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Waste Characterization Strategy Form

This WCSF supersedes the WCSF, "Plug and Abandonment of LANL Wells." [EP2009-0252, June 2009].

Project Title	**Plug and Abandonment (P&A) of LANL Wells**
Solid Waste Management Unit or Area of Concern #	**LANL Wide**
Activity Type	**Well Plug and Abandonment**
Project Manager	**Theodore T. Ball**
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Date	**August 16, 2011**

Description of Activity:

The waste-generating activities addressed in this Waste Characterization Strategy Form (WCSF) consist of the plug and abandonment of test holes, wells, and/or well sites throughout the Laboratory. The well abandonment will be consistent with the New Mexico Environment Department's letter of July 30, 2010 (NMED 2010, 110427), Section IV,B.1.b.v and X.D (Well Abandonment) of the Compliance Order on Consent (Consent Order), and the New Mexico Office of the State Engineer (NMOSE) regulations. Figure 1 is a map of well locations.

The following waste streams are anticipated:

- Contact Waste
- Steel or PVC Well Casing
- Concrete Rubble
- Decontamination Fluids
- Residual Solids from Secondary Containment
- Excess Grout Mixture (i.e., Cement/Soil or Rock/Bentonite)
- Residual Concrete Washout
- Petroleum Contaminated Soils (PCS)
- Municipal Solid Waste (MSW)
- Drill Cuttings
- Drilling Fluids
- Purge Water
- Sand/Gravel Filter Pack
- Fencing and Steel Posts

All wastes will be managed in accordance with P-409, *Waste Management*; EP-SOP-5238, *Characterization and Management of Environmental Program Waste*; P-930-1, *LANL Waste Acceptance Criteria;* P-930-2, *Waste Certification Program*, and approved work plans.

Trained and qualified Field Waste Management Technician (FWMT), Waste Sampling Personnel (SP), and Hazardous Materials Packaging and Transportation (HMPT) personnel will be assigned to perform the duties outlined in EP-SOP-5238.

The selection of waste containers will be based on U.S. Department of Transportation requirements, waste types, and estimated volumes of waste to be generated. Immediately following containerization,

each waste container will be individually labeled with a unique container identification number and with information regarding waste classification, contents, and date generated. A waste determination must be made within 30 days of the generation of the waste. A Waste Acceptance Criteria (WAC) waste exception form (WEF) can be used if the generator does not meet the 30 day deadline.

This WCSF will be implemented before any waste generating activity is undertaken. An amendment to this WCSF will be prepared and submitted for review and approval if any of the waste streams change in description or characterization approach or unanticipated waste streams are generated. The generation of no path forward wastes must be approved by the Department of Energy (DOE) prior to generation of the waste.

Plug & Abandonment activities will be conducted in a manner that minimizes the generation of waste. Waste minimization will be accomplished by implementing the most recent version of the "Los Alamos National Laboratory Hazardous Waste Minimization Report" (LANL 2008, 104174). Waste streams will be recycled/reused, as appropriate.

Relevant Site History and Description:

Wells are plugged and abandoned when they are no longer required in the monitoring network or when they are damaged beyond repair. The goal of well abandonment is to seal the borehole in such a manner that the well cannot act as a conduit for migration of contaminants from the ground surface to the aquifer or between aquifers. To properly abandon a well, the preferred method is to completely remove the well casing and screen from the borehole, clean out the borehole, and backfill with a cement or bentonite grout, neat cement, or concrete. All plug and abandonment of LANL wells will be conducted in accordance with the NMED Order on Consent (March 1, 2005), EP-ERSS-SOP-5034, *Monitoring Well and Borehole Abandonment* (December, 2006), applicable fieldwork plans, and current EPA well abandonment guidance.

CHARACTERIZATION STRATEGY

The characterization strategy for investigation derived waste (IDW) generated during plug and abandonment will be based upon well location (i.e., within an Area or Concern [AOC] or Solid Waste Management Unit [SWMU]); direct sampling of the containerized waste, if appropriate; and/or acceptable knowledge (AK) of groundwater conditions within a watershed in the area of a well. AK includes reviews of existing analytical data from the well being plugged and abandoned and may also include source term/process identification performed to identify whether listed hazardous waste may be present (i.e., acceptable knowledge reviews). Initial waste characterization and management of IDW will be based upon the conclusion(s) reached during the Acceptable Knowledge Review that will be conducted prior to the start of the activity and documented on the AK Review Form (See ENV-RCRA-QP-12, *Acceptable Knowledge Review Procedure*). Note: The AK Review Form must be reviewed and approved for each well prior to the start of the P&A activity.

If the AK review does not identify a listed source, the waste may be managed as non-hazardous, if it is not otherwise characteristic. If a listed source is identified, but the levels are below groundwater standards or soil screening levels and land disposal restrictions (LDRs), a contained-in request may be made to New Mexico Environment Department (NMED) in order to remove the listed waste number from the waste stream. A copy of the ENV-RCRA approved AK Review Form, Due Diligence Report, or the NMED contained-in approval must accompany all waste profiles prepared for the subject waste(s).

The IDW from these wells may also be designated as radioactive and may contain high explosive compounds. Once waste has been determined to be radioactive and does not meet land application standards, waste must be managed in a registered radioactive waste staging and storage area.

Note: For IDW that is initially managed as non-hazardous waste, the non-hazardous waste label must be placed on the container and include the date of generation (i.e., initial placement in the container), the generator's name and the container contents as a best management practice.

Waste #1: Contact Waste- This waste stream is comprised of solid waste generated during plug and abandonment activities that has come into contact with environmental media and equipment. This includes, but is not limited to: PPE (e.g., gloves); plastic sheeting (e.g., tarps and liners); plastic and glass sample bottles; disposable sampling supplies (e.g., filters, tubing, plastic bags); and dry decontamination wastes, such as paper items. It is estimated that less than 2 yd^3 of contact waste will be generated per well.

Anticipated Regulatory Status: Green is Clean; Municipal Solid Waste, Industrial, Recycle (non-hazardous/nonradioactive); Low Level Waste (LLW), Hazardous, or Mixed Low Level Waste (MLLW)

Characterization Approach: Contact Waste will be characterized using the AK of the environmental media with which it came into contact and/or historical groundwater data/documentation.

Storage and Disposal Method: Contact waste will be containerized at the point of generation and initially managed based upon the AK Review results of the environmental media. If the contact waste is determined to be non-hazardous/nonradioactive (i.e., the contact waste has been segregated from potentially listed environmental media or the AK Review indicates non-hazardous/nonradioactive) and approval is granted by ENV-RCRA, it may be recycled and reused via the Material Recycling Facility (MRF). Otherwise, the contact waste will be disposed of at an appropriate waste disposal facility. For disposal, separately containerized contact waste may also be combined with the material that it contacted (the Waste Profile Form (WPF) will document the decision to combine the waste streams). Wastes will be treated and/or disposed of in authorized off-site facilities appropriate for the waste classification.

Waste # 2: Steel or PVC Well Casing – This waste stream consists of the casing and/or pipe removed from the wells during plug and abandonment activities. These materials may be recycled, as appropriate. It is estimated that <2,000 linear feet of this material will be generated for each plugged and abandoned well.

Anticipated Regulatory Status: Recycle, LLW, Hazardous, Industrial, or MLLW

Characterization Approach: This waste will be characterized using acceptable knowledge (AK) data/documentation of the media with which it came into contact and historical groundwater data/documentation. If the materials are to be reused, they will be decontaminated in the field prior to reuse, if necessary.

Storage and Disposal Method: If the materials can be reused, they will be decontaminated and transported to the laydown yard. Non-radioactive metals to be recycled will be placed in recycling bins staged at the site. If the materials cannot be recycled or reused, they will be containerized at the point of generation and managed based on the regulatory classification of the waste.

Waste #3: Concrete Rubble- This waste stream consists of broken concrete rubble with rebar from the pads around the well heads and also from the base of fence posts and bollards. It is estimated that <1 yd^3 will be generated from for each well that is plugged and abandoned. Every effort will be made to recycle or reuse these materials.

Anticipated Regulatory Status: Recycle, Industrial, Hazardous, MLLW, or LLW

Characterization Approach: The concrete rubble will be characterized based on AK from the MSDS for the cement and/or using AK of the environmental media with which it came into contact and/or historical groundwater data/documentation.

Storage and Disposal Method: Concrete rubble will be managed in a roll-off container with ribs and a roll-off bin tarp, or other suitable container. If concrete is not contaminated, it may be sent to the county

landfill for reuse, but the waste must meet the landfill's acceptance criteria and have ENV-RCRA approval for release. If it is contaminated, it must be managed as waste and managed appropriately.

Waste #4: Decontamination fluids - This waste streams consists of liquid wastes (e.g., water, water & Alconox) generated from the decontamination of excavation and sampling equipment and the casing removed from the well. Every attempt will be made to limit the volume of this waste stream by using dry decontamination methods, where applicable. It is estimated that approximately 500 gallons of decontamination water will be generated.

> **NOTE #1:** Decontamination fluids that include surfactants (e.g., Alconox) can be difficult to dispose of if the analytical results indicate a Chemical Oxygen Demand (COD) that exceeds the RLWTF WAC of 250 mg/L (P930-1, Attachment 1, 1.4.4). Surfactants are acceptable to use in decontamination solutions but in limited quantities (not in excess of manufacturer recommendations or less than 0.2% by weight).
>
> **NOTE #2:** Decontamination of equipment using water/steam typically results in a waste stream that is comprised of both solids and liquids. The solids are addressed as Waste #5 and must be segregated (within reason) from the bulk decontamination water so that the TSSs do not exceed the RLWTF WAC of 10,000 mg/L (P930-1, Attachment 1; 1.5).

Anticipated Regulatory Status: LLW, Hazardous, Industrial, SWWS, or RLWTF

Characterization Approach: Decontamination fluids will be characterized based upon the AK of the media or equipment with which it came into contact, historical groundwater data/documentation, and or using the analytical results obtained from direct sampling. Samples, if needed to meet a disposal facility WAC or due to poor AK, will be collected in accordance with LANL SOP-06.15, *COLIWASA Sampler for Liquids and Slurries* or subcontractor equivalent procedure. If the SOP is not used, the type of sampling equipment and methods used will be consistent with EPA 530-D-02-002. A representative sample will be taken within 10 days of generation (i.e., date of initial placement into container) so that a waste determination can be made within 30 days of generation and wastes disposed within 90 days, if necessary. All samples will be submitted with a 30-day turnaround time for analyses. Multiple sampling events may be required to ensure WAC requirements are met.

Samples will at a minimum be analyzed for TAL metals; radionuclides (by alpha and gamma spectroscopy); isotopic uranium, isotopic plutonium, americium-241, tritium, and strontium-90; VOCs; SVOCs; oil/grease; TSS; pH; explosive compounds; PCB; cyanide; nitrates/nitrites; perchlorates; pesticides/herbicides; F/Cl/sulfate; BOD; and COD. Other constituents may be analyzed as necessary to meet the WAC of the disposal facility.

Sampling personnel must record sampling information in accordance with EP-ERSS-SOP-5058 and EP-ERSS-SOP-5181. The Field notebook or sample collection sheet must be used to document sample collection activities (e.g., equipment and sampling methods used, number and location of samples, etc.). Sampling personnel must also record field conditions, problems encountered, local sources of contamination (e.g., operating generators or vehicles), the personnel involved, equipment and supplies used, waste generated, and field observations.

Storage and Disposal Method: Decontamination water will be containerized at the point of generation and initially managed based upon AK data/documentation of the equipment that is decontaminated or the AK Review of the environmental media in which it came into contact, if applicable. Final waste characterization will be determined after the review of analytical results obtained from direct sampling of the decontamination fluid. If the decontamination water is initially managed as nonhazardous, the date of generation (i.e., initial placement in the container), as well as the generator's name and container contents will be placed on the non-hazardous waste containers as a best management practice.

If the decontamination water is characterized as LLW it will be managed in a radioactive waste staging or storage area it can be shipped for disposal. Radioactive waste staging and storage area registration and

set up must be coordinated with the assigned LANL WMC. If the decontamination water is characterized as Hazardous or MLLW (with D-codes for characteristic waste) it will be managed in a less than 90-Day Storage Area (with a start date equal to the earliest date of generation by container) until it can be shipped for disposal. Decontamination water may be disposed of on-site at the SWWS or the RLWTF if the facility WAC requirements are met.

If the waste fails to meet the RLWTF WAC only due to high COD, it can be treated (e.g., addition of 30% hydrogen peroxide) to bring down the COD level to the RLWTF limit of 250 mg/L so that the waste can be disposed of at that facility (see Work Instruction – Treatment of Wastewater with High Level of Chemical Oxygen Demand (COD)). If the waste cannot be disposed of at either of these facilities, due to operational limitations or inability to meet the WAC, it will be solidified in 55-gallon drums (if characterized as LLW), or pumped into an off-site pumper truck (if characterized as non-hazardous) and sent to an authorized off-site facility for treatment, storage, and disposal.

Waste # 5 – Residual Solids from Secondary Containment: This waste stream is comprised of residual solids segregated during the containerization of decontamination fluids that have been removed from secondary containments. It may consist of residues, pebbles, soil, cuttings, and/or rocks that cannot be disposed of with the liquid waste stream (i.e., decontamination fluids). It is estimated that <100 gallons of residual solids will be generated per well.

Anticipated Regulatory Status: LLW, Industrial, Hazardous, or MLLW

Characterization Approach: Residual solids will be characterized based upon the AK of the media (i.e., decontamination water) with which it came into contact and/or historical groundwater data/documentation.

***Storage and Disposal Method*:** Residual solids will be containerized at the point of generation and managed based upon the AK of the media (i.e., decontamination water) with which it came into contact. Residual solids from different sources (i.e., decontamination, storm water) must be segregated into different containers and analyzed separately. If the residual solids are characterized as LLW they will be managed in a radioactive waste staging or storage area until it can be shipped for disposal. Radioactive waste staging and storage area registration and set up must be coordinated with the assigned LANL WMC. If the residual solids are characterized as Hazardous or MLLW (with D-codes for characteristic waste) they will be managed in a less than 90-Day Storage Area (with a start date equal to the earliest date of generation by container) until they can be shipped for disposal. Residual solids will be shipped and disposed of at an authorized off-site facility.

Waste # 6 – Excess Grout Mixture (i.e., Cement/Soil/PVC or Rock/Bentonite): This waste stream consists of excess cement/soil/PVC or rock/bentonite grout mixture used in the original installation and removed prior to final sealing of the borehole. An estimated 10 yd^3 may be generated for each well.

Anticipated Regulatory Status: Reusable (released under ENV-RCRA policy), Industrial, Hazardous, LLW, or MLLW

Characterization Approach: This waste stream will be characterized based upon the AK from the MSDS for the cement, rock/bentonite, and/or the media with which it came into contact and/or historical groundwater data/documentation.

***Storage and Disposal Method*:** Excess grout waste will be stored separately from other wastes in 55-gallon steel drums or other containers. The waste will initially be managed and disposed of as non-hazardous/non-radioactive waste. If the grout waste is not contaminated, it may be sent to the county landfill for reuse with an ENV-RCRA approval for release. Otherwise, the concrete must be managed in accordance with the regulatory classification of the waste. Waste concrete will be shipped and disposed of at an authorized off-site facility.

Waste # 7 – Residual Concrete Washout: This waste stream is comprised of residual cement generated from the evaporation of concrete wash out water. It is estimated that 1 yd^3 of residual concrete may be generated for each well.

Anticipated Regulatory Status: Reusable (released under ENV-RCRA policy), Industrial, Hazardous, LLW, or MLLW

Characterization Approach: This waste stream will be characterized based upon the AK from the MSDS for the cement and/or the media (i.e., cuttings) with which it came into contact and/or historical groundwater data/documentation.

Storage and Disposal Method: Residual concrete washout waste will remain in an on-site containment until final waste characterization and disposition. If the residual concrete waste is not contaminated, it may be sent to the county landfill for reuse with an ENV-RCRA approval for release. Otherwise, the concrete must be containerized and managed in accordance with the regulatory classification of the waste. Waste concrete will be shipped and disposed of at an authorized off-site facility.

Waste # 8 – Petroleum Contaminated Soils (PCS): This waste stream is comprised of soils contaminated due to the accidental release of commercial products such as hydraulic fluid, motor oil, unleaded gasoline, or diesel fuel (e.g., from the rupture of hydraulic or fuel hoses, or spills during maintenance, etc.). It may also include adsorbent padding, paper towels, spill pillows or other adsorbent material used to contain the released material and added to the containerized PCS waste for storage and disposal. It is estimated that 1 yd^3 of this waste stream will be generated.

Anticipated Regulatory Status: New Mexico Special Waste (NMSW), Hazardous, MLLW, LLW, or Industrial

Characterization Approach: PCS will be characterized based upon either AK or direct waste sampling. If the material spilled is known and the spill occurs on clean base course, AK can be used to characterize the waste as NMSW. If the spill is of an unknown material/origin or occurs in an AOC, PRS, or SWMU, characterization will be based upon the analytical results from direct sampling either performed in place (same day as spill/containerization) or from the containerized waste within 10 days of generation. If sampling is required, samples will be collected in one of the following two ways:

1. For spills containerized in large containers (i.e., 55-gallon drums) and/or deep spills being sampling in place the samples will be collected in accordance with LANL SOP-06-10, *Hand Auger and Thin-Wall Tube Sampler.*

2. For spills containerized in small containers and/or shallow spills being sampled in place the samples will be collected in accordance with SOP-06.11, *Spade and Scoop Method for Collection of Soil Samples.*

The analysis of the samples will be dependent on where the spill occurred as follows:

- If the spill occurred on clean soil (and samples are collected), samples will be analyzed for VOCs, TPH, gasoline-range and diesel-range (DRO/GRO), and total metals, at a minimum. These analytical suites are required to determine whether the waste is NMSW. Other constituents may be analyzed as necessary to meet the WAC of the disposal facility.

- If the spill occurs on soils with known hazardous contaminants or soils with no available/reliable AK documentation the samples will be analyzed, at minimum, for VOCs, SVOCs, TPH, gasoline-range and diesel-range (DRO/GRO)and total metals. TCLP analysis may also be performed for TAL metals if the analytical results for the total metals divided by 20 indicate contaminants that exceed regulatory thresholds. If radiological contamination is a possibility the samples must also be analyzed for radionuclides (by

alpha and gamma spectroscopy); isotopic uranium, isotopic plutonium, americium-241, tritium, and strontium-90.

All samples will be submitted with a 30-day turnaround time for analysis so that a waste determination can be made within 30 days of generation. The "initial" date or date of generation for NMSW is the date the container is completely full or the date in which no additional NMSW will be added to the container. The "final" date (or the date starting the 90 day NMSW clock) is the date that the validated analytical data is received by the WMC.

Sampling personnel must record sampling information in accordance with EP-ERSS-SOP-5058 and EP-ERSS-SOP-5181. The Field notebook or sample collection sheet must be used to document sample collection activities (e.g., equipment and sampling methods used, number and location of samples, etc.). Sampling personnel must also record field conditions, problems encountered, local sources of contamination (e.g., operating generators or vehicles), the personnel involved, equipment and supplies used, waste generated, and field observations.

***Storage and Disposal Method*:** PCS will be containerized at the point of generation on the same day that the spill occurred. If AK for the site indicates that the soil will not be contaminated with radioactive or hazardous materials, the PCS will be managed as NMSW and the NMSW start date will be the date the container is completely full or the date in which no additional NSW will be added to the container. If AK for the site indicates that the soil could be contaminated with radioactive or hazardous materials the PCS will be stored in a clearly marked and constructed waste accumulation area appropriate to the anticipated waste type. Waste accumulation area postings, regulated storage duration, and inspection requirements will be based upon the waste classification. The following provides the management and disposal pathways for PCS that has a final waste determination:

1. PCS that is not contaminated with radioactive or hazardous materials will be managed as NMSW if one or more of the following conditions are met:

    - If the sum of benzene, toluene, ethylbenzene, and xylene isomer concentrations are greater than 50 mg/kg.
    - If benzene individually is equal to or greater than 10 mg/kg (Note: If benzene concentrations are equal to or greater than 0.5 mg/L, based upon TCLP, it is a hazardous waste, not a NMSW).
    - If TPH (DRO + GRO) concentration is greater than 100 mg/kg.

    PCS that is characterized as NMSW will remain in the registered NMSW area until it is shipped for disposal to an authorized off-site facility.

2. PCS that is not contaminated with radioactive or hazardous materials will be managed as industrial waste if the contaminant levels are less than the NMSW and/or PCB regulatory levels. PCS that is characterized as industrial waste will be removed from the registered NMSW area and stored as industrial waste until it is shipped for disposal to an authorized off-site facility.

3. PCS that is characterized as LLW will be moved to a radioactive waste staging or storage area it can be shipped for disposal to an authorized off-site facility.

4. PCS characterized as Hazardous or MLLW will be managed in a less than 90-Day Storage Area (with a start date equal to the earliest date of generation by container) until it can be shipped for disposal to an authorized off-site facility.

Waste # 9 – Municipal Solid Waste (MSW): This waste stream is comprised of non-contact trash, including, but not limited to, paper, cardboard, wood, plastic, food, and beverage containers. It is estimated that 1 yd^3 of MSW will be generated.

Anticipated Regulatory Status: MSW (nonhazardous/nonradioactive)

Characterization Approach: MSW will be characterized based on AK of the waste materials (including MSDSs) and methods of generation.

Storage and Disposal Method: MSW will be segregated from all other waste streams. It is anticipated that the wastes will be stored in plastic trash bags or other appropriate containers and transferred/disposed of at the County of Los Alamos Solid Waste Transfer Station or other authorized off-site solid waste facility.

Waste # 10: Drill Cuttings – This waste stream is comprised of borehole cuttings and core, soil, and rock sediments produced from over-drilling the well during plug and abandonment. The cuttings may or may not contain residue of drilling additives. It is estimated that <10 cubic yards of drill cuttings may be generated per well.

Anticipated Regulatory Status: LLW, Hazardous, MLLW, Industrial, Reusable (land applied), or PCBs

Characterization Approach: Drill cuttings will be characterized based upon the analytical results obtained from direct sampling. A representative sample of the cuttings will be taken within 10 days of well completion. A waste determination will be made within 30 days of waste generation (i.e., the date the cuttings were removed from the pit and first placed into a container, or the date of initial placement into an approved container). A 30-day turnaround time will be required for analysis. Samples can be collected one of the following ways:

1. After the fluids have been either evaporated or removed from the pit, collect the sample in accordance with LANL SOP-06-10, *Hand Auger and Thin-Wall Tube Sampler,* using a systematic grid sampling (minimum of 20 grids) as described in Section 5.2 of the RCRA Waste Sampling Draft Technical Guidance (EPA 530-D-02-002, August 2002, http://www.epa.gove/osw/hazard/testmethods/sw846/pdfs/rwsdtf.pdf). Collect an incremental sample from each grid by boring through the entire depth of the cuttings. Combine the increments into a single sample for the pit. If a hand auger or thin-wall tube sampler is not a appropriate sampling device, select the appropriate tools described in Table 8 of Section 7.1.3 of the EPA guidance, and operate the sampling device in accordance with Appendix E of the guidance.

2. Collect an aliquot of drill cuttings during the drilling operations (incremental sampling) by diverting the material to a smaller container (i.e., clean 55-gallon drum) that can then be sampled for analysis in accordance with LANL SOP-06-10. This method is not applicable for volatile organic compounds (VOC) analysis. After the samples are collected from the smaller container, the residual cuttings may be placed into the pit, or waste container, with the rest of the cuttings produced during drilling.

> **NOTE:** Due to safety concerns (toxic fumes, slips/trips/falls, and excavation slippage) associated with grid sampling in a pit, the above option (#1) is preferred.

> **NOTE:** If incremental sampling is used for drill cuttings sampling, a VOC sample will be taken at three stages: 1) A sample must be collected upon initial placement of the cuttings in the sample collection container, 2) A second sample should be collected during the middle of the incremental sampling process, and 3) A third sample must be collected after the final placement of the cuttings in the sample collection container.

Samples will at a minimum be analyzed for TAL metals; radionuclides (by alpha and gamma spectroscopy); isotopic uranium, isotopic plutonium, americium-241, tritium, and strontium-90; VOCs; semi-volatile organic compounds (SVOCs); PCB; cyanide; nitrates/nitrites; perchlorates; and pesticides/herbicides. Toxicity characteristic leaching procedure (TCLP) analysis may also be performed for TAL metals if the analytical results for the total metals divided by 20 indicate contaminants that exceed

regulatory thresholds. Total petroleum hydrocarbons (TPH) will be analyzed if staining is observed. Other constituents may be analyzed as necessary to meet the WAC of the disposal facility.

Sampling personnel must record sampling information in accordance with EP-ERSS-SOP-5058, *Sample Control and Field Documentation* and EP-ERSS-SOP-5181, *Documentation for Waste and Environmental Services Technical Field Activities*. The Field notebook or sample collection sheet must be used to document sample collection activities (e.g., equipment and sampling methods used, number and location of samples, etc.). Sampling personnel must also record field conditions, problems encountered, local sources of contamination (e.g., operating generators or vehicles), the personnel involved, equipment and supplies used, waste generated, and field observations.

Storage and Disposal Method: Drill cuttings will initially be containerized and managed based upon review of previous analytical data and/or acceptable knowledge documentation associated with the well (i.e., AK Reviews), pending analytical results from direct sampling of the waste. If the cuttings are initially managed as nonhazardous, the date of generation (i.e., initial placement in the container), as well as the generator's name and container contents will be placed on the non-hazardous waste containers as a best management practice. Based upon validated analytical data, the drill cuttings will be evaluated, using the Automated Waste Determination (AWD) system, for land application in accordance with ENV-RCRA-QP-011, *Land Application of Drill Cuttings*. If the cuttings meet the criteria for land application, the drill cuttings will be land applied in accordance with ENV-RCRA-QP-011.

If the cuttings are characterized as LLW (exceeding the land application criteria) they will be managed in a radioactive waste staging or storage area until they can be shipped for disposal. If the cuttings are characterized as Hazardous or MLLW (with D-codes for characteristic waste) it will be managed in a less than 90-Day Storage Area (with a start date equal to the earliest date of generation by container) until it can be shipped for disposal. Any drill cuttings that cannot be land applied will be managed and disposed of based upon the regulatory classification of the waste at a LANL approved disposal facility.

Waste # 11: Drilling Fluids – This waste stream is comprised of potable water, from a municipal water well, that is introduced into and retrieved from the borehole during over-drilling; mixing with groundwater may occur if water bearing formations are encountered. It is estimated that <2,000 gallons of drilling fluids may be generated from each well plugged and abandoned.

Anticipated Regulatory Status: LLW, Hazardous, MLLW, Industrial, Reusable (land applied)

Characterization Approach: Drilling fluids will be characterized based upon the analytical results obtained from direct sampling. A representative sample of the fluids will be taken within 10 days of well completion. A waste determination will be made within 30 days of waste generation (i.e., the date the fluids were removed from the pit and first placed into a container, or the date of initial placement into an approved container). A 30-day turnaround time will be required for analysis. Samples will be collected in the following manner:

1. Collect a composite sample from the container/tank at intervals across the entire fluids column (surface, middle, and bottom). Stratified, vertical sampling is necessary to address NMED's concerns about stratification of contaminants in the tank. NOTE: If the fluid freezes, leaving a thin film of ice at the top, a composite sample may still be taken by breaking through the thin film, as long as the stratified vertical composite sampling is maintained. The methods available to sample a tank at varying depths include the following:

    - Geotech pump with tubing attached to a weight or pole
    - Bomb sampler
    - COLIWASA liquid waste sampler
    - Thief sampler
    - Bailer depending upon depth of container

Samples will be collected in accordance with LANL SOP-06.15 or subcontractor equivalent procedure. If the SOP is not used, the type of sampling equipment and methods used will be consistent with EPA 530-D-02-002.

2. Collect an aliquot of drilling fluids during the drilling operations (incremental sampling) by diverting the material to a smaller container (i.e., clean 55-gallon drum) that can then be sampled for analysis in accordance with LANL SOP-06.15 or subcontractor equivalent procedure. If the SOP is not used, the type of sampling equipment and methods used will be consistent with the EPA 530-D-02-002. If incremental sampling is used for drilling fluids sampling, a VOC sample will be taken each time the material is diverted into the smaller container (i.e., 55-gallon drum) and analyzed immediately, instead of waiting until all the aliquots have been collected.

Samples will at a minimum be analyzed for TAL metals; radionuclides (by alpha and gamma spectroscopy); isotopic uranium, isotopic plutonium, americium-241, tritium, and strontium-90; VOCs; SVOCs; oil/grease; Total Suspended Solids (TSS); pH; explosive compounds; PCB; cyanide; nitrates/nitrites; perchlorates; general inorganics; F/Cl/sulfate; BOD; COD; and pesticides/herbicides. Other constituents may be analyzed as necessary to meet the WAC of the disposal facility.

Sampling personnel must record sampling information in accordance with EP-ERSS-SOP-5058 and EP-ERSS-SOP-5181. The Field notebook or sample collection sheet must be used to document sample collection activities (e.g., equipment and sampling methods used, number and location of samples, etc.). Sampling personnel must also record field conditions, problems encountered, local sources of contamination (e.g., operating generators or vehicles), the personnel involved, equipment and supplies used, waste generated, and field observations. **Note:** Indicate on the SMO paperwork to "Dilute the sample 2 times prior to extraction, if analysis fails at 2 times dilution, dilute the sample 5 times and re-analyze."

Storage and Disposal Method: Drilling fluid will be containerized at the point of generation and initially managed based upon review of previous analytical data and/or acceptable knowledge documentation (i.e., AK Reviews) associated with the well, pending analytical results from direct sampling of the waste. If the drilling fluid is initially managed as nonhazardous, the date of generation (i.e., initial placement in the container), as well as the generator's name and container contents will be placed on the non-hazardous waste containers as a best management practice. Based upon validated analytical data, the drilling fluid will be evaluated, using the AWD system, for land application in accordance with ENV-RCRA-QP-010. If the drilling fluid meets the criteria for land application it will be land applied in accordance with ENV-RCRA-QP-010. Any drilling fluid that cannot be land applied will be managed and disposed of based upon the regulatory classification of the waste at a LANL approved disposal facility.

If the drilling fluid is characterized as LLW (exceeding the land application criteria) it will be managed in a radioactive waste staging or storage area until it can be shipped for disposal. Radioactive waste staging and storage area registration and set up will be coordinated with the assigned LANL WMC. If the drilling fluid is characterized as Hazardous or MLLW (with D-codes for characteristic waste) it will be managed in a less than 90-Day Storage Area (with a start date equal to the earliest date of generation by container) until it can be shipped for disposal.

Waste #12: Purge Water – This waste stream consists of groundwater generated during the purging of the well prior to P&A. The anticipated volume of purge water that will be generated is approximately 100 gallons per well.

Anticipated Regulatory Status: LLW, Hazardous, MLLW, Industrial, Reusable (land applied), SWWS, HEWTF, or RLWTF

Characterization Approach: Purge water will be characterized based upon the analytical results obtained from direct sampling. A representative sample of the water will be taken within 10 days of well completion. A waste determination will be made within 30 days of waste generation (i.e., the date of initial placement into an approved container). A 30-day turnaround time will be required for analysis. Samples will be collected in the following manner:

1. Collect a composite sample from the container/tank at intervals across the entire water column (surface, middle, and bottom). Stratified, vertical sampling is necessary to address NMED's concerns about stratification of contaminants in the tank. NOTE: If the water freezes, leaving a thin film of ice at the top, a composite sample may still be taken by breaking through the thin film, as long as the stratified vertical composite sampling is maintained. The methods available to sample a tank at varying depths include the following:

    - Geotech pump with tubing attached to a weight or pole
    - Bomb sampler
    - COLIWASA liquid waste sampler
    - Thief sampler
    - Bailer depending upon depth of container

    Samples will be collected in accordance with LANL SOP-06.15 or subcontractor equivalent procedure. If the SOP is not used, the type of sampling equipment and methods used will be consistent with EPA 530-D-02-002.

2. Collect an aliquot of purge water during the drilling operations (incremental sampling) by diverting the material to a smaller container (i.e., clean 55-gallon drum) that can then be sampled for analysis in accordance with LANL SOP-06.15 or subcontractor equivalent procedure. If the SOP is not used, the type of sampling equipment and methods used will be consistent with the EPA 530-D-02-002. If incremental sampling is used for drilling fluids sampling, a VOC and SVOC sample will be taken each time the material is diverted into the smaller container (i.e., 55-gallon drum) and analyzed immediately, instead of waiting until all the aliquots have been collected.

Samples will at a minimum be analyzed for TAL metals; radionuclides (by alpha and gamma spectroscopy); isotopic uranium, isotopic plutonium, americium-241, tritium, and strontium-90; VOCs; SVOCs; oil/grease; Total Suspended Solids (TSS); pH; explosive compounds; PCB; cyanide; nitrates/nitrites; perchlorates; general inorganics; Fl/Cl/sulfate; BOD; COD; and pesticides/herbicides. Other constituents may be analyzed as necessary to meet the WAC of the disposal facility.

Sampling personnel must record sampling information in accordance with EP-ERSS-SOP-5058 and EP-ERSS-SOP-5181. The Field notebook or sample collection sheet must be used to document sample collection activities (e.g., equipment and sampling methods used, number and location of samples, etc.). Sampling personnel must also record field conditions, problems encountered, local sources of contamination (e.g., operating generators or vehicles), the personnel involved, equipment and supplies used, waste generated, and field observations. **Note:** Indicate on the SMO paperwork to "Dilute the sample 2 times prior to extraction, if analysis fails at 2 times dilution, dilute the sample 5 times and re-analyze."

Storage and Disposal Method: Purge water will be containerized at the point of generation and initially managed based upon review of previous analytical data and/or acceptable knowledge documentation (i.e., AK Reviews) associated with the well, pending analytical results from direct sampling of the waste. If the purge water is initially managed as nonhazardous, the date of generation (i.e., initial placement in the container), as well as the generator's name and container contents will be placed on the non-hazardous waste containers as a best management practice. Based upon validated analytical data, the purge water will be evaluated, using the AWD system, for land application in accordance with ENV-RCRA-QP-010. If the purge water meets the criteria for land application it will be land applied in accordance with ENV-RCRA-QP-010. Any purge waters that cannot be land applied will be managed and disposed of based upon the regulatory classification of the waste at a LANL approved disposal facility.

If the purge water is characterized as LLW (exceeding the land application criteria) it will be managed in a radioactive waste staging or storage area until it can be shipped for disposal. Radioactive waste staging and storage area registration and set up will be coordinated with the assigned LANL WMC. If the purge water is characterized as Hazardous or MLLW (with D-codes for characteristic waste) it will be managed

in a less than 90-Day Storage Area (with a start date equal to the earliest date of generation by container) until it can be shipped for disposal.

Waste #13: Sand/Gravel Filter Pack - Sand/gravel filter pack removed from the well by bailing. It is estimated that <1 cubic yards of sand/gravel filter pack may be generated from each well that is plugged and abandoned.

Anticipated Regulatory Status: LLW, Hazardous, MLLW, or Industrial

Characterization Approach: Sand/Gravel Filter Pack IDW will be characterized using acceptable knowledge (AK) of the media with which it came into contact. A representative sample will be taken within 10 days of generation (i.e., date of initial placement into the container) so that a waste determination can be made within 30 days of waste generation. Samples will be submitted with a 30 day turnaround time for analyses.

Storage and Disposal Method: Sand/Filter Pack IDW will be containerized at the point of generation and be managed based upon acceptable knowledge of the media with which it came into contact, or by direct sampling. If the sand/filter pack IDW is initially managed as nonhazardous, the date of generation (i.e., initial placement in the container), as well as the generator's name and container contents will be placed on the non-hazardous waste containers as a best management practice. Based upon the final waste determination, the sand/filter IDW will be managed in an accumulation area appropriate for the regulatory classification of the waste. If the sand/filter pack IDW is classified as nonhazardous/nonradioactive, it will be sent to an authorized facility for treatment, storage, or disposal. Wastes with a 90-day accumulation limit (hazardous waste or NMSW) will be sent to an authorized facility within 90-days of generation.

Waste # 14: Fencing and Steel Posts – This waste stream consists of the metal fencing and steel posts removed from around the wells. This material may be recycled, as appropriate. It is estimated that <10 cubic yards of fencing may be generated for each well that is plugged and abandoned.

Anticipated Regulatory Status: Recycle, Industrial, Municipal Solid Waste, LLW, Hazardous, or MLLW

Characterization Approach: This waste stream will be characterized using acceptable knowledge data/documentation of the media with which it came into contact. If fencing and steel posts are removed from within a Potential Release Site (PRS), characterization will be based upon existing data and documentation associated with the PRS (e.g., AK Reviews). If the materials are to be reused, they will be decontaminated in the field prior to reuse, if necessary.

Storage and Disposal Method: If the materials can be reused, they will be decontaminated and transported to the laydown yard. Non-radioactive metals to be recycled will be placed in recycling bins staged at the site. If the materials cannot be recycled or reused, they will be containerized at the point of generation and managed based on the regulatory classification of the waste.

CHARACTERIZATION TABLE

NOTE: Multiple sampling may be required to ensure WAC requirements are met.

Waste Description	Waste # 1 Contact Waste	Waste # 2 Steel Well Casing	Waste # 3 Concrete Rubble	Waste #4 Decon Fluids	Waste #5 Residual Solids from Secondary Containments
Estimated Volume	< 2yd^3	< 2000 linear ft	< 1yd^3	500-gallons	<100-gallons
Packaging	Drums	Roll Offs	Roll Offs	Drums/Tanks	Drums
Regulatory classification:					
Radioactive Waste	X	X	X	X	X
Recycle/Reusable Material (with ENV-RCRA Approval)	X	X	X		
Municipal Solid Waste (MSW)	X				
Waste destined for LANL's SWWS or RLWTF [1]				X	
Hazardous Waste	X	X	X	X	X
Mixed (hazardous and radioactive) Waste	X	X	X		X
Toxic Substances Control Act (TSCA)					
New Mexico Special Waste					
Industrial Waste	X	X	X	X	X
Characterization Method					
Acceptable knowledge (AK): Existing Data/Documentation	X	X	X	X	X
AK: Site Characterization					
Direct Sampling of Waste				X	
Analytical Testing					
Volatile Organic Compounds (EPA 8260-B)				X	
Semivolatile Organic Compounds (EPA 8270-C)				X	
Organic Pesticides (EPA 8081-A)				X	
Organic Herbicides (EPA 8151-A)				X	
PCBs (EPA 8082)				X	
Total Metals (EPA 6010-B/7471-A)				X	
Total Cyanide (EPA 9012-A) [2]				X	
Nitrates/Nitrites (EPA 300.09)				X	
Dioxins/Furans (EPA 1613B)					
Oil/Grease (EPA 1665)				X	
Fluoride, Chlorine, Sulfate (EPA 300)				X	
TTO (EPA 8260-B and EPA 8270-C) [3]					
Total Suspended & Dissolved Soilds (TSS) and Total Dissolved Soilds (TDS) (EPA 160.1 and 160.2)				X	
Chemical Oxygen Demand (COD) (EPA 410.4)				X	
pH (EPA 904c)				X	
Microtox or Biological Oxygen Demand (BOD) [4]				X	
Perchlorates (EPA 6850)				X	
High Explosives Constituents (EPA 8330/8321-A)				X	
Asbestos					
BTEX (EPA-8021b)					
Total petroleum hydrocarbon (TPH)-GRO (EPA 8015-M) TPH-DRO (EPA 8015-M)					
Toxicity characteristic leaching procedure (TCLP) Metals (EPA 1311/6010-B)					
TCLP Organics (EPA 1311/8260-B & 1311/8270-C)					
TCLP Pest. & Herb. (EPA 1311/8081-A/1311/8151-A)					
Radium 226 & 228 (EPA 9320)				X	
Gross Alpha (alpha counting) (EPA 900)				X	
Gross Beta (beta counting) (EPA 900)				X	
Tritium (liquid scintillation) (EPA 906.0)				X	
Gamma spectroscopy (EPA 901.1)				X	
Isotopic plutonium (Chem. Separation/alpha spec.) (HASL-300)				X	
Isotopic uranium (Chem. Separation/alpha spec.) (HASL-300)				X	
Total uranium (EPA 6020)				X	
Strontium-90 (EPA 905)				X	
Americium-241 (Chem. Separation/alpha spec.) (HASL-300)				X	
Isotopic Thorium				X	
WSP – General Inorganics (filtered)					

Waste Description	Waste #6 Excess Grout Mixture	Waste #7 Residual Concrete Washout	Waste #8 Petroleum Contaminated Soils (PCS)	Waste #9 Municipal Solid Waste (MSW)
Estimated Volume	10-yd^3	1-yd^3	1-yd^3	1-yd^3
Packaging	Drums/Roll Offs	Drums	Drums	Plastic Trash Bags/Trash Cans/Dumpsters
Regulatory classification:				
Radioactive Waste	X	X	X	
Reusable Material (with ENV-RCRA Approval)	X	X		
Municipal Solid Waste (MSW)				X
Waste destined for LANL's SWWS or RLWTF [1]				
Hazardous Waste	X	X	X	
Mixed (hazardous and radioactive) Waste	X	X	X	
Toxic Substances Control Act (TSCA)				
New Mexico Special Waste			X	
Industrial Waste	X	X	X	
Characterization Method				
Acceptable knowledge (AK): Existing Data/Documentation	X	X	X	X
AK: Site Characterization				
Direct Sampling of Waste			X	
Analytical Testing				
Volatile Organic Compounds (EPA 8260-B)			X[5]	
Semivolatile Organic Compounds (EPA 8270-C)			X[5]	
Organic Pesticides (EPA 8081-A)				
Organic Herbicides (EPA 8151-A)				
PCBs (EPA 8082)				
Total Metals (EPA 6010-B/7471-A)			X[5]	
Total Cyanide (EPA 9012-A) [2]				
Nitrates/Nitrites (EPA 300.09)				
Dioxins/Furans (EPA 1613B)				
Oil/Grease (EPA 1665)				
Fluoride, Chlorine, Sulfate (EPA 300)				
TTO (EPA 8260-B and EPA 8270-C) [3]				
Total Suspended & Dissolved Soilds (TSS) and Total Dissolved Soilds (TDS) (EPA 160.1 and 160.2)				
Chemical Oxygen Demand (COD) (EPA 410.4)				
pH (EPA 904c)				
Microtox or Biological Oxygen Demand (BOD) [4]				
Perchlorates (EPA 6850)				
High Explosives Constituents (EPA 8330/8321-A)			X[5]	
Asbestos			X[5]	
BTEX (EPA-8021b)				
Total petroleum hydrocarbon (TPH)-GRO (EPA 8015-M) TPH-DRO (EPA 8015-M)			X[5]	
Toxicity characteristic leaching procedure (TCLP) Metals (EPA 1311/6010-B)			X[5]	
TCLP Organics (EPA 1311/8260-B & 1311/8270-C)			X[5]	
TCLP Pest. & Herb. (EPA 1311/8081-A/1311/8151-A)			X[5]	
Radium 226 & 228 (EPA 9320)			X[5]	
Gross Alpha (alpha counting) (EPA 900)			X[5]	
Gross Beta (beta counting) (EPA 900)			X[5]	
Tritium (liquid scintillation) (EPA 906.0)			X[5]	
Gamma spectroscopy (EPA 901.1)			X[5]	
Isotopic plutonium (Chem. Separation/alpha spec.) (HASL-300)			X[5]	
Isotopic uranium (Chem. Separation/alpha spec.) (HASL-300)			X[5]	
Total uranium (EPA 6020)			X[5]	
Strontium-90 (EPA 905)			X[5]	
Americium-241 (Chem. Separation/alpha spec.) (HASL-300)			X[5]	
Isotopic Thorium			X[5]	
WSP – General Inorganics (filtered)				

Waste Description	Waste #10 Drill Cuttings	Waste #11 Drilling Fluids	Waste #12 Purge Water	Waste #13 Sand/Gravel Filter Pack	Waste #14 Fencing and Steel Posts
Estimated Volume	< 10-yd^3	<2000 gal	<100 gal	< 1-yd^3	< 10-yd^3
Packaging	Drums/Roll Offs	Drums	Drums	Drums	Trash Cans/Dumpsters
Regulatory classification:					
Radioactive Waste	X	X	X	X	X
Reusable Material (with ENV-RCRA Approval)	X (Land Apply)	X (Land Apply)	X (Land Apply)		X
Municipal Solid Waste (MSW)					X
Waste destined for LANL's SWWS, HEWTF, or RLWTF [1]			X		
Hazardous Waste	X	X	X	X	X
Mixed (hazardous and radioactive) Waste	X	X	X	X	X
Toxic Substances Control Act (TSCA)	X (PCBs)				
New Mexico Special Waste					
Industrial Waste	X	X	X	X	X
Characterization Method					
Acceptable knowledge (AK): Existing Data/Documentation				X	X
AK: Site Characterization					
Direct Sampling of Waste	X	X	X		
Analytical Testing					
Volatile Organic Compounds (EPA 8260-B)	X	X	X		
Semivolatile Organic Compounds (EPA 8270-C)	X	X	X		
Organic Pesticides (EPA 8081-A)	X	X	X		
Organic Herbicides (EPA 8151-A)	X	X	X		
PCBs (EPA 8082)	X	X	X		
Total Metals (EPA 6010-B/7471-A)	X	X	X		
Total Cyanide (EPA 9012-A) [2]	X	X	X		
Nitrates/Nitrites (EPA 300.09)	X	X	X		
Dioxins/Furans (EPA 1613B)					
Oil/Grease (EPA 1665)		X	X		
Fluoride, Chlorine, Sulfate (EPA 300)		X	X		
TTO (EPA 8260-B and EPA 8270-C) [3]					
Total Suspended & Dissolved Soilds (TSS) and Total Dissolved Soilds (TDS) (EPA 160.1 and 160.2)		X	X		
Chemical Oxygen Demand (COD) (EPA 410.4)		X	X		
pH (EPA 904c)		X	X		
Microtox or Biological Oxygen Demand (BOD) [4]		X	X		
Perchlorates (EPA 6850)	X	X	X		
High Explosives Constituents (EPA 8330/8321-A)	X[5]	X	X		
Asbestos					
BTEX (EPA-8021b)					
Total petroleum hydrocarbon (TPH)-GRO (EPA 8015-M) TPH-DRO (EPA 8015-M)	X[5]				
Toxicity characteristic leaching procedure (TCLP) Metals (EPA 1311/6010-B)	X[5]				
TCLP Organics (EPA 1311/8260-B & 1311/8270-C)	X[5]				
TCLP Pest. & Herb. (EPA 1311/8081-A/1311/8151-A)	X[5]				
Radium 226 & 228 (EPA 9320)	X	X	X		
Gross Alpha (alpha counting) (EPA 900)	X	X	X		
Gross Beta (beta counting) (EPA 900)	X	X	X		
Tritium (liquid scintillation) (EPA 906.0)	X	X	X		
Gamma spectroscopy (EPA 901.1)	X	X	X		
Isotopic plutonium (Chem. Separation/alpha spec.) (HASL-300)	X	X	X		
Isotopic uraSannium (Chem. Separation/alpha spec.) (HASL-300)	X	X	X		
Total uranium (EPA 6020)	X	X	X		
Strontium-90 (EPA 905)	X	X	X		
Americium-241 (Chem. Separation/alpha spec.) (HASL-300)	X	X	X		
Isotopic Thorium	X	X	X		
WSP – General Inorganics (filtered)		X	X		

1 In addition to other analytes needed to characterize the waste (e.g., VOC, SVOC, total metals), analyze for TSS, TDS, Oil and Grease, gross alpha gross beta, tritium, and pH for liquids destined for the LANL sanitary waste water system (SWWS). For wastes destined for the RLWTF additional constituents include TTO, TSS, COD, pH, total nitrates/nitrites, and gross alpha, gross beta (not including tritium), and gross gamma or the sum of individual alpha-, beta-, and gamma-emitting nuclides.
2 Filtered metals and filtered Cyanide are required for land application, with the exception of mercury (hg).
3 TTO is the total of volatile organic and semi-volatile organic compound contaminants. Request methods EPA 8260-B (VOCs) and EPA 8270-C (SVOCs).
4 If Microtox analysis is not available, request BOD.
5 As needed (e.g., Conduct TCLP analysis only if total concentrations of RCRA toxicity characteristic constituents exceed 20 times their regulatory limit. Conduct TPH analysis only if there is visible staining. Analyze for HE constituents if there is a potential for HE contamination based upon historical data/documentation.

Notes:

If data are insufficient to make a definitive regulatory classification at the time of WCSF completion, more than one box on the characterization table may be checked, along with an explanation in the text section. The final regulatory classification will be reflected on the waste profile form. The table identifies the suite of analyses required based on site knowledge, information needed by the anticipated receiving facility, or for land application, if applicable.

Section 1.2 of the TCLP method 1311 states "If a total analysis of the waste demonstrates that individual analytes are not present in the waste, or that they are present but at such low concentrations that the appropriate regulatory levels could not possibly be exceeded, the TCLP need not be run." The methodology for using total waste analyses determination for the 40 TC constituents in soil is as follows:

Liquids – Wastes containing less than 0.5% filterable solids do not require extraction and therefore by filtering the waste and measuring the total constituent level of the filtrate and comparing those levels to regulatory levels is appropriate.

Solids – Constituent concentrations from the extraction fluid of wastes that are 100% physical solids are divided by 20 (reflecting the 20 to 1 ratio of TCLP extraction) and then compared to the regulatory levels. If the theoretical levels do not equal or exceed the regulatory levels, the TCLP need not be run. If the levels do equal or exceed the regulatory levels, the generator may either declare the waste hazardous or run TCLP analyses.

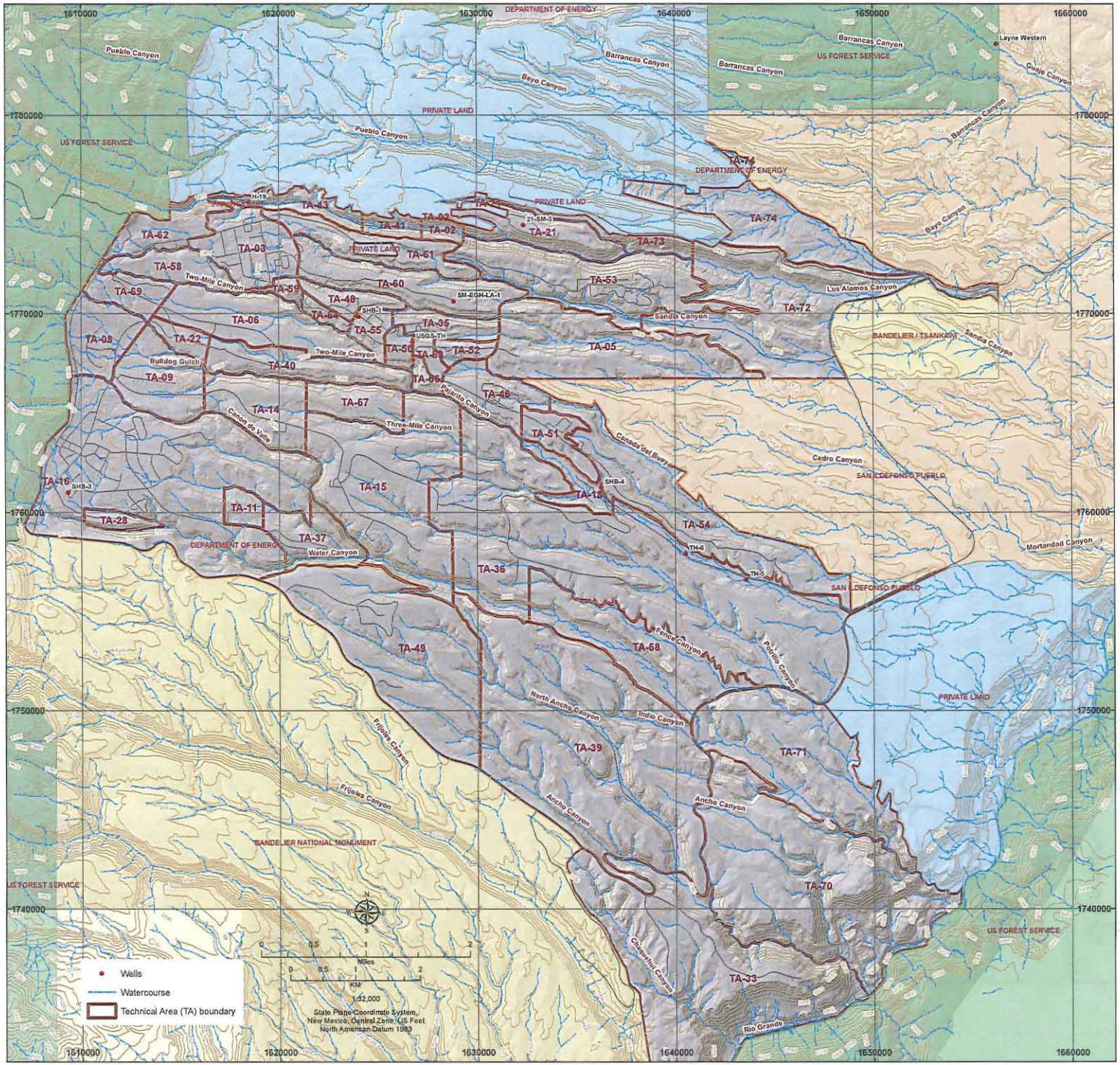
Additional Analytical Information:

Standard analytical turnaround time is anticipated to be 30 calendar days. In the event a waste is suspected to be hazardous, the total waste volume exceeds 55 gallons (e.g., purge water, decontamination fluids, and contact waste), and a <90-day Accumulation Area is required, then an expedited analytical turnaround time will be needed to meet the 90-day time limit. Environmental Stewardship sample support will be notified if an expedited analysis is necessary. Utah-certified analytical laboratory data is recommended to meet the MLLW WAC for waste streams that are suspected to be hazardous and low-level radioactive.

References:

- 40 CFR 261.24, 40 *Code of Federal Regulations* Part 261, Identification and Listing of Hazardous Waste, Subpart C, Section 24, Toxicity Characteristic.
- ADEP-SOP-5238, *Characterization and Management of Environmental Program Waste*
- P-409, *Waste Management*
- P930-1, LANL Waste Acceptance Criteria
- P930-2, Radioactive Waste Certification Program
- ENV-RCRA-QP-10, Land Application of Groundwater
- ENV-RCRA-QP-11, Land Application of Drill Cuttings
- ENV-RCRA-QP-12, Acceptable Knowledge (AK) Review Procedure

Signatures	Date
Project Manager: Theodore T. Ball Theodore T. Ball	8/23/11
Waste Generator: Bennie Martinez Bennie A. Martinez	8/23/11
Waste Management Coordinator: Victor Garde	8/23/11
ENV-RCRA Representative: Jocelyn Y. Buckley Jocelyn Y. Buckley	8-23-11
Waste Acceptance Representative: Andy Elicio	08/23/2011
Waste Certification Program Representative: ~~Richard~~ Randy J. Martinez Randy J. M	8/23/11
Los Alamos National Laboratory EP	



Wells for P and A - 2011

WORK INSTRUCTION
Treatment of Wastewater with High Level of Chemical Oxygen Demand (COD)

1. Determine the amount of 30% hydrogen peroxide you will need to add to the waste drum.

   - Amount of 30% H_2O_2 (in mL)=x*V/157
   - x is the COD in mg O_2/L; V is the volume (in L) of the waste water

   If the COD concentration is very high (e.g., 1000 mg/L) add up to 1.2 times more 30% hydrogen peroxide of the calculated value.

2. Open the drum lid.

3. Using Tyvex coveralls (or labcoat), latex (or nitrile) gloves, and safety glasses (or faceshield), first check the pH and next add a small amount of the 30% hydrogen peroxide to the contents in the drum, adding it slowly at first and watching for any reaction that might occur (e.g., foaming or small bubbles of gas). Check the pH. If the pH drops, add 20% sodium hydroxide solution to raise the pH close to it's initial value.

4. Stir the drum with a long stick or plastic rod after each addition of 30% hydrogen peroxide and/or 20% sodium hydroxide, watching for any violent reaction.

5. Continue Steps 3 and 4 until all the 30% hydrogen peroxide has been added.

6. Mix the content of the drum for 10-30 seconds and take a sample of the treated wastewater for analysis. If the COD level for the treated sample has not gone down to the TA-50 RLWTF COD WAC level (250 mg/L) or has increased, proceed to Step. 7.

7. **Optionally:** Adjust pH of the reaction mixture to between 5 and 9 (closer to 9 is better). Add about 10 ml of 10% ferric chloride solution per 1 L of waste water. (*Ferric chloride will cause precipitation of brown ferric hydroxide. Ferric hydroxide serves as a catalyst to decompose excess of hydrogen peroxide. Presence of free hydrogen peroxide may cause false and a very high COD result*).

8. After a sample has been taken of the mixed contents, place the drum lid back on and allow for venting to occur by clamping down bung lids and drum lid ring loosely.

Reagents used:

30% hydrogen peroxide

20% sodium hydroxide solution

10% ferric chloride solution