	

Table A-2
FY 2012 Assessments Results
 (Page 3 of 4)

Type	Date	Scope	Findings	Corrective Actions	Due Date
LANL					
Management	06/05/2012	Yucca Flat Documentation Status	N/A	N/A	N/A
NSTec					
Management	07/30/2012	Pre-start Walkdown for the FY 2012 Drilling Campaign	N/A	N/A	N/A
Management	09/05/2012	Well ER-20-11 Drilling Operations (Shadowed by NNSA/NSO)	N/A	N/A	N/A
N-I					
Management 496	01/26/2012	UGTA Field Operations/Field Documentation	Logbook format and required content inconsistent with procedure.	All UGTA field personnel required to read procedure UF-DR-4. A Field Operations staff meeting 02/10/2012 discussed the Management Assessment finding and reviewed the procedurally correct practices for completion of the field logbooks.	Closed 02/13/2012
Independent 567	02/17/2012	Contractor Laboratory Performance	N/A	N/A	N/A

Table A-2
FY 2012 Assessments Results
 (Page 4 of 4)

Type	Date	Scope	Findings	Corrective Actions	Due Date
Management 509	05/31/2012	Implementation of Health and Safety Requirements within UGTA, Soils/Industrial Sites, and PI Organizations (Shadowed by NNSA/NSO)	The Standards-Based Management System (SBMS) Hazard Analysis Process requires a Preliminary Hazard Analysis (PHA) and an ASA before any new work begins. The PHA has not been reviewed recently because the work is consistent with current practices. However, new staff members were not part of the original PHA, so it seems prudent to reevaluate the PHAs and verify consistency with current work.	Representatives from UGTA, Quality Assurance, Health and Safety, Environmental Compliance and Radiological Services reviewed the ASA as provided in the UGTA FAWPs. The ASA was found to be acceptable in describing the work activities and hazards and sufficient for continued use on ongoing work activities. Some minor revisions were noted for clarity. The PHA/ASA sections of FAWPs will be revised to incorporate the revisions.	Corrective actions completed 09/28/2012; finding closed 10/01/2012
Management 502	06/05/2012	Yucca Flat Documentation Status	N/A	N/A	N/A
USGS					
Management	02/2012	Pahute Mesa Water-Level Data Collection	Work inconsistent with procedures.	Update following procedures and forms: <ul style="list-style-type: none"> • Manually Measuring Depth-to-Water with Steel Tapes, Electric Tapes, and Wirelines (USGS-WL-COLLECT-01, Rev. No: 2) • Measurement Field Form, (USGS-WL-COLLECT-fm-01, Rev. No: 0) • Pressure Transducer Installation, Calibration, Data Collection, And Removal (USGS-TRANS-INSTAL-01, Rev. No: 3) • Pressure Transducer Station Log (USGS-TRANS-INSTAL-fm-01, Rev. No: 0) • Transducer Calibration (USGS-TRANS-INSTAL-fm-02, Rev. No: 0) • Reviewing and Finalizing for Public Release, Transducer Data Collected (USGS-TRANS-REVIEW-01, Rev. No: 0) 	Closed 09/24/2012

A.1.0 References

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Appendix B

UGTA Procedure Matrix

Table B-1
UGTA Procedure Matrix
(Page 1 of 13)

Section	Title	DRI	LANL	LLNL	N-I	NSTec	USGS
1	Management	UGTA QAP					
1.1	Problem Definition and Background	FFACO					
1.2	Description	FFACO					
1.2.1	Schedule	FFACO					
1.3	Roles and Responsibilities	UGTA QAP/Task Plans					
1.3.2	Participants	<ul style="list-style-type: none"> UGTA and DRI-DOE QAPs Data collection (field, lab, and modeling) SOPs and forms Task Plans TREDS (DOE/DRI Contract) NSO.PC.G01: Change Control and Baseline Maintenance Guide 	<ul style="list-style-type: none"> UGTA QAP Data collection (field, lab, and modeling) SOPs and forms Task Plans LANL SC330: Quality Assurance Program LANL P781-1: Conduct of Training Manual 	<ul style="list-style-type: none"> UGTA QAP Data collection (field, lab, and modeling) SOPs and forms Task Plans LLNL LTRAIN system LLNL policy for stop-work authorization 	<ul style="list-style-type: none"> UGTA QAP Data collection (field, lab, and modeling) SOPs and forms SA: Deficient Conditions SA: Developing or Revising SBMS Documents SA: Event/Issue Management SA: Management Assessments Program SA: Planning, Scheduling, and Budgeting SA: Requirements Management SA: Suspend Work/Stop Work Authority SA: Training Program SA: Work Planning and Control Process 	<ul style="list-style-type: none"> UGTA QAP CCD-QA03.003: Lessons Learned/ Operating Experience CCD-QA05.001: NSTec Integrated Work Control Process CCD-QA09.001: Management Assessment Program CCD-QA05.001-008: Time Out/ Stop Work CCD-QA05.001-006: Technical Procedure Process and Use CCD-QA05.001-010: Plan of the Day/Plan of the Week UGTA Health and Safety Plan OP-2152.118: EM Mentoring Program OP-2152.201: Geology Job Orientation and Mentoring PY-3200: Quality Assurance PY-3200.002: Integrated Safety Management System 	<ul style="list-style-type: none"> UGTA QAP USGS Manual 502.1: Quality Management Policy Data collection (field, lab, and modeling) SOPs and forms Quality Management Policy USGS Training Policy (http://www.usgs.gov/humancapital/ecd/trainingpolicies.html)
1.3.3	Subcontractors	<ul style="list-style-type: none"> DRI-DOE QAP 	<ul style="list-style-type: none"> Procurement process - SOWs 	<ul style="list-style-type: none"> Procurement process - SOWs 	<ul style="list-style-type: none"> PR-PMS-5: Subcontract/Purchase Order Administration SA: Purchase of Materials and Services 	<ul style="list-style-type: none"> OP-0400.005: Subcontracts OP-2113.001: Subcontract Technical Representative OP-2113.002: Subcontracts Management OP-2151.320: Procurement and Control of Items and Services 	<ul style="list-style-type: none"> Procurement process - SOWs
1.3.4	Interfaces	UGTA QAP					
1.3.4.1	Contract Managers	Each organization has assigned a contract manager through DOE contract. Contract managers are identified in the annual QA Report and participate in a monthly conference call with NNSA/NSO (among many other meetings/calls)					
1.3.4.2	CAU Leads	CAU leads are identified in the annual QA Report and participate in a monthly conference call with NNSA/NSO that discusses technical status and issues					
1.3.5	Committees	UGTA QAP; committee members are identified in the annual QA Report					
1.3.5.1	Technical Working Group	UGTA QAP					
1.3.5.2	Pre-emptive Review Committees	UGTA QAP; committee members are identified in the annual QA Report					
1.3.5.3	Topical Committees	UGTA QAP					
1.3.5.4	Drilling Advisory Teams	UGTA QAP					
1.4	Qualifications and Training	UGTA QAP (See list below for Sections 1.4.1 and 1.4.2).					

Table B-1
UGTA Procedure Matrix
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Section	Title	DRI	LANL	LLNL	N-I	NSTec	USGS
1.4.1	Participants	<ul style="list-style-type: none"> DRI-DOE QAP 	<ul style="list-style-type: none"> LANL P781-1: Conduct of Training Manual Human Resources Policies 	<ul style="list-style-type: none"> LLNL LTRAIN system and performance review processes 	<ul style="list-style-type: none"> N-I QAPP SA: Records Management SA: Training Program TQ-TP-1: Analyzing Training Needs and Establishing Training Requirements TQ-TP-2: Designing and Developing Training TQ-TP-3: Implementing Training TQ-TP-4: Evaluating Training TQ-TP-6: Creating, Assigning and Maintaining Job Roles 	<ul style="list-style-type: none"> CCD-QA02.001: Training Program Manual OP-2152.118: EM Mentoring Program OP-2152.201: Geology Job Orientation and Mentoring PEP-EM-4025: Underground Test Area Project PY-EQ10.001: Review of Mandatory Training Requirements UGTA Health and Safety Plan 	<ul style="list-style-type: none"> USGS Training Policy (http://www.usgs.gov/humancapital/ecd/trainingpolicies.html)
1.4.2	Subcontracts	<ul style="list-style-type: none"> DRI-DOE QAP 	<ul style="list-style-type: none"> LANL SC330: Quality Assurance Program 	<ul style="list-style-type: none"> LLNL LTRAIN system 	<ul style="list-style-type: none"> SA: Purchase of Materials and Services PR-PMS-5: Subcontract/Purchase Order Administration TQ-TP-5: New associate/TDY Orientation and General Employee Training 	<ul style="list-style-type: none"> OP-0400.005: Subcontracts OP-2113.001: Subcontract Technical Representative OP-2113.002: Subcontracts Management OP-2151.320: Procurement and Control of Items and Services 	<ul style="list-style-type: none"> USGS Training Policy (http://www.usgs.gov/humancapital/ecd/trainingpolicies.html)
1.5	Quality Objectives and Criteria	<ul style="list-style-type: none"> UGTA and DRI-DOE QAPs Task Plans TREDS (DOE/DRI Contract) NSO.PC.G01: Change Control and Baseline Maintenance Guide Task Plans CAIPs FAWPs Project Controls SOPs 	<ul style="list-style-type: none"> UGTA QAP Task Plans CAIPs FAWPs Project Controls SOPs 	<ul style="list-style-type: none"> UGTA QAP Task Plans CAIPs FAWPs Project Controls SOPs 	<ul style="list-style-type: none"> UGTA QAP Task Plans CAIPs FAWPs Project Controls SOPs SA: Graded Approach 	<ul style="list-style-type: none"> CCD-QA05.001: NSTec Integrated Work Control Process UGTA QAP Task Plans CAIPs FAWPs Project Controls SOPs 	<ul style="list-style-type: none"> USGS Manual 502.1: Quality Management Policy UGTA QAP Task Plans CAIPs Sampling Plans FAWPs Project Controls Procedures
1.5.1	Data Quality Objective Process	FFACO					
1.6	Document Control	<ul style="list-style-type: none"> UGTA and DRI-DOE QAPs Task Plans Change Control Process PA-UPI-2: Information Submittal^a 	<ul style="list-style-type: none"> LANL P1020-2: Laboratory Document Control Program UGTA QAP Task Plans PA-UPI-2: Information Submittal^a 	<ul style="list-style-type: none"> LLNL Information Management System UGTA QAP Task Plans Change Control Process PA-UPI-2: Information Submittal^a 	<ul style="list-style-type: none"> SA: Document Management DR-DM-1: Technical Document Preparation and Review PA-UPI-2: Information Submittal^a 	<ul style="list-style-type: none"> CCD-QA04.001: Directives Management System CD-3500.003: Forms Management System CD-3500.007: Correspondence Management System CCD-QA04.003: Records Management PA-UPI-2: Information Submittal^a 	<ul style="list-style-type: none"> USGS Manuals 502.4 and 205.18 PA-UPI-2: Information Submittal^a
1.6.1	Revisions	<ul style="list-style-type: none"> UGTA and DRI-DOE QAPs Task Plans Change Control Process PA-UPI-2: Information Submittal^a 	<ul style="list-style-type: none"> LANL P1020-2: Laboratory Document Control Program UGTA QAP Task Plans Change Control Process PA-UPI-2: Information Submittal^a 	<ul style="list-style-type: none"> LLNL Information Management System UGTA QAP Task Plans Change Control Process PA-UPI-2: Information Submittal^a 	<ul style="list-style-type: none"> DR-DM-3: Technical Changes to Documents UGTA QAP Task Plans Change Control Process PA-UPI-2: Information Submittal^a 	<ul style="list-style-type: none"> CCD-QA04.001: Directives Management System CCD-QA05.001-010: Plan of the Day/Plan of the Week UGTA QAP Task Plans Change Control Process PA-UPI-2: Information Submittal^a 	<ul style="list-style-type: none"> USGS Manuals 502.4 and 205.18 UGTA QAP Task Plans Change Control Process PA-UPI-2: Information Submittal^a

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Section	Title	DRI	LANL	LLNL	N-I	NSTec	USGS
1.6.2	Protection of Documents	<ul style="list-style-type: none"> DRI SOP 450.7 Report and Publications Review Process 	<ul style="list-style-type: none"> INDEX-10-1: Index of DOE Classification Guidance 	<ul style="list-style-type: none"> LLNL Information Management System LLNL Authorized Derivative Classifier protocols 	<ul style="list-style-type: none"> DR-DM-1: Technical Document Preparation and Review 	<ul style="list-style-type: none"> CD-2000.014: Scientific and Technical Information Product (STIP) Review CCD-QA04.001: Directives Management System 	<ul style="list-style-type: none"> USGS Manuals 502.4 and 205.18
1.7	Records Management	<ul style="list-style-type: none"> Data collection (field, lab, and modeling) SOPs and forms PA-UPI-2: Information Submittal^a 	<ul style="list-style-type: none"> LANL P-1021.1: Laboratory Records Management PA-UPI-2: Information Submittal^a 	<ul style="list-style-type: none"> LLNL UGTA project data repositories PA-UPI-2: Information Submittal^a 	<ul style="list-style-type: none"> DR-RM-1: Creating, Maintaining, Submitting, Protecting, and Retrieval of Records, Form "UGTA file categories" SA: Document Management DR-RM-2: Central Files Record Process PA-UPI-2: Information Submittal^a 	<ul style="list-style-type: none"> CCD-QA04.001: Directives Management System OP-2152.206: Data Validation and Reporting CCD-QA04.003: Records Management CD-2000.014: Scientific and Technical Information Product (STIP) Review FAWPs OP-2152.204: Handling and Documenting Geologic Samples PA-UPI-2: Information Submittal^a 	<ul style="list-style-type: none"> USGS Manuals 502.4 and 205.18
1.8	Data Management	<ul style="list-style-type: none"> Data collection (field, lab, and modeling) SOPs and forms DRI-DOE QAP PA-UPI-2: Information Submittal^a 	<ul style="list-style-type: none"> PA-UPI-2: Information Submittal^a 	<ul style="list-style-type: none"> PA-UPI-2: Information Submittal^a 	<ul style="list-style-type: none"> SA: Data, Analysis, and Documentation Quality Processes and Procedures SA: Modeling Documentation Process SA: The Checkprinting Process SA: Records Management PA-UPI-2: Information Submittal^a 	<ul style="list-style-type: none"> OP-2152.206: Data Validation and Reporting OP-2152.204: Handling and Documenting Geologic Samples CCD-QA04.003: Records Management OP-2152.203: Rock Descriptions OP-2152.208: General Field Instructions for Geotechnical Activities OP-2152.209: Geologic Well-Site Support Well Completion Reports HFM Documentation Reports 	<ul style="list-style-type: none"> NVWSC 11.01 USGS Manual 502.1: Quality Management Policy
1.9	Computer Software and Codes	<ul style="list-style-type: none"> DRI Administrative Manual DRI Financial Services User Guide DRI-DOE QAP Procedures for Numerical Modeling Activities Conducted for UGTA Tasks Under the DRI Research, Engineering, and Development Services Contract for the DOE/National Nuclear Security Administration^a PA-UPI-2: Information Submittal^a (Records: U-100, U-101, U-103 forms) 	<ul style="list-style-type: none"> LANL P-1040: Software Quality Management PA-UPI-2: Information Submittal^a (Records: U-100, U-101, U-103 forms) 	<ul style="list-style-type: none"> LLNS Procurement Standard Practices Manual PA-UPI-2: Information Submittal^a (Records: U-100, U-101, U-103 forms) 	<ul style="list-style-type: none"> SA: Modeling Documentation Process SA: Software Quality Assurance (off-the-shelf-software) PA-UPI-2: Information Submittal^a (Records: U-100, U-101, U-103 forms) 	<ul style="list-style-type: none"> CD3500.010: Management of Licensed Software PY-3500.001: Computer Software Copyright Compliance CCD-QAS1.002: Software Management and Control for Quality Grade 3 PA-UPI-2: Information Submittal^a (Records: U-100, U-101, U-103 forms) 	<ul style="list-style-type: none"> See list below for Sections 1.9.1 through 1.9.6.

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Section	Title	DRI	LANL	LLNL	N-I	NSTec	USGS
1.9.1	Selection	<ul style="list-style-type: none"> Procedures for Numerical Modeling Activities Conducted for UGTA Tasks Under the DRI Research, Engineering, and Development Services Contract for the DOE/National Nuclear Security Administration^a PA-UPI-2: Information Submittal^a (Records: U-100, U-101, U-103 forms) 	<ul style="list-style-type: none"> LANL P-1040: Software Quality Management 	<ul style="list-style-type: none"> Code requirements are documented in applicable HST modeling reports and LLNL Modeling Protocol LLNL Modeling Protocol 	<ul style="list-style-type: none"> SA: Modeling Documentation Process SA: Software Quality Assurance (off-the-shelf-software) CAIP Outline 	N/A	<ul style="list-style-type: none"> Requisition Guidelines (procurement): – http://nvinternal.wr.usgs.gov/attachment/681040600000/1991/REQUISITION_GUIDANCE.PDF USGS Fundamental Science Practices (covering peer review of reports and documentation): – http://www.usgs.gov/usgs-manual/500/502-1.html (Foundation Policy) – http://www.usgs.gov/usgs-manual/500/502-3.html (Peer Review) Distribution of Water Resources Software on the USGS World Wide Web: – http://water.usgs.gov/admin/memo/policy/wrd_software-web_policy_2009.01_attachment.pdf
1.9.2	Development	<ul style="list-style-type: none"> Procedures for Numerical Modeling Activities Conducted for UGTA Tasks Under the DRI Research, Engineering, and Development Services Contract for the DOE/National Nuclear Security Administration^a PA-UPI-2: Information Submittal^a (Records: U-100 and U-103 forms) 	<ul style="list-style-type: none"> LANL P-1040: Software Quality Management PA-UPI-2: Information Submittal^a (Records: U-100 and U-103 forms) 	<ul style="list-style-type: none"> Code requirements are documented in applicable HST modeling reports and LLNL Modeling Protocol PA-UPI-2: Information Submittal^a (Records: U-100 and U-103 forms) 	<ul style="list-style-type: none"> SA: Modeling Documentation Process SA: Software Quality Assurance (off-the-shelf-software) 	N/A	<ul style="list-style-type: none"> USGS Fundamental Science Practices (covering peer review of reports and documentation): – http://www.usgs.gov/usgs-manual/500/502-1.html (Foundation Policy) – http://www.usgs.gov/usgs-manual/500/502-3.html (Peer Review) Distribution of Water Resources Software on the USGS World Wide Web: – http://water.usgs.gov/admin/memo/policy/wrd_software-web_policy_2009.01_attachment.pdf
1.9.3	Verification	<ul style="list-style-type: none"> Procedures for Numerical Modeling Activities Conducted for UGTA Tasks Under the DRI Research, Engineering, and Development Services Contract for the DOE/National Nuclear Security Administration^a PA-UPI-2: Information Submittal^a (Records: U-100 and U-103 forms) 	<ul style="list-style-type: none"> LANL P-1040: Software Quality Management PA-UPI-2: Information Submittal^a (Records: U-100 and U-103 forms) 	<ul style="list-style-type: none"> LLNL's NUFT simulator and other codes have been verified against numerous test cases PA-UPI-2: Information Submittal^a (Records: U-100 and U-103 forms) 	<ul style="list-style-type: none"> SA: Modeling Documentation Process SA: Software Quality Assurance (off-the-shelf-software) 	N/A	<ul style="list-style-type: none"> USGS Fundamental Science Practices (covering peer review of reports and documentation): – http://www.usgs.gov/usgs-manual/500/502-1.html (Foundation Policy) – http://www.usgs.gov/usgs-manual/500/502-3.html (Peer Review) Distribution of Water Resources Software on the USGS World Wide Web: – http://water.usgs.gov/admin/memo/policy/wrd_software-web_policy_2009.01_attachment.pdf

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Section	Title	DRI	LANL	LLNL	N-I	NSTec	USGS
1.9.4	Installation Testing	<ul style="list-style-type: none"> Procedures for Numerical Modeling Activities Conducted for UGTA Tasks Under the DRI Research, Engineering, and Development Services Contract for the DOE/National Nuclear Security Administration^a PA-UPI-2: Information Submittal^a (Records: U-101 form) 	<ul style="list-style-type: none"> PA-UPI-2: Information Submittal^a (Records: U-101 form) 	<ul style="list-style-type: none"> LLNL Modeling Protocol PA-UPI-2: Information Submittal^a (Records: U-101 form) 	<ul style="list-style-type: none"> SA: Modeling Documentation Process SA: Software Quality Assurance (off-the-shelf-software) 	<ul style="list-style-type: none"> CD3500.010: Management of Licensed Software PY-3500.001: Computer Software Copyright Compliance CCD-QAS1.002: Software Management and Control for Quality Grade 3 	<ul style="list-style-type: none"> USGS codes (such as MODFLOW) have example problems in the reports that can and are used to verify that the installed code is working correctly Procured software tested using test cases in manuals (if available)
1.9.5	Code Review	<ul style="list-style-type: none"> Procedures for Numerical Modeling Activities Conducted for UGTA Tasks Under the DRI Research, Engineering, and Development Services Contract for the DOE/National Nuclear Security Administration^a PA-UPI-2: Information Submittal^a (Records: U-100 and U-103 forms) 	<ul style="list-style-type: none"> LANL P-1040: Software Quality Management PA-UPI-2: Information Submittal^a (Records: U-100 and U-103 forms) 	<ul style="list-style-type: none"> LLNL's NUFT simulator and other codes have been verified against numerous test cases PA-UPI-2: Information Submittal^a (Records: U-100 and U-103 forms) 	<ul style="list-style-type: none"> SA: Modeling Documentation Process SA: Software Quality Assurance (off-the-shelf-software) 	N/A	<ul style="list-style-type: none"> UGSS Manual 502.1 Quality Management Policy Office of Ground Water Technical Memorandum No. 00.02 (Subject: Programs and Plans– Update of the National Policy to Archive Ground Water Flow and Transport Models) Office of Ground Water Technical Memorandum No. 00.02 (Subject: Update on Guidance for the Preparation, Approval, and Archiving of Aquifer-Test Results) Office of Ground Water Technical Memorandum No. 00.02 (Subject: Policy for the documentation of non-U.S. Geological Survey computer programs used for analysis in ground-water projects) Office of Ground Water Technical Memorandum No. 00.02 (Subject: Clarification of policy for using non-U.S. Geological Survey computer programs in ground-water projects) USGS Fundamental Science Practices (covering peer review of reports and documentation): <ul style="list-style-type: none"> – http://www.usgs.gov/usgs-manual/500/502-1.html (Foundation Policy) – http://www.usgs.gov/usgs-manual/500/502-3.html (Peer Review) Distribution of Water Resources Software on the USGS World Wide Web: <ul style="list-style-type: none"> – http://water.usgs.gov/admin/memo/policy/wrd_software-web_policy_2009.01_attachment.pdf

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Section	Title	DRI	LANL	LLNL	N-I	NSTec	USGS
1.9.6	Configuration Control	<ul style="list-style-type: none"> Procedures for Numerical Modeling Activities Conducted for UGTA Tasks Under the DRI Research, Engineering, and Development Services Contract for the DOE/National Nuclear Security Administration^a PA-UPI-2: Information Submittal^a 	<ul style="list-style-type: none"> LANL P-1040: Software Quality Management LANL Code configuration control^a 	<ul style="list-style-type: none"> LLNL research codes are internally documented Site license provides online access to common commercial software products such as Microsoft Word, Microsoft Excel, etc. 	<ul style="list-style-type: none"> SA: Modeling Documentation Process SA: Software Quality Assurance (off-the-shelf-software) 	<ul style="list-style-type: none"> CD3500.010: Management of Licensed Software PY-3500.001: Computer Software Copyright Compliance CCD-QAS1.002: Software Management and Control for Quality Grade 3 	<ul style="list-style-type: none"> Distribution of Water Resources Software on the USGS World Wide Web (policy on software archiving): <ul style="list-style-type: none"> – http://water.usgs.gov/admin/memo/policy/wrd_software-web_policy_2009.01_attachment.pdf – http://water.usgs.gov/usgs/ogw/software-archive.html
1.10	Procurement	<ul style="list-style-type: none"> DRI Administrative Manual DRI Financial Services User Guide DRI-DOE QAP 	<ul style="list-style-type: none"> LANL P840-1: Quality Assurance for Procurement 	<ul style="list-style-type: none"> LLNL Procurement Guidelines LLNL Procurement Standard Practices Manual 	<ul style="list-style-type: none"> SA: Purchase of Materials and Services QA-RRQ-2: Vendor Approval Process 	<ul style="list-style-type: none"> CCD-QA07.001: Procurement Process OP-2151.320: Procurement and Control of Items and Services OP-0400.005: Subcontracts OP-2113.001: Subcontract Technical Representative OP-2113.002: Subcontracts Management OP-2151.320: Procurement and Control of Items and Services 	<ul style="list-style-type: none"> USGS Manual 205.4 (Procurement) and 400 series (Procurement and Contracting)
1.10.1	Procurement Documents	<ul style="list-style-type: none"> DRI Administrative Manual DRI Financial Services User Guide 	<ul style="list-style-type: none"> LANL P840-1: Quality Assurance for Procurement 	<ul style="list-style-type: none"> LLNL Procurement Guidelines 	<ul style="list-style-type: none"> PR-PMS-1: Standard Purchase Requisition PR-PMS-5: Subcontract/Purchase Order Administration 	<ul style="list-style-type: none"> CCD-QA07.001: Procurement Process OP-2151.320: Procurement and Control of Items and Services OP-0400.005: Subcontracts OP-2113.001: Subcontract Technical Representative OP-2113.002: Subcontracts Management OP-2151.320: Procurement and Control of Items and Services 	<ul style="list-style-type: none"> USGS Manual 205.4 (Procurement) and 400 series (Procurement and Contracting)
1.10.2	Instrument/Equipment Testing, and Inspection	<ul style="list-style-type: none"> DRI Administrative Manual DRI Financial Services User Guide DRI-DOE QAP Data collection (field, lab, and modeling) SOPs and forms 	<ul style="list-style-type: none"> Data collection (field, lab, and modeling) SOPs and forms 	<ul style="list-style-type: none"> Data collection (field, lab, and modeling) SOPs and forms 	<ul style="list-style-type: none"> SA: Receipt Inspection of Quality-Affecting Items and Hazardous Materials QA-RIQ-1: Receiving and Receipt Inspection of Quality-Affecting Items and/or Hazardous Materials SA: Deficient Conditions 	<ul style="list-style-type: none"> OP-2151.320: Procurement and Control of Items and Services 	<ul style="list-style-type: none"> USGS Manual 205.4 (Procurement) and 400 series (Procurement and Contracting)
1.11	Identification and Control of Items	<ul style="list-style-type: none"> DRI Financial Services User Guide 	<ul style="list-style-type: none"> Data collection (field, lab, and modeling) SOPs and forms 	<ul style="list-style-type: none"> Data collection (field, lab, and modeling) SOPs and forms 	<ul style="list-style-type: none"> SA: Property Management SA: Deficient Conditions 	<ul style="list-style-type: none"> OP-2151.320: Procurement and Control of Items and Services OP-F900.006: Identification, Tagging, Marking and Recording Government Property 	<ul style="list-style-type: none"> USGS-ICI-01: USGS NWSC Plans for Compliance with UGTA/QAPP Identification and Control of Items
1.11.1	Suspect and Counterfeit Items	<ul style="list-style-type: none"> DRI Administrative Manual DRI Financial Services User Guide DRI-DOE QAP 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> QA-SCI-1: Identifying, Handling, Reporting, and Verifying Suspect/Counterfeit Items and Defective Items 	<ul style="list-style-type: none"> CCD-QAS2.001: Suspect/Counterfeit Items Program 	<ul style="list-style-type: none"> Denver Radio-Isotope Lab

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Section	Title	DRI	LANL	LLNL	N-I	NSTec	USGS	
1.12	Measuring and Test Equipment	<ul style="list-style-type: none"> DRI-DOE QAP Data collection (field, lab, and modeling) SOPs and forms^a 	<ul style="list-style-type: none"> LANL P330-2: Control and Calibration of Measuring and Test Equipment 	<ul style="list-style-type: none"> Data collection (field, lab, and modeling) SOPs and forms^a 	<ul style="list-style-type: none"> SA: Calibration and Maintenance of Measuring and Testing Equipment, SA: UGTA Equipment Calibration and Use 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> USGS-ICI-01: USGS NWSC Plans for Compliance with UGTA/QAPP Measuring and Test Equipment 	
1.12.1	Equipment Calibration	<ul style="list-style-type: none"> DRI-DOE QAP Data collection (field, lab, and modeling) SOPs and forms 	<ul style="list-style-type: none"> LANL P330-2: Control and Calibration of Measuring and Test Equipment 	<ul style="list-style-type: none"> Data collection (field, lab, and modeling) SOPs and forms 	<ul style="list-style-type: none"> SA: UGTA Equipment Calibration and Use SA: Deficient Conditions 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> USGS-ICI-01: USGS NWSC Plans for Compliance with UGTA/QAPP Measuring and Test Equipment 	
1.12.2	Preventive Maintenance	<ul style="list-style-type: none"> DRI-DOE QAP Data collection (field, lab, and modeling) SOPs and forms 	<ul style="list-style-type: none"> LANL P330-2: Control and Calibration of Measuring and Test Equipment 	<ul style="list-style-type: none"> Data collection (field, lab, and modeling) SOPs and forms 	<ul style="list-style-type: none"> SA: Calibration and Maintenance of Measuring and Testing Equipment SA: UGTA Equipment Calibration and Use 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> USGS-ICI-01: USGS NWSC Plans for Compliance with UGTA/QAPP Measuring and Test Equipment 	
2	Work Processes	No requirements						
2.1	Data Quality Indicators	Data collection SOPs as applicable						
2.1.1	Precision							
2.1.2	Bias							
2.1.3	Accuracy							
2.1.4	Representativeness							
2.1.5	Completeness							
2.1.6	Comparability							
2.2	Field Operations	<ul style="list-style-type: none"> DRI-DOE QAP FAWPs Task Plans Field data collection SOPs and forms 	<ul style="list-style-type: none"> FAWPs Task Plans Field data collection SOPs and forms 	<ul style="list-style-type: none"> FAWPs Task Plans Field data collection SOPs and forms LLNL SOP-UGTA-109: Management of Samples and Records 	<ul style="list-style-type: none"> SA: Work Planning and Control Process Field Instructions for Well Development, Testing, and Sampling Field Instructions for Drilling and Well Completion SA: Work Planning and Control Process OI-WPC-1: Real Estate/Operations Permit Authorization OI-WPC-2: Work Package Preparation and Authorization UGTA Health and Safety Plan 	<ul style="list-style-type: none"> CCD-QA05.001-005: Work Package Process FAWPs OP-2152.201: Geology Job Orientation and Mentoring OP-2152.204: Handling and Documenting Geologic Samples OP-2152.208: General Field Instructions for Geotechnical Activities OP-2152.209: Geologic Well-Site Support 	<ul style="list-style-type: none"> Field data collection SOPs and forms 	
2.2.1	Planning Documentation	<ul style="list-style-type: none"> DOE Order NSO O 412.X1E DOE Order NSO O412.X3C DOE Order NSO O 410.XC SOP.TFM SOP.CT SOP.IDRONAUT 	UGTA QAP					
2.2.2	Sample Collection	<ul style="list-style-type: none"> SOP.SCGW SOP.ISOTOPES 	<ul style="list-style-type: none"> UGTA-LANL-SOP 4.01: Collecting 55 Gallon Drum Samples 	<ul style="list-style-type: none"> LLNL SOP-UGTA-124: Procedure for Collecting Samples From Wells at the Nevada Test Site 	<ul style="list-style-type: none"> SA: UGTA Sample Collection and Processing 	<ul style="list-style-type: none"> OP-2152.204: Handling and Documenting Geologic Samples 	<ul style="list-style-type: none"> N/A 	
2.2.2.1	Sample Labels and Collection Documentation	<ul style="list-style-type: none"> SOP.SCGW SOP.ISOTOPES 	<ul style="list-style-type: none"> UGTA-LANL-SOP 4.01: Collecting 55 Gallon Drum Samples 	<ul style="list-style-type: none"> LLNL SOP-UGTA-124: Procedure for Collecting Samples From Wells at the Nevada Test Site 	<ul style="list-style-type: none"> SA: UGTA Sample Collection and Processing 	<ul style="list-style-type: none"> OP-2152.204: Handling and Documenting Geologic Samples 	<ul style="list-style-type: none"> N/A 	

Table B-1
UGTA Procedure Matrix
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Section	Title	DRI	LANL	LLNL	N-I	NSTec	USGS
2.2.2.2	Sample Handling	<ul style="list-style-type: none"> SOP.SCGW SOP.ISOTOPES Laboratory SOPs 	<ul style="list-style-type: none"> UGTA-LANL-SOP-1.02: UGTA Project Sample Chain of Custody Laboratory SOPs 	<ul style="list-style-type: none"> LLNL SOP-UGTA-124: Procedure for Collecting Samples From Wells at the Nevada Test Site 	<ul style="list-style-type: none"> SA: UGTA Sample Collection and Processing 	<ul style="list-style-type: none"> OP-2152.204: Handling and Documenting Geologic Samples 	<ul style="list-style-type: none"> N/A
2.2.2.3	Chain of Custody	<ul style="list-style-type: none"> SOP.SCGW SOP.ISOTOPES Laboratory SOPs 	<ul style="list-style-type: none"> UGTA-LANL-SOP-1.02: UGTA Project Sample Chain of Custody 	<ul style="list-style-type: none"> LLNL SOP-UGTA-124: Procedure for Collecting Samples From Wells at the Nevada Test Site 	<ul style="list-style-type: none"> SA: UGTA Sample Collection and Processing SA: Independent Quality Assessment Program SA Management Assessments Program 	<ul style="list-style-type: none"> OP-2152.204: Handling and Documenting Geologic Samples 	<ul style="list-style-type: none"> Laboratory SOPs
2.2.2.4	Field QC Samples	<ul style="list-style-type: none"> SOP.SCGW SOP.ISOTOPES 	<ul style="list-style-type: none"> UGTA-LANL-SOP-1.02: UGTA Project Sample Chain of Custody Laboratory SOPs 	<ul style="list-style-type: none"> LLNL SOP-UGTA-124: Procedure for Collecting Samples From Wells at the Nevada Test Site 	<ul style="list-style-type: none"> SBMS Procedure (OI-SC-6): Field Quality Control Samples SA: UGTA Sample Collection and Processing 	<ul style="list-style-type: none"> OP-2152.204: Handling and Documenting Geologic Samples 	<ul style="list-style-type: none"> N/A
2.2.3	Field Documentation	<ul style="list-style-type: none"> SOP.150.1 Field data collection SOPs and forms 	<ul style="list-style-type: none"> Field data collection SOPs and forms 	<ul style="list-style-type: none"> LLNL SOP-UGTA-109: Management of Samples and Records LLNL SOP-ANCD-05: Operation and Maintenance of Field Measurement Equipment Field data collection SOPs and forms 	<ul style="list-style-type: none"> SA: Photo/Video Security SA: UGTA Field Documentation and Reporting UF-DR-4: Monitoring and Documenting Well-Site Activities SA: Field Documentation OI-FD-2: Photo Documentation 	<ul style="list-style-type: none"> FAWPs Work Packages OP-2152.206: Data Validation and Reporting OP-2152.208: General Field Instructions for Geotechnical Activities OP-2152.209: Geologic Well-Site Support Well Completion Reports CD-3700.003: Requesting Special Permits 	<ul style="list-style-type: none"> Field data collection SOPs and forms
2.2.4	Investigation-Derived Waste	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> SA: Waste Planning and Management UGTA Waste Management Plan and UGTA Fluid Management Plan 	<ul style="list-style-type: none"> UGTA Waste Management Plan and UGTA Fluid Management Plan 	<ul style="list-style-type: none"> N/A

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UGTA Procedure Matrix
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Section	Title	DRI	LANL	LLNL	N-I	NSTec	USGS
2.3	Laboratory Analyses	<ul style="list-style-type: none"> Quality Manual, Water Analysis Lab Analytical and Trace Chemistry Laboratories, Standard Operating Procedure, Total/Dissolved Organic Carbon, page 161 Preparation of Groundwater Samples for Dissolved Organic Carbon, Carbon-14 Analysis by Accelerator Mass Spectrometry, DRI SOP #1-1.1^a NSF-Arizona AMS Facility Quality Assurance Manual Nevada Stable Isotope Laboratory Analysis of $\delta^2\text{H}$, $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ in Water^a 	<ul style="list-style-type: none"> UGTA-LANL-SOP-4.05: Separating 85Kr and Other Noble Gases from Water Samples^a UGTA-LANL-SOP-4.06: Evaporation of Large-Volume Water Samples for Analysis of Radioactive Contents^a UGTA-LANL-SOP-4.07: Liquid Scintillation Counting^a UGTA-LANL-SOP-5.21: Determination of Analyte Concentrations In Aqueous Solutions by ICP-MS^a UGTA-LANL-SOP-2.01: Geologic Sample Preparation UGTA-LANL-SOP-3.01: X-ray Diffraction Analyses^a UGTA-LANL-SOP-3.02: X-ray Diffraction Data Reduction^a UGTA-LANL-SOP-3.03: X-ray Fluorescence Analysis^a 	<ul style="list-style-type: none"> SOP-UGTA-109: Management of Samples and Records^a SOP-UGTA-110: Tritium (7500-3H B) Liquid Scintillation Spectrometric Method for Samples Containing Significant Interference^a SOP-UGTA-111 Analysis of ⁹⁹T in Aqueous Samples^a SOP-UGTA-115: Analysis of ³⁶Cl in Aqueous Samples^a SOP-UGTA-116: Analysis of TDIC and TDOC concentrations and Isotopics in Groundwater Samples^a SOP-UGTA-117: Analysis of ⁸⁷Sr / ⁸⁶Sr in Groundwater Samples^a SOP-UGTA-118: ²³⁴U/²³⁸U Analysis of Groundwater Samples^a SOP-UGTA-120: Determination of Inorganic Anions by Ion Chromatography^a SOP-UGTA-121: Analysis of ³H and Dissolved Noble Gases in Groundwater^a SOP-UGTA-123: Analysis of ¹²⁹I in Aqueous Samples^a SOP-UGTA-128: Analysis of ¹⁸O and ²H in Groundwater Samples^a SOP-UGTA-129: Analysis of ¹³C and ¹⁸O in Carbonate Minerals^a SOP-UGTA-130: Plasma Ionization Multi-collector Mass Spectrometry (PIMMS)^a Preparing Samples for Mass Spectrometry—Th, Np, Pu, and U isotopes^a SOP-UGTA-131: Tritium (7500-3H B) Liquid Scintillation Spectrometric Method for Groundwater Sample Analysis^a SOP-UGTA-132: How to Generate Deionized Water^a SOP-UGTA-133: ICP/MS Sample Preparation^a SOP-UGTA-134: Sample Analysis by Quadrupole ICP/MS^a SOP-UGTA-135: Purification of Plutonium from Groundwater Samples for Analysis by MC-ICPMS^a 	<ul style="list-style-type: none"> LAB SOW SA: Tier I Review - Data Verification SA: Tier II Chemical Data Review - Data Validation SA: Tier II Radiological Data Review - Data Validation UM-QPP-1: Updating, Maintaining, and Using N-I Databases 	N/A	<ul style="list-style-type: none"> USGS-DRIL-Sr: Rb-Sr Isotope Geochemistry^a USGS-DRIL-U: U-Th Disequilibrium Studies^a USGS-DSIL-S: Sulfur Isotope Analysis of Dissolved Sulfate in H₂O^a YMPB-USGS-GCP-38: Determination of Chemical Composition by ICP-MS^a
2.3.1	Sample Storage	<ul style="list-style-type: none"> Laboratory SOPs 	<ul style="list-style-type: none"> SOP UGTA-LANL-SOP-1.02: Identification and Control of Samples 	<ul style="list-style-type: none"> SOP-UGTA-109: Management of Samples and Records SOP-UGTA-124: Procedure for Collecting samples from Wells at the Nevada Test Site 	<ul style="list-style-type: none"> LAB SOW 	N/A	<ul style="list-style-type: none"> Laboratory SOPs

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UGTA Procedure Matrix
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Section	Title	DRI	LANL	LLNL	N-I	NSTec	USGS
2.6.1	Model Parameters	<ul style="list-style-type: none"> DRI Model Procedures UGTA QAP Task Plans FFACO 	<ul style="list-style-type: none"> UGTA QAP Task Plans FFACO 	<ul style="list-style-type: none"> UGTA QAP Task Plans FFACO 	<ul style="list-style-type: none"> UGTA QAP Task Plans FFACO 	<ul style="list-style-type: none"> UGTA QAP Task Plans FFACO 	<ul style="list-style-type: none"> UGTA QAP Task Plans FFACO
2.6.1.1	Data Quality Evaluation	<ul style="list-style-type: none"> DRI Modeling Procedure PA-UPI-2: Information Submittal^a (Records: U-104 form) 	<ul style="list-style-type: none"> PA-UPI-2: Information Submittal^a (Records: U-104 form) 	<ul style="list-style-type: none"> PA-UPI-2: Information Submittal^a (Records: U-104 form) 	<ul style="list-style-type: none"> SA: Model Documentation PA-UPI-2: Information Submittal^a (Records: U-104 form) 	<ul style="list-style-type: none"> OP-2152.206: Data Validation and Reporting OP-2152.204: Handling and Documenting Geologic Samples Technical reports/documents typically include data quality statements 	<ul style="list-style-type: none"> USGS Manual 502.1: Quality Management Policy PA-UPI-2: Information Submittal^a (Records: U-104 form)
2.6.1.2	Data Transferability	<ul style="list-style-type: none"> DRI Modeling Procedures UGTA QAP PA-UPI-2: Information Submittal^a (Records: U-104 form) 				<ul style="list-style-type: none"> Well Completion Reports HFM Documents 	
2.6.2	Model Calibration	<ul style="list-style-type: none"> DRI Modeling Procedure PA-UPI-2: Information Submittal^a (Records: U-104 form) 				<ul style="list-style-type: none"> N/A 	
2.6.3	Sensitivity Analysis	<ul style="list-style-type: none"> PA-UPI-2: Information Submittal^a (Records: U-104 form) 					
2.6.4	Uncertainty Analysis	<ul style="list-style-type: none"> PA-UPI-2: Information Submittal^a (Records: U-104 form) 					
2.6.5	Contaminant Boundary Calculations	UGTA QAP					
2.7	Model Evaluation	FFACO; UGTA QAP					
2.8	Configuration Control	<ul style="list-style-type: none"> DRI Modeling Procedure 	<ul style="list-style-type: none"> Archiving and Documenting SFT-developed and SFT-modified software 	<ul style="list-style-type: none"> UGTA QAP LLNL Modeling Protocol^a 	<ul style="list-style-type: none"> SA: Modeling Documentation Process 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> USGS Manual 502.1: Quality Management Policy Office of Ground Water Technical Memorandum No. 00.02 (Subject: Programs and Plans– Update of the National Policy to Archive Ground Water Flow and Transport Models) Office of Ground Water Technical Memorandum No. 00.02 (Subject: Update on Guidance for the Preparation, Approval, and Archiving of Aquifer-Test Results) Office of Ground Water Technical Memorandum No. 00.02 (Subject: Policy for the documentation of non-U.S. Geological Survey computer programs used for analysis in ground-water projects) Office of Ground Water Technical Memorandum No. 00.02 (Subject: Clarification of policy for using non-U.S. Geological Survey computer programs in ground-water projects)

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UGTA Procedure Matrix
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Section	Title	DRI	LANL	LLNL	N-I	NSTec	USGS
3	Assessment and Oversight	No requirements					
3.1	Assessment	No requirements					
3.1.1	NDEP and NNSA/NSO Decision Points	FFACO					
3.1.2	Participant Assessments	<ul style="list-style-type: none"> DRI-DOE QAP 	<ul style="list-style-type: none"> P330-6: Nonconformance Reporting 	<ul style="list-style-type: none"> UGTA QAP 	<ul style="list-style-type: none"> SA: Independent Quality Assessment Program SA: Management Assessments Program SA: Deficient Conditions 	<ul style="list-style-type: none"> PEP-EM-4025: Underground Test Area Project CD-V000.001: Project Management CCD-QA05.001: NSTec Integrated Work Control Process Task Plans 	<ul style="list-style-type: none"> U.S. Geological Survey, Nevada Water Science Center Plans for Compliance with UGTA Quality Assurance Plan Assessment (USGS-A-01)
3.1.3	Oversight Assessments	NSO O 226.XC					
3.2	Technical Reviews	UGTA QAP					
3.3	Peer Review	FFACO, SOW					
3.4	Document Review and Issuance	<ul style="list-style-type: none"> PA-UPI-2: Information Submittal^a (Document Issuance Form and Document Review Sheets [DRS]) 	<ul style="list-style-type: none"> Review and Approval of Scientific and Technical Information PA-UPI-2: Information Submittal^a (Document Issuance Form and Document Review Sheets [DRS]) 	<ul style="list-style-type: none"> PA-UPI-2: Information Submittal^a (Document Issuance Form and Document Review Sheets [DRS]) 	<ul style="list-style-type: none"> SA: Document Management DR-DM-1: Technical Document Preparation and Review 	<ul style="list-style-type: none"> CD-2000.014: Scientific and Technical Information Product (STIP) Review 	<ul style="list-style-type: none"> PA-UPI-2: Information Submittal^a (Document Issuance Form and Document Review Sheets [DRS])
3.4.2	Review for Internal Participant Use Only	<ul style="list-style-type: none"> SOP.450.7 Guidelines for Preparing DOE Contract Reports PA-UPI-2: Information Submittal (Document Review and Issuance)^a 	<ul style="list-style-type: none"> Review and Approval of Scientific and Technical Information PA-UPI-2: Information Submittal^a (Document Review and Issuance) 	<ul style="list-style-type: none"> SOP.450.7 Guidelines for Preparing DOE Contract Reports PA-UPI-2: Information Submittal^a (Document Review and Issuance) 	<ul style="list-style-type: none"> DR-DM-1: Technical Document Preparation and Review 	<ul style="list-style-type: none"> Task Plans CCD-QA05.001: NSTec Integrated Work Control Process CD-V000.001: Project Management 	<ul style="list-style-type: none"> PA-UPI-2: Information Submittal (Document Review and Issuance forms)
3.4.3	Draft Review				<ul style="list-style-type: none"> DR-DM-1: Technical Document Preparation and Review 	<ul style="list-style-type: none"> CD-2000.014: Scientific and Technical Information Product (STIP) Review OP-2152.206: Data Validation and Reporting 	
3.4.4	External Review				<ul style="list-style-type: none"> DR-DM-1: Technical Document Preparation and Review 	<ul style="list-style-type: none"> CD-2000.014: Scientific and Technical Information Product (STIP) Review OP-2152.206: Data Validation and Reporting 	
3.4.5	Public Release				<ul style="list-style-type: none"> DR-DM-1: Technical Document Preparation and Review 	<ul style="list-style-type: none"> CD-2000.014: Scientific and Technical Information Product (STIP) Review OP-2152.206: Data Validation and Reporting 	

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UGTA Procedure Matrix
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Section	Title	DRI	LANL	LLNL	N-I	NSTec	USGS
3.5	Reports to Management	<ul style="list-style-type: none"> NSO.PC.G01: Change Control and Baseline Maintenance Guide (08/21/2011) NSO O 410.XC: Task Plan and Change Control Process PA-UPI-3: Issue Tracking^a 	<ul style="list-style-type: none"> P330-6: Nonconformance Reporting PA-UPI-3: Issue Tracking^a 	<ul style="list-style-type: none"> PA-UPI-3: Issue Tracking^a 	<ul style="list-style-type: none"> SA: Deficient Conditions SA: Developing or Revising SBMS Documents SA: Event Issue Management SA: Independent Quality Assessment Program SA: Management Assessments Program QA-DC-4: Managing and Tracking Corrective Actions DR-DM-1: Technical Document Preparation and Review QA-EIM-4: Developing Corrective Actions IP-FFA-3: FFA CO Monthly and Quarterly Reports 	<ul style="list-style-type: none"> Task Plans PA-UPI-3: Issue Tracking^a 	<ul style="list-style-type: none"> PA-UPI-3: Issue Tracking^a
3.5	Annual QA Report	PA-UPI-2: Information Submittal ^a (Annual QA Report)					
4	Corrective Action	No requirements					
4.1	Stop Work Order	<ul style="list-style-type: none"> DRI-DOE HASP PA-UPI-3: Issue Tracking^a 	<ul style="list-style-type: none"> PD100: Occupational Safety and Health P101-18: Procedure for Pause/ Stop Work 	<ul style="list-style-type: none"> LLNL policy 	<ul style="list-style-type: none"> SA: Suspend Work/Stop Work Authority 	<ul style="list-style-type: none"> CCD-QA05.001-008: Time Out/ Stop Work UGTA Health and Safety Plan 	<ul style="list-style-type: none"> PA-UPI-3: Issue Tracking^a
4.2	Issues	<ul style="list-style-type: none"> DRI-DOE QAP (Corrective Action Report) PA-UPI-3: Issue Tracking^a 	<ul style="list-style-type: none"> P330-6: Nonconformance Reporting PA-UPI-3: Issue Tracking^a 	<ul style="list-style-type: none"> PA-UPI-3: Issue Tracking^a 	<ul style="list-style-type: none"> QA-DC-3: Nonconformance Reporting SA: UGTA: Participant Interactions (Issue Resolution) 	<ul style="list-style-type: none"> NSTec CD for nonconformance reporting PA-UPI-3: Issue Tracking^a 	<ul style="list-style-type: none"> PA-UPI-3: Issue Tracking^a
4.3	Cause	<ul style="list-style-type: none"> PA-UPI-3: Issue Tracking^a 	<ul style="list-style-type: none"> PA-UPI-3: Issue Tracking^a 	<ul style="list-style-type: none"> PA-UPI-3: Issue Tracking^a 	<ul style="list-style-type: none"> QA-EIM-2: Fact-Finding Meetings QA-EIM-3: Causal Analysis 	<ul style="list-style-type: none"> NSTec CD for cause analysis PA-UPI-3: Issue Tracking^a 	<ul style="list-style-type: none"> PA-UPI-3: Issue Tracking^a
4.4	Trend Analysis	<ul style="list-style-type: none"> PA-UPI-3: Issue Tracking^a 	<ul style="list-style-type: none"> P330-6: Nonconformance Reporting PA-UPI-3: Issue Tracking^a 	<ul style="list-style-type: none"> PA-UPI-3: Issue Tracking^a 	<ul style="list-style-type: none"> QA-TR-1: N-I Trending PA-UPI-3: Issue Tracking^a 	<ul style="list-style-type: none"> NSTec CD for trend analysis PA-UPI-3: Issue Tracking^a 	<ul style="list-style-type: none"> PA-UPI-3: Issue Tracking^a
4.5	Lessons Learned	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> SOP-UGTA-109 	<ul style="list-style-type: none"> PF-LL-1: Screening, Dissemination, and Development of Operating Experience/Lessons Learned 	<ul style="list-style-type: none"> CCD-QA03.003: Lessons Learned/ Operating Experience FAWPs 	<ul style="list-style-type: none"> N/A

^a Procedure was not finalized in FY 2012.

Appendix C

Interlaboratory Comparison

Table C-1
Interlaboratory Comparison
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Analyte	Unit	Sample	DRI	LLNL	ALS ^a	USGS	LANL	RPD ^b	Criteria
Bromide	mg/L	ER-20-4	--	0.64	<0.021	--	--	--	±25% (if greater than 10x MDL) No limitation (if less than 10x MDL)
					<0.021				
		ER-20-8 (TSA)	--	<0.05	J 0.08	--	--	--	
					J 0.08				
		ER-20-8 (TCA)	--	<0.05	J 0.10	--	--	--	
					J 0.11				
Chloride	mg/L	ER-20-4	--	4.8	4.7	--	--	3.2	
					4.6				
		ER-20-8 (TSA)	--	24	23	--	--	1.3	
					24				
		ER-20-8 (TCA)	--	28	33	--	--	7.5	
					28				
Fluoride	mg/L	ER-20-4	--	8.1	8.0	--	--	1.9	
					7.9				
		ER-20-8 (TSA)	--	4.7	4.2	--	--	12	
					4.1				
		ER-20-8 (TCA)	--	4.3	3.8	--	--	12	
					3.8				
Sulfate	mg/L	ER-20-4	--	17	17	--	--	0.0	
					17				
		ER-20-8 (TSA)	--	45	43	--	--	5.7	
					42				
		ER-20-8 (TCA)	--	50	49	--	--	0.8	
					50				
Calcium	mg/L	ER-20-4	--	4.5	4.3	3.8	--	5.0–16	
					4.2				
		ER-20-8 (TSA)	--	3.6	3.4	3.4	--	1.5–7.2	
					3.3				
		ER-20-8 (TCA)	--	2.3	2.1	2.1	--	9.5	
					2.1				
Potassium	mg/L	ER-20-4	--	1.3	1.2	1.0	--	9.5	
					1.2				
		ER-20-8 (TSA)	--	1.6	1.8	1.6	--	-12	
					1.7				
		ER-20-8 (TCA)	--	2.2	2.4	2.0	--	-10	
					2.4				
Magnesium	mg/L	ER-20-4	--	0.046	<1	<0.4	--	--	
					<0.013				
		ER-20-8 (TSA)	--	0.032	<1	<0.4	--	--	
					<0.013				
		ER-20-8 (TCA)	--	0.024	<1	<0.4	--	--	
					<1				

Table C-1
Interlaboratory Comparison
(Page 2 of 6)

Analyte	Unit	Sample	DRI	LLNL	ALS ^a	USGS	LANL	RPD ^b	Criteria
Sodium	mg/L	ER-20-4	--	62	J 49 ^c	53	--	7.8–23	
					49				
		ER-20-8 (TSA)	--	93	J 79 ^c	86	--	7.8–17	
					J 78 ^c				
		ER-20-8 (TCA)	--	88	J 77 ^c	89	--	1.1–14	
					J 78 ^c				
Aluminum	µg/L	ER-20-4	--	4.8	<15	5.0	--	4.1	
					<15				
		ER-20-8 (TSA)	R	39	<200	27	--	36	
					<200				
		ER-20-8 (TCA)	R	55	<200	40	--	32	
					<200				
Antimony	µg/L	ER-20-4	--	0.51	--	<2.5	--	--	
		ER-20-8 (TSA)	--	0.42	--	<2.5	--	--	
		ER-20-8 (TCA)	--	0.17	--	<2.5	--	--	
Arsenic	µg/L	ER-20-4	--	4.9	J 5.6	4.6	--	7.2–20	±25% (if greater than 10x MDL) No limitation (if less than 10x MDL)
					<3.9				
		ER-20-8 (TSA)	--	6.7	8.8	6.6	--	1.5–4.4	
					5.0				
		ER-20-8 (TCA)	--	7.1	J- 5.7	6.6	--	7.3–15	
					<3.9				
Barium	µg/L	ER-20-4	--	1.3	J- 1.9 ^e	<15	--	8.4	
					J- 0.49 ^e				
		ER-20-8 (TSA)	--	0.31	<100	<15	--	58	
					<0.19				
		ER-20-8 (TCA)	--	0.67	<100	<15	--	--	
					<100				
Beryllium	µg/L	ER-20-4	--	<0.12	--	<2.5	--	--	
		ER-20-8 (TSA)	--	<0.18	--	<2.5	--	--	
		ER-20-8 (TCA)	--	<0.09	--	<2.5	--	--	
Cadmium	µg/L	ER-20-4	--	<0.06	<0.33	<2.5	--	--	
					<0.33				
		ER-20-8 (TSA)	--	<0.027	<0.33	<2.5	--	--	
					<0.33				
		ER-20-8 (TCA)	--	<0.018	<0.33	<2.5	--	--	
					<0.33				
Cesium	µg/L	ER-20-4	--	1.0	--	<0.5	--	--	
		ER-20-8 (TSA)	--	1.8	--	<0.5	--	--	
		ER-20-8 (TCA)	--	1.3	--	<0.5	--	--	

Table C-1
Interlaboratory Comparison
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Analyte	Unit	Sample	DRI	LLNL	ALS ^a	USGS	LANL	RPD ^b	Criteria
Chromium	µg/L	ER-20-4	--	0.08	<0.51 <0.51	<1.3	--	--	±25% (if greater than 10x MDL) No limitation (if less than 10x MDL)
		ER-20-8 (TSA)	--	0.70	<0.51 <0.51	<1.3	--	--	
		ER-20-8 (TCA)	--	0.41	<0.51 0.67 ^d	<1.3	--	48 ^d	
Cobalt	µg/L	ER-20-4	--	0.165	--	<1.3	--	--	
		ER-20-8 (TSA)	--	0.072	--	<1.3	--	--	
		ER-20-8 (TCA)	--	<0.018	--	<1.3	--	--	
Copper	µg/L	ER-20-4	--	0.88	--	<2.5	--	--	
		ER-20-8 (TSA)	--	0.82	--	<2.5	--	--	
		ER-20-8 (TCA)	--	0.30	--	<2.5	--	--	
Iron	µg/L	ER-20-4	--	3.4	<4.9 <4.9	--	--	--	
		ER-20-8 (TSA)	R	8.7	<100 <100	--	--	--	
		ER-20-8 (TCA)	R	<15	<100 <100	--	--	--	
Lead	µg/L	ER-20-4	--	0.32	<1.3 <1.3	<0.9	--	--	
		ER-20-8 (TSA)	--	0.129	<1.3 <1.3	<0.9	--	--	
		ER-20-8 (TCA)	--	<0.03	<1.3 <1.3	<1.5	--	--	
Manganese	µg/L	ER-20-4	--	2.6	J 2.0 J 1.6	2.3	--	7.6–24.4	
		ER-20-8 (TSA)	--	3.4	<10 <10	3.1	--	8.3	
		ER-20-8 (TCA)	--	3.8	<10 <10	3.6	--	4.9	
Molybdenum	µg/L	ER-20-4	--	9.6	--	9.7	--	1.0	
		ER-20-8 (TSA)	--	5.9	--	6.5	--	--	
		ER-20-8 (TCA)	--	4.9	--	5.5	--	12	
Nickel	µg/L	ER-20-4	--	<0.27	--	<2.5	--	--	
		ER-20-8 (TSA)	--	0.46	--	<2.5	--	--	
		ER-20-8 (TCA)	--	<0.57	--	<2.5	--	--	
Rubidium	µg/L	ER-20-4	--	5.2	--	4.9	--	5.9	
		ER-20-8 (TSA)	--	6.0	--	5.9	--	1.7	
		ER-20-8 (TCA)	--	7.9	--	7.8	--	1.3	

Table C-1
Interlaboratory Comparison
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Analyte	Unit	Sample	DRI	LLNL	ALS ^a	USGS	LANL	RPD ^b	Criteria
Selenium	µg/L	ER-20-4	--	<0.3	<2.7	<2.5	--	--	±25% (if greater than 10x MDL) No limitation (if less than 10x MDL)
					<2.7				
		ER-20-8 (TSA)	--	0.68	<2.7	<2.5	--	--	
					<2.7				
		ER-20-8 (TCA)	--	<2.1	<2.7	<2.5	--	--	
					<2.7				
Silicon	mg/L	ER-20-4	--	--	24	20	--	18	
					24				
		ER-20-8 (TSA)	--	--	24	26	--	6.9	
					24				
		ER-20-8 (TCA)	--	--	25	24	--	2.8	
					25				
Silver	µg/L	ER-20-4	--	<0.033	<1.1	<2.5	--	--	
					<1.1				
		ER-20-8 (TSA)	--	<0.027	<1.1	<2.5	--	--	
					<1.1				
		ER-20-8 (TCA)	--	<0.024	<1.0	<2.5	--	--	
					<1.0				
Strontium	µg/L	ER-20-4	--	5.5	J- 2.3 ^e	4.7	--	15 ^f	
					J- 2.0 ^e				
		ER-20-8 (TSA)	--	6.1	J- 3.3 ^e	7.4	--	19 ^f	
					J- 3.0 ^e				
		ER-20-8 (TCA)	--	1.9	J- 0.22 ^e	2.8 ^f	--	41 ^{d,f}	
					J- 0.32 ^e				
Uranium	µg/L	ER-20-4	--	1.6	1.6	1.7	--	2.8–6.3	
					1.7				
		ER-20-8 (TSA)	--	2.6	2.6	2.8	--	7.1–12	
					2.3				
		ER-20-8 (TCA)	--	2.5	2.8	2.7	--	2.9–12	
					2.6				
Vanadium	µg/L	ER-20-4	--	2.4	--	2.3	--	4.3	
		ER-20-8 (TSA)	--	1.7	--	<1.3	--	--	
		ER-20-8 (TCA)	--	1.9	--	1.7	--	9.0	
Zinc	µg/L	ER-20-4	--	0.65	--	<50	--	--	
		ER-20-8 (TSA)	--	<0.6	--	<50	--	--	
		ER-20-8 (TCA)	--	0.31	--	<50	--	--	
δ ¹³ C	‰	ER-20-4	-8.6	1.8	--	--	--	10	±1‰ ^b
		ER-20-8 (TSA)	-7.2	-2.6	--	--	--	4.6	
		ER-20-8 (TCA)	-7.5	-2.7	--	--	--	4.7	
δ ² H	‰	ER-20-4	-114	-116	--	--	--	2	±2‰ ^b
		ER-20-8 (TSA)	-115	-116	--	--	--	1	
		ER-20-8 (TCA)	-115	-118	--	--	--	3	

Table C-1
Interlaboratory Comparison
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Analyte	Unit	Sample	DRI	LLNL	ALS ^a	USGS	LANL	RPD ^b	Criteria
$\delta^{18}\text{O}$	‰	ER-20-4	-14.9	-15.3	--	--	--	0.4	$\pm 0.2\%$ ^b
		ER-20-8 (TSA)	-15.1	-15.5	--	--	--	0.4	
		ER-20-8 (TCA)	-15.0	-15.4	--	--	--	0.4	
$^{87}\text{Sr}/^{86}\text{Sr}$	ratio	ER-20-4	--	0.71051	--	0.71048	--	0.00003	$\pm 0.0005^b$
		ER-20-8 (TSA)	--	0.71062	--	0.71079	--	0.00017	
		ER-20-8 (TCA)	--	0.71063	--	0.71083	--	0.00020	
$^{234}\text{U}/^{238}\text{U}$ AR	ratio	ER-20-4	--	5.34	--	5.36	--	0.02	$\pm 0.3^b$
		ER-20-8 (TSA)	--	4.03	--	4.04	--	0.01	
		ER-20-8 (TCA)	--	3.66	--	3.67	--	0.01	
Tritium	pCi/L	ER-20-4	--	<142	<300 <290	--	<500	--	$\pm 25\%$ (if greater than 10x MDL) No limitation (if less than 10x MDL)
		ER-20-8 (TSA)	--	267	<350 <350	--	<500	--	
		ER-20-8 (TCA)	--	2,813	3,020 2,650	--	2,800 3,000	0.8 - 3.0	
^{14}C	pCi/L	ER-20-4	--	--	<380 <380	--	--	--	
		ER-20-8 (TSA)	--	0.0636	<400 <380	--	--	--	
		ER-20-8 (TCA)	--	0.197	<400 <400	--	--	--	
^{94}Nb	pCi/L	ER-20-4	--	--	<9.5 <11	--	<0.2 <0.1	--	
		ER-20-8 (TSA)	--	--	<7.0 <6.1	--	<0.2 <0.2	--	
		ER-20-8 (TCA)	--	--	<4.0 <7.0	--	<0.2 <0.2	--	
^{129}I	$\mu\text{g/L}$	ER-20-4	--	1.1E-06	<3.6 <3.9	--	--	--	
		ER-20-8 (TSA)	--	3.5E-05	<14.3 <2.9	--	--	--	
		ER-20-8 (TCA)	--	2.1E-04	J <4.0 J <3.4	--	--	--	
^{137}Cs	pCi/L	ER-20-4	--	--	<10 <9.2	--	<0.4 <0.5	--	
		ER-20-8 (TSA)	--	--	<6.9 <5.6	--	<0.05 <0.06	--	
		ER-20-8 (TCA)	--	--	<3.9 <7.4	--	<0.17 <0.10	--	

Table C-1
Interlaboratory Comparison
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Analyte	Unit	Sample	DRI	LLNL	ALS ^a	USGS	LANL	RPD ^b	Criteria
¹⁵² Eu	pCi/L	ER-20-4	--	--	<52	--	<0.08	--	±25% (if greater than 10x MDL) No limitation (if less than 10x MDL)
					<45		<0.08		
		ER-20-8 (TSA)	--	--	<38	--	<0.1	--	
					<29		<0.1		
		ER-20-8 (TCA)	--	--	<21	--	<0.1	--	
					<38		<0.1		
¹⁵⁴ Eu	pCi/L	ER-20-4	--	--	<55	--	<0.2	--	
					<57		<0.2		
		ER-20-8 (TSA)	--	--	<40	--	<0.3	--	
					<39		<0.3		
		ER-20-8 (TCA)	--	--	<22	--	<0.2	--	
					<44		<0.2		
^{239/240} Pu	pCi/L	ER-20-4	--	--	<0.009	--	<0.001	--	
					<0.008		<0.001		
		ER-20-8 (TSA)	--	--	<0.025	--	<0.001	--	
					<0.010		<0.001		
		ER-20-8 (TCA)	--	--	<0.043	--	<0.001	--	
					<0.038		<0.001		
²⁴¹ Am	pCi/L	ER-20-4	--	--	<18	--	<0.4	--	
					<250		<0.4		
		ER-20-8 (TSA)	--	--	<14	--	<0.5	--	
					<137		<0.5		
		ER-20-8 (TCA)	--	--	<21	--	<0.5	--	
					<46		<0.5		

^a N-I subcontracts to ALS for analyses.

^b Absolute differences are reported for $\delta^2\text{H}$, $\delta^{13}\text{C}$, $\delta^{18}\text{O}$, $^{87}\text{Sr}/^{86}\text{Sr}$, and $^{234}\text{U}/^{238}\text{U}$ AR. Calculation was based on unrounded results.

^c Identified by laboratory as an estimated value because of a possible matrix effect (serial dilution exceeded control limits)

^d Measured value is less than 10x MDL (MDLs for chromium and strontium are 0.51 $\mu\text{g}/\text{L}$ and 2 $\mu\text{g}/\text{L}$).

^e Identified by laboratory as an estimated value biased low from a negative bias found in the continuing calibration/method blank.

^f Only LLNL and USGS were compared because of the possible negative bias reported for N-I samples.

Am = Americium
Cs = Cesium
Eu = Europium
mg/L = Milligrams per liter

Nb = Niobium
pCi/L = Picocuries per liter
Pu = Plutonium
 $\mu\text{g}/\text{L}$ = Micrograms per liter

J = Estimated value.

J- = Estimated value includes a low bias

R = Rejected as a result of a matrix effect.