KIRTLAND AIR FORCE BASE
ALBUQUERQUE, NEW MEXICO

Closure Plan for Open Detonation Unit

October 2010

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Kirtland Air Force Base, Albuquerque, New Mexico
Air Force Environmental Compliance Program
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40 CFR §270.11
DOCUMENT CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

ROBERT L. MANESS, Colonel, USAF
Commander

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1. INTRODUCTION

This closure plan describes the activities necessary to close the open detonation (OD) treatment unit located within the Explosive Ordnance Disposal (EOD) Range at Kirtland Air Force Base (AFB). The OD Unit consists of a cleared circular area approximately 1,500 feet in diameter and surrounded and delineated by an approximately two-ft high earthen berm. Figures 1-1 and 1-2 show the location of the EOD Range at Kirtland AFB, and the collocated OD and open burn (OB) units within the EOD Range. Detonations were conducted in pits measuring approximately 30 ft long, 15 wide and 12 feet deep.

Until final closure of the unit is complete in accordance with the New Mexico Hazardous Waste Management Regulations and certification of closure has been approved by the New Mexico Environment Department (NMED), a copy of the approved Closure Plan and any revisions thereof shall be maintained in the Operating Record. This Closure Plan and any revisions thereof shall be made available, upon request, to the Department.

If the OD Unit cannot be clean-closed, a post-closure care plan will be prepared to address the hazardous constituents remaining at the site and submitted to the NMED for approval.

The OD unit is collocated with an OB treatment unit at the EOD Range. The OD and OB units are scheduled to undergo final closure activities simultaneously. The OB Unit has a separate closure plan, but several elements of the OB and OD unit closure plans overlap and are noted within the documents. Additionally, there is currently a perchlorate groundwater investigation occurring to the west of the EOD range. This investigation and its results are independent of this OD unit closure plan.

1.1 General Closure Information

This closure plan has been prepared in compliance with the requirements of the Resource Conservation Recovery Act (RCRA) (42 U.S.C. §§6901 et seq.) and its implementing regulations at 40 CFR Parts 264 and 270 (see 40 CFR Part 264 Subparts G and X and 270.14(b)(13)), and state implementing statutes and regulations under which the state has delegated RCRA authority (see New Mexico Hazardous Waste Act, Chapter 74 Article 4 NMSA 1978 and 20.4.1 NMAC).

1.2 Closure Performance Standard

The OD Unit shall be closed to meet the following performance standards:

- Minimize the need for further maintenance;
- Control, minimize or eliminate, to the extent necessary to protect human health and the environment, the post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to ground water or surface waters or to the atmosphere; and
- Comply with the requirements of 40 CFR Part 264, Subpart G and 40 CFR §264.601.

1.3 Final Closure Activities

The last treatment event that occurred at the OD Unit was on 11 August 2010. The NMED was notified on 13 August 2010 that Kirtland AFB had closed the OD Unit for all treatment activities effective immediately. Partial closure of the OD Unit is anticipated to be completed in 2011, with final closure and confirmation subject to the results of groundwater monitoring. Kirtland AFB will notify the Secretary of the NMED, in writing, at least 45 calendar days prior to the date that closure activities will commence.

Final closure activities at the OD Unit shall consist of:

- Installation of four groundwater monitoring wells at the EOD range (one upgradient and three downgradient wells) and eight consecutive quarters of groundwater sampling to determine the presence or absence of groundwater contamination;
- Removing any soil or debris from the OD Unit that have contaminant concentrations which pose unacceptable risk to human health or the environment;
- Sending for treatment and disposal any solid and hazardous waste, including any treatment residues, to a permitted Treatment, Storage, or Disposal Facility (TSDF) in accordance with applicable regulatory requirements.

There are no structures or equipment at the OD Unit that require removal.

Final closure for the OD Unit shall be completed when:

- All solid and hazardous waste has been disposed of off-site as required by law;
- Sampling demonstrates that no unacceptable risk to human health or the environment exists in soil or groundwater at the OD Unit;
- A Certification of Closure and Closure Report has been submitted to the NMED; and
- NMED has approved the Certification of Closure and Closure Report.

1.4 Maximum Extent of Operations and Maximum Waste Inventory

The OD Unit was permitted on 20 December of 1994 as Permit# NM9570024423-OD, which allowed 100,000 pounds of net explosive weight (NEW) to be treated at the OD unit annually. Rocket motors, large caliber munitions, explosive wastes and firearms were treated at the OD Unit.

Operations at the OD Unit ceased in August 2010. All wastes were removed from the unit. Therefore, the maximum waste inventory is zero.

Closure activities and any corrective action that may be required shall not be limited to the OD Unit if contamination migrates beyond the OD Unit boundary.

1.5 Schedule for Closure

Final closure of the OD Unit will proceed by the general schedule presented below:

TABLE 1-1
Closure Schedule

Activity	Time Required
Notify the Department of receiving final volume of hazardous waste at the OD Unit	Completed
Removal of all hazardous waste from the OD unit	Completed
NMED approval of final OD Unit closure plan	TBD
Advertise for proposals	Approval of closure plan + 30 days
Receive proposals	Approval of closure plan + 60 days
Select contractor and award contract	Approval of closure plan + 90 days
Submit work plan to NMED for approval, including monitoring well installation plan	Contract award + 60 days
Notify the Department that final closure activities will commence	-45 days prior to closure activities commencing
Begin final closure activities	Day 0
Obtain analysis of soil samples	Day 45
Obtain analysis of groundwater samples from monitoring wells	Monitoring well installation completion + completion of eight consecutive quarters of monitoring
Final closure activities completed	Upon receipt of all soil and groundwater sampling results
Submit final report and closure certification to the NMED	Completion of final closure activities + 60 Days

Note: The schedule above indicates calendar days from the beginning by which activities shall be completed. Some activities may be conducted simultaneously or may not require the amount of time listed. Under 40 CFR §264.113, closure activities are to be complete within 180 days of commencement of closure activities. The monitoring well component of the closure plan, however, necessitates a request for an extension of the normal schedule guidelines.

1.6 Amendment of Closure Plan

If it becomes necessary to amend this Closure Plan, Kirtland AFB will submit, in accordance with applicable regulations, a written notification of or request for a permit modification, as appropriate, describing any change in closure activities which affects this plan. The written notification or request will include a copy of the amended plan for approval by the Department. Kirtland AFB will submit a written notification of, or a request for, a permit modification.

1.7 Closure and Post-Closure Cost Estimate, Financial Assurance and Liability Requirements

Since Kirtland AFB facility is a federal facility, it is currently exempt from the requirement to provide closure and post-closure care estimates and the requirements to provide financial assurance and liability insurance for closure and post-closure activities pursuant to 40 CFR Part 264, Subpart H.

1.8 Closure Certification

Within 60 days after completion of the final closure activities for the OB Unit and the OD Unit, Kirtland AFB will submit, via certified mail, a certification that the units have been closed in accordance with the specifications of the approved closure plan. The certification will be signed by a responsible representative of Kirtland AFB and by an independent, professional engineer registered in the State of New Mexico. Documentation supporting the independent, registered professional engineer's certification shall be furnished to the Department with the certification.

1.9 Closure Report

Within 60 days of completion of the final closure activities, a closure report shall be submitted to the Department. The report will document the closure activities conducted and contain, at a minimum, the following information:

- A summary of the closure activities;
- Any significant variance from the approved closure plan and the reason for the variance;
- A summary of sampling data associated with closure, including analytical results for all field and laboratory quality control samples;
- A quality assurance statement on the adequacy of the analyses to support closure;
- The location of the file of supporting documentation (e.g., memos, logbooks, laboratory sample analysis data);
- Disposal location of all solid and hazardous wastes; and,
- Certification of the accuracy of the report.

1.10 Survey Plat and Post-Closure Requirements

Upon final closure of the OB Unit and the OD unit, a survey plat will be submitted to the NMED. In the event that closure performance standards cannot be achieved for the OD Unit, a post-closure plan will be submitted to the Department for review and approval.

2. CLOSURE PROCEDURES

There is no hazardous waste present at the OD Unit; the last treatment event at the OD Unit occurred on 11 August 2010, and there are no treatment residues remaining. There are no structures or equipment at the OD Unit. (The structures associated with the collocated OB Unit are addressed under the OB Unit closure plan.)

The first phase of closure will consist of a hazards survey of the OD Unit conducted by qualified contractor health physics and industrial hygiene personnel, which will include unexploded ordnance (UXO) safety personnel, and Kirtland AFB EOD personnel. The purpose of the survey shall be to locate and remove any “kick-out” (untreated waste, waste fragments, or UXO), and to identify potential contamination concerns that may present hazards to workers during the closure activities and to specify any control measures necessary to reduce worker risk. This survey will provide the information necessary for health physics, UXO safety, and industrial hygiene personnel to identify worker qualifications, personal protective equipment (PPE), safety awareness, work permits, exposure control programs, and emergency coordination that will be required to perform closure. Any munitions and explosives of concern (MEC) identified during the hazard survey will be reported to and handled by Kirtland AFB EOD staff personnel only in accordance with standard operating procedures. All workers involved in the closure activities will be required to have training and medical monitoring as required by applicable regulations. Personnel performing closure activities will be required to wear PPE as specified by health physics, UXO safety, and industrial hygiene personnel.

Sufficient sampling and analysis will be required to demonstrate that hazardous waste residues are not present at the site after closure and there are no contaminant concentrations which pose unacceptable risk to human health or the environment. Soil and groundwater samples will be analyzed for parameters listed in Tables 2-1, 2-2 and 2-3 to verify the presence or absence of hazardous waste contamination.

Groundwater sampling results will be compared to the Federal Safe Drinking Water Act maximum contaminant levels (MCL’s), included in Table 2-4. If the levels of hazardous constituents in the groundwater exceed the MCLs, a risk assessment will be prepared for each constituent showing a significant increase over samples collected from the area. If the risk assessment demonstrates that the level of contamination is unacceptable, the groundwater shall be subject to corrective action, and a corrective action work plan subject to NMED review and approval will be developed. For perchlorate, Kirtland AFB will apply the Office of the Under Secretary of Defense *Perchlorate Release Management Policy*, 22 April 2009.

Inorganic soil contaminant concentrations will be compared to background levels, summarized in Table 2-5. For other constituents, background will be considered to be the most current NMED residential soil screening level (SSL) or EPA Regional Screening Levels (RSLs), included in Table 2-6. If analysis shows that the soil contains contaminant concentrations which are above background or the appropriate residential SSL or RSL, additional soils will be excavated, removed, and supplementary conformation samples collected and analyzed, or a risk assessment will be prepared for each constituent showing a significant increase over samples collected from the area.

An alternative demonstration of decontamination may be proposed and justified at the time of final closure of the OD Unit, as circumstances indicate. The Secretary of the NMED will evaluate the proposed alternative in accordance with standards and guidance then in effect and, if approved incorporate the alternative into the Closure Plan.

2.1 Monitoring Wells

2.1.1 Installation of New Monitoring Wells

The OD Unit is subject to the environmental performance standards of 40 C.F.R. § 264.601. As such, groundwater monitoring will be conducted as part of closure activities to demonstrate that operations have not impacted groundwater. Four monitoring wells, one upgradient and three downgradient of the EOD Range, will be installed. The location of the proposed monitoring wells is presented in Figure 2-1. These proposed monitoring wells are the same wells as those proposed in the closure plan for the collocated OB Unit.

Kirtland will submit a work plan which will include a monitoring well installation plan, according to the schedule in Table 1-1. At a minimum, the discussion pertaining to the installation of four monitoring wells at the EOD Range will address:

- Well locations,
- Drilling specifications,
- Well construction specifications,
- Well development procedures,
- A schedule for implementation and completion of the well installations; and
- Preparation and submittal of a well completion report.

In addition, the wells installed at the EOD Range will meet the groundwater monitoring requirements of 40 C.F.R. §§ 264.97(a)(2), (b), and (c). Within 30 days of completion of well installation, Kirtland AFB will submit a well completion report to NMED for approval.

Groundwater monitoring wells will be properly plugged and abandoned in accordance with all regulations and NMED guidance, provided groundwater contamination has not occurred. If groundwater contamination has occurred, these monitoring wells will be maintained for the purpose of implementing corrective action. Wells will not be plugged and abandoned until NMED has approved clean closure of the OD unit and the collocated OB unit.

2.1.2 Mesa Schoolhouse Well

The Mesa Schoolhouse Well, a Department of Energy/National Nuclear Surety Administration (DOE/NNSA) well authorized under Kirtland AFB permit #PERM/0-K1-91-0010 is currently being monitored for groundwater contamination as part of the December 1994 OD Unit’s sampling and analysis plan. Once the new proposed monitoring wells are installed and operational, sampling will discontinue at the Mesa Schoolhouse Well.

2.2 Sampling, Decontamination Procedures, and PPE

This section describes procedures and methods for soil and liquid sampling applicable to closure activities. While the procedures and methods are specific, other applicable procedures or methods given in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846) may be used if conditions or experience show the alternate method to be more appropriate, and if approved by the NMED. All sampling procedures actually used will be annotated in the final closure report. Sampling will be conducted in accordance with procedures given in "Samplers and Sampling Procedures for Hazardous Waste Streams" (EPA 600/2-80-018) or SW-846.

Surface and subsurface soil and any scrap metal at the OD Unit will be characterized by sampling and analysis.

The tools and equipment used during the sampling will be vacuumed, cleaned with detergent and water, and scraped as necessary to remove any residue. The wash water will be collected and analyzed for characterization of waste. The vacuums used and their contents will be containerized and shipped off site as hazardous waste for disposal.

All of the PPE worn by personnel performing closure activities will be disposable; therefore, all PPE will be placed into containers and managed as hazardous waste. This waste will be considered to be contaminated with all of the hazardous waste constituents contained in the wastes that have been treated at the OB Unit and the OD unit. All contained PPE wastes will be transported to a permitted facility for disposal.

2.2.1 Soil Sampling

Soil samples shall be conducted on a 25-foot by 25-foot grid spacing from the surface to 15 ft below ground surface at five foot intervals (total of four samples per location). At a minimum, the grid will encompass all portions of the OD Unit that have hosted or may have hosted a pit used for the treatment of hazardous waste. Any areas used as training at the OD Unit shall be considered a part of the OD Unit for the purposes of establishing the sampling grid.

The samples will be analyzed for the parameters listed in Tables 2-1, 2-2 and 2-3, which include all hazardous constituents of the hazardous wastes that were detonated at the OD Unit.

Surface soil samples (zero to six inches depth) will be collected with a wooden or Teflon™ trowel or scoop. Disposable sampling tools will be used. In the event that NMED requests split samples, sufficient soils will be collected to provide split samples to the NMED representatives.

A Veihmeyer soil sampler, auger drill, direct push technology or other appropriate method will be used to collect subsurface soil samples. Only discrete grab samples shall be collected; no samples shall be composited.

Clean sampling equipment shall be used to collect each sample. Unused, disposable sampling equipment may be presumed clean if still in a factory-sealed wrapper prior to use. Reusable sampling equipment shall be decontaminated after each use by scraping to remove any loose material, washing with a detergent and water solution, rinsing several times with tap water, rinsing with deionized water, and drained of excess water, and air-dried or wiped dry.

2.2.2 Liquid Sampling

Groundwater samples will be collected from four newly installed groundwater monitoring wells at the EOD range. Eight consecutive quarters of groundwater monitoring will be conducted initially, following installation of the wells. Groundwater samples will be obtained using methods approved by the NMED within eight hours of the completion of well purging. The samples will be analyzed for the parameters listed in Tables 2-1, 2-2 and 2-3, which include all hazardous constituents of the hazardous wastes that were treated at the OD Unit.

Groundwater in monitoring wells with low recharge rates and that purge dry shall be sampled when the water level in the well has recovered sufficiently to collect the required samples. A low-flow bladder pump will be utilized. Groundwater samples intended for metals analysis will be submitted to the laboratory for analyses of total metals; the samples will not be filtered in the field or laboratory.

Glass tubes will be used to sample liquids. The primary advantage to using this type of sampling device is that the tube can be disposed of after each sample is collected, thus eliminating cross-contamination. Alternatively, a Coliwasa sampler may be used to sample liquids.

2.2.3 Appropriate Sample Containers and Preservatives

Samples will be placed in clean containers compatible with the intended analysis and will be properly prepared and preserved to maintain sample integrity. The most recent version of SW-846 lists the proper container, preservative, and holding time for each chemical parameter of interest, and these requirements will be followed for all samples collected during the closure process. Table 2-7 and 2-8 summarize the sample containers, preservation techniques, and holding times for soil and liquid samples.

2.2.4 Sample Handling and Documentation

Each sample will be labeled, sealed, and accompanied by a chain-of-custody and a request-for-analysis form. A chain-of-custody form will be used to track samples from collection through analysis to ensure that the integrity of the samples is protected, and that analytical results can be attributed to specific closure activities or specific areas. The procedures followed during closure will be equivalent to those provided in the most current version of SW-846. Important aspects of the procedures are presented below. A chain-of-custody form will be prepared for all samples collected for laboratory analyses. The form includes:

- Sample identification number;
- Name and signature of sample collector;
- Date and time of sample collection;
- Location at which sample was collected;
- Type of waste (e.g., soil, liquid, etc.);
- Signatures of persons who have had samples in their possession;
- Dates and times of possession.

This form will be initiated at the point of sample collection and will then remain with the sample during transfer to the laboratory. The form will be completed upon receipt at the laboratory and returned to Kirtland AFB for inclusion in facility operating record. The chain-of-custody form will include a request-for analysis form that lists all analyses to be performed for the identified samples and all special instructions relating to sample management or analysis. Any potential hazards posed by the samples shall be listed on the request-for-analysis form.

The sample containers will be sealed with gummed paper seals attached to the containers in such a way that the seals must be broken in order to open the containers. The seals and sample labels must be completed with a waterproof pen. The sample labels are necessary to prevent misidentification of samples and shall include the following information: a unique sample number; name or initials of sample collector; sample collection date and time; sample location; and, sample type, depth, and description.

A closure sampling field log book will be kept and will contain all information pertinent to field surveys and sampling. Sufficient information shall be recorded so that a person can reasonably reconstruct what occurred at a sampling event without relying on a collector's memory. The log book shall have bound and consecutively numbered pages in 8 by 11-inch format. Minimum entries will include:

- Purpose of sample;
- Location of sampling;
- Name and business address of person making log entry;
- Number, type, and volume of sample;
- Description of each sampling methodology and equipment used;
- Date and time of sample collection;
- Sample destination and transporter's name (name of laboratory, UPS, etc.);
- Map or photograph of the sampling site;
- Field observations (ambient temperature, sky conditions, past 24-hour precipitation, etc.);
- Field measurements, if any (pH, flammability, conductivity, explosivity, etc.);
- Collector's sample identification number(s);
- Signature of person responsible for the log entry.

Documentation of sample acceptance at the laboratory will be provided following sample screening and log-in. This documentation may consist of signed copies of the chain-of-custody, documentation or a letter detailing the field sample numbers accepted. Corresponding laboratory sample identification numbers will be provided. The laboratory is required to have procedures for minimizing cross contamination of samples and securing sample custody within the laboratory.

2.2.5 Sample Shipping

Samples shall be packaged and shipped to the laboratory in accordance with DOT shipping requirements and in a manner to ensure that the integrity of the samples is protected. The sample containers shall be cushioned to protect against breakage or puncture.

2.2.6 Sample Analysis

Closure samples will be analyzed by an EPA-certified commercial laboratory. The analytical laboratory shall have procedures for minimizing cross-contamination of samples and securing sample custody within the laboratory. Test methods for analysis of all samples will be performed according to procedures documented in the most current version of SW-846. Hazardous constituents associated with the regulated wastes treated at the OD Unit are included in these analyses. Recommended analytical methods, detection limits, and instrumentation are provided in Table 2-1 for metals analysis; in Table 2-2 for organics analysis; and in Table 2-3 for high explosives (HE) analysis.

Minimum calibration, operation, and quality control (bias, precision, blank and matrix effects) requirements for laboratory analyses shall be performed as listed in the individual analytical methods of SW-846. All laboratory analyst notebooks, log sheets, instrument printouts, charts, and calculations relevant to analyses of these samples shall be identified and remain accessible.

This information may be requested for independent review and validation. If requested by the NMED, this information will be provided.

2.2.7 Quality Assurance/Quality Control Program

Because decisions about closure activities may be based, in part, on analyses of samples, a program to ensure reliability of analytical data is mandatory. Data reliability will be ensured by documenting sample management so that analyses are traceable to specific areas of potential contamination and by following a quality assurance/quality control (QA/QC) program that mandates documentation of the precision and accuracy of laboratory analyses, as well as data completeness, representativeness, and comparability.

Sampling activities will include collection of QC samples in addition to field documentation requirements. QC samples to be collected include: duplicate samples, trip blanks, field blanks, and rinsate blanks. Table 2-9 summarizes field QC sample requirements.

Blanks and duplicate samples will be collected to determine potential errors introduced in the data from sample collection and handling activities. To determine the potential for cross contamination, rinsate blanks consisting of rinsate from decontaminated grading equipment will be collected and analyzed. At least one rinsate blank will be collected for every ten samples. Duplicate samples will be collected at a frequency of one duplicate sample for every ten field samples. In no case will less than one rinsate blank or duplicate sample be collected for a sampling effort. These blank and duplicate samples will be identified and treated as separate samples. Acceptance criteria for QA/QC sample analyses will be compatible with the most recent version of SW-846 or other applicable EPA guidance.

The analytical laboratory shall operate under a QA program plan (QAPP) that meets the requirements of SW-846. QC procedures in the analytical laboratory are guided by the laboratory's QAPP. Laboratory QC samples are required to establish the accuracy and precision of analytical data in order to determine the quality of the data. Table 2-10 lists laboratory QC procedures by analytical methods.

The analytical laboratory will use the following criteria for data validation:

- Completeness of data deliverable;
- Collection, extraction, and analysis holding times;
- Blank data;
- Laboratory control sample results;
- Matrix spike/matrix spike duplicate results;
- Laboratory duplicate sample results; and
- Overall data assessment and usability.

TABLE 2-1
Maximum Detection Limits, Analytical Methods and Instrumentation for Metals Analysis

Analyte	Maximum Detection Limit[a]		EPA *SW-846*[b] Analytical Method	Instrumentation (Used in Analysis)
	Water (µg/L)	Soil (mg/kg)		
Arsenic	1.0	1.0	6010C, 7000B, 7061A	ICP-AES[c], FLAA[d], GHAA[e]
Antimony	2.0	6.0	6010C, 7000B	ICP-AES[c], FLAA[d]
Barium	2.0	20.0	6010C, 7000B	ICP-AES[c], FLAA[d]
Beryllium	0.20	0.50	6010C, 7000B	ICP-AES[c], FLAA[d]
Cadmium	0.10	0.5	6010C, 7000B	ICP-AES[c], FLAA[d]
Chromium	1.0	1.0	6010C, 7000B, 7195, 7196A, 7197	ICP-AES[c], FLAA[d], coprecipitation, colormetric, chelation/extraction
Copper	2.0	2.5	6010C, 7470A, 7471B	ICP-AES[c], CVAA[f]
Lead	1.0	1.0	6010C, 7000B	ICP-AES[c], FLAA[d]
Mercury	0.2	0.1	7000B, 7470A, 7471B	FLAA[d], CVAA[f]
Nickel	1.0	4.0	6010C, 7000B	ICP-AES[c], FLAA[d]
Selenium	2.0	3.5	6010C, 7000B, 7741B, 7742	ICP-AES[c], FLAA[d], GHAA[e], BRAA[g]
Silver	0.20	1.0	6010C, 7000B	ICP-AES[c], FLAA[d]
Thallium	1.0	2.5	6010C, 7000B	ICP-AES[c], FLAA[d]
Tin	5.0	5.0	6010C, 7000B	ICP-AES[c], FLAA[d]
Vanadium	1.0	5.0	6010C, 7000B	ICP-AES[c], FLAA[d]
Zinc	2.0	5.0	6010C, 7000B	ICP-AES[c], FLAA[d]

[a] mg.kg = milligrams per kilogram (non-aqueous detection limit); µg/L = micrograms per liter (aqueous detection limit)
[b.]U.S. Environmental Protection Agency, 1986 and all approved updates, “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,” SW-846
[c] ICP-AES = Inductively coupled plasma atomic emission spectrometry
[d] FLAA = Flame atomic absorption spectrometry
[e] GHAA = Gaseous hydride atomic absorption spectrometry
[f] CVAA = Cold-vapor atomic absorption spectrometry spectrometry
[g] BRAA = Borohydride Reduction Graphite-furnace atomic absorption

TABLE 2-2
Maximum Detection Limits, Analytical Methods and Instrumentation for Organics

Analyte	Maximum Detection Limit[a]		EPA *SW-846*[b] Analytical Method	Instrumentation (Used in Analysis)
	Water (µg/L)	Soil (mg/kg)		
Volatile Organic Compounds (VOCs)			*8260B*	*GC/MS*[c]
Acetone	5.0	10.0		
Benzene	0.50	5.0		
Bromochloromethane	0.50	5.0		
Bromodichloromethane	0.50	5.0		
Bromoform	0.50	5.0		
Bromomethane	0.50	5.0		
Carbon disulfide	0.50	5.0		
Carbon tetrachloride	0.50	5.0		
Chlorobenzene	0.50	5.0		
Chloroethane	0.50	5.0		
Chloroform	0.50	5.0		
Chloromethane	0.50	5.0		
cis-1,2-Dichloroethene	0.50	5.0		
cis-1,3-Dichloropropene	0.50	5.0		
Cyclohexane	0.50	5.0		
Dibromochloromethane	0.50	5.0		
Dichlorodifluoromethane	0.50	5.0		
Ethylbenzene	0.50	5.0		
Isopropylbenzene	0.50	5.0		
Methyl acetate	0.50	5.0		
Methylcyclohexane	0.50	5.0		
Methylene chloride	0.50	5.0		
Methyl tert-butyl ether (MTBE)	0.50	5.0		
4-Methyl-2-pentanone	5.0	10.0		
Styrene	0.50	5.0		
Toluene	0.50	5.0		
trans-1,2-Dichloroethene	0.50	5.0		
trans-1,3-Dichloropropene	0.50	5.0		
Trichlorofluoromethane	0.50	5.0		
Tetrachloroethene	0.50	5.0		
m,p-Xylene	0.50	5.0		
o-Xylene	0.50	5.0		
Vinyl chloride	0.50	5.0		
1,2-Dibromo-3-chloropropane	0.50	5.0		
1,2-Dichlorobenzene	0.50	5.0		
1,3-Dichlorobenzene	0.50	5.0		

Analyte	Maximum Detection Limit[a]		EPA *SW-846*[b] Analytical Method	Instrumentation (Used in Analysis)
	Water (µg/L)	Soil (mg/kg)		
1,4-Dichlorobenzene	0.50	5.0		
1,1-Dichloroethane	0.50	5.0		
1,2-Dibromoethane	0.50	5.0		
1,2-Dichloroethane	0.50	5.0		
1,1-Dichloroethene	0.50	5.0		
1,2-Dichloropropane	0.50	5.0		
1,4-Dioxane	1.0	100.0		
1,1,2,2-Tetrachloroethane	0.50	5.0		
1,2,3-Trichlorobenzene	0.50	5.0		
1,2,4-Trichlorobenzene		5.0		
1,1,1-Trichloroethane	0.50	5.0		
1,1,2-Trichloroethane	0.50	5.0		
Trichloroethylene	0.50	5.0		
1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	5.0		
1,2,3-Trichloropropane	na	10.0		
1,2,4-Trimethylbenzene	na	na		
1,3,5-Trimethylbenzene	na	na		
2-Butanone	5.0	10.0		
2-Hexanone	5.0	10.0		
Volatile Organic Compounds (VOCs)			*8011*	*GC*[d]
Ethylene dibromide	0.02	na		
1,2-dibromo-3-chloropropane	0.02	na		
Semi-volatile Organic Compounds (SVOCs)			*8270D*	*GC/MS*[c]
Benzaldehyde	5.0	170.0		
Phenol	5.0	170.0		
Bis(2-chloroethyl) ether	5.0	170.0		
2-Chlorophenol	5.0	170.0		
2-Methylphenol	5.0	170.0		
2,2'-Oxybis(1-choloropropane)	5.0	170.0		
Acetophenone	5.0	170.0		
4-Methylphenol	5.0	170.0		
N-Nitroso-di-n propylamine	5.0	170.0		
Hexachloroethane	5.0	170.0		
Nitrobenzene	5.0	170.0		
Isophorone	5.0	170.0		
2-Nitrophenol	5.0	170.0		
2,4-Dimethylphenol	5.0	170.0		
Bis(2-chloroethoxy) methane	5.0	170.0		

Analyte	Maximum Detection Limit[a]		EPA *SW-846*[b] Analytical Method	Instrumentation (Used in Analysis)
	Water (µg/L)	Soil (mg/kg)		
2,4-Dichlorophenol	5.0	170.0		
Naphthalene	5.0	170.0		
4-Chloroaniline	5.0	170.0		
Hexachlorobutadiene	5.0	170.0		
Caprolactam	5.0	170.0		
4-Chloro-3-methylphenol	5.0	170.0		
2-Methylnaphthalene	5.0	170.0		
Hexachlorocyclopentadiene	5.0	170.0		
2,4,6-Trichlorophenol	5.0	170.0		
2,4,5-Trichlorophenol	5.0	170.0		
1,1'-Biphenyl	5.0	170.0		
2-Chloronaphthalene	5.0	170.0		
2-Nitroaniline	10.0	330.0		
Dimethylphthalate	5.0	170.0		
2,6-Dinitrotoluene	5.0	170.0		
Acenaphthylene	5.0	170.0		
3-Nitroaniline	10.0	330.0		
Acenaphthene	5.0	170.0		
2,4-Dinitrophenol	10.0	330.0		
4-Nitrophenol	10.0	330.0		
Dibenzofuran	5.0	170.0		
2,4-Dinitrotoluene	5.0	170.0		
Diethyl phthalate	5.0	170.0		
Fluorene	5.0	170.0		
4-Chlorophenyl-phenyl ether	5.0	170.0		
4-Nitroaniline	10.0	330.0		
4,6-Dinitro-2-methylphenol	10.0	330.0		
N-Nitrosodiphenylamine	5.0	170.0		
1,2,4,5-Tetrachlorobenzene	5.0	170.0		
4-Bromophenyl-phenylether	5.0	170.0		
Hexachlorobenzene	5.0	170.0		
Atrazine	5.0	170.0		
Pentachlorophenol	5.0	330.0		
Phenanthrene	5.0	170.0		
Anthracene	5.0	170.0		
Carbazole	5.0	170.0		
Di-n-butyl phthalate	5.0	170.0		
Fluoranthene	5.0	170.0		
Pyrene	5.0	170.0		
Butyl benzyl phthalate	5.0	170.0		
3,3'-dicholorobenzidine	5.0	170.0		
Benzo(a)anthracene	5.0	170.0		

Analyte	Maximum Detection Limit[a]		EPA *SW-846*[b] Analytical Method	Instrumentation (Used in Analysis)
	Water (µg/L)	Soil (mg/kg)		
Chrysene	5.0	170.0		
Bis(2-ethylhexyl) phthalate	5.0	170.0		
Di-n-octyl phthalate	5.0	170.0		
Benzo(b) fluoranthene	5.0	170.0		
Benzo(k) fluoranthene	5.0	170.0		
Benzo(a) pyrene	5.0	170.0		
Indeno(1,2,3,-cd) pyrene	5.0	170.0		
Dibenzo(a,h) anthracene	5.0	170.0		
Benzo(g,h,i)perylene	5.0	170.0		

a. µg/L = micrograms per liter; mg/kg = milligrams per kilogram.
b. U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
c. GC/MS = Gas chromatography/mass spectrometry.
d. GC = Gas chromatography

TABLE 2-3
Maximum Detection Limits, Analytical Methods and Instrumentation for High Explosives (HE) and Other Compounds Analysis

Analyte	Maximum Detection Limit[a] Soil (mg/kg)	Maximum Detection Limit[a] Water (µg/L)	EPA *SW-846*[b] Analytical Method	Instrumentation (Used in Analysis)
1,3,5- Trinitrobenzene	0.25	7.3	8330B	HPLC[c]
1,3-Dintirobenzene	0.25	4.0	8330B	HPLC[c]
2,4,6-Trinitrotoluene	0.25	6.9	8330B	HPLC[c]
2,4- Dinitrotoluene	0.25	5.7	8330B	HPLC[c]
2,6- Dinitrotoluene	0.25	9.4	8330B	HPLC[c]
2-amino-4,6-Dinitrotoluene	0.26	---	8330B	HPLC[c]
4-amino-2,6 -Dinitrotoluene	0.25	---	8330B	HPLC[c]
Octahydro-1,3,5,7-tetrnitro-1,3,5,7-tetrazocine (HMX)	0.22	13.0	8330B	HPLC[c]
2-Nitrotoluene	0.25	12.0	8330B	HPLC[c]
Nitrobenzene	0.26	6.4	8330B	HPLC[c]
3- Nitrotoluene	0.25	7.9	8330B	HPLC[c]
4- Nitrotoluene	0.25	8.5	8330B	HPLC[c]
Tetryl	0.25	4.0	8330B	HPLC[c]
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.65	14.0	8330B	HPLC[c]
Nitroglycerine	6.1	3.65	8330B	HPLC[c]
Perchlorate	0.010	0.53	6850	HPLC[c] /EI/MS[d]
White Phosporous	0.43	0.008	7580	GC[e]
Dioxins and Furans	0.50	0.005	8280B, 8290A	HRGC/MS[f] or HRGC/HRMS[g]

a. µg/L = micrograms per liter; mg/kg = milligrams per kilogram.
b. U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
c. HPLC = High Performance Liquid Chromatography
d. EI/MS = Electrospray ionization/mass spectrometry
e. GC = Gas chromatography
f. HRGC/MS = High resolution gas chromatography/mass spectrometry
g. HRGC/HRMS = High resolution gas chromatography/high resolution mass spectrometry

TABLE 2-4
Federal Safe Drinking Water Maximum Contaminant Levels

Analyte	MCL (mg/L)
Metals	
Antimony	0.06
Arsenic	0.010
Barium	2.0
Beryllium	0.004
Cadmium	0.005
Chromium	0.1
Copper	1.3
Lead	0.015
Mercury	0.002
Selenium	0.05
Silver	0.1 (Secondary Standard)
Thallium	0.002
Zinc	5 (Secondary Standard)
VOCs and SVOCs	
Benzene	0.005
Bis(2-ethylhexyl) phthalate	0.006
Chlorobenzene	0.1
1,2-Dichlorobenzene	0.6
1,4-Dichlorobenzene	0.075
1,2-Dichloroethane	0.005
1,1-Dichloroethene	0.007
Trans-1,2-Dichloroethene	0.1
1,2-Dichloropropane	0.5
Ethylbenzene	0.7
Ethylene Dibromide	0.00005
Fluorene	4
Methylene chloride	0.005
Pentachlorophenol	0.001
Benzo(a)pyrene	0.0002
Styrene	0.1
Tetrachloroethene	0.005
Toluene	1
1,2,4-Trichlorobenzene	0.07
1,1,1-Trichloroethane	0.2
1,1,2-Trichloroethane	0.005
Trichloroethylene	0.005
Vinyl chloride	0.002
Xylenes (total)	10
Dioxins (2,3,7,8 - TCDD)	0.00000003

Table 2-5
Summary of Background Concentrations for Metals in Soils[1]

Constituent of Concern	Range of Detections (mg/kg[a])	Mean[b] (mg/kg)	Median (mg/kg)	95th Percentile UTL[c] (mg/kg)
Antimony (surface and subsurface)	0.05-44.9	2.1	<6.0	3.9
Arsenic (surface)	0.015-9.7	2.0	2.5	5.6
Arsenic (subsurface)	0.033-17.0	2.0	2.0	4.4
Barium (surface)	0.086-232.0	43.0	59.0	130.0
Barium (subsurface)	0.5-495.0	70.0	71.7	214.0
Beryllium (surface and subsurface)	0.10-1.6	0.3	0.34	0.65
Cadmium (surface)	0.1-7.1	0.3	<0.5	<1.0
Cadmium (subsurface)	0.00265-6.2	0.3	<0.5	0.9
Total chromium (surface)	0.004-240.0	6.0	6.3	17.3
Total chromium (subsurface)	0.0056-58.4	5.3	5.7	12.8
Chromium VI (surface and subsurface)	0.020-<2.5	<0.1	<0.1	<2.5
Cobalt (surface)	0.50-7.8	2.8	2.95	5.2
Cobalt (subsurface)	0.50-8.8	3.0	3.0	5.2
Copper (surface)	0.5-44.0	6.0	5.9	15.4
Copper (subsurface)	1.0-84.5	6.4	6.3	18.2
Lead (surface)	0.005-104.0	7.0	7.8	21.4
Lead (subsurface)	0.75-103.0	5.0	4.9	11.8
Mercury (surface)	0.01-0.68	0.06	<0.1	0.25
Mercury (subsurface)	0.0001-0.68	0.04	<0.1	<0.1
Nickel (surface	0.5-70.2	5.8	6.0	11.5

Constituent of Concern	Range of Detections (mg/kg[a])	Mean[b] (mg/kg)	Median (mg/kg)	95^{th} Percentile UTL[c] (mg/kg)
and subsurface)				
Selenium (surface and subsurface)	0.037-17.2	0.3	<1.0	<1.0
Silver (surface)	0015-4.0	0.4	<1.0	<1.0
Silver (subsurface)	0.00159-8.7	0.4	<1.0	<1.0
Thallium (surface and subsurface)	0.0011-7.1	0.3	<0.5	<1.1
Tin (surface and subsurface)	1.0-<122.0	<51.5	<51.5	<10
Total uranium (surface)	0.005-4.66	1.0	2.2	3.42
Total uranium (subsurface)	0.34-2.6	1.0	1.25	2.3
Vanadium (surface)	0.50-31.5	12.3	12.1	20.4
Vanadium (subsurface)	0.50-50.9	13.0	13.80	21.5
Zinc (surface and subsurface)	0.50-230.0	24	22.75	62
Zirconium (surface and subsurface)	2.7-10.8	5.3	5.35	9.2

[a] mg/kg = milligram per kilogram

[b] Geometric means are provided for those constituents which were log normally or nonparametrically distributed, while arithmetic means are provided for those constituents which were normally distributed.

[c] The 95^{th} Upper Tolerance Limit (UTL) is provided for those constituents that have a normal or lognormal distributions, while the 95^{th} percentile is provided for those constituents that have a nonparametric distribution.

[1] IT Corp, 1996. Background Concentrations of Constituents Of Concern To The Sandia National Laboratories/New Mexico Environmental Restoration Project and The Kirtland Air Force Base Installation Restoration Program dated March 1996.

TABLE 2-6
Soil Screening Levels and Regional Screening Levels for Contaminants in Soil

Analyte	EPA Regional RSL (mg/kg)	NMED Residential SSL (mg/kg)
Metals		
Antimony	410	31.3
Arsenic	1.6	3.9
Barium	190,000	15,600
Beryllium	2,000	156
Cadmium	810	77.9
Chromium	1,400	219
Copper	41,000	31,300
Lead	800	400
Mercury	100	7.71
Nickel	20,000	15,600
Selenium	5,100	391
Silver	5,100	391
Thallium	66	5.16
Tin	610,000	Not Established
Vanadium	5,200	391
Zinc	310,000	23,500
High Explosives		
1,3,5- Trinitrobenzene	27,000	Not Established
1,3-Dintirobenzene	62	Not Established
2,4,6-Trinitrotoluene	79	35.9
2,4- Dinitrotoluene	1,200	15.7
2,6- Dinitrotoluene	620	61.2
2-amino-4,6- Dinitrotoluene	2,000	Not Established
4-amino-2,6 - Dinitrotoluene	1,900	Not Established
Octahydro-1,3,5,7-tetrnitro-1,3,5,7-tetrazocine (HMX)	49,000	30,600
2-Nitrotoluene	12,000	29.1
Nitrobenzene	280	49.4
3- Nitrotoluene	13	15,600
4- Nitrotoluene	110	244
Tetryl	2,500	244
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	24	44.2
Nitroglycerine	62	6.11
Other Analytes		
Perchlorate	720	54.8
White Phosporous	20	Not Established
Dioxins and Furans	0.000018	Not Established

TABLE 2-7
Sample Containers, Preservation Techniques, and Holding Times for Soil Samples

Analyte	Container	Preservative	Holding Time[a]
Metals[b] (except mercury and hexavalent chromium)	4 oz glass jar with Teflon cap	Cool to 4°C	180 days
Mercury	4 oz glass jar with Teflon cap	Cool to 4°C	28 days
Hexavalent chromium	4 oz glass jar with Teflon cap	Cool to 4°C	28 days (plus 4 days after extraction)
Volatile Organic Compounds (VOCs) [b]	4 oz glass jar with Teflon cap	Cool to 4°C	14 days
Semi-volatile Organic Compounds (SVOCs) [b]	4 oz glass jar with Teflon cap	Cool to 4°C	Samples extracted within 14 days and extracts analyzed within 40 days following extraction
High Explosives[b]	4 oz glass jar with Teflon cap	Cool to 4°C	Samples extracted within 14 days and extracts analyzed within 40 days following extraction
Perchlorate[b]	4 oz amber glass bottles	Cool to 4°C	Extract and analyze solids within 28 days of sample acquisition
White Phosphorous	4 oz glass jar with Teflon cap	Cool to 4°C	Indefinite (if preserved at or below 4□C, kept in the dark, and tightly sealed)
Dioxins/Furans	250 mL wide mouth amber glass jar with Teflon lid	Cool to 4°C	30 days

a. Holding time information from U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
b. Volatile and semivolatile organic compounds, metals, and high explosives are listed by respective test method numbers in U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.

TABLE 2-8
Sample Containers, Preservation Techniques, and Holding Times for Liquid Samples

Analyte	Container	Preservative	Holding Time[a]
Metals[b] (except mercury and hexavalent chromium)	1 liter (L) Polyethylene bottle with polyethylene lined cap	HNO_3[c] to pH<2 and cool to 4°C	180 days
Mercury	400 mL Polyethylene or Glass bottle	HNO_3 to pH<2	28 days
Hexavalent chromium	125 mL Glass jar with Teflon lined cap	Cool to 4°C	24 hours
Volatile Organic Compounds (VOCs) [b]	3x40 mL Glass vials with Teflon-lined septum caps	HCl[d] Cool to 4°C	14 days
Semi-volatile Organic Compounds (SVOCs) [b]	4 x 1L amber glass with Teflon-lined lid	Cool to 4°C	Samples extracted within 7 days and extracts analyzed within 40 days following extraction
High Explosives[b]	4 x 1L amber glass	Cool to 4°C	Samples extracted within 7 days and extracts analyzed within 40 days following extraction

a. Holding time information from U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
b. Volatile and semivolatile organic compounds, metals, and high explosives are listed by respective test method numbers in U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
c. HNO_3 = Nitric Acid
d. HCl = Hydrochloric Acid

TABLE 2-9
Summary of Field Quality Control Samples

Quality Control Sample Type	Sample Matrix	Applicable Analysis	Frequency	Purpose
Trip blank	Water/Soil	VOCs[a]	One per day	Document any contamination attributable to shipping and field handling procedures
Field blank	Soil/Water	VOCs	One per day	Document any contamination attributable To field conditions
Field Duplicate	Soil/Water	VOCs, SVOCs[b], metals, HE[c], Dioxins/Furans White Phosphorus Perchlorate	Minimum of one per 20 environmental samples per media type	Document precision of the sampling/analysis process
Equipment blank	Soil/Water	VOCs, SVOCs[b], metals, HE[c], Dioxins/Furans White Phosphorus Perchlorate	One sample per day per media type	Document whether decontamination of sampling equipment was adequate

a VOCs = volatile organic compounds.
b SVOCs = semivolatile organic compounds.
c. HE = High Explosives

TABLE 2-10
Summary of Laboratory Quality Control Procedures by Analytical Method

Parameter	EPA *SW-846*b Analytical Method	Quality Control Check	Frequency
Metals[b] except mercury	6010C	Instrument calibration	Daily, or each setup
		Initial/continuing calibration	After instrument calibration, 10% or every 2 hours
		Initial/continuing calibration blank	Every calibration, 10% or 2 hours
		Preparation blank	Each batch of digested samples
		Interference check sample (ICS)	Each run or twice per 8-hr shift
		Duplicate sample analysis	Once per field batch per matrix
Mercury	7470A, 7471B	Procedural Blank	Once per batch of up to 20 samples
		Matrix spike (MS)/laboratory control samples (LCS)	Once per batch of up to 20 samples
		Duplicate sample analysis	Once per field batch per matrix
		Mid-level standard	Include after each group of 10 samples
Volatile Organic Compounds (VOCs) [b]	8260B	Instrument performance: mass calibration/ion abundance pattern	Every 12 hours of analysis time
		Initial calibration: instrument sensitivity and linearity of response	Five concentration levels; after each instrument performance, check prior to sample analysis
		Continuing calibration	Every 12 hours of analysis time
		Internal standards	All calibration

Parameter	EPA *SW-846*[b] Analytical Method	Quality Control Check	Frequency
			standards, samples, and blanks
		Method blank	Every 12 hours of analysis time
		System monitoring compounds	Every method blank, sample, matrix spike, matrix spike duplicate; matrix specific, per method limits
Semi-volatile Organic Compounds (SVOCs) [b]	8270D	Instrument performance: mass calibration/ion abundance pattern	Every 12 hours of analysis time
		Initial calibration: instrument sensitivity and linearity of response	Five concentration levels; after each instrument performance, check prior to sample analysis
		Continuing calibration	Every 12 hours of analysis time
		Internal standards	All calibration standards, samples, and blanks
		Method blank	Each group of samples of similar matrix and concentration level (soils)
		Surrogate compounds	Each sample and blank
High Explosives[b]	8330B	System performance	Every 12 hours of analysis time
		Initial calibration	Daily
		Daily calibration	At beginning of the day, singly at the

Parameter	EPA *SW-846*b Analytical Method	Quality Control Check	Frequency
			midpoint of the run, and singly after last sample of day (assuming sample group of 10 or less)
		Mid-level standard	Include after each group of 10 samples
		Instrument recalibration	When performance changes and acceptance criteria cannot be achieved
		Blanks	Prior to preparation of stock solutions
		Method blanks	One for each group of up to 20 samples
		Reference samples	Once per batch
		Matrix spike (MS)/laboratory control samples (LCS)	Once per batch of up to 20 samples
		Surrogate recoveries	After analysis of 15-20 field samples
Perchlorate[b]	6860	System performance	Every 12 hours of analysis time
		Initial calibration	Daily or each setup
		Initial/continuing calibration	After every tenth field sample
		Final calibration	At the end of all analyses
		Method blanks	One for each group of up to 20 samples
		Reference samples	Once per batch
		Matrix spike (MS)/laboratory control samples (LCS)	Once per batch of up to 20 samples

Parameter	EPA *SW-846*[b] Analytical Method	Quality Control Check	Frequency
		Reagent blank	One for each group of up to 20 samples
		Instrument recalibration	When performance changes and acceptance criteria cannot be achieved
White Phosporous[b]	7580	Initial calibration	Every 12 hours of analysis time
		Daily calibration	Daily
		Mid-level standard	After every tenth sample
		Matrix spike (MS)/laboratory control samples (LCS)	Once per batch of up to 20 samples
		Instrument recalibration	When performance changes and acceptance criteria cannot be achieved
Dioxins/Furans[b]	8280B, 8290A	System performance	Every 12 hours of analysis time
		Initial calibration	Daily
		Daily calibration	At beginning of the day, singly at the midpoint of the run, and singly after last sample of day (assuming sample group of 10 or less)
		Mid-level standard	Include after each group of 10 samples
		Instrument recalibration	When performance changes and acceptance criteria cannot be achieved
		Blanks	Prior to preparation of stock solutions

Parameter	EPA *SW-846*b Analytical Method	Quality Control Check	Frequency
		Method blanks Reference samples Matrix spike (MS)/laboratory control samples (LCS)	One for each group of up to 20 samples Once per batch Once per batch of up to 20 samples

a. Quality control inforamtion from U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
b. Volatile and semivolatile organic compounds, metals, high explosive, perchlorates, white phosphorous and dioxins and furans are listed by respective test method numbers in U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.

3. MANAGEMENT OF WASTE FROM CLOSURE ACTIVITIES

Wastes that are expected to be generated during the final closure activities at the OD Unit include: excess soil from sampling; well purge water, drill cuttings, decontamination water; PPE; and excavated soils. To minimize the amount of waste to be generated during closure activities, excess soil cuttings from borings will be replaced in the auger holes. The volume of liquid waste generated during the cleaning of excavation and grading equipment will be minimized by only using the amount of wash water and rinse water necessary to achieve successful decontamination. Solvents will not be used. This approach will help minimize the amount of liquids that cannot be disposed of in the sanitary sewer system.

3.1 Waste Management

Wastes associated with closure activities at the OD Unit will be managed as follows:

- Wastes will be stored in appropriate containers that are compatible with the wastes and are in good condition.
- If analytical results indicate that the waste is hazardous or the Kirtland AFB project manager determines that the waste will be classified as hazardous, Kirtland AFB will manage the waste in accordance with all applicable regulations in 40 CFR §261-268.
- Waste containers will remain under the control of the personnel generating the waste.
- Waste containers will be segregated according to the compatibility and chemical waste type.
- Waste will be stored in containers that remain closed, except when adding or removing wastes.
- Waste containers bearing free liquid will be provided with secondary containment of sufficient volume to prevent spilled liquids from being released onto the ground.
- Waste containers will be managed in such a manner as to prevent ruptures and leaks.
- Waste containers will be labeled appropriately, pending receipt of analytical results. Labels will be filled out appropriately and marked using permanent marker or pen. Label information will include waste source, suspected contaminants, contents, depth (if appropriate), the date which accumulation began, and a contact name.

3.2 Waste Characterization

Characterization of the liquid waste and excavated soil generated during the closure of the OD Unit will be based upon the results of sampling and analysis. Decontamination water will be analyzed for the constituents listed in Tables 2-1, 2-2 and 2-3. PPE will be managed as a hazardous waste and will be managed appropriately.

3.3 Waste Disposal

All wastes from closure activities determined to be hazardous will be managed in accordance with the Hazardous Waste Management Regulations from the time of generation. Hazardous wastes will be shipped off-site for treatment and disposal at a permitted RCRA facility. Wastes characterized as nonhazardous (e.g., decontamination liquids) will be evaluated to determine the appropriate disposal method in accordance with applicable law.

4. REFERENCES

EPA, 1986 and all approved updates, “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,” SW-846, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, U.S. Government Printing Office, Washington, D.C.

EPA, 1980, “Samplers and Sampling Procedures for Hazardous Waste Streams,” EPA-600/2-80-018, U.S. Environmental Protection Agency, Municipal Environmental Research Laboratory, Cincinnati, OH.

IT Corporation, 1996, “Background Concentrations of Constituents of Concern to the Sandia National Laboratories/New Mexico Environmental Restoration Project and the Kirtland Air Force Base Installation Restoration Program,” prepared for Sandia National Laboratories/New Mexico Environmental Restoration Department 7585, Albuquerque, NM.

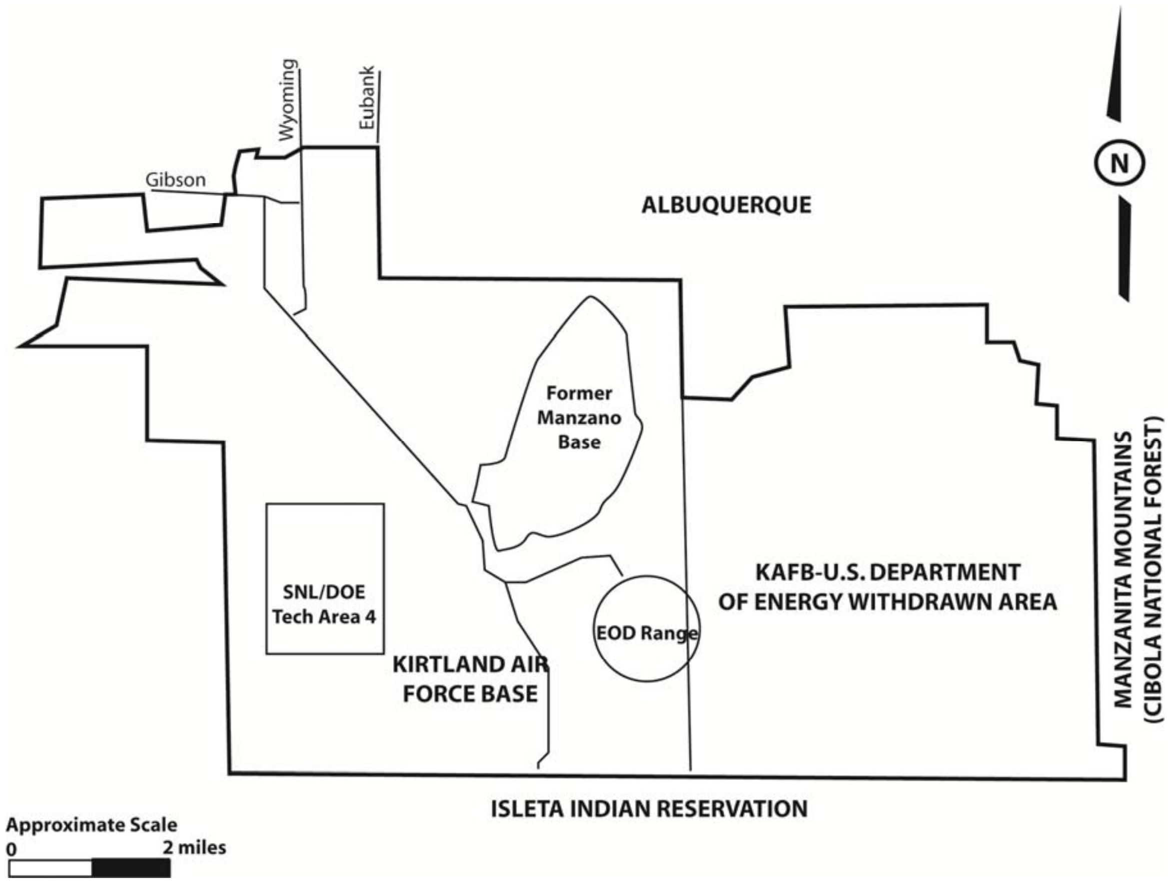


Figure 1-1. Location of EOD Range at Kirtland AFB

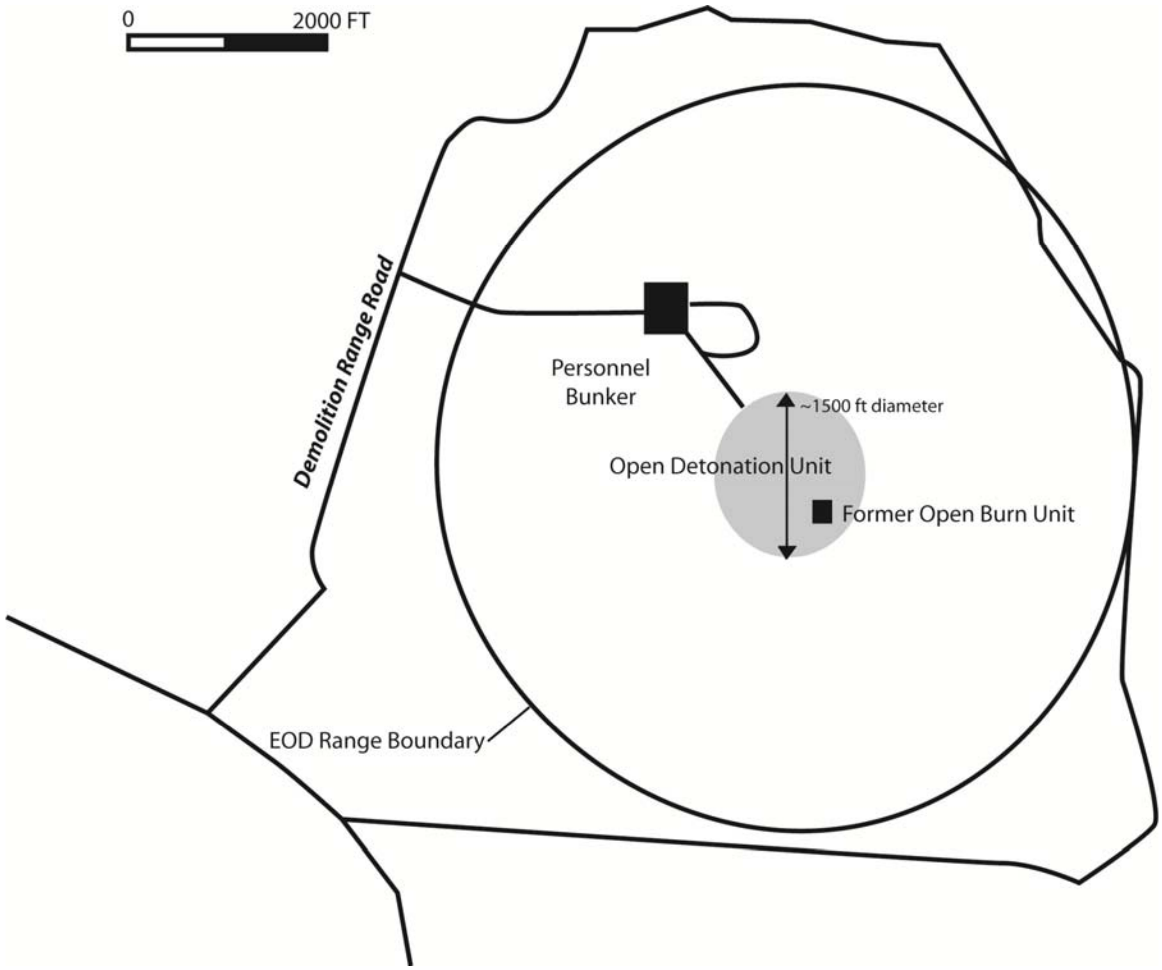
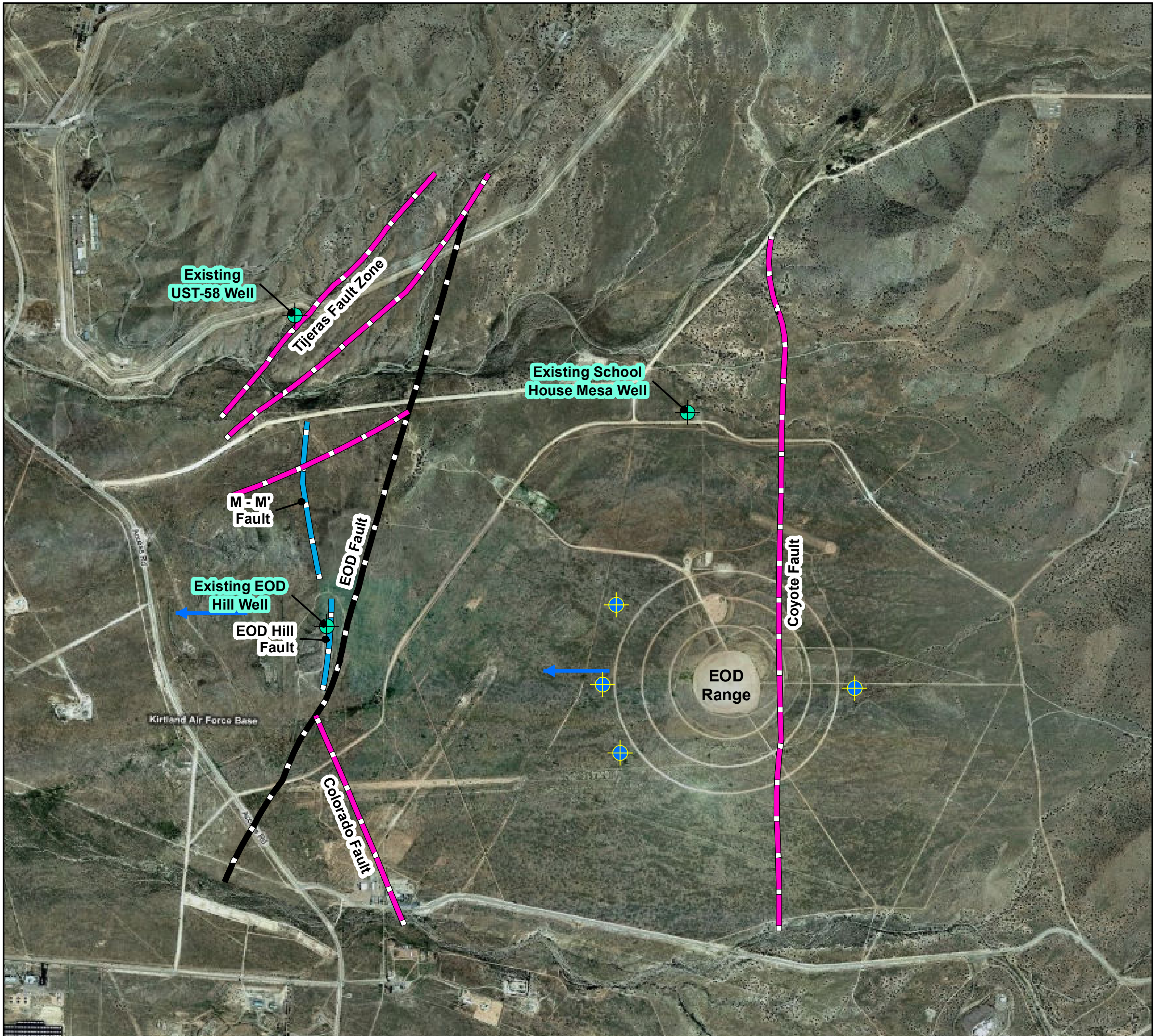
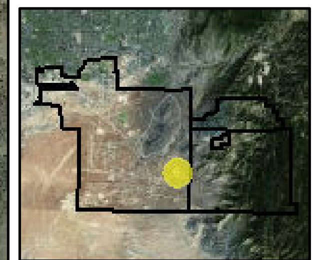


Figure 1-2. Location of Open Burn Unit and Open Detonation Unit at EOD Range

Figure 2-1

Location of Proposed Groundwater Monitoring Wells at the EOD Range





Proposed Monitoring Well Location

Existing Monitoring Well Location

Assumed Groundwater Flow Direction

Fault
Surface extension of faults shown taken from New Mexico Bureau of Geology and Mineral Resources (Revised 2002).

Fault
Surface extension of faults shown taken from SNL Sand Report (2003).

Fault
Fault referred to as "EOD" fault in SNL Sand Report (2003).

1,000 500 0 1,000
Feet

TechLaw