June 2010

U.S. Department of Energy/Sandia Corporation Response to the New Mexico Environment Department letter of April 8, 2010 entitled, "Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUS/AOCS (Request of March 1, 2006) and 5 Other SWMUS/AOCS (Request of January 7, 2008) Sandia National Laboratories EPA ID# NM5890110518 HWB-SNL-06-007 and HWB-SNL-08-001"

INTRODUCTION

This document responds to the New Mexico Environment Department (NMED) letter to the U.S. Department of Energy (DOE) and Sandia Corporation (Sandia) dated April 8, 2010 regarding the DOE/Sandia request for granting Corrective Action Complete (CAC) status for 31 Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) at Sandia National Laboratories/New Mexico (SNL/NM). The NMED letter is entitled: "Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001" (NMED April 2010).

The NMED April 8, 2010 letter contains a section entitled "SWMUs Requiring Corrective Action," and specifies additional site characterization requirements for SNL/NM SWMUs 68 (Old Burn Site), 149 (Building 9930 Septic System), 154 (Building 9960 Septic System and Seepage Pits), and 8 and 58 (Open Dump [Coyote Canyon Blast Area] and Coyote Canyon Blast Area). The responses for SWMUs 149 and 154 must be submitted to the NMED by June 30, 2010; whereas the responses for SWMUs 68, and 8 and 58 must be submitted to the NMED by September 30, 2010. This DOE/Sandia response addresses groundwater sampling requirements for SWMUs 149 and 154 only. Responses for SWMUs 68, and 8 and 58 will be submitted as a separate document.

The specific requirements for SWMUs 149 and 154 in the NMED letter are repeated in boldface below, and are followed by the DOE/Sandia response written in normal font under "Response."

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1	Sampling and Analysis Plan for Collection and Analysis of Additional Groundwater Samples Collected from Monitoring Well CTF-MW3, Located Near SNL/NM SWMU 149, June 2010, Environmental Restoration Project, Sandia National Laboratories, New Mexico
2	Sampling and Analysis Plan for Collection and Analysis of Additional Groundwater Samples Collected from Monitoring Well CTF-MW2, Located Near SNL/NM SWMU 154, June 2010, Environmental Restoration Project, Sandia National Laboratories, New Mexico

2. **SWMU 149 (Building 9930 Septic System): Additional groundwater monitoring for general chemistry, VOCs, perchlorate, metals (including selenium), and nitrate plus nitrite must be conducted at a frequency of three months (quarterly) for a period of at least two years. The Permittee must submit to NMED for its review and approval a work plan to sample and analyze the groundwater at the site. The work plan shall present details on field procedures, sampling and analysis of the groundwater, and related quality control. The plan shall also contain a summary of the results to be reported after the investigation phase is completed, and a schedule for implementation of the work.**

   Response: DOE/Sandia will conduct the additional groundwater sample collection and analysis (from existing groundwater monitoring well CTF-MW3 located near SWMU 149). A work plan (sampling and analysis plan [SAP]) describing details of the CTF-MW3 additional groundwater sample collection and analysis, and containing elements of the site characterization report which will summarize the results of this additional SWMU 149 work is provided as Attachment 1 of this response for NMED review and approval.

   The additional sampling from well CTF-MW3 will commence in the quarter following the quarter in which the attached SWMU 149 SAP is approved by NMED. The SWMU 149 groundwater site characterization report summarizing the results of this work will be completed and submitted to the NMED for review within 6 months of completion of the final (eighth) round of sampling.

3. **SWMU 154 (Building 9960 Septic System, Septic Tanks, and Drainfields): Additional groundwater monitoring for general chemistry, VOCs, SVOCs, HE compounds, perchlorate, metals (including barium), nitrate plus nitrite, and gross alpha and beta, and gamma spectrum must be conducted at a frequency of 3 months (quarterly) for a period of at least two years. The Permittee must submit to NMED for its review and approval a work plan to sample and analyze the groundwater at the site. The work plan shall present details on field procedures, sampling and analysis of the groundwater, and related quality control. The plan shall also contain a summary of the results to be reported after the investigation phase is completed, and a schedule for implementation of the work.**

   Response: DOE/Sandia will conduct the additional groundwater sample collection and analysis (from existing groundwater monitoring well CTF-MW2 located near SWMU 154). A work plan (SAP) describing details of the CTF-MW2 additional groundwater sample collection and analysis, and containing elements of the site characterization report which will summarize the results of this additional SWMU 154 work is provided as Attachment 2 of this response for NMED review and approval.

The additional sampling from well CTF-MW2 will commence in the quarter following the quarter in which the attached SWMU 154 SAP is approved by NMED. The SWMU 154 groundwater site characterization report summarizing the results of this work will be completed and submitted to the NMED for review within 7 months of completion of the final (eighth) round of sampling.

Reference

New Mexico Environment Department (NMED), April 2010, "Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUS/AOCS (Request of March 1, 2006) and 5 Other SWMUS/AOCS (Request of January 7, 2008), Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001," April 8, 2010.

Attachment 1

Sampling and Analysis Plan for Collection and Analysis of Additional Groundwater Samples Collected From Monitoring Well CTF-MW3, Located Near SNL/NM SWMU 149

June 2010

Environmental Restoration Project
Sandia National Laboratories, New Mexico

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1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) describes procedures that will be adhered to by the Department of Energy (DOE) and Sandia Corporation (Sandia) for the collection and analysis of water samples from groundwater monitoring well CTF-MW3 associated with Sandia National Laboratories/New Mexico (SNL/NM) Solid Waste Management Unit (SWMU) 149 (Building 9930 Septic System). This response for additional groundwater monitoring is designed to address the requirements of Section VII.D.6 of the Compliance Order on Consent (the Order) (NMED April 2004), and the April 8, 2010 letter from the New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB) (NMED April 2010).

As discussed below, groundwater samples will be collected from monitoring well CTF-MW3. During August 2001, monitoring well CTF-MW3 was installed approximately 290 ft downgradient of SWMU 149. The well is screened from 340 to 360 feet below ground surface in Precambrian granite and quartzite. Groundwater is under confined conditions. In April 2010, the potentiometric surface was approximately 303 feet below the ground surface.

The purpose of this SAP is to document procedures for the collection and reporting of consistent, reliable, defensible, and comparable groundwater sampling results. This SAP provides additional instructions for sample collection, data management, and reporting of data that will be adhered to during the compliance period. Other instructions are provided in SNL/NM Field Operating Procedures (FOPs), SNL/NM Administrative Operating Procedures (AOPs), and the SNL/NM Statement of Work (SOW) for Analytical Laboratories; however, the requirements of this SAP and the Order will take precedence over any FOPs, AOPs, or SOWs. Table 1-1 summarizes documents that are referenced in this SAP, which can be obtained from the SNL/NM Customer Funded Records Center. The most current versions of these documents will be consulted for the purpose of conducting groundwater sampling.

DOE/Sandia will provide to the NMED prior to the effective date of this SAP in hard copy and electronic format the current versions of the FOPs and AOPs listed below. DOE/Sandia will provide the NMED with any updated versions of the FOPs/AOPs within 30 days of their internal acceptance. If any requirement or procedure in the FOPs or AOPs is found by the NMED to be unacceptable for reasons including, but not limited to, the requirement or procedure will or could prevent the acquisition of representative and reliable groundwater sampling results, the requirement or procedure will be revised accordingly.

1.1 DATA QUALITY OBJECTIVES AND QUALITY CONTROL

The data quality objective (DQO) for groundwater monitoring is to collect accurate and defensible data of sufficient quality to assess the concentrations of constituents in the groundwater associated with SWMU 149. DOE/Sandia will evaluate accuracy, precision, representativeness, completeness, and comparability of the groundwater data to verify that data are of sufficient quality and ensure that the DQO is met. Quality Control (QC) procedures discussed in Section 1.20 of this SAP will also be used to determine whether the DQO has been attained. QC samples generated in both the field and the laboratory will be analyzed and evaluated.

Laboratory measurements will comply with SNL/NM Sample Management Office (SMO) procedures and protocols listed in Table 1-1, including qualification or validation of laboratory analytical data, and will also comply with this SAP. This procedure for determining the quality

and usability of analytical data acquired during groundwater sampling will be summarized in data validation reports regarding the overall quality of the data and the resulting data qualifiers. All associated data validation reports will be submitted to the NMED in the groundwater site investigation report which will summarize the results of this additional SWMU 149 work.

TABLE 1-1
SNL/NM Reference Documentation
SWMU 149 Groundwater Monitoring

Document Number	Document Title
AOP 00-03	Data Validation Procedure for Chemical and Radiochemical Data
AOP 95-16	Sample Management and Custody
FOP 05-01	LTES Groundwater Monitoring Well Sampling and Field Analytical Measurements
FOP 05-02	LTES Groundwater Monitoring Equipment Field Check For Water Quality Measurements
FOP 05-03	LTES Groundwater Sampling Equipment Decontamination
FOP 05-04	LTES Groundwater Monitoring Waste Management
LOP 94-03	Sample Handling, Packaging, and Shipping
PLA 05-09	LTES Groundwater Monitoring Health and Safety Plan
SMO 05-03	Procedure for Completing the Contract Verification Review
Not Applicable	SNL/NM Statement of Work for Analytical Laboratories
Not Applicable	Quality Assurance Project Plan (QAPP) for the Sample Management Office

Data not meeting DQO requirements are subject to corrective action(s) as discussed in SNL/NM SMO procedures and protocol and as discussed in Section 1.22 of this SAP.

1.2 ACCURACY

Accuracy is the agreement between a measured value and an accepted reference value at the analytical laboratory. When applied to a set of observed values, accuracy is influenced by a combination of a random component and a systematic bias. Accuracy will be maintained and evaluated through referenced calibration standards, laboratory control (LC) samples, matrix spike (MS) samples, and surrogate spike samples. The bias component will be evaluated and expressed as percent recovery (%Recovery), as indicated in the equation below:

%Recovery = [(spike result – unspiked sample result) / concentration added] x 100

The acceptable range for %Recovery is 50-130% for volatile organic compounds (VOCs) and 75-125% for metals.

1.3 PRECISION

Precision is the agreement among a set of replicate measurements. Precision data will be derived from field and laboratory duplicate samples. Precision will be reported as relative percent difference (RPD), which is calculated as follows:

RPD = [(Sample A value – Sample B value) / (average of Sample A + B values)] x 100

The acceptable range for RPD is ±20% for VOCs and ±35% for metals.

1.4 COMPLETENESS

Completeness is defined as a measure of the amount of usable data compared to the total amount of data required. Examples of events that reduce the amount of usable data include improperly collected and preserved samples, missed holding times, sample container breakage, and equipment operating outside prescribed QC limits. The completeness objective is 100% for compliance data. If the completeness objective is not met and sufficient sample material remains for re-analysis, and if within holding times, the laboratory will repeat the analysis. Otherwise, the incomplete portion of the sampling will be made complete by repeating the sampling and analysis as necessary. Percent completeness is expressed in the equation below:

%Completeness = [(number of useable data points) / (total number of samples required)] x 100

1.5 DATA REPRESENTATIVENESS

Data representativeness is the degree to which samples represent the media they are intended to represent. To help ensure that samples are representative of formation water, DOE/Sandia will implement the procedures in this SAP for groundwater purging and sampling. Monitoring wells will be adequately purged and stability of field parameters achieved prior to the collection of water samples.

1.6 COMPARABILITY

Comparability is the extent to which one data set or value can be related to another. Comparability between data sets will be achieved through the collection and analysis of samples using consistent methods and QC criteria.

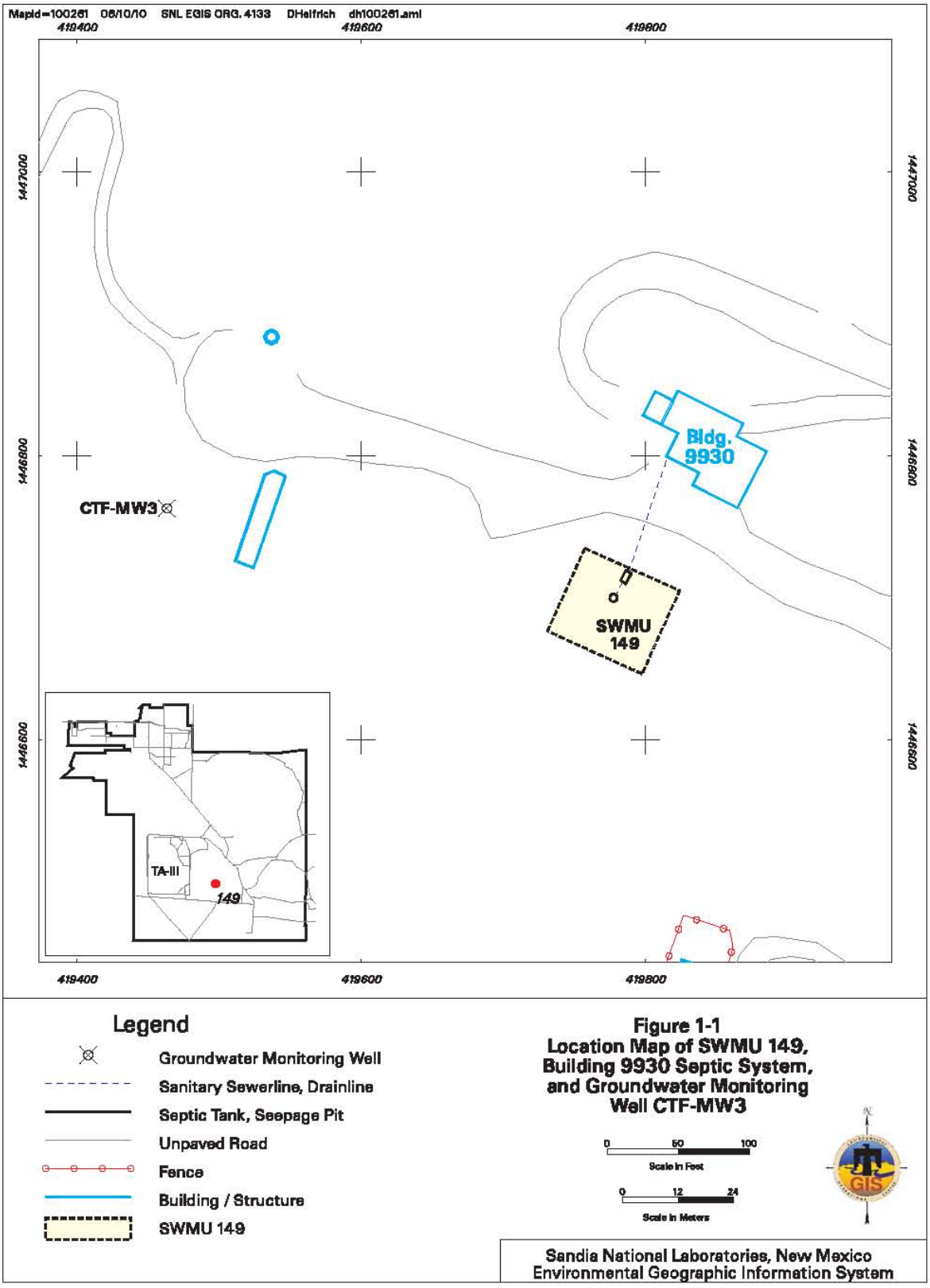
1.7 SAMPLING LOCATION AND FREQUENCY

The compliance groundwater monitoring network at SWMU 149 consists of a single monitoring well, CTF-MW3 and is shown on Figure 1-1. Table 1-2 summarizes the planned groundwater sampling frequency. The well construction diagram for CTF-MW3 is provided in Appendix A.

In accordance with the April 8, 2010 letter from the NMED (NMED April 2010) samples will be collected at a quarterly frequency for a period of at least two years. As shown on Table 1-2, groundwater samples collected at SWMU 149 will be analyzed for VOCs, perchlorate, general chemistry, metals (including selenium), and nitrate plus nitrite (NPN). Analytical results for the aqueous samples will be reported in units of milligrams per liter (mg/L) or micrograms per liter (μg/L).

1.8 FIELD OPERATIONS

Groundwater sampling will be conducted in accordance with this SAP to ensure accurate, precise, representative, complete, and comparable groundwater sampling results. Other groundwater monitoring activities will include the measurement of water levels, the decontamination of equipment, inspection of monitoring equipment, monitoring water quality parameters, collection and handling of samples, and management of waste.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419400
419600
419800
1447000
1446800
1446600
CTF-MW3
Bldg. 9930
SWMU 149
TA-III
149
Legend
Groundwater Monitoring Well
Sanitary Sewerline, Drainline
Septic Tank, Seepage Pit
Unpaved Road
Fence
Building / Structure
SWMU 149
0 50 100
Scale in Feet
0 12 24
Scale in Meters
Figure 1-1
Location Map of SWMU 149, Building 9930 Septic System, and Groundwater Monitoring Well CTF-MW3
Sandia National Laboratories, New Mexico
Environmental Geographic Information System

TABLE 1-2
SWMU 149 Groundwater Monitoring Well Sampling Frequency and Sample Analytical Requirements

Well Number	Quarterly Events				
	VOCs	Perchlorate	General Chemistry	Metals	NPN
CTF-MW3	8	8	8	8	8

Note: Refer to Table 1-3 for specific information regarding analytical methods and constituents.
The NMED requirement for general chemistry analyses includes: calcium, magnesium, sodium, potassium, chloride, sulfate, carbonate, and bicarbonate.
NPN = Nitrate plus nitrite.
VOC = Volatile Organic Compound.

1.9 SAFETY

Field operations will be conducted in a manner that protects the health and safety of field personnel. Every team member has the authority and responsibility to stop operations if an unsafe condition develops or is observed. All groundwater monitoring personnel will perform field activities safely in accordance with the SNL/NM Groundwater Health and Safety Plan, PLA 05-09.

1.10 WATER LEVEL MEASUREMENTS

Water level information is used to calculate the volume of water in a well casing and the amount required for purging. Measurements will be referenced to a surveyed mark of known elevation at the top of each well casing. The static water level will be measured in CTF-MW3 prior to purging or obtaining a sample, and measurements will be taken to the nearest 0.01-foot using a water level meter. Other requirements for water level measurements are provided in SNL/NM FOP 05-01. Water levels in the compliance well will be measured during each sampling event. Water level measurements in CTF-MW3 will be used to produce a hydrograph for the monitoring period, and that will be presented in the SWMU 149 groundwater site investigation report.

1.11 WATER QUALITY PARAMETERS

Water quality parameters will be collected during purging in accordance with SNL/NM FOP 05-01 and this SAP. Measurements taken will include potential of hydrogen (pH), specific conductance (SC), temperature, and turbidity. Additional water quality parameters will include dissolved oxygen (DO) and oxidation-reduction potential (ORP). Water quality parameters are as follows:

DO − The DO content of the water in percent saturation or in mg/L.

SC − The ability of a cubic centimeter of water to conduct electricity. It varies directly with hardness and is the amount of ionized minerals in the water. SC is reported in micro-mhos per centimeter at 25 degrees Celsius (ºC).

pH − A measure of the acidity or alkalinity of a solution. Numerically equal to 7 for neutral solutions, increasing with increasing alkalinity and decreasing with increasing acidity.

ORP − Potential for an oxidation (loss of electrons to another atom or molecule) or reduction (gain of electrons from another atom or molecule) reaction in millivolts.

Temperature – The temperature of the water in °C.

Turbidity – The cloudiness of water due to suspended and colloidal organic and inorganic material. Water turbidity is measured in Nephelometric Turbidity Units (NTUs).

1.12 SAMPLE COLLECTION

Sample collection procedures are provided in SNL/NM FOP 05-01 and this SAP. Groundwater monitoring will be performed using conventional sampling methods. CTF-MW3 will be purged with a portable Bennett™ submersible pump system or equivalent. The pump intake will be set at or near the bottom of the screened interval. A pumping rate that creates minimal disturbance to the groundwater flow regime, given equipment limitations, will be employed.

The maximum pumping rate in any case will not exceed 12 liters per minute, and groundwater samples collected for VOC analyses will be collected by filling the sample containers at a slow flow rate, given equipment limitations, to minimize volatilization. The sampling system may be modified in order to split the flow of water, such that the flow of water through one side can be reduced to a rate of 0.1 liter per minute or less to facilitate the filling of VOC sample containers. The flow rate through the other side will be the minimum rate that is reasonably achievable. CTF-MW3 will be purged a minimum of one saturated casing volume (a saturated casing volume is the volume of one length of the saturated portion of the screen in the well plus the volume of water in the primary and secondary filter packs). Prior to the collection of groundwater samples, purging may continue beyond one saturated casing volume until four stable measurements are obtained for turbidity, pH, temperature, and SC. Groundwater stability will be considered acceptable when measurements are ± 10 percent or less than 5 NTUs for turbidity, ± 0.1 pH units, ± 1.0 °C for temperature, and ± 5% for SC. If a monitoring well is purged dry prior to meeting the above purging and stability requirements, then sampling will be conducted once the well has recovered such that the volume of water available in the well is the minimum necessary to fill the sample containers..

Samples will be placed into clean laboratory-supplied containers. Groundwater samples will be collected in order of decreasing volatilization. Samples will not be filtered. Sample documentation and custody will be performed in accordance with SNL/NM SMO procedures and protocols (AOP 95-16 and LOP [Laboratory Operating Procedure] 94-03) and this SAP. Samples will be delivered to the shipping facility for repackaging in shipping coolers in accordance with appropriate U.S. Department of Transportation shipping regulations (49 Code of Federal Regulations [CFR] Parts 170–179).

1.13 MONITORING EQUIPMENT FIELD CHECKS

Monitoring instruments used to measure water quality parameters in the field will be calibrated where appropriate or function-checked prior to sampling activities. Calibration and field-check instructions are presented in FOP 05-02.

1.14 EQUIPMENT DECONTAMINATION

All equipment coming into contact with a sample, the interior of a well, or groundwater will be decontaminated prior to entering any well or contacting any sample to prevent cross-contamination. Equipment and materials (including chemicals and protective clothing), decontamination procedures, and waste management procedures are presented in the FOPs 05-01, 05-02, 05-03, and 05-04.

1.15 WASTE MANAGEMENT

All waste generated during groundwater sampling activities will be managed in accordance with federal, state, and local regulations. All purge and decontamination water will be managed as non-regulated waste, based upon historical groundwater results. Analytical data from sampling events will be compared to discharge and disposal criteria. The anticipated disposal path for purge water and decontamination water is discharge to the sanitary sewer. If the City of Albuquerque discharge standards are not met, purge and decontamination water will be managed appropriately through the SNL/NM Hazardous Waste Management Facility. The disposal path for personal protective equipment that comes into contact with groundwater will be determined by the associated groundwater analytical data results. Waste management activities associated with groundwater monitoring are discussed in FOP 05-04.

1.16 SAMPLE DOCUMENTATION AND CUSTODY

To ensure the integrity of samples from the time of collection through the reporting of analytical results, sample collection, handling, and custody will be documented in writing. Primary elements in the documentation of samples are: sample identification numbers, sample labels, custody tape, and Analysis Request/Chain of Custody (AR/COC) forms. Standardized forms will be used to document sample information. Sample custody and documentation procedures for sampling activities are outlined in SNL/NM AOP 95-16 and LOP 94-03. These procedures, and the procedures in this SAP, will be followed throughout each groundwater sampling event.

1.17 SAMPLE SHIPMENT

Samples will be shipped to the analytical laboratory in accordance with SMO procedures detailed in LOP 94-03. Prior to shipment, sample collection documentation will be verified. Any error will be noted in writing and corrected. Samples will be packaged and shipped in accordance with LOP 94-03.

1.18 LABORATORY ANALYTICAL PROCEDURES

DOE/Sandia will ensure that the analytical laboratory analyzes samples using U.S Environmental Protection Agency (EPA)-approved analytical methods. The analytical laboratory will provide appropriate sample containers prepared with the required preservative. The analytical laboratory will prepare and submit to DOE/Sandia an analysis data report as described in Section 4.0 of the SOW for Analytical Laboratories and as required by the conditions of this SAP. Table 1-3 summarizes EPA Methods (EPA November 1986), container types and preservation methods applicable to groundwater sampling at SWMU 149; however, DOE/Sandia may use other appropriate test methods, container types, and preservation methods that meet the data quality requirements of this SAP.

1.19 ANALYTICAL LABORATORY

DOE/Sandia will ensure that the analytical laboratory performs the analyses in accordance with this SAP and regulatory requirements. The laboratory will maintain written documentation of sample handling and custody, analytical results, and internal QC data. The laboratory will analyze QC samples in accordance with this SAP and its own internal QC program. DOE/Sandia will direct the laboratory to investigate and if necessary conduct corrective action where data are found to be outside quality acceptance limits.

TABLE 1-3
Laboratory Analytical Methods, Container Types and Preservatives
SWMU 149 Groundwater Sampling

Analysis	EPA Method[a]	Number of Containers, Types, Preservation
Volatile Organic Compounds	8260B	3 x 40 mL glass, HCL, 4°C
Metals[b]	6020/7470	1 x 500 mL polyethylene, HNO_3, 4°C
Perchlorate	314.0	1 x 250 mL polyethylene, 4°C
Major Anions[c]	9056	1 x 500 mL polyethylene, 4°C
Alkalinity as Total, Carbonate, and Bicarbonate	SM 2320B	1 x 500 mL polyethylene, 4°C
NPN (Nitrate plus Nitrite)	353.2	1 x 250 mL polyethylene, H_2SO_4, 4°C

[a] U.S. Environmental Protection Agency, 1986 (and updates), "*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*," SW-846, 3rd Edition, U.S. Environmental Protection Agency, Washington, D.C.
U.S. Environmental Protection Agency, 1999, "*Perchlorate in Drinking Water Using Ion Chromatography*," EPA 815/R-00-014, U.S. Environmental Protection Agency, Washington, D.C.
Clesceri, L.S., A.E. Greenburg, and A.D. Eaton, 1998. *Standard Methods for the Examination of Water and Wastewater,* 20th ed., Standard Method 2320B, Published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.
[b] Metals = filtered and unfiltered samples, Target Analyte List (TAL) metals including calcium, magnesium, potassium, selenium, and sodium.
[c] Major anions includes bromide, chloride, fluoride, and sulfate.
°C = Degrees Celsius.
H_2SO_4 = Sulfuric Acid.
HCL = Hydrochloric acid.
HNO_3 = Nitric acid.
L = Liter
mL = Milliliter(s).

Two types of additional analytical laboratory audits will be performed as part of the sampling program: system audits and performance audits. A system audit determines whether appropriate project systems (i.e., equipment, procedures) are in place. Performance audits indicate whether the projects systems are functioning properly and are capable of meeting project DQOs. These audits will be completed as required by SMO procedures and protocols.

1.20 QUALITY CONTROL

QC samples will be collected in the field and prepared in the laboratory to ensure that the data generated meet the DQO requirements. QC will be achieved through adherence to requirements and procedures listed and described in Section 1.1 of this SAP. Mandatory QC samples are identified in the following sections.

1.20.1 Field Quality Control

Field QC samples are used to document data quality and identify errors that may be introduced by field conditions, in sample collection, storage, transportation, and equipment decontamination. Field QC samples submitted to the analytical laboratory will be handled and analyzed in an identical manner as environmental samples. DOE/Sandia will collect and send to the analytical laboratory for analysis the following field QC sample types: equipment blanks, duplicates, field blanks, and trip blanks.

Equipment blanks demonstrate the effectiveness of equipment decontamination and monitor the cleanliness of the sampling system. After sampling equipment decontamination has been completed, an equipment blank is prepared by pumping de-ionized water through the portable

sampling equipment and collecting a sample of this water. Equipment blanks will be collected when well CTF-MW3 is sampled in the first and fifth quarters of the required eight quarters (a frequency of 25%) and will be analyzed for all of the constituents required by this SAP.

Duplicate environmental samples are collected in the field and analyzed to document the precision of the sampling and analysis process. The duplicate samples will be collected immediately after the original environmental sample in order to reduce variability caused by time and/or the sampling process. Duplicates will be collected when well CTF-MW3 is sampled in the first and fifth quarters of the required eight quarters (a frequency of 25%) and will be analyzed for all of the constituents required by this SAP.

Field blanks are collected to assess whether any contamination of the samples was caused by ambient field conditions. The field blanks will be prepared by pouring deionized water into sample containers at the sample collection point to simulate the transfer of environmental samples from the sampling system to the sample container. Field blank samples will be collected when well CTF-MW3 is sampled in the first and fifth quarters of the eight required quarters (a frequency of 25%) and will be analyzed for VOCs only.

Trip blanks (TBs) are used to assess the potential for cross-contamination between environmental samples during sample handling and shipping activities. The TBs will be analyzed for VOCs only. Each batch of groundwater samples from CTF-MW3 to be analyzed for VOCs will be accompanied by at least one TB during shipping. The analytical laboratory will prepare the TB by filling a VOC-sample vial with deionized water and using the same sample preservation method designated for VOC environmental samples. Each vial will be sealed with custody tape and dated when it is prepared. The TBs will accompany the empty sample containers when they are shipped to SNL/NM prior to the start of sample collection. The TBs will be taken into the field during sample collection and will be included in the shipment of environmental samples to the laboratory. The TBs must remain sealed during this entire cycle and may be opened only for analysis on return to the analytical laboratory.

1.20.2 Laboratory Quality Control

The analytical laboratory is required to have established procedures that demonstrate the analytical process is always in control during each sample analysis step. These procedures are used for all samples including environmental samples, method blank samples, and MS samples.

An LC sample consists of a control matrix (e.g., deionized water) spiked with known concentrations of analytes representative of the target analytes. An LC sample will be prepared and analyzed for each analytical procedure and batch to determine accuracy of the data. The laboratory will also evaluate the precision of the data by analyzing twice either the environmental samples, LC samples, or MS samples and calculating the RPD between corresponding results.

Method blank samples will be used to check for contamination in the laboratory during sample preparation and analysis. Method blank samples will be concurrently prepared and analyzed with each analytical batch. Method blanks will be reported in the same units as corresponding environmental samples, and the results will be included with each analytical report.

Surrogate spike analysis will be performed for all samples analyzed by Gas Chromatography/ Mass Spectroscopy. The surrogate compounds added to the sample will be those specified in the applicable EPA analytical method procedure (EPA November 1986). Recovery values for

surrogate compounds that are outside specified control limits require corrective action, which is detailed in the SOW for Analytical Laboratories.

The analytical process will be systematically evaluated for the effects of indigenous constituents present in the environmental sample matrix. MS/matrix spike duplicate (MSD) analyses will be performed in accordance with the specified analytical procedures.

1.21 DATA VALIDATION, REVIEW, AND REPORTING

Data validation and review of analytical and field documentation will be performed. Field and analytical QC data will be reviewed for conformance to QC acceptance criteria. The entire data package will be reviewed for completeness, comparability, representativeness, precision, and accuracy to determine whether the DQO has been met. All groundwater monitoring data will be reported in the SWMU 149 groundwater site investigation report.

1.21.1 Field Water Quality Data and Documentation Review

Completed field documentation will be reviewed and checked for errors, completeness, and conformance with the procedures required by this SAP. The review will occur at the end of each day in the field to allow verification, correction, and retrieval of missing information as appropriate. Field documentation found to be incomplete or to contain questionable data will be corrected prior to finalizing the field reports. If necessary, measurements of water quality parameters will be repeated.

1.21.2 Laboratory Data Verification and Validation

DOE/Sandia will review laboratory reports for completeness and conformance to the requirements of this SAP and to the performance criteria of the laboratory contract according to the "Procedure for Completing the Contract Verification Review," SMO 05-03.

Upon receipt of the analytical results from the analytical laboratory, DOE/Sandia will arrange for the third-party validation of the data. The purpose of the validation is to determine the usability and establish the defensibility of the results in support of environmental and waste management activities. Data qualification will be based upon review of field and laboratory-supplied QC data, the specific QC criteria identified in the procedures for the EPA-approved analytical methods, and the QC criteria for meeting the DQO identified in this SAP. Data validation will be conducted according to the requirements of this SAP and AOP 00-03, "Data Validation Procedure for Chemical and Radiochemical Data." All associated data validation reports will be submitted in the SWMU 149 groundwater site investigation report.

1.21.3 Data Reporting

All groundwater monitoring data will be reported in the SWMU 149 groundwater site investigation report. for. This report will include a description of sampling activities, field water quality data, laboratory analytical data, a discussion of QC evaluations and data reviews, a description of any project variance or nonconformance, and data validation summaries. All analytical data results will be compared to EPA Primary Drinking Water Standard Maximum Contaminant Levels (MCLs) for public drinking water systems. In addition, perchlorate will be compared to the screening level/method detection limit of 4 μg/L identified in the Order (NMED April 2004). The report will also include plots displaying constituents exceeding established EPA MCLs, and the screening level for perchlorate only, for samples collected from well CTF-MW3 during the compliance period.

1.21.4 Records Management

Records associated with groundwater monitoring, including field documentation, chains of custody, laboratory analytical results, data validation reports, and technical data evaluations will be maintained at the SNL/NM Customer Funded Records Center.

1.22 NON-CONFORMANCES AND VARIANCES

Corrective actions will be taken to rectify or prevent a nonconformance or variance that could adversely affect the quality of data generated. Corrective actions will be documented in writing by the persons identifying the need for action.

Any purposeful change to or deviation from the requirements of this SAP will take effect only after approval by the NMED.

A nonconformance is any action or condition that does not meet the requirements of this SAP. The analytical laboratory, SMO, groundwater monitoring team members, or the Project Leader may identify a nonconformance. The person noting a nonconformance will document the nonconformance in writing and suggest an appropriate corrective action. Resolution of the nonconformance will be documented in writing and acknowledged by DOE/Sandia.

DOE/Sandia and the analytical laboratories will have systems in place to identify QC issues and initiate corrective actions. In accordance with SMO procedures, the laboratories are required to notify the SMO of QC problems that may affect data quality. DOE/Sandia will evaluate and determine whether data are comparable to historical values and whether or not corrective action is required based upon the specific issue. Corrective action may include documentation of QC issues in an analytical laboratory report, data qualifiers, and/or sample re-analysis. In all cases, the DQO in Section 1.1 of this SAP will be met.

1.23 REFERENCES

EPA, see U.S. Environmental Protection Agency.

New Mexico Environment Department (NMED), April 2004. "Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act § 74-4-10," prepared by the New Mexico Environment Department in the matter of Respondents U.S. Department of Energy and Sandia Corporation, Sandia National Laboratories, Bernalillo County, New Mexico, April 29, 2004.

New Mexico Environment Department (NMED), April 2010. "Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUS/AOCS (Request of March 1, 2006) and 5 Other SWMUS/AOCS (Request of January 7, 2008), Sandia National Laboratories, EPA ID# NM5890110518 , HWB-SNL-06-007 and HWB-SNL-08-001," April 8, 2010.

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Sandia National Laboratories/New Mexico (SNL/NM), May 2009. "SNL/NM Statement of Work for Analytical Laboratories," Sandia National Laboratories, Albuquerque, New Mexico.

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Sandia National Laboratories/New Mexico (SNL/NM), November 2009. "LTES Groundwater Sampling Equipment Decontamination," FOP 05-03, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), November 2009. "LTES Groundwater Monitoring Waste Management," FOP 05-04, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), March 2010. "LTES Groundwater Monitoring Health and Safety Plan," PLA 05-09, Sandia National Laboratories, Albuquerque, New Mexico.

SNL/NM, see Sandia National Laboratories/New Mexico.

U.S. Environmental Protection Agency (EPA), November 1986. "Test Methods for Evaluating Solid Waste," 3rd ed., and all updates, SW-846, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

Appendix A

Groundwater Monitoring Well CTF-MW3 Construction Diagram

WELL DATABASE SUMMARY SHEET

Project Name:	OU 1295 MON. WELLS	**Geo Location:**	~4000' E. OF TA III
State File Code::	RG-90065, Point of Diversion: 7	**Well Completion Date:**	21-AUG-2001
Well Name:	CTF-MW3	**Completion Zone:**	REGIONAL GROUNDWATER
Owner Name:	SNL/NM	**Formation of Completion:**	PRE-CAM GRANITE & QUARTZITE
Date Drilling Started:	16-AUG-2001	**Well Comment:**	0'-29' DRILLED W/ ARCH, 29'-420' DRILLED W/ AIR ROTARY W/ DOWN HOLE HAMMER (UNCASED)
Drilling Contractor:	WDC INC.		
Drilling Method:	ARCH, AIR ROTARY		
Borehole Depth:	430 FBGS		
Casing Depth:	365 FBGS		

Survey Data

Survey Date: 04-OCT-2001

Surveyed By: ALBQ. SURVEYING CO. (ASC)

State Plane Coordinates

(X) Easting: 419463.46

(Y) Northing: 1446763.32

Surveyed Elevations (FAMSL)

Protective Casing:	5520.62
Top of Inner Well Casing:	5520.15
Concrete Pad:	5517.48
Ground Surface:	5517.1

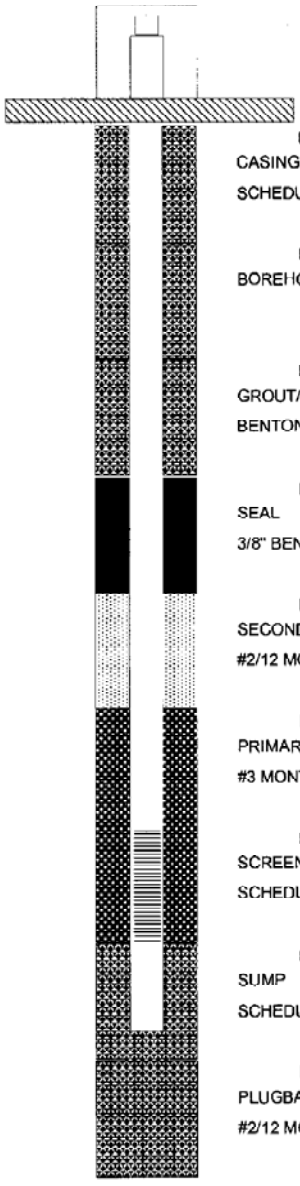
Calculated Depths and Elevations

Initial Water Elevation: (FAMSL)	5220.52
Initial Depth To Water: (FBGS)	296.58

Last measured water level was 5214.2 **FASL** **measured on** 08-APR-2010

Date Updated: 30-MAY-02

Date Printed: 20-MAY-2010



Completion Data Measured Depths (FBGS)

Casing Stickup: 3.1

Interval	**Start**		**Stop**
CASING	0'		365'
SCHEDULE 80 PVC	**I.D.** 5"	**O.D.**	5.5"
Interval	**Start**		**Stop**
BOREHOLE	0'		430'
		O.D.	8.5"
Interval	**Start**		**Stop**
GROUT/BACKFILL	1'		315'
BENTONITE GROUT			
Interval	**Start**		**Stop**
SEAL	315'		330.5'
3/8" BENTONITE CHIPS			
Interval	**Start**		**Stop**
SECONDARY PACK	330.5'		334.5'
#2/12 MONTERREY SAND			
Interval	**Start**		**Stop**
PRIMARY PACK	334.5'		367'
#3 MONTERREY SAND			
Interval	**Start**		**Stop**
SCREEN	340'		360'
SCHEDULE 80 PVC		**Slot Size**	.02"
Interval	**Start**		**Stop**
SUMP	360'		365'
SCHEDULE 80 PVC			
Interval	**Start**		**Stop**
PLUGBACK	367'		382'
#2/12 MONTERREY SAND			

Attachment 2

Sampling and Analysis Plan for Collection and Analysis of Additional Groundwater Samples Collected From Monitoring Well CTF-MW2, Located Near SNL/NM SWMU 154

June 2010

Environmental Restoration Project
Sandia National Laboratories, New Mexico

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) describes procedures that will be adhered to by the Department of Energy (DOE) and Sandia Corporation (Sandia) for the collection and analysis of water samples from groundwater monitoring well CTF-MW2 associated with Sandia National Laboratories/New Mexico (SNL/NM) Solid Waste Management Unit (SWMU) 154 (Building 9960 Septic System). This response for additional groundwater monitoring is designed to address the requirements of Section VII.D.6 of the Compliance Order on Consent (the Order) (NMED April 2004), and the April 8, 2010 letter from the New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB) (NMED April 2010).

As discussed below, groundwater samples will be collected from monitoring well CTF-MW2. During August 2001, monitoring well CTF-MW2 was installed approximately 260 ft downgradient of SWMU 154. The well is screened from 110 to 130 feet below ground surface in Precambrian granite. Groundwater is under confined conditions. In April 2010, the potentiometric surface was approximately 41 feet below the ground surface.

The purpose of this SAP is to document procedures for the collection and reporting of consistent, reliable, defensible, and comparable groundwater sampling results. This SAP provides additional instructions for sample collection, data management, and reporting of data that will be adhered to during the compliance period. Other instructions are provided in SNL/NM Field Operating Procedures (FOPs), SNL/NM Administrative Operating Procedures (AOPs), and the SNL/NM Statement of Work (SOW) for Analytical Laboratories; however, the requirements of this SAP and the Order will take precedence over any FOPs, AOPs, or SOWs. Table 1-1 summarizes documents that are referenced in this SAP, which can be obtained from the SNL/NM Customer Funded Records Center. The most current versions of these documents will be consulted for the purpose of conducting groundwater sampling.

DOE/Sandia will provide to the NMED prior to the effective date of this SAP in hard copy and electronic format the current versions of the FOPs and AOPs listed below. DOE/Sandia will provide the NMED with any updated versions of the FOPs/AOPs within 30 days of their internal acceptance. If any requirement or procedure in the FOPs or AOPs is found by the NMED to be unacceptable for reasons including, but not limited to, the requirement or procedure will or could prevent the acquisition of representative and reliable groundwater sampling results, the requirement or procedure will be revised accordingly.

1.1 DATA QUALITY OBJECTIVES AND QUALITY CONTROL

The data quality objective (DQO) for groundwater monitoring is to collect accurate and defensible data of sufficient quality to assess the concentrations of constituents in the groundwater associated with SWMU 154. DOE/Sandia will evaluate accuracy, precision, representativeness, completeness, and comparability of the groundwater data to verify that data are of sufficient quality and ensure that the DQO is met. Quality Control (QC) procedures discussed in Section 1.20 of this SAP will also be used to determine whether the DQO has been attained. QC samples generated in both the field and the laboratory will be analyzed and evaluated.

Laboratory measurements will comply with SNL/NM Sample Management Office (SMO) procedures and protocols listed in Table 1-1, including qualification or validation of laboratory analytical data, and will also comply with this SAP. This procedure for determining the quality

and usability of analytical data acquired during groundwater sampling will be summarized in data validation reports regarding the overall quality of the data and the resulting data qualifiers. All associated data validation reports will be submitted to the NMED in the groundwater site investigation report which will summarize the results of this additional SWMU 154 work.

TABLE 1-1
SNL/NM Reference Documentation
SWMU 154 Groundwater Monitoring

Document Number	Document Title
AOP 00-03	Data Validation Procedure for Chemical and Radiochemical Data
AOP 95-16	Sample Management and Custody
FOP 05-01	LTES Groundwater Monitoring Well Sampling and Field Analytical Measurements
FOP 05-02	LTES Groundwater Monitoring Equipment Field Check For Water Quality Measurements
FOP 05-03	LTES Groundwater Sampling Equipment Decontamination
FOP 05-04	LTES Groundwater Monitoring Waste Management
LOP 94-03	Sample Handling, Packaging, and Shipping
PLA 05-09	LTES Groundwater Monitoring Health and Safety Plan
SMO 05-03	Procedure for Completing the Contract Verification Review
Not Applicable	SNL/NM Statement of Work for Analytical Laboratories
Not Applicable	Quality Assurance Project Plan (QAPP) for the Sample Management Office

Data not meeting DQO requirements are subject to corrective action(s) as discussed in SNL/NM SMO procedures and protocol and as discussed in Section 1.22 of this SAP.

1.2 ACCURACY

Accuracy is the agreement between a measured value and an accepted reference value at the analytical laboratory. When applied to a set of observed values, accuracy is influenced by a combination of a random component and a systematic bias. Accuracy will be maintained and evaluated through referenced calibration standards, laboratory control (LC) samples, matrix spike (MS) samples, and surrogate spike samples. The bias component will be evaluated and expressed as percent recovery (%Recovery), as indicated in the equation below:

%Recovery = [(spike result – unspiked sample result) / concentration added] x 100

The acceptable range for %Recovery is 50-130% for volatile organic compounds (VOCs) and 75-125% for metals.

1.3 PRECISION

Precision is the agreement among a set of replicate measurements. Precision data will be derived from field and laboratory duplicate samples. Precision will be reported as relative percent difference (RPD), which is calculated as follows:

RPD = [(Sample A value – Sample B value) / (average of Sample A + B values)] x 100

The acceptable range for RPD is ±20% for VOCs and ±35% for metals.

1.4 COMPLETENESS

Completeness is defined as a measure of the amount of usable data compared to the total amount of data required. Examples of events that reduce the amount of usable data include improperly collected and preserved samples, missed holding times, sample container breakage, and equipment operating outside prescribed QC limits. The completeness objective is 100% for compliance data. If the completeness objective is not met and sufficient sample material remains for re-analysis, and if within holding times, the laboratory will repeat the analysis. Otherwise, the incomplete portion of the sampling will be made complete by repeating the sampling and analysis as necessary. Percent completeness is expressed in the equation below:

%Completeness = [(number of useable data points) / (total number of samples required)] x 100

1.5 DATA REPRESENTATIVENESS

Data representativeness is the degree to which samples represent the media they are intended to represent. To help ensure that samples are representative of formation water, DOE/Sandia will implement the procedures in this SAP for groundwater purging and sampling. Monitoring wells will be adequately purged and stability of field parameters achieved prior to the collection of water samples.

1.6 COMPARABILITY

Comparability is the extent to which one data set or value can be related to another. Comparability between data sets will be achieved through the collection and analysis of samples using consistent methods and QC criteria.

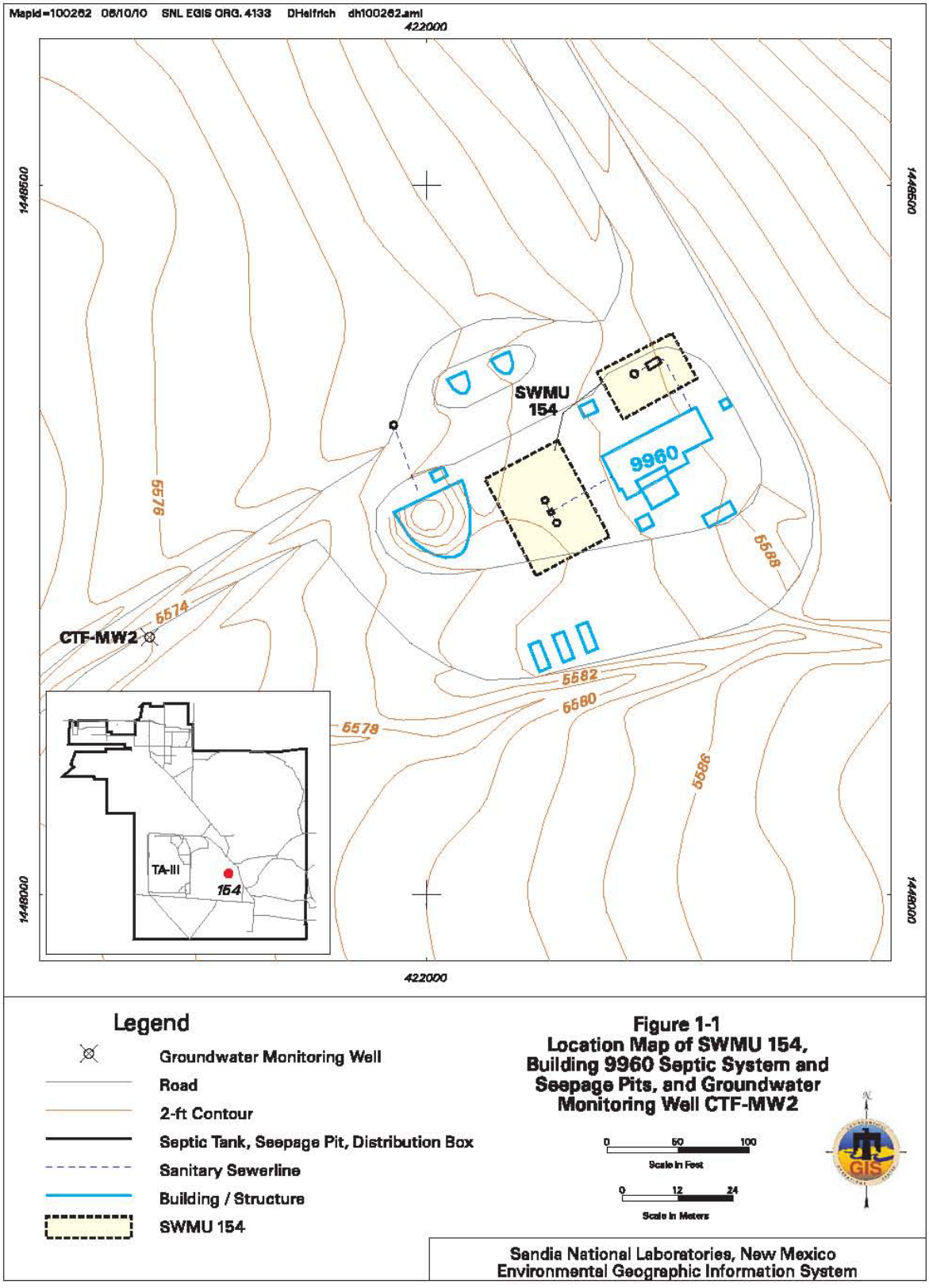
1.7 SAMPLING LOCATION AND FREQUENCY

The compliance groundwater monitoring network at SWMU 154 consists of a single monitoring well, CTF-MW2 and is shown on Figure 1-1. Table 1-2 summarizes the planned groundwater sampling frequency. The well construction diagram for CTF-MW2 is provided in Appendix A.

In accordance with the April 8, 2010 letter from the NMED (NMED April 2010) samples will be collected at a quarterly frequency for a period of at least two years. As shown on Table 1-2, groundwater samples collected at SWMU 154 will be analyzed for VOCs, semi volatile organic compounds (SVOCs), high explosive (HE) compounds, perchlorate, general chemistry, metals (including barium), nitrate plus nitrite (NPN), gross alpha/beta, and radionuclides by gamma spectroscopy. Analytical results for the aqueous samples will be reported in units of milligrams per liter (mg/L) or micrograms per liter (μg/L).

1.8 FIELD OPERATIONS

Groundwater sampling will be conducted in accordance with this SAP to ensure accurate, precise, representative, complete, and comparable groundwater sampling results. Other groundwater monitoring activities will include the measurement of water levels, the decontamination of equipment, inspection of monitoring equipment, monitoring water quality parameters, collection and handling of samples, and management of waste.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422000
1448500
SWMU 154
9960
5576
5588
5574
CTF-MW2
5582
5580
5578
5586
TA-III
154
Legend
Groundwater Monitoring Well
Road
2-ft Contour
Septic Tank, Seepage Pit, Distribution Box
Sanitary Sewerline
Building / Structure
SWMU 154
Figure 1-1
Location Map of SWMU 154, Building 9960 Septic System and Seepage Pits, and Groundwater Monitoring Well CTF-MW2
0 50 100
Scale in Feet
0 12 24
Scale in Meters
GIS
Sandia National Laboratories, New Mexico
Environmental Geographic Information System

TABLE 1-2
SWMU 154 Groundwater Monitoring Well Sampling Frequency and Sample Analytical Requirements

Well Number	Quarterly Events								
	VOCs	SVOCs	HE	Perchlorate	General Chemistry	Total Metals	NPN	Gross Alpha/Beta	Gamma Spectroscopy
CTF-MW2	8	8	8	8	8	8	8	8	8

Note: Refer to Table 1-3 for specific information regarding analytical methods and constituents.
The NMED requirement for general chemistry analyses includes: calcium, magnesium, sodium, potassium, chloride, sulfate, carbonate, and bicarbonate.
HE = High Explosive.
NPN = Nitrate plus nitrite.
SVOC = Semi Volatile Organic Compound.
VOC = Volatile Organic Compound.

1.9 SAFETY

Field operations will be conducted in a manner that protects the health and safety of field personnel. Every team member has the authority and responsibility to stop operations if an unsafe condition develops or is observed. All groundwater monitoring personnel will perform field activities safely in accordance with the SNL/NM Groundwater Health and Safety Plan, PLA 05-09.

1.10 WATER LEVEL MEASUREMENTS

Water level information is used to calculate the volume of water in a well casing and the amount required for purging. Measurements will be referenced to a surveyed mark of known elevation at the top of each well casing. The static water level will be measured in CTF-MW2 prior to purging or obtaining a sample, and measurements will be taken to the nearest 0.01-foot using a water level meter. Other requirements for water level measurements are provided in SNL/NM FOP 05-01. Water levels in the compliance well will be measured during each sampling event. Water level measurements in CTF-MW2 will be used to produce a hydrograph for the monitoring period, and that will be presented in the SWMU 154 groundwater site investigation report.

1.11 WATER QUALITY PARAMETERS

Water quality parameters will be collected during purging in accordance with SNL/NM FOP 05-01 and this SAP. Measurements taken will include potential of hydrogen (pH), specific conductance (SC), temperature, and turbidity. Additional water quality parameters will include dissolved oxygen (DO) and oxidation-reduction potential (ORP). Water quality parameters are as follows:

DO − The DO content of the water in percent saturation or in mg/L.

SC − The ability of a cubic centimeter of water to conduct electricity. It varies directly with hardness and is the amount of ionized minerals in the water. SC is reported in micro-mhos per centimeter at 25 degrees Celsius (ºC).

pH − A measure of the acidity or alkalinity of a solution. Numerically equal to 7 for neutral solutions, increasing with increasing alkalinity and decreasing with increasing acidity.

ORP − Potential for an oxidation (loss of electrons to another atom or molecule) or reduction (gain of electrons from another atom or molecule) reaction in millivolts.

Temperature – The temperature of the water in °C.

Turbidity – The cloudiness of water due to suspended and colloidal organic and inorganic material. Water turbidity is measured in Nephelometric Turbidity Units (NTUs).

1.12 SAMPLE COLLECTION

Sample collection procedures are provided in SNL/NM FOP 05-01 and this SAP. Groundwater monitoring will be performed using conventional sampling methods. CTF-MW2 will be purged with a portable Bennett™ submersible pump system or equivalent. The pump intake will be set at or near the bottom of the screened interval. A pumping rate that creates minimal disturbance to the groundwater flow regime, given equipment limitations, will be employed.

The maximum pumping rate in any case will not exceed 12 liters per minute, and groundwater samples collected for VOC analyses will be collected by filling the sample containers at a slow flow rate, given equipment limitations, to minimize volatilization. The sampling system may be modified in order to split the flow of water, such that the flow of water through one side can be reduced to a rate of 0.1 liter per minute or less to facilitate the filling of VOC sample containers. The flow rate through the other side will be the minimum rate that is reasonably achievable. CTF-MW2 will be purged a minimum of one saturated casing volume (a saturated casing volume is the volume of one length of the saturated portion of the screen in the well plus the volume of water in the primary and secondary filter packs). Prior to the collection of groundwater samples, purging may continue beyond one saturated casing volume until four stable measurements are obtained for turbidity, pH, temperature, and SC. Groundwater stability will be considered acceptable when measurements are ± 10 percent or less than 5 NTUs for turbidity, ± 0.1 pH units, ± 1.0 °C for temperature, and ± 5% for SC. If a monitoring well is purged dry prior to meeting the above purging and stability requirements, then sampling will be conducted once the well has recovered such that the volume of water available in the well is the minimum necessary to fill the sample containers..

Samples will be placed into clean laboratory-supplied containers. Groundwater samples will be collected in order of decreasing volatilization. Samples will not be filtered. Sample documentation and custody will be performed in accordance with SNL/NM SMO procedures and protocols (AOP 95-16 and LOP [Laboratory Operating Procedure] 94-03) and this SAP. Samples will be delivered to the shipping facility for repackaging in shipping coolers in accordance with appropriate U.S. Department of Transportation shipping regulations (49 Code of Federal Regulations [CFR] Parts 170–179).

1.13 MONITORING EQUIPMENT FIELD CHECKS

Monitoring instruments used to measure water quality parameters in the field will be calibrated where appropriate or function-checked prior to sampling activities. Calibration and field-check instructions are presented in FOP 05-02.

1.14 EQUIPMENT DECONTAMINATION

All equipment coming into contact with a sample, the interior of a well, or groundwater will be decontaminated prior to entering any well or contacting any sample to prevent cross-contamination. Equipment and materials (including chemicals and protective clothing), decontamination procedures, and waste management procedures are presented in the FOPs 05-01, 05-02, 05-03, and 05-04.

1.15 WASTE MANAGEMENT

All waste generated during groundwater sampling activities will be managed in accordance with federal, state, and local regulations. All purge and decontamination water will be managed as non-regulated waste, based upon historical groundwater results. Analytical data from sampling events will be compared to discharge and disposal criteria. The anticipated disposal path for purge water and decontamination water is discharge to the sanitary sewer. If the City of Albuquerque discharge standards are not met, purge and decontamination water will be managed appropriately through the SNL/NM Hazardous Waste Management Facility. The disposal path for personal protective equipment that comes into contact with groundwater will be determined by the associated groundwater analytical data results. Waste management activities associated with groundwater monitoring are discussed in FOP 05-04.

1.16 SAMPLE DOCUMENTATION AND CUSTODY

To ensure the integrity of samples from the time of collection through the reporting of analytical results, sample collection, handling, and custody will be documented in writing. Primary elements in the documentation of samples are: sample identification numbers, sample labels, custody tape, and Analysis Request/Chain of Custody (AR/COC) forms. Standardized forms will be used to document sample information. Sample custody and documentation procedures for sampling activities are outlined in SNL/NM AOP 95-16 and LOP 94-03. These procedures, and the procedures in this SAP, will be followed throughout each groundwater sampling event.

1.17 SAMPLE SHIPMENT

Samples will be shipped to the analytical laboratory in accordance with SMO procedures detailed in LOP 94-03. Prior to shipment, sample collection documentation will be verified. Any error will be noted in writing and corrected. Samples will be packaged and shipped in accordance with LOP 94-03.

1.18 LABORATORY ANALYTICAL PROCEDURES

DOE/Sandia will ensure that the analytical laboratory analyzes samples using U.S Environmental Protection Agency (EPA)-approved analytical methods. The analytical laboratory will provide appropriate sample containers prepared with the required preservative. The analytical laboratory will prepare and submit to DOE/Sandia an analysis data report as described in Section 4.0 of the SOW for Analytical Laboratories and as required by the conditions of this SAP. Table 1-3 summarizes EPA Methods (EPA November 1986), container types and preservation methods applicable to groundwater sampling at SWMU 154; however, DOE/Sandia may use other appropriate test methods, container types, and preservation methods that meet the data quality requirements of this SAP.

TABLE 1-3
Laboratory Analytical Methods, Container Types and Preservatives
SWMU 154 Groundwater Sampling

Analysis	EPA Method[a]	Volume and Container Type/Preservation
Volatile Organic Compounds	8260B	3 x 40 mL glass, HCL, 4°C
Semi-Volatile Organic Compounds	8270C	3 x 1 L Amber Glass, 4°C
High Explosives	8321A	4 x 1 L Amber Glass, 4°C
Metals[b]	6020/7470	1 x 500 mL polyethylene, HNO_3, 4°C
Perchlorate	314.0	1 x 250 mL polyethylene, 4°C
Major Anions and Cations[c]	6020/7470/9056	1 x 500 mL polyethylene, 4°C
Alkalinity as Total, Carbonate, and Bicarbonate	SM 2320B	1 x 500 mL polyethylene, 4°C
Nitrate plus Nitrite	353.2	1 x 250 mL polyethylene, H_2SO_4, 4°C
Gross Alpha/Beta	900.0	1 x 1 L polyethylene, HNO_3, 4°C
Gamma Spectroscopy[d]	901.0	1 x 1 L polyethylene, HNO_3, 4°C

[a] U.S. Environmental Protection Agency, 1986 (and updates), "*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*," SW-846, 3rd Edition, U.S. Environmental Protection Agency, Washington, D.C.
U.S. Environmental Protection Agency, 1999, "*Perchlorate in Drinking Water Using Ion Chromatography*," EPA 815/R-00-014, U.S. Environmental Protection Agency, Washington, D.C.
Clesceri, L.S., A.E. Greenburg, and A.D. Eaton, 1998. *Standard Methods for the Examination of Water and Wastewater,* 20th ed., Standard Method 2320B, Published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.
[b] metals = filtered and unfiltered samples, Target Analyte List (TAL) metals including barium, calcium, magnesium, potassium, and sodium, plus uranium.
[c] major anions includes bromide, chloride, fluoride, and sulfate.
[d] gamma spectroscopy = report Americium-241, Cesium-137, Cobalt-60, and Potassium-40.
°C = Degrees Celsius.
H_2SO_4 = Sulfuric Acid.
HCL = Hydrochloric acid.
HNO_3 = Nitric acid.
L = Liter
mL = Milliliter(s).

1.19 ANALYTICAL LABORATORY

DOE/Sandia will ensure that the analytical laboratory performs the analyses in accordance with this SAP and regulatory requirements. The laboratory will maintain written documentation of sample handling and custody, analytical results, and internal QC data. The laboratory will analyze QC samples in accordance with this SAP and its own internal QC program. DOE/Sandia will direct the laboratory to investigate and if necessary conduct corrective action where data are found to be outside quality acceptance limits.

Two types of additional analytical laboratory audits will be performed as part of the sampling program: system audits and performance audits. A system audit determines whether appropriate project systems (i.e., equipment, procedures) are in place. Performance audits indicate whether the projects systems are functioning properly and are capable of meeting project DQOs. These audits will be completed as required by SMO procedures and protocols.

1.20 QUALITY CONTROL

QC samples will be collected in the field and prepared in the laboratory to ensure that the data generated meet the DQO requirements. QC will be achieved through adherence to requirements and procedures listed and described in Section 1.1 of this SAP. Mandatory QC samples are identified in the following sections.

1.20.1 Field Quality Control

Field QC samples are used to document data quality and identify errors that may be introduced by field conditions, in sample collection, storage, transportation, and equipment decontamination. Field QC samples submitted to the analytical laboratory will be handled and analyzed in an identical manner as environmental samples. DOE/Sandia will collect and send to the analytical laboratory for analysis the following field QC sample types: equipment blanks, duplicates, field blanks, and trip blanks.

Equipment blanks demonstrate the effectiveness of equipment decontamination and monitor the cleanliness of the sampling system. After sampling equipment decontamination has been completed, an equipment blank is prepared by pumping de-ionized water through the portable sampling equipment and collecting a sample of this water. Equipment blanks will be collected when well CTF-MW2 is sampled in the first and fifth quarters of the required eight quarters (a frequency of 25%) and will be analyzed for all of the constituents required by this SAP.

Duplicate environmental samples are collected in the field and analyzed to document the precision of the sampling and analysis process. The duplicate samples will be collected immediately after the original environmental sample in order to reduce variability caused by time and/or the sampling process. Duplicates will be collected when well CTF-MW2 is sampled in the first and fifth quarters of the required eight quarters (a frequency of 25%) and will be analyzed for all of the constituents required by this SAP.

Field blanks are collected to assess whether any contamination of the samples was caused by ambient field conditions. The field blanks will be prepared by pouring deionized water into sample containers at the sample collection point to simulate the transfer of environmental samples from the sampling system to the sample container. Field blank samples will be collected when well CTF-MW2 is sampled in the first and fifth quarters of the eight required quarters (a frequency of 25%) and will be analyzed for VOCs only.

Trip blanks (TBs) are used to assess the potential for cross-contamination between environmental samples during sample handling and shipping activities. The TBs will be analyzed for VOCs only. Each batch of groundwater samples from CTF-MW2 to be analyzed for VOCs will be accompanied by at least one TB during shipping. The analytical laboratory will prepare the TB by filling a VOC-sample vial with deionized water and using the same sample preservation method designated for VOC environmental samples. Each vial will be sealed with custody tape and dated when it is prepared. The TBs will accompany the empty sample containers when they are shipped to SNL/NM prior to the start of sample collection. The TBs will be taken into the field during sample collection and will be included in the shipment of environmental samples to the laboratory. The TBs must remain sealed during this entire cycle and may be opened only for analysis on return to the analytical laboratory.

1.20.2 Laboratory Quality Control

The analytical laboratory is required to have established procedures that demonstrate the analytical process is always in control during each sample analysis step. These procedures are used for all samples including environmental samples, method blank samples, and MS samples.

An LC sample consists of a control matrix (e.g., deionized water) spiked with known concentrations of analytes representative of the target analytes. An LC sample will be prepared and analyzed for each analytical procedure and batch to determine accuracy of the data. The laboratory will also evaluate the precision of the data by analyzing twice either the environmental samples, LC samples, or MS samples and calculating the RPD between corresponding results.

Method blank samples will be used to check for contamination in the laboratory during sample preparation and analysis. Method blank samples will be concurrently prepared and analyzed with each analytical batch. Method blanks will be reported in the same units as corresponding environmental samples, and the results will be included with each analytical report.

Surrogate spike analysis will be performed for all samples analyzed by Gas Chromatography/ Mass Spectroscopy. The surrogate compounds added to the sample will be those specified in the applicable EPA analytical method procedure (EPA November 1986). Recovery values for surrogate compounds that are outside specified control limits require corrective action, which is detailed in the SOW for Analytical Laboratories.

The analytical process will be systematically evaluated for the effects of indigenous constituents present in the environmental sample matrix. MS/matrix spike duplicate (MSD) analyses will be performed in accordance with the specified analytical procedures.

1.21 DATA VALIDATION, REVIEW, AND REPORTING

Data validation and review of analytical and field documentation will be performed. Field and analytical QC data will be reviewed for conformance to QC acceptance criteria. The entire data package will be reviewed for completeness, comparability, representativeness, precision, and accuracy to determine whether the DQO has been met. All groundwater monitoring data will be reported in the SWMU 154 groundwater site investigation report.

1.21.1 Field Water Quality Data and Documentation Review

Completed field documentation will be reviewed and checked for errors, completeness, and conformance with the procedures required by this SAP. The review will occur at the end of each day in the field to allow verification, correction, and retrieval of missing information as appropriate. Field documentation found to be incomplete or to contain questionable data will be corrected prior to finalizing the field reports. If necessary, measurements of water quality parameters will be repeated.

1.21.2 Laboratory Data Verification and Validation

DOE/Sandia will review laboratory reports for completeness and conformance to the requirements of this SAP and to the performance criteria of the laboratory contract according to the "Procedure for Completing the Contract Verification Review," SMO 05-03.

Upon receipt of the analytical results from the analytical laboratory, DOE/Sandia will arrange for the third-party validation of the data. The purpose of the validation is to determine the usability and establish the defensibility of the results in support of environmental and waste management activities. Data qualification will be based upon review of field and laboratory-supplied QC data, the specific QC criteria identified in the procedures for the EPA-approved analytical methods, and the QC criteria for meeting the DQO identified in this SAP. Data validation will be conducted according to the requirements of this SAP and AOP 00-03, "Data Validation Procedure for Chemical and Radiochemical Data." All associated data validation reports will be submitted in the SWMU 154 groundwater site investigation report.

1.21.3 Data Reporting

All groundwater monitoring data will be reported in the SWMU 154 groundwater site investigation report. for. This report will include a description of sampling activities, field water quality data, laboratory analytical data, a discussion of QC evaluations and data reviews, a description of any project variance or nonconformance, and data validation summaries. All analytical data results will be compared to EPA Primary Drinking Water Standard Maximum Contaminant Levels (MCLs) for public drinking water systems. In addition, perchlorate will be compared to the screening level/method detection limit of 4 μg/L identified in the Order (NMED April 2004). The report will also include plots displaying constituents exceeding established EPA MCLs, and the screening level for perchlorate only, for samples collected from well CTF-MW2 during the compliance period.

1.21.4 Records Management

Records associated with groundwater monitoring, including field documentation, chains of custody, laboratory analytical results, data validation reports, and technical data evaluations will be maintained at the SNL/NM Customer Funded Records Center.

1.22 NON-CONFORMANCES AND VARIANCES

Corrective actions will be taken to rectify or prevent a nonconformance or variance that could adversely affect the quality of data generated. Corrective actions will be documented in writing by the persons identifying the need for action.

Any purposeful change to or deviation from the requirements of this SAP will take effect only after approval by the NMED.

A nonconformance is any action or condition that does not meet the requirements of this SAP. The analytical laboratory, SMO, groundwater monitoring team members, or the Project Leader may identify a nonconformance. The person noting a nonconformance will document the nonconformance in writing and suggest an appropriate corrective action. Resolution of the nonconformance will be documented in writing and acknowledged by DOE/Sandia.

DOE/Sandia and the analytical laboratories will have systems in place to identify QC issues and initiate corrective actions. In accordance with SMO procedures, the laboratories are required to notify the SMO of QC problems that may affect data quality. DOE/Sandia will evaluate and determine whether data are comparable to historical values and whether or not corrective action is required based upon the specific issue. Corrective action may include documentation of QC issues in an analytical laboratory report, data qualifiers, and/or sample re-analysis. In all cases, the DQO in Section 1.1 of this SAP will be met.

1.23 REFERENCES

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Sandia National Laboratories/New Mexico (SNL/NM), November 2009. "LTES Groundwater Monitoring Well Sampling and Field Analytical Measurements," FOP 05-01, Sandia National Laboratories, Albuquerque, New Mexico.

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Sandia National Laboratories/New Mexico (SNL/NM), March 2010. "LTES Groundwater Monitoring Health and Safety Plan," PLA 05-09, Sandia National Laboratories, Albuquerque, New Mexico.

SNL/NM, see Sandia National Laboratories/New Mexico.

U.S. Environmental Protection Agency (EPA), November 1986. "Test Methods for Evaluating Solid Waste," 3rd ed., and all updates, SW-846, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

Appendix A

Groundwater Monitoring Well CTF-MW2 Construction Diagram

WELL DATABASE SUMMARY SHEET

Project Name:	OU 1295 MON. WELLS	**Geo Location:**	~1.5 MILES E. OF TA III
State File Code::	RG-90065, Point of Diversion: 6	**Well Completion Date:**	18-AUG-2001
Well Name:	CTF-MW2	**Completion Zone:**	REGIONAL GROUNDWATER
Owner Name:	SNL/NM	**Formation of Completion:**	PRE-CAMBRIAN GRANITE
Date Drilling Started:	17-AUG-2001	**Well Comment:**	0'-110' DRILLED W/ ARCH, 110'-190' DRILLED W/ AIR ROTARY \ DOWN HOLE HAMMER, HOLE UNCASED CAVED IN 135'-190'.
Drilling Contractor:	WDC INC.		
Drilling Method:	ARCH, AIR ROTARY		
Borehole Depth:	190 FBGS		
Casing Depth:	135 FBGS		

Survey Data

Survey Date: 04-OCT-2001

Surveyed By: ALBQ. SURVEYING CO. (ASC)

State Plane Coordinates

(X) Easting: 421605.04

(Y) Northing: 1448181.14

Surveyed Elevations (FAMSL)

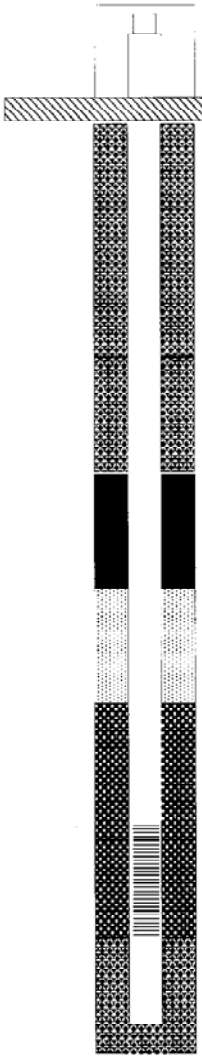
Protective Casing:	5576.25
Top of Inner Well Casing:	5575.93
Concrete Pad:	5573.23
Ground Surface:	5572.9

Calculated Depths and Elevations

Initial Water Elevation: (FAMSL)	5531.07	
Initial Depth To Water: (FBGS)	41.87	
Last measured water level was measured on 08-APR-2010	5532.21	**FASL**

Date Updated: 29-MAY-02

Date Printed: 20-MAY-2010



Completion Data Measured Depths (FBGS)

Casing Stickup: 3

Interval	**Start**	**Stop**			
CASING	0'	135'			
SCHEDULE 80 PVC	**I.D.**	5"	**O.D.**	5.5"	
Interval	**Start**	**Stop**			
BOREHOLE	0'	190'			
			O.D.	9.625"	
Interval	**Start**	**Stop**			
GROUT/BACKFILL	1'	71'			
BENTONITE GROUT					
Interval	**Start**	**Stop**			
SEAL	71'	94'			
3/8" BENTONITE CHIPS					
Interval	**Start**	**Stop**			
SECONDARY PACK	94'	105'			
#2/12 MONTERREY SAND					
Interval	**Start**	**Stop**			
PRIMARY PACK	105'	135'			
#3 MONTERREY SAND					
Interval	**Start**	**Stop**			
SCREEN	110'	130'			
SCHEDULE 80 PVC			**Slot Size**	.02"	
Interval	**Start**	**Stop**			
SUMP	130'	135'			
SCHEDULE 80 PVC					