ESHID-601189

Waste Characterization Strategy Form

Project Title:	**R-67/CrCH-6 Well Drilling**
Area of Impact:	**R-67/CrCH-6 Well**
Activity Type:	**Installation of Regional Well**
Project Manager/Waste Generator:	**Stephani Swickley/Ron Desotel**
LANL Waste Management Coordinator:	**Victor Garde**
Completed by:	**Victor Garde**
Date:	**March 2, 2015**

Description of Activity:

The waste-generating activities addressed in this Waste Characterization Strategy Form (WCSF) consist of the installation (i.e., drilling, collecting samples, development, groundwater sampling, and aquifer testing) of groundwater monitoring well R-67/CrCH-6. The following waste streams are expected to be generated during the drilling and installation of this well:

- Contact Waste
- Drill Cuttings
- Drilling Fluids
- Development Water
- Decontamination Fluids
- Storm water
- Residual Solids from Secondary Containments
- Drilled Out Concrete, Chips, Concrete Slurry
- Residual Concrete Washout
- Petroleum Contaminated Soils (PCS)
- Municipal Solid Waste (MSW)

Note: Waste streams generated from this project will be stored separately on site.

All wastes will be managed in accordance with P-409, *Waste Management*; EP-DIR-SOP-10021, *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-DIR-SOP-10021.

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.

Investigation 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." Waste streams will be recycled/reused, as appropriate.

Relevant Site History and Description:

The U.S. Department of Energy (DOE) and Los Alamos National Security, LLC (LANS) are installing a single-screen regional aquifer groundwater monitoring well, R-67, as required by the New Mexico Environment Department's (NMED's) approval with modifications of the Phase II Investigation Report for Sandia Canyon, dated February 19, 2014 (NMED 2014, 524467). In addition, this location optimizes the objectives for Corehole 6 (CrCH-6), as stated in the July 2014 Drilling Work Plan for Chromium Project Coreholes, specifically to characterize the upgradient portion of the primary chromium plume. Data derived from CrCH-6 will be evaluated to determine the western extent of anthropogenic chromium in vadose zone pore water and core and within the regional aquifer. This location will also determine if chromium-contaminated surface water in the Sandia Canyon wetland is a potential source of recharges to the regional aquifer.

Los Alamos National Laboratory (LANL) and NMED collaboratively selected the location of the collocated well and corehole. The approval with modifications from NMED states the objectives of the well are to "fully constrain the nature and extent of chromium contamination in the regional aquifer west and upgradient of R-62." Data from this well may also provide important information regarding the upgradient extent of the infiltration pathway(s) for chromium and related contaminants.

CHARACTERIZATION STRATEGY

The characterization strategy for investigation derived waste (IDW) generated during sampling of drilling waste is based upon direct sampling of the waste and/or acceptable knowledge (AK) data/documentation associated with the sampling location. AK includes review of existing analytical data (i.e., soil, sediment, cuttings, and groundwater data) in the vicinity of the sampling locations, historical documentation associated with nearby AOCs or SWMUs (i.e., RFI Work Plans, Investigation Reports, Sediment Canyon Investigation Report, etc.), and may also include source term/process identification performed to identify whether listed hazardous waste may be present (i.e., due diligence review).

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 45 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 45 day deadline.

Based upon analytical data of groundwater from nearby wells and due diligence, there are no F-, U-, P-, or K-listed waste codes applicable to waste streams from R-67/CrCH-6 (See attachment #1: Due Diligence for Sandia Watershed).

Waste # 1 - Contact Waste: This waste stream is comprised of solid waste generated during well installation activities that has come into contact with contaminated environmental media and equipment. This includes, but is not limited to: PPE (e.g., gloves); plastic sheeting (e.g., tarps, 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 25 yd^3 of contact waste may be generated.

Anticipated Regulatory Status: Green is Clean (GIC); Hazardous, Municipal Solid Waste (MSW) (non-hazardous/non-radiological), LLW, or MLLW

Characterization Approach: Contact waste will be characterized using the AK of the environmental media (i.e., drill cuttings and drilling fluids) with which it came into contact.

Storage and Disposal Method: Contact waste will initially be stored as non-hazardous/non-radiological waste. If approval is granted by WM-PROG, it may be recycled and reused via the Material Recycling Facility (MRF). Otherwise, the contact will be disposed of at an appropriate waste disposal facility.

Waste # 2 – Drill Cuttings: This waste stream is comprised of borehole cuttings and core, soil, and rock sediments produced during drilling. The cuttings may or may not contain residue of drilling additives. It is estimated that a total of 90yd^3 of drill cuttings will be generated for this well.

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

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 45 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 21-day turnaround time will be required for analysis. Samples will be collected in the following way:

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 EP-SOP-06.10. This method is not applicable for VOC analysis (read note, below, for VOC sampling). After the samples are collected from the smaller container, the residual cuttings may be placed into the pit with the rest of the cuttings produced during drilling.

VOC samples 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; volatile organic compounds (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 any spills of petroleum based products occurred during the project. 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-SOP-5181, *Notebook and Logbook Documentation for Environmental Directorate Technical and 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 stored in lined pits within the project-controlled area at the well, pending review of analytical results to determine final waste characterization. Specifications for the cuttings pit will be in accordance with the approved Storm Water Pollution Prevention Plan. Based upon validated analytical data, the drill cuttings will be evaluated, using the Automated Waste Determination (AWD) system, for land application in accordance with WM-PROG-QP-011, *Land Application of Drill Cuttings*. If the cuttings meet the criteria for land application, the pit liner will be removed and managed as contact waste and the drill cuttings will be land applied in accordance with WM-PROG-QP-011. If the analytical data and due diligence documentation show that the cuttings are hazardous wastes (i.e., contain constituents from a listed source), which is not anticipated, but meet all of the other land application criteria, they will be left in the pit pending approval of a "contained in" from the NMED for the potentially listed constituents. WM-PROG must be notified on or before day 70 of the need for a "contained in" request so that approval may be obtained from NMED.

If the cuttings are characterized as LLW (exceeding the land application criteria) they will be removed from the pit, containerized, and 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 they will be containerized (with a start date equal to the date the cuttings were containerized) and managed in a less than 90-Day Storage Area until they 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 # 3 – 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 drilling; mixing with groundwater may occur if water bearing formations are encountered. Drilling fluids may or may not contain drilling additives. It is estimated that a total of 5000 gallons of drilling fluids will be generated for this well.

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

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 45 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 21-day turnaround time will be required for analysis. Samples will be collected in the following way:

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 EP-DIV-SOP-20014 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.

VOC and SVOC samples will be taken at three stages: 1) A sample must be collected upon initial placement of the fluids 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 fluids 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; volatile organic compounds (VOCs); semi-volatile organic compounds (SVOCs); oil/grease; Total Suspended Solids (TSS); pH; explosive compounds; 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 any spills of petroleum based products occurred during the project. 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-SOP-5181, *Notebook and Logbook Documentation for Environmental Directorate Technical and 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*:** Drilling fluids will initially be stored in lined pits within the project-controlled area at the well, pending review of analytical results to determine final waste characterization. Specifications for the pit will be in accordance with the approved Storm Water Pollution Prevention Plan. Based upon validated analytical data, the drilling fluids will be evaluated, using the AWD system, for land application in accordance with ENV-QP-010, *Land Application of Groundwater*. If the drilling fluids meet the criteria for land application, the pit liner will be removed and managed as contact waste and the drilling fluids will be land applied in accordance with ENV-QP-010. If the analytical data and due diligence documentation show that the drilling fluids are hazardous wastes (i.e., contain constituents from a listed source), which is not anticipated, but meet all of the other land application criteria, they will be left in the pit pending approval of a "contained in" from the NMED for the potentially listed constituents. WM-PROG must be notified on or before day 70 of the need for a "contained in" request so that approval may be obtained from NMED.

If the drilling fluids are characterized as LLW (exceeding the land application criteria) they will be removed from the pit, containerized, and managed in a radioactive waste staging or storage area until they can be shipped for disposal. If the drilling fluids are characterized as Hazardous or MLLW they will be containerized (with a start date equal to the date the fluids were containerized) and managed in a less than 90-Day Storage Area until they can be shipped for disposal. Any drilling fluids 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.

Alternatively, if the drilling fluids are characterized as non-hazardous, but cannot be land applied, the fluids may be evaporated.

Waste # 4 – Development/Purge Water: This waste stream is comprised of groundwater generated during development of the well and aquifer testing. The anticipated volume of development water that will be generated is approximately 80,000 gallons for this well.

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

Characterization Approach: Development 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 45 days of waste generation. A 21-day turnaround time will be required for analysis. Samples will be collected in the following way:

Collect an aliquot of development water as it is generated (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 EP-DIV-SOP-20014 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.

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; volatile organic compounds (VOCs); semi-volatile organic compounds (SVOCs); oil/grease; Total Suspended Solids (TSS); pH; explosive compounds; 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. 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-SOP-5181, *Notebook and Logbook Documentation for Environmental Directorate Technical and 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*:** Development water will be containerized at the point of generation and initially managed non-hazardous/non-radioactive. Based upon validated analytical data, the development water will be evaluated, using the AWD system, for land application in accordance with ENV-QP-010. If the development water meets the criteria for land application it will be land applied in accordance with ENV -QP-010. If the analytical data and due diligence documentation show that the development water is hazardous wastes (i.e., contain constituents from a listed source), which is not anticipated, but meet all of the other land application criteria, they will be managed as non-hazardous/non-radioactive pending approval of a "contained in" from the NMED for the potentially listed constituents. WM-PROG must be notified on or before day 70 of the need for a "contained in" request so that approval may be obtained from NMED.

If the development water is characterized as LLW (exceeding the land application criteria) it will be managed in a radioactive waste staging or storage area it can be shipped for disposal. If the development 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. Any development water 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 # 5 – Decontamination Fluids: This waste stream consists of liquid wastes (e.g., water, water & Alconox) generated from the decontamination of excavation, sampling, and drilling equipment. 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 13, 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 drill rigs, augers, and other equipment using water/steam typically results in a waste stream that is comprised of both solids and liquids. The solids are addressed as Waste #7 and must be segregated (within reason) from the bulk decontamination water so that the Total Suspended Solids (TSSs) do not exceed the RLWTF WAC of 10,000 mg/L (*P930-1, Attachment 13;* 1.5).

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

Characterization Approach: Decontamination fluids will be characterized based upon the AK of the media with which it came into contact 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 EP-DIV-SOP-20014, *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 45 days of generation and wastes disposed within 90 days, if necessary. All samples will be submitted with a 21-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; volatile organic compounds (VOCs); semi-volatile organic compounds (SVOCs); oil/grease; Total Suspended Solids (TSS); pH; explosive compounds; 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-SOP-5181, *Notebook and Logbook Documentation for Environmental Directorate Technical and 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*:** Decontamination water will be containerized and initially managed as nonhazardous waste. Decontamination water from different sources (i.e., down hole equipment, rinsing a frac tank, drilling equipment/materials prior to use) must be segregated into different containers and analyzed separately. If the analytical data and due diligence documentation show that the decontamination water is a hazardous waste (i.e., contain constituents from a listed source), which is not anticipated, they will continue to be managed as non-hazardous/non-radioactive pending approval of a "contained in" from the NMED for the potentially listed constituents. WM-PROG must be notified on or before day 70 of the need for a "contained in" request so that approval may be obtained from NMED. If the decontamination water was derived from the decontamination of drilling equipment/materials prior to use at LANL and it is found to contain chemicals that are potentially K-listed only, a due diligence does not have to be prepared. In lieu of addressing the K-listed chemicals, the following statement must be included on the Waste Profile Form (WPF):

> "Most K-listed sources are industrial in nature and not typical of Laboratory operations. The Laboratory generates only small amounts of K-listed wastes, primarily spent carbon from high explosives processing that is disposed off-site. The documents amounts of K-listed wastes generated are not sufficient to have impacted well drilling and sampling operations. Therefore, the IDW is not K-listed."

If the decontamination water is characterized as Hazardous (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 facility if WAC requirements are met. If the waste cannot be disposed of at the SWWS facility, due to operational limitations or inability to meet the WAC, it will be sent to an authorized off-site facility for treatment and/or disposal.

Waste # 6 – Storm water: This waste stream is comprised of storm water for discharge and/or potentially contaminated storm water (i.e., tainted with petroleum or non-hazardous glycol based lubricants) collected within a secondary containment unit. It is estimated that approximately 500 gallons of storm water will be generated.

NOTE #1: Storm water collected in a secondary containment typically results in a waste stream that is comprised of both solids and liquids. The solids are addressed as Waste #7 and must be segregated (within reason) from storm water that cannot be discharged (is a waste) before it is containerized so that the Total Suspended Solids (TSSs) do not exceed the RLWTF WAC of 10,000 mg/L (*P930-1, Attachment 1;* 1.5).

Anticipated Regulatory Status: Reusable (released under ENV-CP policy), Used Oil for Recycle (Oily Water), Hazardous, Industrial, or SWWS

Characterization Approach: Storm water will be characterized based on the AK from the MSDS of the contaminant (e.g., hydraulic fluid) or by direct sampling. Samples, if needed, 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 45 days of generation and wastes dispositioned within 90 days, if necessary. All samples will be submitted with a 30-day turnaround time for analyses. Samples will be analyzed for TAL metals; VOCs; SVOCs; oil/grease; TSS; pH; PCB; cyanide; nitrates/nitrites; perchlorates; fluorine, chlorine, sulfate, COD, biological oxygen demand (BOD), TPH, and pesticides/herbicides.

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 #2: The criteria for recycling oil, used oil, and coolant is as follows:

- Acceptable Oil, used Oil, and Coolant
  - Used and unused petroleum oils
  - Oil filters for non-prohibited oils
  - Non-hazardous glycol-based coolants (antifreeze)
  - Oily water
  - Used and unused synthetic oils
  - Non-hazardous used oil adsorbents
  - Mineral oil
- Unacceptable Oil, Used Oil, and Coolant
  - Oil with >1000 ppm halogens (oils mixed with solvents)
  - Freon-contaminated oil
  - Oils containing chlorinated compounds
  - Degreasers containing chlorinated compounds
  - Radiation-contamination oils
  - Any oil containing >2ppm PCB
  - Hazardous glycol-based coolants (fails TCLP for Se or Pb)
  - Vegetable and other food oils

***Storage and Disposal Method*:** Potentially contaminated storm water will be managed in accordance with the requirements in 20-6-2-1201, NMAC of the New Mexico Water Quality control Commission (NMWQCC) Regulations; 40 CF 112, Oil Pollution Prevention Regulations (SPPC Plan): 40 CFR122, Construction General Permit Regulations, and applicable SWPPP requirements. To determine if storm water discharges from secondary containment systems are permitted on LANL property under LANL's discharge policy, the following steps are mandatory:

1. Check for oil sheen. If oil sheen exists, contact Jake Meadows, at 606-0185, for handling requirements.
2. Check pH. The pH must be between 6 and 9.
3. Notify ENV-CP (Jake Meadows 606-0185) prior to proposed discharge.
4. If discharge is not granted by ENV-CP, the contaminated storm water must be containerized and managed as waste.

Contaminated storm water that cannot be discharged will be containerized at the point of generation and managed in accordance with the regulatory classification of the waste and disposed of at an authorized treatment, storage, disposal facility.

For unintentional release or discharges of potentially contaminated storm water to the environment, the following actions must be taken:

1. Document the volume of waste released; time, date, and location of the discharge; and other conditions on the Liquid Discharge Form (see Attachment 1).
2. Submit the Liquid Discharge Form to Jacob Meadow via FAX to 505-665-9344.
3. Document the discharge in the SPCC Plan or SWPP, when applicable.

Waste # 7 – Residual Solids from Secondary Containments: This waste stream is comprised of residual solids segregated during the containerization of storm water and decontamination fluids that have been removed from secondary containments. It is estimated that approximately 1 yd^3 of residual solids may be generated.

NOTE #4: Residual solids cannot be collected and added to the drill cuttings/fluids pit. They must be containerized, segregated, and managed as waste.

Anticipated Regulatory Status: LLW, MLLW, Hazardous, Industrial

Characterization Approach: Residual solids will be characterized based upon the AK of the media (i.e., cuttings, decontamination water, storm water) with which it came into contact and/or using the analytical results obtained from direct sampling. Samples, if needed, will be collected in accordance with LANL SOP-06-10, *Hand Auger and Thin-Wall Tube Sampler* and analyzed for TAL metals; radionuclides (by alpha and gamma spectroscopy); isotopic uranium, isotopic plutonium, americium-241, tritium, and strontium-90; volatile organic compounds (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 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: Residual solids will be containerized at the point of generation and managed as non-hazardous/non-radiological pending review of AK and/or analytical results to determine final waste characterization. Residual solids from different sources (i.e., decontamination, storm water) must be segregated into different containers and analyzed separately. If the analytical data and due diligence documentation show that the residual solids are a hazardous waste (i.e., contain constituents from a listed source), they will continue to be managed as non-hazardous/non-radioactive pending approval of a "contained in" from the NMED for the potentially listed constituents. WM-PROG must be notified on or before day 70 of the need for a "contained in" request so that approval may be obtained from NMED.

If the residual solids are characterized as Hazardous (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 # 8 – Drilled Out Concrete, Chips, Concrete Slurry: This waste stream consists of concrete chips from drilling out a plug used to seal off perched groundwater or stabilized the borehole to facilitate drilling. It is estimated that 80 yd^3 of drilled out concrete chips or concrete slurry may be generated.

Anticipated Regulatory Status: Reusable (released under ENV-CP policy), Industrial

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.

Storage and Disposal Method: Concrete waste will be containerized at the point of generation and managed as non-hazardous/non-radiological pending review of AK and/or analytical results (of associated media) to determine final waste characterization. If the concrete waste is not contaminated, it may be sent to the county landfill for reuse with an ENV-CP 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 # 9 – Residual Concrete Washout: This waste stream is comprised of residual cement generated from the evaporation of concrete wash out water. It is estimated that 4 yd^3 of residual concrete may be generated.

Anticipated Regulatory Status: Reusable (released under ENV-CP policy), Industrial

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.

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-CP 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 # 10 – 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 1yd^3 of this waste stream will be generated.

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

Characterization Approach: If the material spilled is known and the spill occurs on clean base course, AK along with direct sampling for TPH-DRO, TPH-GRO, and BTEX 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.*

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. 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. 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 45 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 NMSW 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 # 11 – 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 8 yd^3 of MSW will be generated.

Anticipated Regulatory Status: MSW

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. If this waste is stored in roll-off bins, these bins will be covered with a tarp and inspected to make sure no rain water enters the bin.

TABLE 1- CHARACTERIZATION TABLE

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

Waste Description	Waste # 1 Contact Waste	Waste # 2 Drill Cuttings	Waste # 3 Drilling Fluids	Waste # 4 Development Water
Estimated Volume	25-yd^3 (includes liner)	90-yd^3	5,000-gallons	80,000-gallons
Packaging	Drums/Roll Offs	Lined Pit/Drums/Roll Offs	Lined Pit/Drums/Tanks	Frac Tanks/Drums
Regulatory classification:				
Radioactive Waste	X	X	X	X
Reusable Material		X (Land Applied)	X (Land Applied)	X (Land Applied)
Municipal Solid Waste (MSW)	X			
Waste destined for LANL's SWWS or RLWTF [1]			X	X
Hazardous Waste	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
Characterization Method				
Acceptable knowledge (AK): Existing Data/Documentation	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	X
Asbestos				
BTEX (EPA-8021b)				
Total petroleum hydrocarbon (TPH)-GRO (EPA 8015-M) TPH-DRO (EPA 8015-M)		X (As needed)		
Toxicity characteristic leaching procedure (TCLP) Metals (EPA 1311/6010-B)		X (As needed)	X (As needed)	
TCLP Organics (EPA 1311/8260-B & 1311/8270-C)		X (As needed)	X (As needed)	
TCLP Pest. & Herb. (EPA 1311/8081-A/1311/8151-A)		X (As needed)	X (As needed)	
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 uranium (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
Waste Profile Form #	TBD	TBD	TBD	TBD

TABLE 1- CHARACTERIZATION TABLE (CONTINUED)

Waste Description	Waste #5 Decontamination Fluids	Waste #6 Storm Water	Waste #7 Residual Solids from Secondary Containments	Waste #8 Drilled Out Concrete, Chips, Concrete Slurry
Estimated Volume	500-gallons	500-gallons	1-yd^3	80-yd^3
Packaging	Drums/Tanks	Drums/Tanks	Drums	Drums/Roll Offs
Regulatory classification:				
Radioactive Waste	X		X	
Reusable Material		X (Released; Used Oil for Recycle)		X (with ENV-CP Approval)
Municipal Solid Waste (MSW)				
Waste destined for LANL's SWWS or RLWTF [1]	X	X		
Hazardous Waste	X	X	X	
Mixed (hazardous and radioactive) Waste	X		X	
Toxic Substances Control Act (TSCA)				
New Mexico Special Waste				
Industrial Waste	X	X	X	X
Characterization Method				
Acceptable knowledge (AK): Existing Data/Documentation	X	X	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		
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)	X			
Perchlorates (EPA 6850)	X	X	X	
High Explosives Constituents (EPA 8330/8321-A)	X	X		
Asbestos				
BTEX (EPA-8021b)				
Total petroleum hydrocarbon (TPH)-GRO (EPA 8015-M) TPH-DRO (EPA 8015-M)		X	X (As needed)	
Toxicity characteristic leaching procedure (TCLP) Metals (EPA 1311/6010-B)			X (As needed)	
TCLP Organics (EPA 1311/8260-B & 1311/8270-C)			X (As needed)	
TCLP Pest. & Herb. (EPA 1311/8081-A/1311/8151-A)			X (As needed)	
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 uranium (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	
Waste Profile Form #	TBD	TBD	TBD	TBD

TABLE 1- CHARACTERIZATION TABLE (CONTINUED)

Waste Description	Waste #9 Residual Concrete Washout	Waste #10 Petroleum Contaminated Soils (PCS)	Waste #11 Municipal Solid Waste (MSW)
Estimated Volume	4-yd^3	1-yd^3	8-yd^3
Packaging	Drums	Drums	Plastic Trash Bags/Trash Cans/Dumpsters
Regulatory classification:			
Radioactive Waste			
Reusable Material	X (with ENV-CP Approval)		
Municipal Solid Waste (MSW)			X
Waste destined for LANL's SWWS or RLWTF [1]			
Hazardous Waste		X	
Mixed (hazardous and radioactive) Waste			
Toxic Substances Control Act (TSCA)			
New Mexico Special Waste		X	
Industrial Waste	X	X	
Characterization Method			
Acceptable knowledge (AK): Existing Data/Documentation	X	X	X
AK: Site Characterization			
Direct Sampling of Waste		X	
Analytical Testing			
Volatile Organic Compounds (EPA 8260-B)		X (As needed)	
Semivolatile Organic Compounds (EPA 8270-C)		X (As needed)	
Organic Pesticides (EPA 8081-A)			
Organic Herbicides (EPA 8151-A)			
PCBs (EPA 8082)			
Total Metals (EPA 6010-B/7471-A)		X (As needed)	
Total Cyanide (EPA 9012-A)			
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) [2]			
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)[3]			
Perchlorates (EPA 6850)			
High Explosives Constituents (EPA 8330/8321-A)			
Asbestos			
BTEX (EPA-8021b)		X	
Total petroleum hydrocarbon (TPH)-GRO (EPA 8015-M) TPH-DRO (EPA 8015-M)		X	
Toxicity characteristic leaching procedure (TCLP) Metals (EPA 1311/6010-B)		X (As needed)	
TCLP Organics (EPA 1311/8260-B & 1311/8270-C)		X (As needed)	
TCLP Pest. & Herb. (EPA 1311/8081-A/1311/8151-A)			
Radium 226 & 228 (EPA 9320)		X (As needed)	
Gross Alpha (alpha counting) (EPA 900)		X (As needed)	
Gross Beta (beta counting) (EPA 900)		X (As needed)	
Tritium (liquid scintillation) (EPA 906.0)		X (As needed)	
Gamma spectroscopy (EPA 901.1)		X (As needed)	
Isotopic plutonium (Chem. Separation/alpha spec.) (HASL-300)		X (As needed)	
Isotopic uranium (Chem. Separation/alpha spec.) (HASL-300)		X (As needed)	
Total uranium (EPA 6020)		X (As needed)	
Strontium-90 (EPA 905)		X (As needed)	
Americium-241 (Chem. Separation/alpha spec.) (HASL-300)		X (As needed)	
Isotopic Thorium		X (As needed)	
Waste Profile Form #	TBD	TBD	TBD

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). Filtered metals and filtered Cyanide are required for land application, with the exception of mercury (hg).

2 TTO is the total of volatile organic and semi-volatile organic compound contaminants. Request methods EPA 8260-B (VOCs) and EPA 8270-C (SVOCs).
3 If Microtox analysis is not available, request BOD.

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-10021, *Characterization and Management of Environmental Program Waste*
- P-409, *Waste Management*
- P930-1, LANL Waste Acceptance Criteria
- P930-2, LANL Radioactive Waste Certification Program
- LA-UR-12-26098, *Drilling Work Plan for Regional Aquifer Well R-47 (EP2012-0254)*
- LA-UR-12-26784, *Drilling Work Plan for Regional Aquifer Well R-58 (EP2012-0271)*
- LA-UR-13-20150, *Drilling Work Plan for Regional Aquifer Well R-63i (EP2013-0015)*
- LA-UR-13-20779, *Drilling Work Plan for Well CdV-9-1(i) (EP2013-0007)*

Waste Characterization Strategy Form

Signatures	Date
Project Manager: Stephani Swickley	3/23/15
Waste Generator: Ron DeSotel	3.23.15
Waste Management Coordinator: Victor Garde FOR VICTOR GARDE	3.23.15
ENV-CP Representative: John Valdez	3/24/15
Waste Acceptance Representative: Andy Elicio	03/23/2015
	Los Alamos National Laboratory EP

Attachment #1: AK-Review: SIMR-2

Due Diligence for Sandia Watershed

February 2011
Revision 0

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The due diligence process serves as a good faith effort to determine if the analytes of concern detected in waste samples originated from a potentially listed hazardous waste source. It consists of reviewing historical and site investigation documentation, evaluating chemical data, assessing chemical and physical properties, and assessing chemical tracking systems for use, storage, and spills of chemicals. The following document presents the due diligence review for the Sandia Canyon Watershed. It includes evaluation of groundwater sample data collected from December 2007 through June 2010 from the following:

- SCA-1
- SCA-1-DP
- SCA-2
- SCA-4
- SCA-5
- SCI-1
- SCI-2
- R-35a
- R-35b
- R-36
- R-12, Screen 1
- R-12, Screen 2
- R-12, Screen 3
- R-10, Screen 1
- R-10, Screen 2
- R-10a
- R-11
- R-43, Screen 1
- R-43, Screen 2

The chemicals detected at these sites that can potentially carry listed Resource Conservation and Recovery Act (RCRA) hazardous waste codes include:

- Aldrin
- Arsenic
- Bis(2-ethylhexyl)phthalate
- Bromomethane
- Carbon Disulfide
- Chloroform
- Chloromethane
- Chromium
- Chromium VI
- Cyanide (Total)
- Heptachlorodibenzodioxin[1,2,3,4,6,7,8-]
- Heptachlorodibenzofuran[1,2,3,4,6,7,8-]
- Heptachlorodibenzodioxin (Total)
- Heptachlorodibenzofuran (Total)
- Hexachlorodibenzodioxins (Total)
- Mercury
- Methylene Chloride
- Naphthalene
- Nickel
- Octachlorodibenzodioxin[1,2,3,4,6,7,8,9-]
- Octachlorodibenzofuran[1,2,3,4,6,7,8,9-]
- Toluene

The conclusion of this due diligence is that there are not any potential listed sources for the above chemicals detected in the groundwater associated with the Sandia Canyon Watershed. If the wastes generated at these sites are not otherwise listed or characteristic, they should be managed as non-hazardous.

1.0 INTRODUCTION

This document presents the due diligence review for potentially listed chemicals detected in the groundwater monitoring wells located in the Sandia Canyon Watershed (Figure 1) at Los Alamos National Laboratory (LANL or the Laboratory). It includes evaluation of samples collected during ongoing groundwater monitoring events from December 2007 through June 2010, as reported in the LANL Water Quality Data Base (WQDB). The technical areas reviewed were; TA-03, TA-20, TA-53, TA-60, TA-61, and TA-72. There are approximately 272 SWMUs and AOCs are within these TAs that vary from industrial outfalls to open-detonation firing sites.

The Sandia Canyon Watershed is located within the central part of the Laboratory. Sandia Canyon heads on Laboratory property within TA-03 at an elevation of approximately 7300 ft (2225 m) and trends east-southeast across the Laboratory, Bandelier National Monument, and San Ildefonso Pueblo. Sandia Canyon merges with the Rio Grande in White Rock Canyon at an elevation of 5450 ft (1661 m). The area of the Sandia Watershed is approximately 5.5 mi^2 (14.2 km^2). Perennial stream flow and saturated alluvial aquifer conditions occur in the upper and middle portions of the canyon system because of sanitary wastewater and cooling-tower discharges to the canyon from operating facilities. A wetland of approximately 7 acres has developed as a result of the wastewater and cooling-tower discharges.

There are twenty-one surface, alluvial, intermediate, and regional water sample locations associated with the Sandia Canyon Watershed and shown on Figure 1. Quarterly sampling is conducted in compliance with the annual revision of the Interim Facility-Wide Groundwater Monitoring Plan (IFWGWMP). This due diligence review will be used as a basis for the management of wastes generated during sampling, maintenance and/or rehabilitation of the wells within the Sandia Canyon Watershed. The waste generated during sampling of the baseflow in Sandia Canyon is addressed in a separate due diligence. As new groundwater analytical data become available they will be reviewed and the findings of this review revised, as appropriate.

The chemicals detected that can potentially carry Resource Conservation and Recovery Act (RCRA) waste codes are listed in Table 1. The processes associated with those codes are provided in Attachment A.

2.0 DATA REVIEW

2.1 Eliminated K-Listed Codes

Most K-listed sources are industrial in nature and not typical of Laboratory operations. The Laboratory generates only small amounts of K-listed wastes, primarily spent carbon from high explosives processing that is disposed off-site. None of the K code listings in Table 1 are due to spent carbon from a high explosives processing source. The documented amounts of K-listed wastes generated are not sufficient to have impacted well drilling and sampling operations, therefore, waste from the Sandia Canyon Watershed is not K-listed.

Table 1
Potential RCRA Waste Codes for Reviewed Chemicals

Analyte	Maximum Concentration	Qualifier	Units	Sample ID	Location name	U/P Code	F/K Code
Aldrin	0.0175	J-	ug/L	CASA-09-501	SCI-2	P004	NA
Arsenic	15.7	J	ug/L	CASA-08-7356	SCA-4	NA	F032,F034,F035 K031,K060,K161,K171,K172,K176,K084,K101,K102
Bis(2-ethylhexyl)phthalate	59.1	NQ	ug/L	CASA-08-12884	R-36	U028	NA
Bromomethane	23.6	NQ	ug/L	CASA-08-12884	R-36	U029	NA
Carbon Disulfide	2.91	J	ug/L	CASA-09-8309	R-35b	P022	F005
Chloroform	0.742	J	ug/L	CASA-08-12858	SCI-1	U044	F024,F025 K009,K010,K019,K020,K021,K029,K073,K116,K149, K150,K151,K158
Chloromethane	1.86	NQ	ug/L	CASA-08-12884	R-36	U045	F024,F025 K009,K010,K149,K150,K157
Chromium	658	NQ	ug/L	CASA-09-8315	SCI-2	NA	F032,F034,F035,F037,F038 K090
Chromium VI	0.66	NQ	mg/L	CASA-09-504	SCI-2	NA	F006,F019 K002,K003,K005,K048,K049,K051,K061,K062,K069, K086,K100,K004,K006,K007,K008,K050
Cyanide (Total)	7.98	NQ	ug/L	CASA-09-2991	SCI-2	NA	F006,F007,F008,F009,F010,F011,F012,F019 K007,K011,K013,K060,K088
Heptachlorodibenzodioxin [1,2,3,4,6,7,8-]	28.6	J	pg/L	CASA-09-10367	SCI-2	NA	F032 K174
Heptachlorodibenzodioxins (Total)	55.4	NQ	pg/L	CASA-09-10367	SCI-2	NA	F032 K174
Heptachlorodibenzofuran [1,2,3,4,6,7,8-]	0.522	J	pg/L	CASA-10-3861	R-43,Port2	NA	F032 K174
Heptachlorodibenzofurans (Total)	0.522	NQ	pg/L	CASA-10-3861	R-43,Port2	NA	F032 K174
Hexachlorodibenzodioxins (Total)	14.2	NQ	pg/L	CASA-09-10367	SCI-2	NA	F021, F022, F026, F027, F028, F032 K174
Mercury	0.0000862	NQ	mg/L	CASA-08-14846	R-12,Port1	U151	K175, K071, K106

Table 1 (continued)
Potential RCRA Waste Codes for Reviewed Chemicals

Analyte	Maximum Concentration	Qualifier	Units	Sample ID	Location name	U/P Code	F/K Code
Methylene Chloride	2.93	J	ug/L	CASA-08-7347	R-10, Port1	U080	F001, F002,F024, F025 K009,K010,K156,K157,K158
Naphthalene	1.52	NQ	ug/L	CASA-08-12858	SCI-1	U165	F024,F025,F034, K001,K035,K087,K145,K060
Nickel	19.4	NQ	ug/L	CASA-10-3653	SCA-5	NA	F006
Octachlorodibenzodioxin [1,2,3,4,6,7,8,9-]	74.7	NQ	pg/L	CASA-09-10367	SCI-2	NA	K174
Octachlorodibenzofuran [1,2,3,4,6,7,8,9-]	0.913	J	pg/L	CASA-10-3861	R-43,Port2	NA	K174
Toluene	11.2	NQ	ug/L	CASA-08-12884	R-36	U220	F005 K015,K036,K037,K149,K151

[1] contaminants are included only if they exceed regional groundwater background concentrations.
NA = not applicable

2.2 Eliminated P-Listed Codes

P-listed codes are typically associated with chemical production and assigned only when the source is a discarded commercial chemical product, off-specification chemical product, container residue, and/or spill residue. The following P-codes have been eliminated from this due diligence because there is no documentation that these chemicals were made or disposed of at the Technical Areas associated with the Sandia Canyon Watershed.

- **Aldrin** was detected in the October 2008 purge water sample (CASA-09-501) from well SCI-2, at a maximum concentration of 0.0175 ug/L. Aldrin is no longer produced or used in the United States and any past releases have probably been converted to dieldrin. Aldrin was used mainly against soil insects. It has also been effective against termites and was used for wood preservation against insect infestation. Wastes containing Aldrin are listed as P004 only if the source is a discarded commercial chemical product, off-specification chemical product, container residue, and/or spill residue. The extremely low level of Aldrin detected is likely due to the use of insecticide in the areas surrounding SCI-2. This constitutes use of a consumer product for its intended purpose and the P004 listing is not applicable.

- **Carbon Disulfide** was detected in the April 2009 purge water sample (CASA-09-8309) from well R-35b, at a concentration of 2.91 ug/L. Carbon disulfide may be used at the Laboratory as a solvent or as a metal treating and plating chemical. It can also be emitted with many other volatiles in small amounts from hot mix asphalt plants, such as the one formerly located on the west side of Sandia Canyon. Waste containing carbon disulfide is listed as P022 only if the source is a discarded commercial chemical product, off-specification chemical product, container residue, and or spill residue. The low concentration of carbon disulfide detected is likely due to runoff associated with asphalt on the mesa tops surrounding Sandia Canyon. This constitutes use of a consumer product for its intended purpose and the P022 listing is not applicable.

2.3 Eliminated F- Listed Codes

Several potential F-listings for the chemicals listed in Table 1 would be applied only if the source were wastes from the following sources:

- production and manufacturing of tri-, tetra- or pentachlorophenol, or tetra-, penta- or hexachlorobenzene (F021, F022, F023, F026, F027, F028)
- aliphatic hydrocarbon production (F024, F025)
- wood preserving (F032, F034, F035)
- Petroleum refining (F037, F038)

There is no documented evidence that any of the above processes were used in the vicinity of the wells, springs, or baseflow within the Sandia Watershed. Therefore, these F-listings would not be applicable.

2.4 Chemicals/Listed Codes for Due Diligence

The following chemicals and listed hazardous waste codes are applicable for due diligence to determine if potential sources exist within the Sandia Watershed:

- **Bis(2-ethylhexyl)phthalate [U028]** was detected in the May 2008 purge water sample (CASA-08-12884) from well R-36, at a concentration of 59.1 ug/L. The U028 code is applicable only if the source is due to the disposal or spill of an unused chemical with Bis(2-ethylhexyl)phthalate as the sole active ingredient.

- **Bromomethane [U029]** was detected in the May 2008 purge water sample (CASA-08-12884) from well R-36, at a concentration of 23.6 ug/L. The U029 code is applicable only if the source is due to the disposal or spill of an unused chemical with bromomethane as the sole active ingredient.

- **Carbon Disulfide [F005]** was detected in the April 2009 purge water sample (CASA-09-8309) from well R-35b, at a concentration of 2.91 ug/L. The F005 code is applicable only if the source is the disposal and/or spill a spent solvent mixture/blend containing, before use, a total of ten percent or more (by volume) of one or more specific non-halogenated solvents required by the code.

- **Chloroform [U044]** was detected in the June 2008 purge water sample (CASA-08-12858) from well SCI-1, at a concentration of 0.742 ug/L. The U044 code is applicable only if the source is due to the disposal or spill of an unused chemical with chloroform as the sole active ingredient.

- **Chloromethane [U045]** was detected in the May 2008 purge water sample (CASA-08-12884) from well R-36, at a concentration of 1.86 ug/L. The U045 code is applicable only if the source is due to the disposal or spill of an unused chemical with chloromethane as the sole active ingredient.

- **Chromium VI [F006, F019]** was detected in the October 2008 purge water sample (CASA-09-504) from well SCI-2, at a concentration of 0.66 mg/L. The F006 and F019 codes are applicable only if the source is determined to be the disposal or spill of wastewater treatment sludges from electroplating operations or the chemical conversion coating of aluminum, respectively.

- **Cyanide (Total) [F006, F007, F008, F009, F010, F011, F012, F019]** was detected in the February 2009 purge water sample (CASA-09-2991) from well SCI-2, at a concentration of 7.98 ug/L. The F006, F007, F008, F009, F010, F011, F012 and F019 codes are applicable only if the source is determined to be the disposal or spill of wastewater treatment sludges from electroplating operations [F006]; spent cyanide plating bath solutions [F007], plating bath residues [F008], or spent stripping and cleaning bath solutions [F009] from electroplating operations; quenching bath residues from oil baths [F010], spent cyanide solutions from salt bath pot cleaning [F011], or quenching waste water treatment sludges from metal heat treating operations; and quenching baths or the chemical conversion coating of aluminum [F019].

- **Mercury [U151]** was detected in the August 2008 purge water sample (CASA-08-14846) from well R-12, Port1 at a concentration of 0.0000862 mg/L. The U151 code is applicable only if the source is due to the disposal or spill of an unused chemical with mercury as the sole active ingredient.

- **Methylene Chloride [F001, F002, U080]** was detected in the November 2007 purge water sample (CASA-08-7347) from well R-10, Port1, at a concentration of 2.93 ug/L. The U080 code is applicable only if the source is due to the disposal or spill of an unused chemical with methylene chloride as the sole active ingredient. The F001 and F002 codes are applicable only if the source is the disposal and/or spill a spent solvent mixture/blend containing, before use, a total of ten percent or more (by volume) of one or more specific halogenated solvents required by the code.

- **Naphthalene [U165]** was detected in the June 2008 purge water sample (CASA-08-12858) from well SCI-1, at a concentration of 1.52 ug/L. The U165 code is applicable only if the source is due to the disposal or spill of an unused chemical with naphthalene as the sole active ingredient.

- **Nickel [F006]** was detected in the November 2009 purge water sample (CASA-10-3653) from well SCA-5, at a concentration of 19.4 ug/L. The F006 code is applicable only if the source is determined to be the disposal or spill of wastewater treatment sludges from electroplating operations.

- **Toluene [F005, U220]** was detected in the May 2008 purge water sample (CASA-08-12884) from well R-36, at a concentration of 11.2 ug/L. The U220 code is applicable only if the source is due to the disposal or spill of an unused chemical with toluene as the sole active ingredient. The F005 codes is applicable only if the source is the disposal and/or spill a spent solvent mixture/blend containing, before use, a total of ten percent or more (by volume) of one or more specific non-halogenated solvents required by the code.

The bullets above identify the location within the Sandia Watershed where the maximum concentration of the chemical was detected. Attachment B provides a table with all detections of each chemical across the Sandia Watershed.

3.0 SOURCE TERM REVIEW

This source term review includes examining applicable LANL work plans and historical and RCRA Facility Investigation (RFI) reports, as well as the LANL Environmental Remediation and Surveillance Services (ERSS) PRS database, to identify possible listed sources of contamination that may have affected Sandia Watershed.

3.1 General Sources

Bis(2-ethylhexyl)phthalate [U028]

Bis(2-ethylhexyl)phthalate is used as plasticizers in the formulations of many plastic and rubber compounds. They are also present in oils, soaps and many other products. Bis(2-ethylhexyl)phthalate is also found in plastic components used in explosive devices. Contact with plastic sampling equipment (i.e. plastic liners, poly tanks, plastic scoops,

tubing, nitrile gloves, etc.) and leaching of these materials in samples commonly results in the low level concentrations observed in analytical results.

Bromomethane [U029]

Bromomethane was used extensively as a pesticide until the early 2000s and was widely applied as a soil sterilant. It was also used in specialty fire extinguishers, prior to the advent of less toxic halons, as it is electrically non-conductive and leaves no residue. It was used primarily for electrical substations, military aircraft, and other industrial hazards.

Carbon Disulfide [F005]

Carbon disulfide is used frequently as a building block in organic chemistry as well as an industrial and chemical non-polar solvent. Small amounts of carbon disulfide are released by volcanic eruptions and marshes. It is used for fumigation in airtight storage warehouses, airtight flat storages, bins, grain elevators, railroad box cars, ship holds, barges and cereal mills. It is also used as an insecticide for the fumigation of grains, nursery stock, in fresh fruit conservation and as a soil disinfectant against insects and nematodes. It is also a solvent for phosphorus, sulfur, selenium, bromine, iodine, fats, resins and rubber. The principal industrial uses of carbon disulfide are the manufacture of viscose rayon, cellophane film, carbon tetrachloride and xanthogenates and electronic vacuum tube. It is also used in the manufacture of bamboo fiber.
It can be emitted with many other volatiles in small amounts from hot mix asphalt plants, such as the one formerly located on the west side of Sandia Canyon.

Chloroform [U044]

Chloroform has a variety of uses. It is widely produced as a precursor to Teflon and produced for refrigerants. It is used as a common laboratory solvent, an adhesive, and for producing dyes and pesticides. It is also used as a reagent in organic synthesis, as an anesthetic, and for veterinary use.

Chloromethane [U045]

Chloromethane was once widely used as a refrigerant. It was also used for producing lead-based gasoline additives as well as other applications in a variety of other fields: from process wastes, extrants, blowing agents, local anesthetic, polymerizers and herbicides. Chloromethane may have been used at the Laboratory as a solvent or a fluid for thermometric and thermostatic equipment. It is also possible that chloromethane was used as a chlorinating agent in organic chemistry or as an extractant for greases, oils and resins. There is no documentation that chloromethane was used for these purposes at the Laboratory. Chloromethane also occurs naturally and is released to the environment from natural sources such as the chemical reactions that occur in the oceans or when materials like grass, wood, charcoal, and coal are burned.

Chromium VI [F006, F019]

Chromium VI is used for the production of stainless steel, textile dyes, wood preservation, leather tanning, and as anti-corrosion and conversion coatings.

Cyanide (Total) [F006, F007, F008, F009, F010, F011, F012, F019]

Cyanide is mainly produced for the mining of gold and silver to help dissolve these metals and their ores. It is also used in electroplating processes; heat treating operations; chemical conversion coating of aluminum, medical applications (to measure ketone bodies in urine, rapid decrease in blood pressure), as a finishing agent for bronze sculptures, in jewelry-making, certain kinds of photography, as insecticides for fumigating ships, killing ants, and as rat poison.

Cyanide is very stable when combined with iron to form ferrocyanides (i.e., sodium ferrocyanide, potassium ferrocyanide and calcium ferrocyanide). These compounds do not readily decompose to lethal levels in the human body so they can be used in the food industry as an anti-caking agent (e.g., table salt). This also makes them usable for environmental applications such as fire retardants (potassium ferrocyanide) to prevent caking or hardening and to protect the tanks on slurry bombers from corrosion.

Mercury [U151]

Mercury is a rare metal that can carry hazardous waste codes when disposed of as a pure, unused chemical; as brine purification muds or as wastewater treatment sludge from the mercury cell process in chlorine production; or as baghouse filters from the production of antimony oxide. Mercury metal has many uses. Because of its high density, it is used in barometers and manometers. It is extensively used in thermometers, thanks to its high rate of thermal expansion that is fairly constant over a wide temperature range. Industry uses mercury metal as a liquid electrode in the manufacture of chlorine and sodium hydroxide by electrolysis of brine. Mercury is still used in some electrical gear, such as switches and rectifiers, which need to be reliable, and for industrial catalysis. Mercury compounds have many uses. Calomel (mercurous chloride, Hg_2Cl_2) is used as a standard in electrochemical measurements and in medicine as a purgative. Mercuric chloride (corrosive sublimate, $HgCl_2$) is used as an insecticide, in rat poison, and as a disinfectant. Mercuric oxide is used in skin ointments. Mercuric sulphate is used as a catalyst in organic chemistry. Vermilion, a red pigment, is mercuric sulphide; another crystalline form of the sulphide (also used as a pigment) is black. Mercury fulminate, $Hg(CNO)_2$, is used as a detonator.

Mercury enters the environment as a result of normal breakdown of minerals in rocks and soil through exposure to wind and water. Release of mercury from natural sources has remained fairly the same over the years. Most of the mercury released from human activities is released into air, through fossil fuel combustion, mining, smelting and solid waste combustion. Some forms of human activity release mercury directly into soil or water, for instance the application of agricultural fertilizers and industrial wastewater disposal. All mercury that is released in the environment will eventually end up in soils or surface waters.

Methylene Chloride [F001, F002, U080]

Methylene chloride is a highly volatile chemical with the ability to dissolve a wide range of organic compounds. It is widely used as a paint stripper and a degreaser. In the food industry it has been used to decaffeinate coffee and teas as well as to prepare extracts of hops and other flavorings. Its volatility has led to its use as an aerosol spray

propellant and as a blowing agent for polyurethane foams. Methylene chloride chemically welds certain plastics and is often sold as a main component of plastic welding adhesives. It is also used to separate the binder from the aggregate of an asphalt or macadam to allow for the testing of the materials.

Naphthalene [U165]

Naphthalene is best known as the traditional, primary ingredient of mothballs. The largest use of naphthalene is the industrial production of phthalic anhydride. It is also used as a precursor to surfactants, insecticides, and some low volatility solvents. It is also used in dyes, pigments, rubber processing, pharmaceuticals, plasticizers/dispersants, and tanning agents.

Nickel [F006]

Nickel is used extensively for making stainless-steel and other corrosion-resistant alloys. It is also used extensively in coinage and is frequently added to glass to give a green color. Nickel plating is often used to provide a protective coating for other metals, and finely divided nickel is a catalyst for hydrogenating vegetable oils. It is also used in ceramics, magnets, and batteries.

Toluene [F005, U220]

Toluene is as a mixture added to gasoline to improve octane ratings. Toluene is also used to produce benzene and as a solvent in paints, coatings, synthetic fragrances, adhesives, inks, and cleaning agents; in the production of polymers used to make nylon, plastic soda bottles, and polyurethanes; and for pharmaceuticals, dyes, cosmetic nail products, and the synthesis of organic chemicals. Toluene may also be used as chemical intermediates in laboratory reactions, including condensation, halogenation, ammonolysis, and oxidation

3.2 LANL General Sources

3.2.1 Cerro Grande Fire

In May 2000, the Cerro Grande Fire destroyed 232 homes in Los Alamos and burned approximately 48,000 acres of Los Alamos, San Ildefonso Pueblo, Santa Clara Pueblo, and Santa Fe National Forest. Much of the mountainside draining onto the Los Alamos area was severely burned resulting in increased storm water runoff and transport of contaminants by runoff into the canyons traversing LANL. Not all of these contaminants were due to operations at LANL. Some appear to be associated with combustion products and/or the fire retardants used to fight the fire. This includes the following list of VOCs, SVOCs, and PAHs:

- Benzoic acid
- Benzyl Alcohol
- 4-Methylphenol (p-cresol)
- Pyridine
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(g,h,I)perylene

- Chrysene
- Fluoranthene
- Naphthalene
- Phenanthrene
- Pyrene
- Summed 2,3,7,8-TCDD equivalent

These contaminants were not typically detected in environmental samples prior to the fire. In addition the LANL Water Quality and Hydrology Group noted the presence of cyanide in stormwater running onto Laboratory property from the burned areas. This is likely due to the use of fire retardants which often contain cyanide compounds like potassium ferrocyanide to prevent caking of the retardant slurry and/or corrosion of the slurry bombers.

3.2.2 Firing Sites

Plastics that may be the source of organic contaminants (e.g., 2-Butanone) were used throughout the Sandia Canyon Watershed, both as a component of shot assemblies and as a bonding agent for high explosives. Plastic parts were also a common component of shot assemblies, which could have spread plastic fragments from dust to shrapnel-sized pieces throughout the Sandia Canyon technical areas.

3.2.3 Asphalt/Concrete Parking Lot Run-off

Stormwater runoff from parking lots and roadways associated with LANL and the Los Alamos Town Site may be the source of low level detections of some organics in baseflow, springs, and alluvial groundwater. The following bullets provide a list of organics typically detected in virgin asphalt as it is received from the plant:

- 2-Butanone
- Acetone
- Toluene
- 1,2,4 Trimethylbenzene
- Methylene Chloride
- 1,1,2-Trichloro-1,2,2,-Trifluoroethane
- Hexane
- 3-methylpentane
- methylcyclopentane

3.3 LANL Specific Sources

3.3.1 TA-03, South Mesa Site

TA-03 is LANL's main TA; it houses approximately half of LANL's employees, and contains about half of the total LANL floor space. It is the entry point to LANL, and most of the administrative and public access activities are located within its boundaries. The site also contains a mixture of LANL's activities, which include experimental sciences,

special nuclear materials, administrative, public and corporate access, theoretical/computations, and physical support operations. Many of LANL's major facilities providing physical support in the form of utilities and maintenance are located in TA-03. Much like a university campus, research facilities are scattered throughout the area. These range from small laboratories with bench-scale operations to activities involving radioactive materials carried out in the CMR Facility (Building 03-29). There are a total of 92 SWMUs/AOCs associated with operations at TA-03 that are potential sources for contaminants in the LA/Pueblo, Mortandad, Pajarito, and Sandia Canyon Watersheds. Table 2 identifies each SWMU/AOC and the watershed that it is associated with.

Table 2
Potential SWMU/AOC Sources at TA-03

Potential Sources at TA-03					Watershed
AOC		SWMU		Consolidated Unit	
NA		03-009(j)	03-055(c)	03-038(a)-00	Los Alamos/Pueblo
03-003(i)	03-014(w)	03-026(c)	03-034(b)	03-045(h)-00	Mortandad
03-004(c)	03-014(x)	03-031	03-049(e)	03-049(b)-00	
03-004(d)	03-026(a)	03-034(a)	03-054(e)		
03-007	C-03-006				
03-001(e)	03-014(z)	03-001(k)	03-025(b)	03-050(a)-00	Pajarito (Two Mile Canyon)
03-003(e)	03-022	03-003(a)	03-026(d)	03-052(a)-00	
03-003(h)	03-025(c)	03-003(b)	03-033	03-054(a)-00	
03-003(j)	03-038(f)	03-010(a)	03-043		
03-003(k)	03-042	03-011	03-055(a)		
03-003(l)	03-043(c)	03-014(t)			
03-003(p)	03-051(a)				
03-014(a2)	03-051(b)				
03-001(i)	03-038(d)	03-002(c)	03-045(e)	03-009(a)-00	Sandia
03-003(d)	03-043(a)	03-003(c)	03-045(f)	03-012(b)-00	
03-003(f)	03-047(d)	03-009(i)	03-046	03-013(a)-00	
03-003(g)	03-047(g)	03-013(i)	03-054(c)	03-014(a)-99	
03-003(o)	03-051(c)	03-014(r)	03-056(a)	03-015-00	
03-013(b)	03-052 (b)	03-014(s)	03-056(c)	03-059-00	
03-014(v)	03-056(h)	03-021	03-056(l)		
03-014(y)	03-056(k)	03-036(c)			
03-027	C-03-016	03-036(d)			
03-036(b)	C-03-022	03-037			
03-038(c)		03-045(a)			

The following bullets describe the 45 SWMUs/AOCs associated with the Sandia Canyon Watershed and evaluate each as a potential source:

- **AOC 03-001(i)** is the former location of a PCB-containing transformer in a former vault beneath the Cryogenics Building (03-032). In 1992 the PCB transformer was removed from the vault along with three large concrete slabs and three 55-gallon drums of soil/debris. Soil samples from the location have indicated detections of PCB below cleanup standards.

The operations associated with this AOC are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **AOC 03-003(d)** is a concrete pad that is located east of building 03-0141 where two former PCB-containing transformers were located. These transformers were removed in 1991 and 1992, respectively. No stains were visible on the concrete pad after the transformers were removed and new non-PCB transformers were relocated on the same concrete pad.

  The operations associated with this AOC are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **AOC 03-003(f)** is an area located in the basement of building 03-0066 where nine PCB-containing transformers were formerly located. The transformers were replaced in 1991. The stained concrete slabs for all of the transformers were remove din 1992 and taken to TA-54, Area G. Soil can gravel samples collected from beneath the excavated concrete pads indicated PCB concentrations less than 1.6 ppm. New concrete pads were poured at these sites when the new non-PCB transformers were installed in 1992. There is a record of a 3 gallon spill of PCB containing oil at one of the locations in 1991. The floor in that location was encapsulated with plasite.

  The operations associated with this AOC are not a listed source. The PCB spill was cleaned up, the concrete encapsulated, and there is no pathway from the basement to the Sandia Canyon Watershed. There is no record of a spill of an unused U-listed chemical.

- **AOC 03-003(g)** is the former location of a PCB-containing transformer located in the basement of Building 03-0035. The transformer was removed and replaced with a non-PCB transformer in 1984. Oil staining was not present on the concrete upon removal of the transformer.

  The operations associated with this AOC are not a listed source. In addition, there is no pathway from the basement to the Sandia Canyon Watershed. There is no record of an unused U-lised chemical

- **AOC 03-003(o)** was a storage area in former Building 03-0287 for a 60 kV capacitor bank. During the decommissioning of Building 03-0287, the capacitors were temporarily stored south of the Building at this AOC. Swipes collected from the pavement were free of PCB contamination.

  The operations associated with this AOC are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **AOC 03-013(b)** is the floor drains in the basement of Building 03-0038 located in the plasma-burning machine area, the metals cutting room, and the pipe-fabrication shop. These drains emptied into a storm drain and discharged to an outfall. The piping for these drains was rerouted to the sanitary sewer line in

1987. During the 1960s and 1970s, spent paint solvents and cutting oils contaminated with machined beryllium particles may have been release to the floor drains. In 1994 an RFI conducted at this AOC included the collection of samples from the storm drain, outfall, and drainage ditch. Seven sediment samples were collected from the areas where contaminants would most likely be retained. The investigation found low level concentrations of PAHs which were attributed to runoff from an adjacent parking lot.

The operations associated with the AOC **are a potential solvent source (F001, F002, F005)**. The sample data from this AOC, however, indicate that there were no detections of solvents in the drainage and outfall sediments. There is also no documentation of a spent solvent spill/disposal to this AOC. Given the lack of documentation and the sample results, there is no pathway for potential solvents from this AOC to have contaminated the Sandia Canyon Watershed. There are also no records regarding a spill of an unused U-listed chemical.

- **AOC 03-014(v)** was a floor drain within a former garage at Building 03-0036 that was connected to the sanitary sewer line, which flowed to the WWTP. The drain was installed in 1953. Building 03-0036 was removed in 1999 and approximately 60 yd3 of contaminated soil were removed during the demolition project. Two fill samples were collected from one location associated with the floor drain before the area was excavated for the installation of the foundation for building 03-2327. Cobalt was detected slightly above it background in one sample and TPH-DRO was detected in both samples.

  The operations associated with this AOC are not a listed source. In addition, there is no pathway from the drain to the Sandia Canyon Watershed. There is no record of a spill of an unused U-listed chemical.

- **AOC 03-014(y)** is a floor drain in the basement of the press Building at 03-0035 that formerly discharged to the sanitary sewer. The drain was installed in 1953 and become inactive in 1981. Building 03-0035 was constructed in 1953 and housed operations to fabricate enriched uranium-loaded graphite and carbide fuel elements.

  The operations associated with this AOC are not a listed source. In addition, there is no pathway from the drain to the Sandia Canyon Watershed. There is no record of a spill of an unused U-listed chemical.

- **AOC 03-027** is two former concrete-block lined lift wells in the floor below the hydraulic lifts at the former garage Building 03-0036. The lift wells collected wash water and residual oil from the floor of the vehicle maintenance bays. The contents of the lift wells were manually pumped to 55-gallon containers that were emptied into the stations oil/water separator before being discharged to the sanitary sewer. Building 03-0036 was removed in 1999 and approximately 60 yd3 of contaminated soil were removed during the demolition project. Nine fill and tuff samples were collected from the location associated with the former lift wells before the area was excavated for the installation of the foundation for Building 03-2327. Aluminum, antimony, beryllium, iron, magnesium, nickel, and zinc were detected above background. Butanone[2-], isopropylbenzene, PCE,

butylbenzene(sec-), isopropyltoluene(4-), propylbenzene(1-), xylene, butylbenzene(n-), trimethylbenzene (1,3,5-), trimethylbenzene(1,2,4-), and TPH were detected.

The operations associated with this AOC are not a listed source. Tthere is no record of a spill of an unused U-listed chemical.

- **AOC 03-036(b)** was the former location of two-25 to 50 gallon aboveground storage tanks associated with the former asphalt batch plant that contained No. 2 diesel fuel. The tanks were located 100-ft west of the former asphalt batch plant and were surrounded by a 3-ft soil berm. The diesel fuel from the tanks was applied to the dump truck beds before they were loaded with asphalt to prevent sticking. Residual fuel was collected in a aboveground metal catch basin on the east side of the berm. Before 1989, kerosene was stored in the tanks and used for the same purpose. Periodic drips and splashes from the tanks stained the gravel. The tanks operated from 1960 to 2003. The tanks, soil berm, and stained soil were removed during the D&D of the former asphalt batch plant in 2002. Samples were collected from the site in 2003. Barium, beryllium, calcium, copper, zinc, lead, and selenium were detected above background. PCE, trimethylbenzene(1,2,4), acetone, phenanthrene, methylnaphthalene(2-) and TPH were also detected.

  The operations associated with this AOC are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **AOC 03-038(c)** is a 2-inch cast iron drainline that carried rinse solution from a copper electroplating bath in Building 03-028, Room 46, to the industrial waste line. The electroplating bath operate din the 1960s and was used to plate very small parts of printed circuit boards. By 1971, the operation was terminated and moved to Building 03-0040. During the electroplating process, water was sprayed through rows of holes in a manifold on either side of the rinse sink. Minuscule amounts of plating and acid solutions were washed off the circuit boards and down the drain. Spent plating baths and the spent acid-strip solutions were transported to TA-50 for treatment. These solutions contained cyanide, chromic sulfuric acid, and hydrochloric acid. The electroplating bath met EPA point source category standards until it ceased operation in the early 1970s. The drainpipe was cut and capped inside the wall to make it inaccessible.

  The operations associated with this AOC **are a potentially listed source for cyanide (i.e., spent cyanide plating bath solutions [F007], plating bath residues [F008], or spent stripping and cleaning bath solutions [F009] from electroplating operations).** There are no documented releases from this AOC to environment so there is no pathway to the Sandia Canyon Watershed. There is also no record of a spill of an unused U-listed chemicals to this AOC.

- **AOC 03-038(d)** is a former industrial waste line associated with the liquid waste treatment system. Between the 1950s and 1970s, the industrial drains from Buildings 03-0032 and 03-0034 connected the two buildings to the old industrial waste line. These lines were placed with a new line in 1986 that connected

Building 03-0034 to the RLW facility at TA-50 and the drains in Building 03-0032 to the sanitary sewer.

The operations associated with this AOC are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **AOC 03-043(a)** is a former 20,000 gallon underground storage tank installed in 1948 at the former asphalt batch plant for the storage of asphalt emulsion. The tank was removed in 1963, disassembled, disposed of at the LA County landfill, and replaced with another storage tank. The area was used for aggregate (sand and gravel) storage and feed mixing for the former asphalt batch plant. There are no records of releases to the environment at this AOC and historical aerial photographs revealed no staining in the area. The site is currently covered by an asphalt parking lot. Sampling was conducted at the site prior to installation of the parking lot in 2003.

  The operations associated with this AOC are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **AOC 03-047(d)** is the location of a former container storage area located on the east side of the power plant building 03-0022. The storage area consisted of an asphalt pad where drums of new motor oil, used oil, and Stoddard solvent (mineral spirits) were stored from 1954 and 1989. A new location for an upgraded materials storage area was selected in 1989. The asphalt pad was subsequently removed in 1989 when the storage area was decommissioned. A VCA was implemented at the site in 1995 that involved the characterization, excavation, and removal of the top 6-in of soil. The site was subsequently restored by backfilling and compacting the excavated area, followed by revegetation. Three soil samples were collected from the top 6-inches of soil in the excavated area. Cadmuim, lead, copper, mercury, and zinc were detected above background. Chrysene, indeno(1,2,3-cd)pyrene, acetone, methylene chloride, benzo(a)pyrene, benzo(b)fluoranthene, fluoranthene, phenanthrene, pyrene, and Aroclor-1260 were also detected. In January 2002 a 6-in potable water main to the power plant ruptured and released approximately 250,000 gallons of water that eroded the soil and fill within and around the excavated area inside the AOC boundary.

  The operations associated with this AOC are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **AOC 03-047(g)** is a product drum storage area where drums of acetone, vacuum pump oil, and ethylene glycol were stored under a canopy on the north side of Building 03-0141. The mineral oil, used for vacuum pumps, is stored in drums with a hand pump inserted into the drum bung hole. As oil is dispensed, spills have been known to occur. The stains are evident on the concrete but does not continue off the concrete indicated that the small oil spills have not migrated off the concrete pad.

  The operations associated with this AOC are not a potentially listed source. The documented spill of mineral oil (evident by staining on the concrete) was

contained to the concrete and there is no pathway to the Sandia Canyon Watershed. There is no record of a spill of an unused U-listed chemical.

- **AOC 03-051(c)** consists of two stained asphalt areas attributed to vacuum pump oil operational leaks or exhaust emissions located on the east and northeast sides of the building. A VCA was performed at this AOC in 1995 and the stained areas of the asphalt were removed and the soil was excavated until unstained soil was reached. Four soil samples were collected from the site before it was backfilled. Lead, zinc, and cadmium were detected.

  The operations associated with this AOC are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **AOC 03-052(b)** consists of five storm drain access areas located about 20-ft north and west of Building 03-0066. Surface runoff flows across the surrounding area into the system at two locations: the system on the northeast side of Building 03-0066 discharges to a storm drain outlet just north of Eniwetok Drive and a single storm drain located on the northwest side of Building 03-0066 discharges to a low-lying grassy area. In 1997 an RFI conducted at the site included the collection of nine samples. Cobalt, manganese, nickel, and lead were detected above background. No organic chemicals were detected.

  The operations associated with this AOC are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **AOC 03-056(h)** consists of container storage areas associated with former Building 03-105. Building 03-105 housed magnetic fusion energy experiments and the storage areas were used to store capacitors, transformers, and oils. Swipes collected in 1992 showed no PCB contamination. PCB spills were reported in September 1991 and March 1993 and were cleaned up in accordance with TSCA requirements. Building 03-105 was decommissioned and in 1992 and the PCB/non-PCB containing equipment was removed. In 2001 the building and all surrounding asphalt were removed to make room for the NSSB building.

  The operations associated with this AOC are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **AOC 03-056(k)** is a container storage area on the north side of a loading dock at the NW corner of Building 03-066. Waste oil, solvents, and radioactively-contaminated graphite were kept in the storage area. In a 1989 site visit, staining was observed on the asphalt where the drums were stored outside the center doors on the east side of the loading dock. There are no recorded releases from the drums to the concrete dock and no staining on the dock. There are four documented radiological material releases at this AOC. The first two included the release of graphite and depleted uranium oxide dust. The third release was due to janitors dumping wastewater from floor cleaning in the foundry off the dock. The fourth release was due to a broken steam pipe that caused water to spill through a radiological controlled area and out the back of the loading dock.

In 1997, ten soil and fill samples were collected. Lead, copper, antimony, cadmium, and silver were detected above background. Carbon disulfide and 2-butanone were detected in one sample.

The operations associated with this AOC are not a listed source. There is no record of a spill of an unused U-listed chemical. The solvent detections are likely due to the presence of asphalt at the location.

- **AOC C-03-016** was an oil cleanout bin installed in the mid-1970s to contain used asphalt emulsion oil that was applied to road before laying asphalt. Photos from the 1970's and 1980s show extensive stains in the immediate vicinity of the bin and in the late 1980s the area surrounding the oil cleanout bin was excavated and new fill consisting of sand and gravel was put around the bin. The bin and the stained soil around it were removed in the 1990s. Staining occurs because the asphalt distributor machine rollers, when sprayed off, drip residue onto the gravel surrounding the former tank. In 2003 subsurface samples were collected and indicated detections of aluminum, arsenic, beryllium, calcium chromium, iron, magnesium, nickel, vanadium, barium, copper, lead, and selenium above background. Bis(2-ethylhexyl)phthalate and TPH were also detected.

  The operations associated with this AOC are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **AOC C-03-022** is the location of a former tanker trailer used to store and distribute kerosene for former asphalt batch plant operations. The tanker trailer was located in a bermed materials storage area on a hill approximately 200-ft west of former building 03-070. The tanker was in service for approximately 15 years. Kerosene was dispensed through a gravity-feed line that extended from the tanker down the hill to a location approximately 12-ft southwest of the tanker. The tanker trailer and gravity-feed line were removed in 1989 when kerosene use was replaced by the use of diesel fuel No. 2. There is no record of release associated with this tanker trailer.

  The operations associated with this AOC are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **SWMU 03-002(c)** is the former location of a small wood storage shed that was used from 1960 – 1984 to store containers of liquid and powdered pesticides and possibly herbicide. The shed was removed in 1989 and the floor was disposed of as hazardous waste. Between 1994 and 1996, the original concrete pad beneath the shed was surrounded by a new concrete pad that covered the site. The eastern portion of the concrete pad was paved over with asphalt in 2006 as part of the construction of an access road and parking lot. In 1994 a Phase I RFI was conducted at this SWMU that included the collection of six soil samples from five locations (four under the concrete pad, one down gradient of the pad). Cadmium, manganese, mercury, and silver were detected in one sample above background; zinc and calcium were detected above background in two and three samples, respectively. Organic chemicals and radionuclides were not detected.

The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **SWMU 03-003(c)** was a temporary equipment storage area used to store dielectric fluids and capacitors located on the south side of Building 03-0287. The sealed capacitors contained non-PCB dielectric oil and each of the associated spark-gap switches required approximately 2 quarts of non-PCB mineral oil for electric insulation. The capacitors were associated with a magnetic confinement experiment for the heating and confinement of hot plasmas. The experiment was decommissioned in the mid-1980's and some of the capacitors were stored at this SWMU. Swipe samples collected from the pavement in the early 1990's indicated that PCBs were not present. Asphalt and soil samples were collected from the location when the building underwent D&D in 2001. Aroclor-1254 (PCB) was detected in two fill samples and two asphalt samples.

  The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **SWMU 03-009(i)** is an inactive surface disposal site located east of the liquid and compressed gas facility (building 03-0170). This site consists of construction debris including crushed tuff, pieces of concrete, rock, and piles of fill. This surface disposal site ceased to be used in 1980. No RFI sampling has been conducted at SWMU 03-009(i).

  The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **SWMU 03-013(i)** consists of soil and gravel contaminated from historical releases of hydraulic oil at Buildings 03-0246 and 03-0247. These buildings were constructed before 1967 and housed operations that involved testing the tensile strength of various steel cables used in conjunction with underground nuclear test assemblies. Building 03-0246 was a corrugated metal building constructed on a concrete slab that contained the controls for the pull test equipment, as well as a hydraulic oil compressor and storage tank. Building 03-0247 was a corrugated metal building constructed on a concrete curb surrounding a gravel floor that contained two hydraulic rams used to perform the tensile strength testing. Hydraulic oil appeared to have been released to the concrete slab floor inside Building 03-0246 and to have subsequently flowed beneath the building walls and onto the soil surrounding the building. Soil staining was evident along the north side of the building and along the NE and NW corners. The gravel floor inside Building 03-0247 was also visibly stained with oil in several locations beneath the hydraulic ram assembly. Both buildings were demolished in 2005, including the removal of the concrete slab and approximately 144 ft^2 of potentially contaminate soil. Confirmation samples collected at the site indicated detections of barium, copper, nickel, antimony, lead, zinc, and cadmium above background. Acenaphthene, butanon[2-], anthracene, isopropyltoluene[4-], methylnaphthalene[2-] benzoic acid, bic(2-ethylhexyl)phthalate, fluorine, pyrene, acetone, fluoranthene, and phenanthrene, PCBs, and TPH were also detected.

The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **SWMU 03-014(r)** is a sewage lift station located south of Building 03-0271 and associated with the former WWTP and the SWSC. The lift station was built in the 1970s and consisted of two 7 ½ horsepower pumps. This lift station is still in use and has not been sampled.

  The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **SWMU 03-014(s)** is a sewage lift station associated with the former WWTP and the SWSC. This lift station was built in the 1970s and is located south of Building 03-0443. The lift station contains two pumps and measures 5-ft in diameter by 11-ft deep. This lift station is still in use and has not been sampled.

  The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **SWMU 03-021** is an outfall and associated daylight channel located approximately 60-ft north of the north exterior wall of the liquid and compressed gas facility at Building 03-0170. The outfall is a formerly NPDES-permitted outfall used to discharge caustic wash and rinse water from compressed-gas cylinder cleaning operations from 1964 – 1976. The cylinders were washed and stripped of paint using a caustic soda solution before they were repainted. Washing and stripping were done in a below floor-grade pit in the northern part of the building. A 2-in diameter iron outfall pipe in an open ditch carried the caustic wash and rinse water from the pit. Discharge from the end of the outfall pipe was directed into a northeast-trending surface ditch that continued about 180 ft to the main north-south ditch. Detailed information about the chemicals and processes associated with the SWMU are not available, however, paint used during that time period typically contained heavy metals. Use of the outfall and ditch was discontinued in 1976. RFI activities conducted in 1997 included the collection of soil samples from the outfall area, five locations along the channel. Cobalt, copper, iron, nickel, chromium, thallium, zinc, and lead were detected above background. VOCs and SVOCs were not detected.

  The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **SWMU 03-036(c) (a.k.a., AOC 03-043(f))** is the location of a former 30,000 gallon asphalt emulsion tank. The tank was partially buried with sand and gravel packed around the base. In 1989, the tank was removed, cut apart, and disposed of at the Los Alamos County landfill. An inspection of the site determined that the tank had not leaked. The former tank location was used to store aggregate and to mix feed for the asphalt plant until the plant was decommissioned in 2002. In 2003, the surface of the site was paved with asphalt for use as a parking lot. Sampling was conducted at the site prior to installation

of the parking lot in 2003. Arsenic and selenium were detected above background in one sample and acetone was detected in one sample.

The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **SWMU 03-036(d) (a.k.a., AOC 03-043(g))** is the location of a former 10,000 gallon underground steel storage tank that stored asphalt emulsion. The tank was installed in 1967 and in 1989 was cleaned out, removed, cut apart, and disposed of at the Los Alamos County landfill. An inspection of the site determined that the tank had not leaked. The former tank location was used to store aggregate and to mix feed for the asphalt batch plant until the plan was decommissioned in 2002. In 2003, the surface of the site was paved with asphalt for use as a parking lot. Sampling was conducted at the site prior to installation of the parking lot in 2003. Arsenic and selenium were detected above background in one sample and PCE and TPH were detected in one sample.

  The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **SWMU 03-037** is a below grade 9,000 gallon concrete tank located in the basement of 03-0066. The tank began operation in 1960 and was divided into two 4,500 gallon unlined sections that are fitted with separate covers. One section of the tank was used to store spent cyanide solution. The other section was used to store nitric, sulfuric, and hydrochloric acid solutions from electroplating operations. Both sections discharged to the industrial waste line. In 1989 the waste line serving the cyanide tank collapsed and leaked. The leak was repaired and two core samples were collected along the route of the line.

  The operations associated with this SWMU **are a potentially listed source for cyanide (i.e., spent cyanide plating bath solutions [F007], plating bath residues [F008], or spent stripping and cleaning bath solutions [F009] from electroplating operations).** There is a record of a spill of spent cyanide solutions from the waste line serving the tank, however, the location of the spill was inside a basement and there is no apparent pathway to the Sandia Canyon Watershed. There is no record of a spill of an unused U-listed chemical.

- **SWMU 03-045(a)** is an inactive outfall from the TA-03 power plant (building 03-0022). The outfall was operational from the 1950s to May 1993. The primary outflow from the building to the outfall was non-contact water from steam condensate. In addition, water from floor drains in the basement, first floor, mezzanine, heater floor, platform, and roof drains of the steam facility previously discharged to this outfall. In 1989, an oil/water separator was installed near the outfall to prevent any oil from building machinery reaching the outfall. In 1993, the separator was removed and the discharge pipe was capped. In the 1997 LANL provided NMED with sample results following the cleanup of the diesel spill at the SWMU. LANL also reiterated that the entire outfall area was excavated and restored with clean fill following the diesel spill cleanup. In January 1999, NMED requested additional documentation on the site. To confirm the nature and extent of any residual hazardous wastes or TPH (diesel) at this outfall, LANL

collected six surface sediment confirmation samples in July 2001. The samples were analyzed for PCBs, TPH, metals, and SVOCs. Results showed metals detected above BVs and numerous detected SVOCs and detected. The SWMU 03-045(a) outfall area also receives runoff from parking lots and the surrounding areas discharged to outfall from the large culvert directly west of the outfall.

The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **SWMU 03-045(e)** is an inactive outfall from a floor drain in an oil pump house located at the TA-3 power plant (Building 03-0022). One line from two diesel storage tanks passed through the pump house to the steam plant. Valves in the pump house operated each line and allowed diesel to flow from one or both storage tanks. The drain was in place to prevent the pump house from filling with diesel fuel if a valve junction should rupture or leak. The drain and associated piping were plugged in 1989. A concrete apron is located at the point where the drainline discharged to Sandia Canyon.

  The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **SWMU 03-045(f)** is an inactive outfall from a sink drain that served the utilities control center at Building 03-223 from 1950 – 1989. The sink was used as a quench tank for welding and cutting. The sink contained only water to cool welded metal, and no leaching of metal was possible. The outfall was located on the north side of the building and emptied into Sandia Canyon. There are no known releases of hazardous wastes or hazardous constituents to the sink and its outfall. The sink was removed in the late 1980s. In 1993 the outfall was vegetated and had no distinct erosion based on visual inspection. This outfall did not discharge large quantities of water.

  The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **SWMU 03-046** is an aboveground wastewater neutralization tank located within TA-3 approximately 60-ft southeast of LANL's steam plant at Building 03-022. The function of the tank was to adjust the pH of blowdown water from boilers, softeners, and a demineralization tank located at the steam plant. The tank discharged through an NPDES-permitted outfall. From May 20 – May 21 1990, three uncontrolled releases of sulfuric acid into the neutralization tank resulted in the discharge of acidic waste water to the outfall. The area of Sandia Canyon affected by the discharge was immediately remediated and the spill was reported to EPA Region 6. This action resulted in an administrative order, which was addressed, and an action plan was implemented to ensure that future discharges from the tank meet NPDES permit pH requirements. On July 1993 the incident was closed. No further documented releases have occurred from this tank.

  The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **SWMU 03-054(c)** is a former cooling tower, pump house, and a former permitted outfall located southwest of Building 03-105 and northwest of 03-287. Both structures were used to cool an electromagnet formerly located at Building 03-105. The outfall discharged into the storm sewer formerly located 25-ft east of the cooling tower. Both buildings underwent D&D in 2001 and 2003/2004, respectively. Soil samples collected north of the cooling tower in 1992 indicated detections of chromium. The cooling tower was dismantled in the mid-1990s and the associated concrete pad/pump were dismantled in 2001. Confirmation sampled collected in 2001 indicated detections of chromium and lead above background.

  The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **SWMU 03-056(a)** is an inactive used-oil accumulation facility that was built in 1986 and was located north of Building 03-271. The storage area has a concrete floor that slopes toward a sump and is surrounded by a concrete berm. The area is roofed but the sides are open. No spills from the bermed area to the environment have occurred and the structure has no drains.

  The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **SWMU 03-056(c)** is an inactive outdoor storage area located on the north side of a utilities shop at Building 03-0223. The SWMU occupies an area that extends along the length of Building 03-223 and is bounded by a security fence and the building to the south. The outdoor storage was used for storing electrical equipment, capacitors, and transformers with PCB-containing dielectric fluids. Waste solvents used for cleaning electrical equipment were also stored at this location. The types of solvents used at the site from 1967 to 1981 are unknown. Viking R30 (1,1,1-trichloroethane) was used from 1981 and 1990. Beginning in 1990 and continuing through 1992 a nonhazardous citrus-based solvent was used as a substitute for solvent based cleaners. It is unknown whether the solvents used at the site were stored onsite. In addition, Transclene, which contains tetrachloroethene (a.k.a., PCE), may have been stored at the site because it was used by an electrical equipment maintenance subcontractor to retrofill transformers in the field. In 1991 clean fill was placed on the area occupying the former storage area to elevate it and to reroute run-on drainage away from this site. In 1992, the storage area was decommissioned.

  Previous work conducted at this site by the ER Project includes investigations and cleanups conducted in 1994, 1995, 1999, 2000, and 2001 as summarized below:

  - 1995 – Characterization samples from the western and northern slopes to determine nature and extent of PCB contamination.
  - 1999 – Development of a VCA plan to remove the PCB-contaminated soils.
  - August 2000 – Implementation of the VCA plan including excavation of 2400 yd^3 of contaminated soil, confirmation sampling, and a determination that the PCB contamination extended beyond the original SMWU boundary.

- March 2001 – Excavation of the additional PCB contaminated areas.
- April 2001 – Confirmation sampling including analysis for PCB, organics and inorganics.

The confirmation samples collected after the implementation of the VCA indicated detections of the following inorganic chemicals above background: Arsenic (1/18 samples), cadmium (1/18 samples), chromium (1/18 samples), lead (3/18 samples), mercury (1/18 samples), nickel (1/18 samples), and silver (2/18 samples). The following organic compounds were also detected: Acetone (10/18 samples), benzene (7/18 samples), isopropyltoluene[4-] (7/18 samples), PCE (1/18 samples), toluene (10/18 samples), trichloroethane [1,1,1] (1/3 samples), trichlorofluoromethane (1/18 samples).

The operations (storage of waste solvents) associated with this SWMU are potentially a **listed source for PCE (F005).** The sample data indicate that PCE was detected in a single confirmation sample, after the completion of the VCA, collected from a location adjacent to Building 03-223 in a small inaccessible area. All other PCE results (working from the building, down the drainage and into the canyon) were non-detects. The acetone, benzene, and toluene detections in the soil are likely due to stormwater runoff from the asphalt parking lots in an around the SWMU. Given the lack of documentation, the sample results, the implementation of a VCA that removed the primary source, and the stabilization of the site using asphalt and BMPs, there is no pathway from contamination from the SWMU to the Sandia Canyon Watershed. There are also no records regarding a spill of any other unused U-listed chemicals.

- **SWMU 03-056(l)** is an outdoor storage facility immediately adjacent to the east side of Building 03-141. Containers of disposable clothing contaminated with beryllium powder are staged there before disposal. Sporadically, carboys for beryllium powder in water were also stored in this area. The carboys were usually in a tray that served as secondary containment. There is not history of releases from the drums or carboys into the environment.

  The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **Consolidated Unit 03-009(a)-00** consists of SWMU 03-009(a), 03-029, and 03-045(g), which includes sites associated with the former TA-03 asphalt batch plant operations. SWMU 03-009(a) is a fill area located on the rim of a small tributary of Sandia Canyon south of the former TA-03 asphalt batch plant. The fill was generated by asphalt plant operations and contained small amounts of concrete, building materials, and asphalt road-construction debris. SWMU 03-029 is a former landfill located approximately 300 ft south of building 03-0271 near the rim of Sandia Canyon. This landfill received excess asphalt from the batch plant and was subsequently covered with sand. The fill raised and leveled the surface areas at the mesa rim. LANL completed a required corrective action at SWMU 03-029 in early 1993 to remove the asphalt within the drainage and on the associated slope, regrade the watercourse and slope to support vegetation, extend the drainage, and construct a concrete berm to prevent additional exposure of asphalt buried in the fill. SWMU 03-045(g) consists of a closed and

locked storm drain that connected to an inactive outfall. The storm drain has been closed and locked since late 1990. Since 1987, the only intentional discharge from the asphalt plant to the outfall was from a former holding pond (SWMU 03-028) used to collect dust from batching operations. Stormwater from parking lots, roads, and roof drains located west of the former asphalt batch plant also discharged to the outfall along with intermittent discharges from the former holding pond and a one-time oil emulsion spill.

In 2003 RFI activities performed at all three sites included the collection of subsurface samples from boreholes drilled to a depth of 20 ft bgs at SWMUs 03-009(a) and 03-029 and from sediment samples collected within the outfall of 03-045(g). Metals were detected above background. Methylene chloride and tetrachloroethene (PCE) were also detected in the fill sample. SVOCs and TPH were not detected. The four sediment samples were collected within the catch basin of the closed storm drain (located approximately 150 ft north of the outfall). Numerous metals were detected above background and the following VOCs and SVOCs were detected: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, butylbenzene(n-), bis(2-ethylhexyl)phthalate, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, isopropyltoluene(4-), methylene chloride, phenanthrene, pyrene, trichloroethene (TCE), trimethylbenzene(1,2,4-), and trimethylbenzene(1,3,5-), and TPH-GRO. TPH-DRO was not detected.

An accelerated corrective action (ACA) was proposed for completing the investigation and remediation of SWMU 03-029 in 2004 to accommodate the Laboratory's security perimeter project. In May 2005, a geophysical survey was conducted at SWMU 03-029 consisting of ground penetrating radar and electromagnetic surveys. The survey results identified two possible locations for buried waste, which were further investigated by trenching. In July 2005, a total of 12 trenches were excavated to the top of bedrock, approximately 2 to 4 ft bgs, and varied in length from 20 ft to greater than 100 ft. Buried waste was not encountered in any of the trenches.

The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **Consolidated Unit 03-012(b)-00** Consolidated Unit 03-012(b)-00 consists of SWMUs 03-014(q), 03-045(c), 03-012(b), and 03-045(b). SWMU 03-045(b) is a duplicate of 03-012(b). The SWMUs within this consolidated unit (CU) are associated with the TA-03 power plant (building 03-0022) operations. SWMU 03-014(q) is an cooling water holding tank (structure 03-0336), which receives blowdown water from the power plant boilers and treated wastewater. The water is discharged to the SWMU 03-012(b) outfall. SWMUs 03-045(c) and 03-012(b) are outfalls that discharge into a small tributary of Sandia Canyon directly southeast of the steam plant.

  The 1994 Phase I RFI focused on shallow sampling in the soils and sediments discharging from the outfalls. Surface samples were collected at five locations at SWMUs 03-012(b) and 3-045(c). Data are screening-level and showed numerous metals detected above background and detected organic chemicals

including PCBs, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g, h, i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene.

In 2002, soil samples were collected around the mesa top structures of Consolidated Unit 03-012(b)-00 to characterize the site conditions and for waste characterization purposes before installation of a gas turbine generator, associated utilities and asphalt paving. Sampling was conducted within the anticipated footprint of the proposed utility corridor for the new gas turbine around SWMU 03-014(q). Twenty-eight fill samples were collected from fourteen locations at depths of 0 to 0.5 ft and 0.5 to 1 ft; four fill samples were collected at four locations from a depth of 0.5 to 1 ft. Data are of decision-level quality and showed mercury detected above the BV in one sample. The entire area around SWMU 03-014(q) (structure 03-0336) and the new gas turbine to the SWMU 03-12(b) outfall was paved with asphalt in 2005.

The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **Consolidated Unit 03-013(a)-00** consists of SWMU 03-013(a) and 03-052(f), which include a storm drain that served Building 03-0038 and its associated outfall located northeast of Building 03-207. The floor drains from 03-0038 formerly drained into these two SWMUs but were rerouted to the sanitary sewer system in 1987. SWMU 03-013(a) consists of a former 1500-ft long corrugated metal pipe storm drain that was removed in 2004 to accommodate the construction of the NSSB and a new parking structure. SWMU 03-052(f) is a former NPDES-permitted outfall that received wastewater from floor drains, sinks, water fountains, and a storm drain that served Building 03-0038. It is known that Stoddard solvents, dry acid, and caustic materials from the maintenance shop were discarded through sinks and floor drains to this outfall. Spent paint solvents and cutting oils contaminated with machine beryllium particles may also have been released to the floor drains during the 1960s and 1970s. The welding torch wastewater may have contained lead, chromium, nickel, and other inorganic chemicals.

  Two spills may have entered the drain system. The first spill was approximately 200 gallons of water/waste oil mixture that was discharged when an automatic compressor blowdown mechanism failed. A second spill from a ruptured air compressor oil line resulted in the release of approximately 1 quart of compressor oil to the drain. This spill produced an oily sheen on the surface of the water at the outfall. The third spill occurred when approximately 15 gallons of diesel fuel was released from a ruptured truck fuel line into the utilities construction trench between buildings 03-1793 and 03-1794. On the same day, a clay sewer pipe in the utility trench broke, releasing approximately 2000 gallons of wastewater into the excavation.

  The RFI activities conducted at this SWMU in 1994 included the collection of seven sediment samples from five locations along the sides and within the SWMU 03-052(f) outfall channel 10 – 50 ft downstream from the outfall pipe.

Chromium, copper, and mercury were detected above background in one sample. Lead was detected above background in three samples and zinc in six samples. Aroclor-1254 and total PCBs were detected in one sample. VOCs, SVOCs, and radionuclides were not detected. SWMU 03-052(f) was characterized further during the 2009 investigation. Fourteen samples were collected from seven locations along the storm drainage. Antimony, barium, cadmium, chromium, copper, lead, selenium, and zinc were detected above background, or had detection limits above background. Acenaphthene, acenaphthylene, acetone (3 samples), anthracene, PCBs, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluroanthene, bis(2-ethylhexyl)phthalate (7 samples), chrysene, dibenz(a,h)anthracene, dibenzofuran, fluoranthene (13 samples), fluorene, indeno(1,2,3-cd)pyrene, 2-methynaphthalene, naphthalene, 4-nitroaniline, phenanthrene, pyrene, toluene (1 sample), TPH-DRO, and 1,2, 4-trimethylbenzene (1 sample) were detected.

The operations (use and disposal of solvents) associated with this Consolidated Unit **are a potential listed source for solvents (F001, F002, F005)**. There are no documented releases of solvents to the floor drains and the sampling results at the outfall do not indicate the detection of residual solvents. The toluene is more likely due to stormwater runoff from asphalt and into the storm drain. Given the lack of documentation, the sample results, and the discontinued use of the outfall, there is no pathway to Sandia Canyon. There are also no records regarding a spill of any other unused U-listed chemicals.

- **Consolidated Unit 03-014(a)-99** Consolidated Unit 03-014(a)-99 consists of 20 of the 30 SWMUs and AOCs associated with the former WWTP that operated at TA-03 from 1951 to 1992, until the Laboratory's SWSC Plant at TA-46 became active in 1992. The former WWTP is adjacent to and east of the utilities control center (building 03-0223) on the southern rim near the head of Sandia Canyon. The WWTP served TA-03, TA-43, TA-59, and TA-60, the trailer park on West Jemez Road, and holding tank and septic system wastes throughout the Laboratory. The WWTP also began treating sanitary wastes from TA-02 and TA-41 in 1990 and TA-21 in 1992. The WWTP had two parallel systems, the north plant (Plant 1) built in 1951, and the south plant (Plant 2) built in 1964. Each system consisted of entrance works, Imhoff tanks, dosing siphons, trickling filters, settling ponds, and final clarifying tanks. The plants were different in some physical dimensions but essentially functioned identically. The WWTP was designed with a 750,000 gal/day combined capacity. Although no longer operational, many of the structures associated with the SWMUs and AOCs of Consolidated Unit 03-014(a)-99 are still present.

  The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **Consolidated Unit 03-015-00** consists of SWMU 03-015 and AOC 03-053. SWMU 03-015 is a former permitted outfall which is located between Eniwetok Road and the security fence northeast of Building 03-141. This outfall historically received effluent from janitorial sinks as well as from floor and roof drains. The basement of Building 03-141 housed electrochemical and DU processing

facilities from 1962 and 1990. The floor drains were designated as AOC-03-053. Powder characterization, plasma flame spray processing, beryllium processing, and DU processing are ongoing operations. It is not known if releases occurred through the basement floor drains formerly connected to the stormwater system that leads to the outfall. The basement floor drains in Building 03-141 have been rerouted to the TA-50 RLW line, and the roof drains were rerouted to an existing outfall in Mortandad Canyon in 1992. The lines draining to SWMU 03-015 were decommissioned in February 1993. SWMU 03-015 was characterized in 1994 when biased surface soil and sediment samples were collected from the drainage channel associated with the outfall. Barium, lead, mercury, nickel, and silver were detected above background. Acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(aH,anthreancene, dibenzofuran, fluorine, inden(1,2,3-cd)perylene, naphthalene, and phenantrene, fluoranthene, and pyrene were also detected. The elevated levels of PAHs were attributed to runoff from road and parking lot asphalt.

The operations associated with this Consolidated Unit are not a listed source. There are no records of a spill of any unused U-listed chemicals.

- **Consolidated Unit 03-059-00** consists of AOC 03-003(n) and SWMU 03-059. This consolidated unit is a former storage area adjacent to Building 03-0271. SWMU 03-059 was initially identified as the former salvage yard that was used to store transformers, electrical equipment, batteries, and scrap metal pending sale or reuse. AOC 03-003(n) is the location of a one-time PCB spill at the salvage yard approximately 20-ft south of the northwest corner of Building 03-0271.

  The operations associated with this Consolidated Unit are not a listed source and there is no record of a spill of an unused U-listed chemical.

Several of the SWMUs/AOCs at TA-03 include records that indicate the presence of operations and spills (i.e., waste solvent disposal; waste solvent storage, disposal of spent electroplating solutions/residues) that may require the application of the listed hazardous waste codes F001, F002, F005, F007, F008, F009 to the wastes generated in the Sandia Canyon Watershed. However, further analysis indicates that there is currently no pathway for those contaminants to reach the Sandia Canyon Watershed.

3.3.2 TA-61, East Jemez Site

TA-61 is a relatively small site that contains physical support and infrastructure facilities. The facilities, all previously designated non-hazardous, include the Los Alamos County landfill, sewer pump stations, a radio shop, general storage sheds, a blower house, and general warehouse storage for maintenance activities performed throughout LANL. TA-61 is bounded on the north by Los Alamos County and on the south by Sandia Canyon. TA-61 also surrounds a small parcel of private property known as the Royal Crest manufactured Home Community. There are a total of 5 SWMUs/AOCs associated with operations at TA-61 that serve as potential sources for contaminants in the Los Alamos and Sandia Canyon Watersheds. Table 3 identifies each SWMU/AOC and the watershed that it is associated with.

Table 3
Potential SWMU/AOC Sources at TA-61

Potential Sources at TA-61			Watershed
AOC	**SWMU**	**Consolidated Unit**	
NA	61-007	NA	Los Alamos/Pueblo
C-61-002	61-002 61-005 61-006	NA	Sandia

There are 4 SWMUs/AOCs at TA-61 that are associated with the Sandia Canyon Watershed. The following bullets describe each SWMU/AOC and evaluate it as a potential source:

- **SWMU 61-002** is a former storage area that was located in TA-61, east of the Radio Repair Shop (Building 61-23) on East Jemez Road. This storage area is part of a fenced area that measures 81 ft x 91 ft and historically was used to store capacitors and transformers. In addition, the storage area contained several oil-filled containers as well as unmarked containers. Before 1985, containers of PCB-contaminated oil were stored in this area and were known to have leaked. In 1986, elevated PCB concentrations were detected in 32 samples collected at this area. The area was subsequently excavated, backfilled with clean soil, and paved over with asphalt. All storage operations were discontinued in 1992. Staining was observed on the surface of the asphalt. Potential contaminants are PCBs and lead.

  RFI activities conducted in 1994 included the collection of eighteen samples from 16 locations. Zinc was detected above BV. Elevated PCB concentrations were found in two samples in the drainage pathway at the furthest down gradient locations that were sampled. In 1997, 42 samples were collected but no report was written for this sampling event. In 2005, petroleum hydrocarbon contamination was discovered in the subsurface during additional investigation and remediation activities at the site. Two underground product lines and a total of 424 yd^3 of soil were removed in August 2005 and the site was back filled with clean soil. In 2006, additional investigation was performed at the site that included the collection 15 samples from eight borehole locations in and around the area of petroleum hydrocarbon contamination discovered during 2005.

  The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **SWMU 61-005** is the Los Alamos County landfill. The landfill is located in TA-61 on the rim of Sandia Canyon near East Jemez Road. It consists of 400-ft^2 pits that were excavated into the tuff. The pits are designed so runoff does not enter the canyon. The land fill was create in 1974 and is owned by DOE and operated by the Los Alamos County for use by the public, the county, and LANL. It has a permit to managed nonhazardous solid waste and is regulated by the NMED.

Samples have not been collected from this site. It is not identified as a listed source.

The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **SWMU 61-006** is an active oil recycling area located at the Los Alamos County landfill. The oil recycling area consists of an open, lined pit approximately 10-ft x 20-ft x 7-ft deep that contains a 2500-gallon holding tank. An 8-ft long pipe leads to a filling bin at ground level. According to the 1990 SWMU report, historically there were three underground tanks in the pit. In 1989, two of the tanks were removed. The third tank was moved its current location in the open, lined pit. The area where the tanks were formerly located was excavated as a disposal pit for use at the landfill. The pit was covered, a leak detection system installed on the tank, and the pit was relined with an improved liner in 2000. Samples have not been collected from this site.

  The operations associated with this SWMU are not a listed source and there is no record of a spill of an unused U-listed chemical.

- **AOC C-61-002** is a subsurface contamination that was encountered in 1995 during a drill rig test. The test hole is located in TA-61, approximately 15-ft north of building 61-0016, a former storage building. During the drilling test, an odor was noted and contamination was encountered at 7 – 8 ft bgs. The contamination was suspected to be petroleum based (e.g., diesel). A sample of the tuff was collected and the analysis showed the presence of diesel. Personnel interviews conducted after the drilling indicated that the source of the diesel may have been the previous road maintenance support work performed in the area.

  The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

There are no records indicating the disposal or spill of solvents and/or pure chemicals at TA-61. In addition, the former operations at TA-61 do not include electroplating, heat treating operations, or waste water treatment from chemical conversion coating of aluminum. The SWMUs/AOCs at TA-61 may be a source for low concentrations of organics including solvents and petroleum hydrocarbons in the groundwater but there are no records to indicate that this residual contamination is from a listed source. The conclusion of this analysis is that the SWMUs/AOCs and operations associated with Former TA-61 are not a potential source for F-, K-, P- or U-listed contaminants.

3.3.3 TA-60, Sigma Mesa Site

TA-60 lies southeast of TA-03 between Mortandad Canyon and Sandia Canyon. The site is primarily used for LANL physical support and infrastructure activities. Some support services and physical support areas for subcontractors are also located at TA-60. The NTS Test Fabrication Facility and a test tower (Buildings 60-0017 and -0018) are located in TA-60. Because of the moratorium on testing, these buildings are not currently in use but are being maintained for future use, should testing again become a part of LANL's mission. There are a total of 10 SWMUs/AOCs associated with

operations at TA-60 that serve as potential sources for contaminants in the Mortandad and Sandia Canyon Watersheds. Table 4 identifies each SWMU/AOC and the watershed that it is associated with.

Table 4
Potential SWMU/AOC Sources at TA-60

Potential Sources at TA-60					Watershed
AOC		SWMU		Consolidated Unit	
60-004(c) 60-004(e)		60-005(e)		NA	Mortandad
60-004(b) 60-004(d)	60-004(f)	60-002 60-006(a)	60-007(a) 60-007(b)	NA	Sandia

There are 7 SWMUs/AOCs at TA-60 that are associated with the Sandia Canyon Watershed. The following bullets describe each SWMU/AOC and evaluate it as a potential source:

- **SWMU 60-002** is comprised of three storage areas on Sigma Mesa that have been used for the storage of construction and fill materials for Laboratory support contractors from the 1960s until present. The first area (western area) is located on the north side of unimproved road that traverses the mesa. It contains piles of concrete blocks, cured asphalt chunks, and cables. Historically the site also included a large mound of soil with some asphalt and concrete but it is no longer there. Samples have not been collected at the western area. The second area (central area) is located northwest of the pesticide storage facility at TA-60-0029 and formerly contained a mound of soil, rocks, concrete fence post supports, pipe, metal strips, wood, and similar debris. Six soil samples were collected at the central area in 2004. Acenaphthene, PCBs, and TPH-GRO were each detected in two of the samples. The third area (eastern area) is on the south side of the unimproved road near the end of the mesa. This area was used to stage piles of broken cured asphalt chunks removed from roadways and parking lots prior to recycling. This area is currently the site of the asphalt batch plant. Ten soil and tuff samples were collected in the eastern area in 2003. Nickel and lead were detected above background in two of the soil samples. Arsenic, barium, chromium, and nickel were detected above background in three of the tuff samples. Fluoranthene, fluorine, pyrene, hexanone[2-], and TPH-DRO were also detected.

  The operations associated with this SWMU are not a listed source, There is no record of a spill of an unused U-listed chemical.

- **AOC 60-004(b)** is a former storage area for 12 containers of diesel sludge from underground storage tanks removed from the power plant and stored in 1988. The storage site is located northeast of the geothermal well mud pit at the east end of Sigma Mesa and is contained within the boundaries of AOC 60-004(d). RFI activities were performed at this site in 1994 that included the collection of two soil samples. A third sample was collected south and adjacent to the AOC within the boundary of AOC 60-004(d). Mercury was detected above background

in one sample. Bis(2-ethylhexyl)phthalate, phenol, and PCBs were detected in one sample.

The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **AOC 60-004(d)** is a former area used to dismantle decommissioned underground storage tanks and to temporarily store drums containing fluids removed from the underground storage tanks. The site is located northeast of the geothermal well mud pit at the east end of Sigma Mesa. The area was first developed in 1979 during a drilling project for a geothermal well. The northern edge of the area was used to dispose of building rubble, concrete, and rebar. RFI activities were performed at this site in 1994 that included the collection of two soil samples. A third sample was collected south and adjacent to the AOC within the boundary of AOC 60-004(d). Mercury was detected above background in one sample. Bis(2-ethylhexyl)phthalate, phenol, and PCBs were detected in one sample.
  The operations associated with this SWMU are not a listed source, There is no record of a spill of an unused U-listed chemical.

- **AOC 60-004(f)** consists of two unpaved, bermed storage pads, Pad 2 and Pad 3, used for new product storage. The pads were constructed when the maintenance warehouse 60-002 was built in 1978. Both pads were used to store 55-gallon containers that dispensed Stoddard solvent, antifreeze, motor oil, grease, transmission fluid, and window-washing fluid. In 1985, 6-in asphalt berms were built at the open ends of both pads to mitigate rainfall run-on and runoff problems. In 1990, all containers were removed from the pads which were discolored and had a petroleum odor. RFI activities were conducted at this site in 1994 and included the collection of thirteen samples at five locations at Pad 2 and eleven samples from five locations at Pad 3. Aluminum, barium, chromium, lead mercury, nickel, and zinc were detected above background in several of the tuff samples. Barium was also detected above background in two of the sediment samples. PCBs were detected in one tuff sample.

  The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **SWMU 60-006(a)** is a decommissioned septic system located on Sigma Mesa near the northeast corner of the fence surrounding buildings 60-0017 (NTS Test Rack Fabrication Facility) and 60-0019 (NTS Test Tower), which it served. The septic system consists of a 1000-gallon septic tank and seepage pit with no outfall. Building 60-0017 began operating in 1986 to fabricate equipment for testing activities carried out at NTS. From 1986 to 1989, wastewater generated from facility bathrooms and seven floor drains, including one in a paint booth, was discharged to the septic system. In 1989, Building 60-0017 was connected to the sanitary sewer. RFI activities were conducted at this site in 1994 to determine whether the septic tank had been drained after its use was discontinued and, if not, whether its contents were hazardous. The tank was found to be full and two waste characterization samples were collected from the sludge in the tank. Aluminum, arsenic, barium, beryllium, cadmium, chromium,

lead, mercury, nickel, selenium, and sliver were detected. SVOCs were not detected. During the 2009 investigation of SWMU 60-006(a) as part of the Upper Sandia Canyon Aggregate Area investigation, the SWMU 60-006(a) septic tank was uncovered and opened in November 2009. Only a thin layer of what appeared to be dried sludge remained on the bottom of the tank, liquid and sludge were not present and tree roots were found to be growing through the tank bottom. One sample of the material remaining in the tank was collected. The analytical results indicated detections of antimony, arsenic, cadmium, chromium, cyanide, lead, mercury, nickel, bis(2-ethylhexyl)phthalate, and diethylphthalate. The likely sources of the inorganics in the sludge include metal fabrication activities carried out in building 60-0017 and paints washed into the septic tank when the paint booth was cleaned with water. Lead, mercury, cadmium, and chromium were commonly used in paint as pigments and preservatives. Arsenic has been used as a pigment, a wood preservative and as an anti-fouling ingredient. None of these operations are listed.

The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **SWMU 60-007(a)** is a former storage area located near the east end of Sigma Mesa that was used to store equipment for drilling a geothermal well. Oil, hydraulic fluid, and similar materials were reported to have been released to the environmental at this site. In 1992, areas of stained soil were removed, placed into containers, and disposed of by the user group. The remediated areas were covered with gravel. RFI activities were performed at the site in 1994 that included the collection of eleven soil samples from eight locations. PCBs were detected in one of the samples. Barium was detected above background in one sample and toluene was detected in one sample. Additional characterization was performed at this SWMU in 2001 that included the collection of six fill samples. Thallium was detected above background in one sample. TPH-DRO/LRO were detected in two and three samples, respectively.

  The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

- **SWMU 60-007(b)** is a storm drainage ditch that starts north of the motor pool building and extends approximately 600-ft from a paved area directly north of building 60-001 to the bottom of Sandia Canyon. Two parking lots located east of building 60-001 drain to a ditch that eventually joins this drainage ditch. Other former sources of potential contamination to the ditch are a steam-cleaning pad, a used-oil storage tank, and an oil/water separator. Equipment that used PCB-containing oil was stored on an asphalt area east of Building 60-001. The area of the ditch visibly affected by these sources was remediated by the user group in 1986. RFI activities were conducted at this site in 1994 to determine if any contamination remained in the sediment after the 1986 soil removal. Six soil and sediment samples were collected from four locations at depths ranging from 0 - 1.5 ft bgs. Bis(2-ethylhexyl)phthalate was detected in one sample.

  The operations associated with this SWMU are not a listed source. There is no record of a spill of an unused U-listed chemical.

There are no records indicating the disposal or spill of solvents and/or pure chemicals at TA-60. In addition, the former operations at TA-60 do not include electroplating, heat treating operations, or waste water treatment from chemical conversion coating of aluminum. The SWMUs/AOCs at TA-60 may be a source for low concentrations of organics including solvents and petroleum hydrocarbons in the groundwater but there are no records to indicate that this residual contamination is from a listed source. The conclusion of this analysis is that the SWMUs/AOCs and operations associated with Former TA-60 are not a potential source for F-, K-, P- or U-listed contaminants.

3.3.4 TA-53, Los Alamos Neutron Science Center [LANSC]

TA-53 is located on Mesita de Los Alamos, north of the lower portion of Sandia Canyon. TA-53 occupies 750 acres and includes approximately 400 buildings and other structures. It is the current location of one of the largest research accelerators in the world. TA-53 currently supports both basic and applied research programs. Basic research includes studies of subatomic and particle physics, atomic physics, neutrinos, and the chemistry of subatomic interactions. Applied research includes materials science studies that use neutron spallation and contributions to defense programs such as stockpile stewardship and the production of tritium. The facility also supports the production of radioisotopes for medical research and use and supports programs for accelerator-related technologies (i.e., radio-frequency power sources, high-power microwaves, and free-electron lasers). There are a total of 15 SWMUs/AOCs associated with operations at TA-53 that serve as potential sources for contaminants in the Los Alamos/Pueblo and Sandia Canyon Watersheds. Table 5 identifies each SWMU/AOC and the watershed that it is associated with.

Table 5
Potential SWMU/AOC Sources at TA-53

Potential Sources at TA-53					Watershed
AOC		SWMU		Consolidated Unit	
53-008		NA		53-002(a)-99	Los Alamos/Pueblo
53-009	53-013	53-001(a)	53-006(f)	53-006(b)-99	Sandia
53-010	53-014	53-001(b)	53-007(a)	53-006(d)-99	
53-012(e)		53-005	53-015		

There are 13 SWMUs/AOCs at TA-53 that are associated with the Sandia Canyon Watershed. The following bullets describe each SWMU/AOC and evaluate it as a potential source:

- **SWMU 53-001(a)** consists of an outdoor storage area located on the north side of the TA-53 equipment test laboratory at Building 53-2. The storage area consists of a covered concrete pad that is currently used as a drum storage area for 53-2. Non-polychlorinated biphenyl (non-PCB) dielectric oil is currently stored on the concrete pad. This area was also formerly used as a satellite accumulation area (SAA) up until 1992. The pad is surrounded by a concrete curb to provide secondary containment. A drain valve located in the northwest corner of the curbed area was previously used to release accumulated rainwater but is now plugged. The storage area is believed to have been first use in 1968

when operations at 53-2 began. The site was inspected during preparation of the RFI work plan in 1993 and no evidence of staining or releases was noted.

ER activities at this SWMU have included Phase I RFI sampling in 1995, a VCA conducted in 1997, and additional Phase I RFI sampling in 1997. The analytical results from the 1995 RFI included detections of copper, lead, and mercury above background. Aroclor-1260 was detected in two samples. Alpha-chlordane, dieldrin, endosulfan II, and endrin aldehyde were each detected in one sample. TPH was detected in four samples. The analytical results from the 1997 RFI included detections of Aroclor-1260 in seven of the nine samples collected. The VCA conducted in 1997 removed approximately 10 yd^3 of PCB contaminated soil.

RFI activities conducted in lower Sandia Canyon in the summer of 2010 included the collection of twenty five samples from 12 locations at depths ranging from 0 – 5 ft bgs. Chromium, lead, mercury, selenium, and silver were detected above background. Acetone, Aroclor-1254, Aroclor-1260, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, isopropylbenzene, tirmethlbenzene[1,2,4-], and TPH were also detected.

The operations associated with this SWMU are not a listed source. There are no records of a spill of any unused U-listed chemicals. There are no records of a spill of a spent solvent or solvent mixture.

- **SWMU 53-001(b)** consists of a less-than-90-day hazardous waste accumulation area located on the asphalt parking lot outside the south side of the TA-53-2 equipment test laboratory. Prior to 1990, this area consisted of drum racks that were used to store drums of products and wastes associated with maintenance activities conducted in Building 53-2. These wastes included spent TCE, Freon, other solvents, and acidic waste. Engineering drawings show this area was constructed in 1971. A photograph taken in 1989 showed no evidence of spills or leakage. In 1990, the drum racks were removed and replaced with four lockable, flammable-material storage cabinets. The site was inspected during preparation of the RFI work plan in 1993 and no evidence of staining or releases was noted.

  In 1995 an RFI was conducted to determine the presence of contaminants in the drainage channel down gradient of this site. Five surface samples and two subsurface samples were collected. Inorganic chemicals detected above background included cadmium, copper, lead, and zinc. SVOCs, VOC, and PCBs were not detected. TPH was detected in three samples.

  RFI activities conducted in lower Sandia Canyon in the summer of 2010 included the collection of four samples from two locations at depths ranging from 0 – 3 ft bgs. Antimony, barium, cadmium, chromium, lead, mercury, and silver were detected above background. Aroclor-1254, Aroclor-1260, and TPH were also detected.

  The operations associated with this SWMU are not a listed source. There are no records of a spill of any unused U-listed chemicals. There are no records of a spill of a spent solvent or solvent mixture.

- **SWMU 53-005** consists of an inactive disposal pit located east of the TA-53 equipment test laboratory (Building 53-2). This pit was excavated into the tuff, was unlined, and was formerly used for the disposal of waste oils, acids, and solvents from ~1970 until 1986. Information from historical engineering drawings (titled "Trichloroethylene and Freon Waste System Modifications" and "Acid Drain replacement Piping Installation Plan" per the RFI Work Plan) suggests that solvent wastes and acidic wastes were piped from the Building 53-2 equipment test laboratory to the pit. Other wastes may also have been dumped into the pit. The 1986 working draft CEARP report describes the pit as being full of a thick, brownish liquid and notes the presence of a metal grate over the pit. In 1986, the pit contents were removed and the pit sides scraped clean. The contents of the pit were sampled during the 1986 removal, but the sampling data are not available.

  RFI activities conducted in lower Sandia Canyon in the summer of 2010 included the collection of 10 samples from four locations with depth ranging from 2-16 ft bgs. Antimony, barium, chromium, lead, nickel, and selenium were detected above background. Acetone, Aroclor-1254, Aroclor-1260, butanone[2-], butylbenzene[sec-], dichloroethane[1,1-], isopropyltoluene[4-], methylene chloride, tetrachloroethene, toluene, trichlorethane[1,1,1-], trichloroethene, trimethylbenzene[1,2,4-], trimethyl benzene[1,3,5-], and xylene were also detected.

  SWMU 53-005 is **a potential listed source for TCE (F005)** due to disposal of spent solvent that has been released to the environment and is increasing in concentration (in the soil) laterally from the source toward canyon. The extent of the contamination is not currently characterized. TCE has not been detected in the groundwater at the nearest baseflow (Middle Sandia at Terminus) and well (SCA-2). TCE is also not a COPC under review in this revision of the due diligence for the Sandia Canyon Watershed. There are no records of a spill of any unused U-listed chemicals that may have entered the floor drains associated with these tanks.

- **Consolidated Unit 53-006(b)-99** consists of three deactivated underground tanks associated with the former RLW system at TA-53 (AOC 53-006(a) and SWMUs 53-006(b and c)).

  - AOC 53-006(a) is a steel underground tank (53-59) that was formerly used to store spent ion-exchange resin from the LANSCE accelerator facility and was in operation from 1972 until the early 1980s. Spent ion-exchange resins were generated from the operation of a water purification system. The resins from this system were flushed into the tank and allowed to settle twice per year. After the resin settled, the water was discharged to the tanks 53-68 and 69 (SWMUs 53-006(b and c).

  - SWMUs 53-006(b and c) are two identical steel underground tanks that were used to store RLW generated during operation of the LANSCE accelerator. Most of this RLW consisted of tritiated DI water collected in floor drains along the length of the accelerator tunnel. The tanks also received wastewater

from a sink, shower, and clothes washer and were used as holding tanks to allow for short-lived activations products to decay before discharging to the TA-53 surface impoundments. The tanks were operated from 1973 until 1999. In 2000 and 2001 both tanks were emptied, washed, and double rinsed. The drainlines to the tanks were cut and capped, isolating the tanks. A video camera and light source were placed in the tank to observe conditions inside the tanks. Not cracks, fractures, holes, or other integrity issues were observed. The tanks were backfilled with sand following decontamination.

During 2000 and 2001, a borehole was installed adjacent to Tank 53-59 [AOC 53-006(a)] and subsurface samples were collected at 5-ft intervals along the length of the tank and at 10-ft intervals below the bottom of the tank. Boreholes also were installed adjacent to Tanks 53-68 and -69 [SWMUs 53-006(b and c)] and subsurface samples were collected at 5-ft intervals from the surface to the bottom of each tank and at a 10-ft interval below the bottom of each tank. Subsurface samples also were collected at two depths beneath the drainline tie-in locations for each tank. Eight boreholes were installed along the drainlines and samples were collected at two depths below the drainline at each location. These sampling activities were coordinated with intrusive activities associated with deactivation of the RLW system, including cutting and capping the drainlines to isolate the tanks. No inorganic chemicals were detected above background. Benzene and Bis(2-ethylhexyl)phthalate were the only organic chemicals detected. The contents of all three tanks were also sampled in 2000 to verify that it met the waste acceptance criteria of the treatment facility. No organic chemicals were detected in the tank sludge. Barium, Cadmium, and lead TCLP results were below regulatory levels.

The operations associated with this Consolidated Unit are not a listed source and there are no records of a spill of any unused U-listed chemicals that may have entered the floor drains associated with these tanks.

- **Consolidated Unit 53-006(d)-99** consists of two compartments (SWMUs 53-006(d and e) in an inactive underground tank associated with the RLW system at TA-53operated from 1977 until 1999. The compartments were used as holding tanks to allow short-lived activation products to decay before discharging the RLW to the TA-53 surface impoundments. Wastes received by these tank compartments included drainage/discharges from the following:

  - Floor drains in the beam-line, target, and experimental areas in Building 53-7
  - A contaminated DI pump stand in Building 53-8
  - Contaminated floor drains and sink drains in Building 53-30
  - DI water system in Building 53-30
  - An equipment room floor drain in Building 53-368

  In 2000, both tank compartments were emptied, high-pressure washed, and double rinsed. The drainlines to the tanks were cut and capped, isolating the tanks. A video camera and light source were placed in the tank to observe conditions inside the tank. No cracks, fractures, holes, or other integrity issues were observed. The tank was backfilled with sand following decontamination.

In 1999, the waste lines connected to the tanks were exposed, cut, and capped to bypass the tanks and reroute the lines to the new RLW system at TA-53. During these activities samples were collected at two locations beneath the waste lines. Bis(2-ethylhexyl)phthalate, PHAs, ethylbenzene, methylene chloride, and Aroclor-1254 were detected. Barium and chromium TCLP detections were below regulatory levels.

The operations associated with this Consolidated Unit are not a listed source and there are no records of a spill of any unused U-listed chemicals that may have entered the floor drains associated with these tanks.

- **SWMU 53-006(f)** is an inactive 3000-gallon underground tank located beneath the D Wing basement of an office and laboratory building (Building 53-1) at TA-53. This tank operated from 1972 until 1996 and was used to store neutralized RLW generated in Building 53-01 radiochemistry laboratories. The wastes were collected in a neutralization tank [SWMU 53-007(a)] located in the basement of D Wing. The wastes were neutralized with sodium hydroxide and drained to the SWMU 53-006(f) tank. When sufficient wastes had accumulated in the SWMU 53-006(f) tank, the tank contents were removed for treatment or disposal by pumping it to a transfer pad located outside the south side of Building 53-1 for loading into tank trucks to transport the wastes to the appropriate treatment or disposal facility. The transfer pad had a spill-collection sump that drained back into the storage tank.

  The tank was intended only for the management of radioactive waste, however, a 1990 RCRA inspection by NMED, identified the potential for the tank to have received mercury from a spill in one of the radiochemistry laboratories in Building 53-1. The tank contents were sampled and found to contain hazardous waste. The contents were removed and the tank steam cleaned before it was taken out of service in August 1996. The tank is currently empty and all piping into and out of it has been cut and capped. The access doors into the tank are locked, and a spill-containment berm has been placed around the tank to prevent any spills inside the building from entering the tank.

  The operations associated with this SWMU are not a listed source. There is a record of a Mercury spill **that may require a U151 listing for any releases from the tank and/or its associated underground piping to the environment**. There are no records of a release from this tank or its piping to the environment. There are also no records of a spill of unused U-listed chemicals (other than Mercury) to or from this tank/piping.

- **SWMU 53-007(a))** is an inactive 50-gallon aboveground tank located in the D Wing basement of an office and laboratory building (Building 53-1) at TA-53. This tank operated from 1972 until 1996 and was used to neutralize RLW generated in the radiochemistry laboratories in Building 53-1. The sources of these wastes were cup drains, an emergency eye wash/shower drain, and a floor sink drain. The wastes were collected in the SWMU 53-007(a) tank when they were neutralized with sodium hydroxide. After neutralization, the treated wastes were

then drained to an underground tank located beneath the basement floor [SWMU 53-006(f)].

The tank was intended only for the management of radioactive waste, however, a 1990 RCRA inspection by NMED, identified the potential for the tank to have received mercury from a spill in one of the radiochemistry laboratories in Building 53-1. The tank contents were sampled and found to contain hazardous waste. The contents were removed and the tank steam cleaned before it was taken out of service in August 1996. The tank is currently empty and all piping into and out of it has been cut and capped. The access doors into the tank are locked, and a spill-containment berm has been placed around the tank to prevent any spills inside the building from entering the tank.

The operations associated with this SWMU are not a listed source. There is a record of a Mercury spill **that may require a U151 listing for any releases from the tank and/or its associated underground piping to the environment**. There are no records of a release from this tank or its piping to the environment. There are also no records of a spill of unused U-listed chemicals (other than Mercury) to or from this tank/piping.

- **AOC 53-009** is an area used to store liquid scintillation oil used in experiments conducted at TA-53 located north of the inactive TA-53 surface impoundments. The operating dates of this storage area are unknown. The 1990 SWMU report describes this storage area as an earth-bermed area containing three aboveground storage tanks. The three tanks and an earthen containment berm are shown in a 1989 photograph. This photograph also shows twenty five 55-gallon drums within the berm. Another photograph taken that day shows soil staining near one of the tanks.

  The original earthen-bermed area was later replaced with two steel containment structures (53-1071 and -1072), each of which measures 30 ft x 60 ft x 3 ft high. Both containment structures are lined with .125-in.-thick butyl rubber to prevent release of spills. This storage area was inspected in 1993 during preparation of the RFI work plan. At that time, the western structure (structure 53-1071) contained three large aboveground tanks, each containing 30,000 gallon liquid scintillation oil 1,2,4-trimethylbenzene). In addition, there were thirty 55-gallon drums that collectively contained 165 gallons of liquid scintillation oil. These drums were covered with a canvas tarp. The eastern structure (structure 53-1072) contained four large, empty tanks and 141 55-gallon drums that collectively contained 7755 gallon of liquid scintillation oil. These drums also were covered with a canvas tarp. At the time that this area was inspected, there was no evidence of spills or releases.

  In September 2006, two subsurface samples were collected at 53-1071 as part of the closeout activities for removal of this structure. TPH-DRO was detected in one sample. RFI activities conducted in lower Sandia Canyon in the summer of 2010 included the collection of eighteen samples from nine locations with depths ranging from 0-3 ft bgs. Antimony, barium, chromium, lead, and nickel were detected above background. Aroclor-1242, Aroclor-1260, and TPH-DRO were also detected.

The operations associated with this SWMU are not a listed source. There are no records of a spill of any unused U-listed chemicals.

- **AOC 53-010** is a former unpaved storage area used to store scintillation liquid in tanks and drums. This former storage area was located approximately 150-ft southeast of building 53-1031. The storage area measured 30-ft x 35-ft and was surrounded by 2-ft high soil berms. The bottom and sidewalls of the storage area were lined with a reinforced, welded geomembrane that was covered with soil. The 1990 SWMU report notes that this site was used in 1989 and 1990 to store scintillation liquid in two 3000-gallon tanks and eighteen 55-gallon drums. A 1989 photograph shows two tanks labeled "mineral oil" and approximately 12 drums. The tanks and drums were removed in 1990 when the site was closed. Two small areas of stained soil were also removed at that time. The area was inspected in 1993 during preparation of the RFI work plan. The cover soil at the top of the berms had been eroded in some places, exposing the membrane liner and causing deterioration. No staining was noted during this inspection

  In 1995 a Phase I investigation was conducted at this AOC that included the collection of six surface samples above the liner and within the bermed area. TPH was detected at concentrations ranging from 7.93 0 5100 mg/kg. No SVOCs were detected. Based upon these results a VCA was conducted that included removal of the cover soil above the membrane liner, removal of the membrane liner, inspection of the soil underneath the liner for staining (none observed), the collection of six confirmation samples, removal of the soil berms, and regrade/reseed of the site.

  RFI activities conducted in lower Sandia Canyon in the summer of 2010 included the collection of twelve samples from six locations at depths ranging from 0-4 ft bgs. Barium and chromium were detected above background. Aroclor-1254, Aroclor-1260, benzo(b)fluoranthene, and diethylphthalate were also detected.

  The operations associated with this SWMU are not a listed source. There are no records of a spill of any unused U-listed chemicals.

- **AOC 53-012(e)** is a drainline and outfall associated with a TA-53 equipment test lab (Building 53-2). The drainline runs southwest approximately 140 ft from the southwest corner of Building 53-2 under an asphalt parking lot and then runs northwest approximately 50 ft to the associated outfall near the edge of Sandia Canyon. The drainline received discharges from 12 trench drains, two sink drains, and a floor drain in Building 53-2. The primary source of wastewater was blowdown from the cooling tower at TA-53-2, which was discharged to one of the trench drains. Historically, chemicals added to the cooling tower water included sodium molybdate and hydroxyethylidene diphosphonic acid as corrosion inhibitors; 1-bromo-3-chloro-5,5,dimethylhydantoin as a microbicide; and sodium bisulfate as an oxygen scavenger. The trench drains also received equipment-flushing and floor washing wastewater. The oufall operated from 1968 until 1995.

A Phase I RFI was conducted in 1995 that included a geomorphic survey conducted downstream of the outfall to identify sediment catchments. Two surface samples were collected at each of three locations in the sediment catchments. Antimony, cadmium, chromium, lead, mercury, nickel, and silver were detected above background. Aroclor-1248, Aroclor-1254, Aroclor-1260, alpha-chlordane, gamma-chlordane, dieldrin, endosulfan II, endrin aldehyde, and TPH were also detected.

RFI activities conducted in lower Sandia Canyon in the summer of 2010 included the collection of twelve samples from six locations with depths ranging 0-4 ft bgs. Antimony, cadmium, chromium, cyanide, lead, mercury, nickel, and selenium were detected above background. Aroclor-1248, Aroclor-1254, Aroclor-1260, Bis(20ethylhexyl)phthalate, chlordane[alpha], Chlordane[gamma], dieldrin, Endosulfan II, Endrin aldhyde, Ethybenzene, and TPH were also detected.

The operations associated with this SWMU (discharge of cooling tower blowdown) are not a listed source. There are no records that the trench drains received spent solvents, even though solvents were known to be in use at Building 53-2. There are no records of a spill of any unused U-listed chemicals.

- **AOC 53-013** is a lead spill site located near the east end of TA-53, northeast of the LANSCE accelerator facility. Lead shot was present within two fenced areas, approximately 50 ft × 80 ft and 60 ft × 180 ft, that are used for storage and as staging areas for equipment used in beam experiments. The lead shot was used as radiation shielding for experiments conducted in building 53-10. The shot ranged from 1.5–4 mm in diameter and was mixed into the sandy soil present at the site. The shot was spilled at the site during assembly of components containing the shot and was also released from defective containers (ICF Kaiser Engineers 1995, 058172, p. 2). The dates the shot was spilled onto the ground surface are not known but could date as far back as the late 1960s or the early 1970s, when accelerator operations began.

  In July 1995, a sample of soil containing visible lead shot was collected to characterize the concentrations of lead present. The concentration of lead was 110,000 mg/kg for the total (unsieved) sample; 72,400 mg/kg for the fraction less than 1.7 mm; and 210,200 mg/kg for the fraction between 1.7 mm and 4 mm. The TCLP results were 129 mg/L in the total sample, 168 mg/L for the size fraction less than 1.7 mm, and 155 mg/L for the size fraction between 1.7 mm and 4 mm (ICF Kaiser Engineers 1995, 058172, p. 2). Soil outside the areas of visible lead contamination was also sampled in 1995 as part of planning activities for a VCA. Ten soil samples for screening were collected inside and outside the storage areas (ICF Kaiser Engineers 1995, 058172, p. 3). These samples were screened for lead using x-ray fluorescence (XRF), and lead was detected in one sample collected near the entrance to the southern storage area.

  RFI activities conducted in lower Sandia Canyon in the summer of 2010 included the collection of forty samples from twenty locations with depths ranging from 0-3 ft bgs. Arsenic and lead (max = 34 mg/kg) were detected above background. Aroclor-1254 and Aroclor-1260 were also detected.

The operations associated with this SWMU are not a listed source. There are no records of a spill of any unused U-listed chemicals.

- **AOC 53-014** a lead spill site, is located at a paved storage area in TA-53 west of building 53-18 (Figure 7.14-1). Lead shot was spilled on the paved surface, and stormwater washed the lead into an asphalt-lined channel that joins a drainage below an NPDES-permitted outfall (03A113). The lead shot was observed at a number of locations in the channel but was not seen below a large catchment approximately 50 ft below the canyon rim (ICF Kaiser Engineers 1995, 058172, pp. 4–5).

  In August 1995, sediment in the channel was sampled as part of planning activities for a VCA. Fifteen sediment samples were collected in the drainage below the extent of visible lead contamination (ICF Kaiser Engineers 1995, 058172, p. 5) and screened for lead using XRF. Lead was not detected. In 1997, a VCA was conducted that included removing all lead shot from the paved area, the asphalt channel, and the drainage. To minimize impacts to the drainage, visible lead was picked up by hand, and sediment was sieved to remove lead. After the lead was removed, five surface sediment samples (0 to 0.5 ft) were collected from the drainage as confirmatory samples. These samples were submitted for analysis of lead. Lead was detected slightly above the BV for sediment, but less than the maximum background concentration for sediment (25.6 mg/kg; LANL 1998, 059730), in two samples.

  The operations associated with this SWMU are not a listed source. There are no records of a spill of any unused U-listed chemicals.

- **53-015** SWMU 53-015 consists of the RLW management system for TA-53. This system consists of two lift stations, three 30,000-gal. double-walled tanks in an underground vault, two evaporation basins, and underground double-walled waste piping. AOC 53-015 also includes some of the existing underground waste piping from the former RLW system. SWMU 53-015 was constructed to replace the former TA-53 RLW system, which included underground tanks [SWMUs 53-006(b-e)] and a surface impoundment [SWMU 53-002(b)]. SWMU 53-015 began operation in October 1999 and, therefore, was not originally identified in the 1990 SMWU report or in the 1994 RFI work plan for OU 1100. LANL and DOE agreed with NMED to notify NMED of the existence of this system as a new SWMU, with the understanding that it not be subject to a compliance schedule for CA. When this system ceases operation, it will be evaluated to determine whether releases have occurred.

  The operations associated with this SWMU are not a listed source. There are no records of a spill of any unused U-listed chemicals.

Several of the SWMUs/AOCs at TA-53 include records that indicate the presence of operations and/or spills (i.e., waste solvent disposal; waste solvent storage, mercury spill) that may require the application of the listed hazardous waste codes F005 and U151 to the wastes generated in the Sandia Canyon Watershed. However, further analysis indicates that there is currently no pathway for those contaminants to reach the Sandia Canyon Watershed.

3.3.5 TA-72, East Entry Site (Firing Range)

TA-72 includes portions of both Los Alamos Canyon and Sandia Canyon. It is the site of AOC 72-001, a small arms firing and training range used by the LANL security force. The firing range is located in Sandia Canyon at the west end of TA-72 and has been operational since 1966. There is one AOC at TA-72 that is a potential source in the Sandia Canyon Watershed. The following bullet provides a description:

- AOC 72-001 is a small arms firing and training range used by the LANL security force. The firing range is located in Sandia Canyon at the west end of TA-72 and has been operational since 1966. It includes a 175-ft x 250-ft firing range surrounded by earthen berms, an adjacent skeet shooting range, and administrative buildings. The drainage channel and flood plain of Sandia Canyon run through the middle of the firing range. Lead is known to be present in the firing range because bullets are scattered at the base of the berms and cliffs and lead shot from skeet shooting is visible on the ground. In 1995 a Phase I RFI was conducted at AOC 72-001 that included a geomorphic survey to locate sediment catchments in the downstream drainage and the collection of eight soil samples. Selenium was detected above background for sediment in one sample. HE was not detected and organic compounds were not included in the analytical request. In 1995, as part of the VCA conducted at SWMU 00-016, approximately 4660 yd3 of lead contaminated soil from SWMU 00-016 was transported to TA-72 and placed on the berms located along the north side of AOC 72-001 and along the berm located between, and north of, canopies 3 and 4.

There are no records indicating the disposal or spill of solvents and/or pure chemicals at TA-72. In addition, the former operations at TA-72 do not include electroplating, heat treating operations, or waste water treatment from chemical conversion coating of aluminum. The conclusion of this analysis is that the SWMUs/AOCs and operations associated with Former TA-72 are not a potential source for F-, K-, P- or U-listed contaminants.

3.3.6 FORMER TA-20, Operations and Environmental Setting

The former site of TA-20 lies in the canyon bottom near the west end of Sandia Canyon within the current boundaries of TA-72 and TA-53. Operations ceased at former TA-20 in the late 1940's so that East Jemez Road could be built through the area. The area was used to test initiators, devices used to add neutrons to nuclear explosions. Explosives, inorganic chemicals, possibly short-lived radioactive materials, and uranium were used at the site.

Table 6
Potential SWMU/AOC Sources at FormerTA-20

Potential Sources at TA-20			Watershed
AOC	SWMU	Consolidated Unit	
20-003(b) 20-004	20-001(a) 20-002(d) 20-005	20-001(b)-00 20-001(c)-00	Sandia

The following bullets provide a description of the 7 SWMUs/AOCs that are associated with the operations at Former TA-20:

- **SWMU 20-001(a)** is a former landfill used to bury scrap metal, some of which may have been contaminated from firing site activities conducted at former TA-20. The landfill was removed in 1948 before East Jemez Road was constructed. Organic and inorganic contaminants would be expected from disposal of equipment associated with detonations at firing sites. Due to the proximity of the site to East Jemez, polycyclic aromatic hydrocarbons and volatile organic compounds from asphalt runoff would also be expected. In 1995, the former location of SWMU 20-001(a) was gridded (200 ft x 300 ft) and a geophysical survey was conducted. A backhoe was used to excavate portions (two trenches) of the site that showed anomalies in the geophysical survey. The north trench excavation exposed small pieces of wood debris, a 3-ft-long section of a pole, and a metal power-pole anchor. Excavation of the south trench produced no evidence of previous disturbance. Seven soil samples were collected from the north trench at a depth of 10 ft to 11 ft and one sample was collected (depth of 10 ft to 11 ft) from the south trench. Uranium was the only inorganic compound detected above background. The only organic compound detected was 2,4,5-trinitrophenyl-N-methylnitramine, an explosive compound that is hazardous only if it is present at concentrations that are reactive.

  The operations associated with this SWMU are not a listed source. There are no records of a spill of any unused U-listed chemicals.

- **Consolidated Unit 20-001(b)-00** is a landfill and firing site that consists of SWMU 20-001(b), SWMU 20-002(c), and AOC 20-003(c). SWMU 20-001(b) is a small landfill known as Sandia Canyon Area 2 that received debris from the adjoining firing site [SWMU 20-002(c)], the US Navy gun site [AOC 20-003(c)], and the decommissioned control building and berm. This site was excavated and the contents were removed in a 1948 cleanup. In 1995 a Phase I RFI was conducted at this consolidated unit. It included geophysical surveys, the excavation of three trenches at SWMU 20-001(b) based upon the presence of anomalies found during a geophysical survey, and the collection of samples. The excavations at SWMU 20-001(b) exposed debris (i.e., conduit, concrete, structural steel) at all three trenches. The analytical results from the soil samples collected at SWMU 20-001(b) indicated detections of cadmium, copper, iron, silver, and uranium above background. HE was not detected and organic compounds were not included in the analytical request. At 20-002(c) eight soil samples were collected that indicated detections of chromium, lead, mercury, silver, thallium, uranium and zinc above background. HE was not detected and organic compounds were not included in the analytical request. At AOC 20-003(c) eight soil samples were collected but the sample locations could not be verified during data validation. In 1995 a VCA was also conducted at this AOC 20-003(c) and approximately 21.5 yd^3 of concrete debris was removed and disposed of at the LA county landfill.

  The operations associated with this SWMU are not a listed source. There are no records of a spill of any unused U-listed chemicals.

- **Consolidated Unit 20-001(c)-00** is a small landfill and firing site area consisting of SWMUs 20-001(c), 20-002(a and b). Potential contaminants at this site include HE, inorganic chemicals, and uranium. SWMU 20-001(c) is a small landfill used to dispose of debris from the adjoining firing sites [SWMU 20-002(a and b)], and from the decommissioned control building. SWMU 20-002(a) is the site of an inactive firing pit used from 1945 to 1948 to conduct initiator tests. The tests conducted at this site were contained within a vessel located in the pit. The inside dimensions of the vessel were 14 ft, 8 in. x 14 ft, 8 in. x 12 ft deep. The walls and floor consisted of 0.75-in.-thick steel plate backed by 12-in. x 12-in. timbers. A steel framework covered the pit, overlain by a mat of 0.25-in.-diameter steel rods spaced 1 in. apart. According to a 1947 memo, the framework and mat, presumably installed to contain debris from the shots, failed after the first few shots. SWMU 20-002(b) is the site of a former cylindrical steel tank (known as Dumbo) that was used to contain an explosive test so that shot fragments could be recovered. Dumbo was used only once due to the difficulty of opening the tank after the shot was fired within the tank. A second Dumbo, built and installed on the firing pad at the other end of the concrete platform, was never used. The two Dumbos were constructed in 1945 and removed in 1948. In 1995 a Phase I RFI was conducted at this consolidated unit. This included the collection of soil samples from 21 locations at SWMU 20-001(c) that cannot be validated. At SWMU 20-002 (a) soil samples were collected at 11 locations within 100-ft radius of the firing point. The analytical results indicated detections of copper, lead, and uranium above background. HE was not detected and organic compounds were not included in the analytical request. At SWMU 20-002(b) soil samples were collected at 11 locations within 100-ft radius of the firing point. The analytical results indicated detections of mercury and uranium above background

  The operations associated with this SWMU are not a listed source. There are no records of a spill of any unused U-listed chemicals.

- **SWMU 20-002(d)** was identified as a firing site on the basis of descriptions of TA-20 activities. Historical data for TA-20 that several implosion tests were conducted near structure 20-3. This firing site apparently was used for fewer than 10 shots; however, there is a report of one shot (containing 500 lb. of Composition B) that underwent a low-order explosion (i.e., did not detonate completely). A 1962 LANL memo describes two cleanup efforts related to this incident: one conducted immediately after the incident and a second that was part of the 1948 Sandia Canyon cleanup before the construction of East Jemez Road. Periodic inspections of SWMU 20-002(d) (seven documented inspections) were conducted in the area from 1964 to 1975. The final three inspections (1971, 1973, and 1975) found no explosives at SWMU 20-002(d). This site was inspected again in 1985 under the Los Alamos Characterization Program and two soil samples were collected from the site. The results of the samples indicated the soils surrounding SWMU 20-002(d) were contaminated with uranium. In 1995 a Phase I RFI was conducted that included the collection of soil samples from eight locations with a 50-ft radius of the former firing point. The analytical results indicated detections of beryllium, copper, thallium, uranium, and zinc above background. HE was not detected and organic compounds were not included in the analytical request.

The operations associated with this SWMU are not a listed source. There are no records of a spill of any unused U-listed chemicals.

- **AOC 20-003(b)** is a 20-mm gun-firing site, consisted of two buildings associated with the firing of the gun. Building 20-44 was a 16-ft x 16-ft x 8-ft-high wood-frame building that was equipped with concrete gun mounts. An adjacent control building (Building 20-13) had approximately the same dimensions. The site was used to conduct initiator timing tests, which consisted of firing projectiles from a 20-mm gun into steel plates set against the canyon walls. In 1948, the 20-mm gun was relocated to TA-04. A site visit in 1993 confirmed that all surface structures and the steel plates had been removed and that some concrete foundations remained. In 1995 a Phase I RFI was conducted at the AOC that included the collection of nine soil and tuff samples from six locations in the drainage channel down gradient of the projectile impact area. The analytical results indicated a detection of lead above the maximum background concentration soil (28 mg/kg) in one sample. HE and organic compounds were not included in the analytical request.

  The operations associated with this SWMU are not a listed source. There are no records of a spill of any unused U-listed chemicals.

- **AOC 20-004** is a former septic system (septic tank and drainlines), was located next to the current TA-72 small-arms firing range. This septic system was constructed in 1952 to serve the guardhouse (structure 20-47, now designated as 72-8) at former TA-20. The 540-gal.-capacity tank (structure 20-49) was a single-tank chamber made of 6-in. reinforced concrete, with inside dimensions of 6 ft x 6 ft x 5 ft (LASL 1951, 026066). The inlet drainline to the septic tank consisted of 6-in.-diameter vitrified clay pipe and was approximately 100 ft long. It is not clear from engineering drawings whether the system discharged to daylight. The tank ceased to be used after 1957, when the guard shack was abandoned, but was returned to service in 1966 when the TA-72 firing range opened. In 1989, the tank was collapsed and filled in. Interviews with site personnel state that the tank and associated drainlines were removed during a construction project in the early 1990s. This tank was registered with the New Mexico Environmental Improvement Division (NMEID) as an Unpermitted Individual Liquid Waste System (Registration Number LA-10). The NMED registration states no leach bed was associated with the tank. In 1995 a Phase I RFI was conducted that included the collection of three surface and six subsurface soil samples from the former location of the septic tank. The analytical results indicated no inorganic contaminants above background. Benzoic acid and butylbenzylphthalate were each detected in one sample.

  The operations associated with this SWMU are not a listed source. There are no records of a spill of any unused U-listed chemicals.

- **SWMU 20-005** is a former septic system that served Building 20-1. The septic system was constructed in 1945 and its use was discontinued in 1948. Plumbing drawings for this building indicate this system served a toilet, restroom sink, and darkroom sink. The septic system reportedly was removed and the tank was not located during a 1985 LANL investigation. Excavation of the area turned up no

evidence of the tank or its waste lines. The septic tank was shown in engineering drawings as having 6-in.-thick concrete walls with interior dimensions of 3 ft x 6 ft x 5 ft high and a capacity of 540 gal. The discharge point of the tank is not known. The only discharges identified for this SWMU were sanitary sewage and photographic chemicals. Organics and inorganics characteristic of these operations would be expected. However, sanitary sewage and photographic chemicals are not listed sources. Due to the proximity of the site to East Jemez, polycyclic aromatic hydrocarbons and volatile organic compounds from asphalt runoff would also be expected; asphalt runoff is not a listed source. In 1995 a Phase I RFI was conducted that included the collection of nine subsurface samples in the drainage down gradient of the former location of the septic tank. The analytical data indicated a detection of lead above background. Organic contaminants were no included in the analytical request.

The operations associated with this SWMU are not a listed source. There are no records of a spill of any unused U-listed chemicals.

There are no records indicating the disposal or spill of solvents and/or pure chemicals at the Former TA-20. In addition, the former operations at Former TA-20 did not include electroplating, heat treating operations, or waste water treatment from chemical conversion coating of aluminum. The conclusion of this analysis is that the SWMUs/AOCs and operations associated with Former TA-20 are not a potential source for F-, K-, P- or U-listed contaminants.

3.4 Spill Logs/Reports

The spill reports from May 1990 to December 2010 were reviewed to determine if there were any spills that could have contributed to the presence of the chemicals identified in Section 2.4. Table 7 summarizes those spills that may be relevant.

Table 7
Summary of Recorded Spills at TA-3, 53, 60, and 61

Date	TA	Location	Description
10/5/1990	3	TA-3, Sandia Canyon	Asphalt
3/20/1991	3	TA-3 WWTP	Sludge Filtrate
4/25/1991	3	TA-3, Bldg. 287	Steam Condensate
8/1/1991	3	TA-3, Bldg. 105	Oily Sheen
8/29/1991	3	TA-3 WWTP, Outfall 01S	Foam
9/4/1991	3	TA-3, Cooling Tower 1837	Milky Substance
9/10/1991	3	TA-3 WWTP	Foam
9/25/1991	3	TA-3, Bldg. 22	Diesel
10/30/1991	3	TA-3 Roads and Grounds	Lift Station 10077-72 Overflow Seepage
10/30/1991	3	TA-3, SM100	Steam Condensate
12/18/1991	3	TA-3 WWTP	Primary Treated Effluent
2/11/1992	3	TA-3, 2011 ACI	Hydraulic Fluid
6/1/1992	3	TA-3 SM	UST Release
8/25/1992	3	TA-3 SM-30	SWMU (Hg) Release
11/23/1992	3	TA-3 SM-29	Gas/Fire Water
1/26/1993	3	TA-3-40	Ethylene Glycol
3/3/1993	3	TA-3-336 Reuse Tank	Treated Effluent

Table 7 (continued)
Summary of Recorded Spills at TA-3, 53, 60, and 61

Date	TA	Location	Description
6/17/1993	3	TA-3-22 Power Plant	Water Treatment Chemicals Liquid
6/22/1993	3	TA-3-34	Ethylene Glycol
8/2/1994	3	TA-3 Sigma Mesa	Sediment Slurry Soil Washing
9/12/1994	3	TA-3-22	Cooling Tower
10/18/1994	3	TA-3-22	Treated Power Plant Effluent
5/9/1995	3	TA-3	SWMU 3-056 PCB
2/1/1996	3	TA-0 Pajarito Well #2	Oil Sheen from Well Flushing
5/20/1997	3	TA-3-470	Diesel
4/23/1998	3	TA-3-127 Sigma area	Treated C.T. water
11/16/1998	3	TA-3-261	Grease/water to SWMU 3- 013 (a & b)
8/11/2000	3	TA-3-22	Hg in trap
3/10/2003	3	TA-3-261 (Otowi)	Hydraulic Fluid
4/2/2003	3	TA-3-26 AST	Diesel Fuel No. 2
4/9/2004	3	TA-3-38	Petroleum Product
7/23/2004	3	TA-3-4100	Motor Oil
2/2/2005	3	TA- 3, 15, 16, and 40	Diesel
9/29/2005	3	TA-3-30 and TA-54-245	Diesel Fuel
10/4/2005	3	TA-3-261 Otowi	Sewage / Grease
5/2/2007	3	TA-3-38	Oil to storm water
8/13/2007	3	West of TA-3-39	Concrete washout water
7/28/2009	3	TA-3-29 CMR	Propylene Glycol and Storm Water
7/28/2008	3	TA-3-218	Roof Guard and Storm Water
1/8/2010	3	TA-3-1698	Fire Suppression Water with Glycerin
2/1/2010	3	TA-3 SCC	Hydraulic fluid
2/26/2010	3	TA-3-223	Re-use water from the TA-3-SWWS
10/25/1991	53	TA-53 South of Adm. Bldg.	Potable Water/Gas
4/9/1992	53	TA-53, Bldg. 44	Diesel Fuel
10/19/1992	53	TA-53 Sector S&M	LAMPF Cooling Water
6/18/1993	53	TA-53 near Bldg. 28 & 7	Ethylene Glycol air cond. 40 gallons
7/6/1993	53	TA-53	Ethylene Glycol
11/14/1994	53	TA-3-31	Sewage Spill
12/15/1994	53	TA-53 Cooling Tower #62	Treated Cooling Water
4/24/1995	53	TA-53 East of Bldg. 28	Boiler Water
4/27/1995	53	TA-53-294 Cooling Tower	Treated Cooling Water
10/6/1995	53	TA-53-145 Holding Tank	Rad Holding Tank
12/8/1995	53	TA-53 CT	Treated Cooling Water
4/16/1996	53	TA-53, 60, 62	TCW & CT Solids
6/23/1996	53	TA-53-622	Treated Cooling Water
12/20/1996	53	TA-53-63	Cooling Tower Water
1/7/1997	53	TA53-1032	Cooling Water
1/16/1997	53	TA53-1032	Cooling Water
4/14/1997	53	TA-53-62	Treated Cooling H20 frozen return line
6/10/1997	53	TA-53-365	Dielectric oil
6/20/1997	53	TA-53-63	Cooling Water Inhibitor
6/10/1998	53	TA-53-64	Treated Cooling Tower Water
5/29/2002	53	TA-53-80	Mineral Oil Spill
10/15/1991	60	TA-60 Sigma Mesa	Oil/Water
4/9/1992	60	TA-60, Bldg. 1	Equipment Shop
6/12/1992	60	TA-60 East of tank farm	Chlorinated Water

Table 7 (continued)
Summary of Recorded Spills at TA-3, 53, 60, and 61

Date	TA	Location	Description
6/24/1997	60	TA-60-41	Diesel oil/sludge
5/15/2000	60	TA-60 Sigma Mesa	Diesel Fuel
6/30/2000	60	TA-60 US West Bldg.	DLW
2/25/2004	60	TA-60-1	Diesel Release to Watercourse
4/14/2004	60	TA-60-5 MRF	Storm Water and Mineral Oil
7/29/2009	60	TA-60-1 Lower Lot	Hydraulic Fluid
6/15/1995	61	TA-61-16	Diesel/Historical Release

4.0 CONCLUSION

Guidance provided by EPA's Management of Remediation Waste Under RCRA (EPA 530-F-98-026), Determination of When Contamination is Caused by Listed Hazardous Waste states:

> "Where a facility owner/operator makes a good faith effort to determine if a material is a listed hazardous waste but cannot make such a determination because documentation regarding a source of contamination, contaminant, or waste is unavailable or inconclusive, EPA has stated that one may assume the source, contaminant or waste is not listed hazardous waste and, therefore, provided the material in question does not exhibit a characteristic of hazardous waste, RCRA requirements do not apply."

This due diligence is a good faith effort to determine if the anyalytes of concern detected in waste samples from the Sandia Canyon Watershed originated from a listed hazardous waste source. This process consisted of reviewing historical and site investigation documentation, evaluating chemical data, assessing chemical and physical properties, and assessing chemical tracking systems for use, storage, and spills of chemicals.

The following general conclusions are applicable to the TAs investigated for this due diligence:

- TA-03 has the following operations and/or spills that are listed sources.
  - AOC 03-013(b) is a potential solvent source (F001, F002, F005). The sample data, however, from this AOC indicate that there were no detections of F-listed solvents in the drainage and outfall sediments. There is also no documentation of a spent solvent spill to this AOC. Given the lack of documentation and the sample results, there is no pathway for potential solvents from this AOC to have contaminated the Sandia Canyon Watershed.
  - AOC 03-038(c) is a potential listed source for cyanide (i.e., spent cyanide plating bath solutions [F007], plating bath residues [F008], or spent stripping and cleaning bath solutions [F009] from electroplating operations). There are no documented releases from this AOC to the environment so there is no pathway to the Sandia Canyon Watershed.

- SWMU 03-037 is a potential source for cyanide (i.e., spent cyanide plating bath solutions [F007], plating bath residues [F008], or spent stripping and cleaning bath solutions [F009] from electroplating operations). . There is a record of a spill of spent cyanide solutions from the waste line serving the tank associated with this SWMU, however, the location of the spill was inside a basement and there is no apparent pathway to the Sandia Canyon Watershed.

- SWMU 03-056(c) is a potential listed source for PCE (F005). The sample data indicate that PCE was detected in a single confirmation sample, after the completion of the VCA at this SWMU, adjacent to Building 03-223 in a small inaccessible area. All other PCE results (working from the building, down the drainage and into the canyon) were non-detects. The acetone, benzene, and toluene detections in the soil are likely due to stormwater runoff from the asphalt parking lots in an around the SWMU. Given the lack of documentation, the sample results, the implementation of a VCA that removed the primary source, and the stabilization of the site using asphalt and BMPs, there is no pathway from contamination from the SWMU to the Sandia Canyon Watershed.

- Consolidated Unit 03-013(a)-00 is a potential listed source for solvents (F001, F002, F005). There are no documented releases of solvents to the floor drains and the sampling results at the outfall do not indicate the detection of residual solvents. The toluene is more likely due to stormwater runoff from asphalt and into the storm drain. Given the lack of documentation, the sample results, and the discontinued use of the outfall, there is no pathway to Sandia Canyon.

- TA-60 has no operations and/or spills that are listed sources.

- TA-61 has no operations and/or spills that are listed sources.

- TA-53 has the following operations and/or spills that are listed sources.

  - SWMU 53-005 is a potential listed source for TCE (F005) due to disposal of spent solvent that was released to the environment and was detected in the soil during site characterization. The TCE, however, has not been detected in the groundwater at the nearest baseflow (Middle Sandia at Terminus) and well (SCA-2) so there is no pathway to the Sandia Canyon Watershed. TCE is also not a chemical identified in Section 2.4 for review in this revision of the due diligence for the Sandia Canyon Watershed.

  - SWMUs 53-006(f) and 53-007(a) are a listed source for Mercury (U151) due to a spill that entered the floor drains that fed these tanks. The U151 listing is only applicable if it can be shown that the mercury was released from these tanks to environment. At this time there is no indication that these tanks or the associated piping have leaked to the environment.

- TA-72 has no operations and/or spills that are listed sources.

- Former TA-20 has no operations and/or spills that are listed sources.

Table 8 identifies the most likely source for each chemical under consideration in this due diligence. It also provides the conclusions regarding assignment of the potentially listed hazardous waste codes for the chemicals identified in Section 2.4.

Table 8
Summary of Conclusions for Sandia Canyon Watershed

Chemical	Codes	Most Likely Source	Conclusion
Bis(2-ethylhexyl) phthalate	U028	Plastics used as components of shot assemblies, as a bonding agent for high explosives, in waste storage equipment, and/or sampling equipment.	U028 is not applicable.
Bromomethane	U029	Residual fumigant or pesticide.	U029 is not applicable.
Carbon Disulfide	F005	Run off from paved surfaces and/or oil/fuel spills.	F005 is not applicable.
Chloroform	U044	Disinfection byproduct due to the chlorination of drinking water/potable water.	U044 is not applicable.
Chloromethane	U045	Residual contaminant due to decomposing and or burned biomass from the Cerro Grande Fire.	U045 is not applicable.
Chromium VI	F006, F019	Residual contaminant due to the breakdown of stainless steel cooling towers and other equipment.	F006 and F019 are not applicable.
Cyanide (Total)	F006, F007, F008, F009, F010, F011, F012, F019	Residual contaminant due to the use of insecticides.	F006, F007, F008, F009, F010, F011, F012, and F019 are not applicable.
Mercury	U151	Residual contaminant due to the use of fertilizers.	U151 is not applicable.
Methylene Chloride	U080, F001, F002	Run off from paved surfaces and/or oil/fuel spills.	F001 and F002 are not applicable. U080 is not applicable.
Naphthalene	U165	Residual contamination due to open burning and/or burned biomass during the Cerro Grande Fire.	U165 is not applicable.
Nickel	F006	Residual contaminant due to the breakdown of stainless steel well components and/or cooling towers/ other equipment that discharge potable water to the canyon.	F006 is not applicable.
Toluene	F005	Run off from paved surfaces and/or oil/fuel spills.	F005 is not applicable.

Based on these results, the listed waste codes for the analytes discussed in this review should not be applied at Sandia Watershed. If the waste is not otherwise listed or characteristic, it should be managed as non-hazardous waste.

5.0 REFERENCES/DOCUMENTS REVIEWED

Document Type	Title	Date	ER ID No.	Applicable TA(s)
Report	SWMU and AOC Report	Jan 2007	ER2006-0144	3, 20, 53 60, 61, 72
NA	PRS Database	NA	NA	3, 20, 53 60, 61, 72
Report	Spill Report – May 1990 – December 2010	Dec 2010	NA	3, 20, 53 60, 61, 72
Work Plan	RFI Work Plan for Operable Unit 1114	July 1993	0020947 LA-UR-93-1000	3, 60, 61
Work Plan	RFI Work Plan for Operable Unit 1100	May 1994	34756 LA-UR-94-1097	20, 53, 72
Addendum to Work Plan	RFI Work Plan for Operable Unit 1114, Addendum 1	July 1995	57590 LA-UR-95-731	3, 60, 61
RFI Report	RFI Report at PRSs at TA-3, 59, 60, 61	Feb 1996	52930 LA-UR-96-726	3, 60, 61
RFI Report	RFI Report at PRSs at TA-20, 53, 72	March 1996	54466 LA-UR-96-906	20, 53, 72
Remedy Completion	SWMU 61-002 Remedy Completion Report, Revision 1	Nov 2007		61
Work Plan Upper Sandia	Investigation Work Plan for Upper Sandia Canyon Aggregate Area	March 2008	100692 LA-UR-08-1850	3, 60, 61
HIR Upper Sandia	Historical Investigation Report for Upper Sandia Canyon Aggregate Area	March 2008	100693 LA-UR-08-1851	3, 60, 61
HIR Lower Sandia	Historical Investigation Report for Lower Sandia Canyon Aggregate Area	April 2009	105078 LA-UR-09-2077	20, 53, 72
Work Plan Lower Sandia	Investigation Work Plan for Lower Sandia Canyon Aggregate Area	April 2009	105079 LA-UR-09-2076	20, 53, 72
IR Sandia Canyon	Investigation Report for Sandia Canyon	October 2009	PRR-WTR-0281 LA-UR-09-6450	3, 20, 53, 60, 61, 72
IR Upper Sandia	Investigation Report for Upper Sandia Canyon Aggregate Area	May 2010	PRR-REM-0500 LA-UR-10-3256	3, 60, 61
IR Lower Sandia	Investigation Report for Lower Sandia Canyon Aggregate Area	DRAFT	DRAFT	20, 53, 72

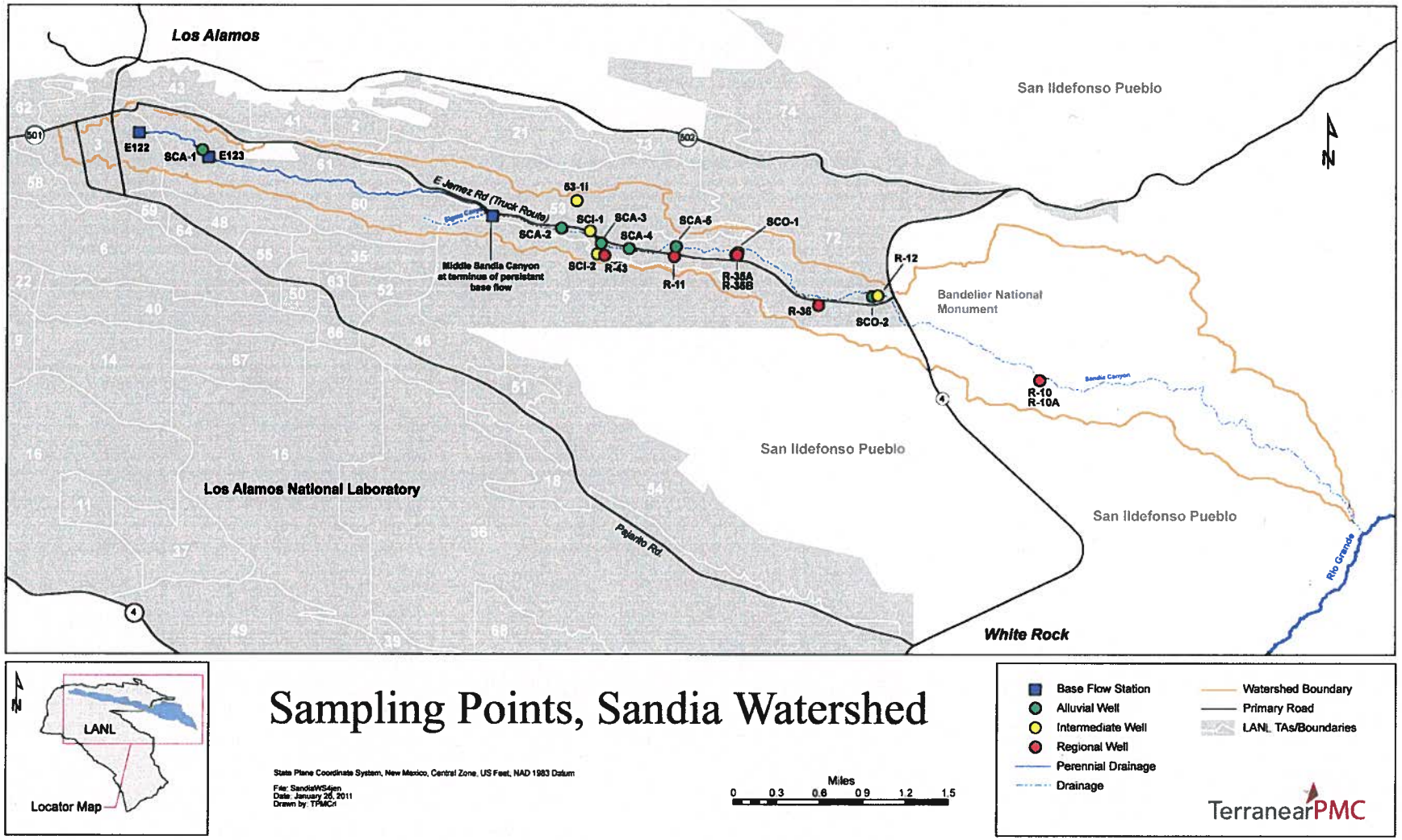

Figure 1 **Location of Well and Baseflow Sampling Points in Sandia Canyon Watershed**

Attachment A
Processes Associated With F- Codes for Detected Chemicals

Code	Process
F005	The following spent non-halogenated solvents: Toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.
F006	Wastewater treatment sludges from electroplating operations except from the following processes: (1) Sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum.
F007	Spent cyanide plating bath solutions from electroplating operations
F008	Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process.
F009	Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.
F010	Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.
F011	Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations.
F012	Quenching waste water treatment sludges from metal heat treating operations where cyanides are used in the process.
F019	Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusive conversion coating process. Wastewater treatment sludges from the manufacturing of motor vehicles using a zinc phosphating process will not be subject to this listing at the point of generation if the wastes are not placed outside on the land prior to shipment to a landfill for disposal and are either: disposed in a Subtitle D municipal or industrial landfill unit that is equipped with a single clay liner and is permitted, licensed or otherwise authorized by the state; or disposed in a landfill unit subject to, or otherwise meeting, the landfill requirements in § 258.40, § 264.301 or § 265.301. For the purposes of this listing, motor vehicle manufacturing is defined in paragraph (b)(4)(i) of this section and (b)(4)(ii) of this section describes the recordkeeping requirements for motor vehicle manufacturing facilities.
F021	Wastes (except wastewater and spent carbon hydrogen chloride purification) for production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives. (H)
F022	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions.
F024	Process wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes, from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution. (This listing does not include wastewaters, wastewater treatment sludges, spent catalysts, and wastes listed in § 261.31 or § 261.32.).
F025	Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution.

Attachment A (continued)
Processes Associated With F- Codes for Detected Chemicals

Code	Process
F026	Wastes (except wastewater (H) and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions.
F027	Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols.(This listing does not include formulations containing Hexachlorophene sythesized from prepurified 2,4,5-trichlorophenol as the sole component.).
F028	Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027.
F032	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross-contaminated wastes that have had the F032 waste code deleted in accordance with Sec. 261.35 of this chapter or potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.
F034	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.
F035	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.
F037	Petroleum refinery primary oil/water/solids separation sludge—Any sludge generated from the gravitational separation of oil/water/ solids during the storage or treatment of process wastewaters and oil cooling wastewaters from petroleum refineries. Such sludges include, but are not limited to, those generated in oil/water/ solids separators; tanks and impoundments; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludge generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges generated in aggressive biological treatment units as defined in Sec. 261.31(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and K051 wastes are not included in this listing. This listing does include residuals generated from processing or recycling oil-bearing hazardous secondary materials excluded under Sec. 261.4(a)(12)(i), if those residuals are to be disposed of.

Attachment A (continued)
Processes Associated With F- Codes for Detected Chemicals

Code	Process
F038	Petroleum refinery secondary (emulsified) oil/water/solids separation sludge—Any sludge and/or float generated from the physical and/or chemical separation of oil/ water/solids in process wastewaters and oily cooling wastewaters from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in DAF units. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges and floats generated in aggressive biological treatment units as defined in § 261.31(b)(2) (including sludges and floats generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this listing.

Attachment B
Wells and Base Flow - Sandia Canyon Watershed

Analyte	Analyte Type	CAS Number	Result	Qualifier	Units	Sample ID	Location Name
Aldrin	PEST	309-00-2	0.0175	J-	ug/L	CASA-09-501	SCI-2
Arsenic	METALS	As	15.7	J	ug/L	CASA-08-7356	SCA-4
			8.56	NQ	ug/L	CASA-10-3667	SCI-1
			5.91	NQ	ug/L	CASA-10-3653	SCA-5
			4.62	NQ	ug/L	CASA-10-3717	SCI-2
			3.1	J	ug/L	CASA-09-3013	R-12,Port1
Bis(2-ethylhexyl)phthalate	SVOC	117-81-7	59.1	NQ	ug/L	CASA-08-12884	R-36
			51.2	J	ug/L	CASA-08-7354	SCA-4
			25.1	J	ug/L	CASA-09-8279	R-12,Port1
			4.67	J	ug/L	CAMO-09-10501	R-43,Port1
			2.49	J	ug/L	CASA-08-12877	R-35b
Bromomethane	VOC	74-83-9	23.6	NQ	ug/L	CASA-08-12884	R-36
Carbon Disulfide	VOC	75-15-0	2.91	J	ug/L	CASA-09-8309	R-35b
Chloroform	VOC	67-66-3	0.742	J	ug/L	CASA-08-12858	SCI-1
			0.366	J	ug/L	CASA-09-8262	SCA-4
			0.339	J	ug/L	CASA-09-959	SCI-2
Chloromethane	VOC	74-87-3	1.86	NQ	ug/L	CASA-08-12884	R-36
			0.589	J	ug/L	CASA-09-8313	SCI-2
			0.534	J	ug/L	CASA-09-10350	SCI-1
			0.318	J	ug/L	CASA-09-2786	R-10, Port2
Chromium	METALS	Cr	658	NQ	ug/L	CASA-09-8315	SCI-2
			18.5	NQ	ug/L	CASA-09-10333	SCA-1DP
			18	NQ	ug/L	CASA-09-852	SCA-1
			17.1	NQ	ug/L	CASA-08-10569	SCI-1
			16.2	NQ	ug/L	CASA-08-10659	SCA-4
			13.7	NQ	ug/L	CASA-10-3653	SCA-5
			8.8	J	ug/L	CASA-08-12885	R-36
			7.39	J	ug/L	CASA-10-9839	R-43,Port2
			5.63	J	ug/L	CASA-10-9481	R-43,Port1
			4.82	NQ	ug/L	CASA-09-8277	R-12,Port1

Attachment B (continued)
Wells and Base Flow - Sandia Canyon Watershed

Analyte	Analyte Type	CAS Number	Result	Qualifier	Units	Sample ID	Location Name
Chromium hexavalent ion	HEX_CR	Cr(VI)	0.66	NQ	mg/L	CASA-09-504	SCI-2
			0.022226	NQ	mg/L	CASA-08-12871	R-11
			0.004435	J	mg/L	CASA-08-12868	R-10a
			0.004074	NQ	mg/L	CASA-08-12884	R-36
			0.003638	NQ	mg/L	CASA-08-12877	R-35b
			0.002159	NQ	mg/L	CASA-08-12865	R-10, Port2
			0.001612	NQ	mg/L	CASA-08-12875	R-35a
			0.000266	NQ	mg/L	CASA-08-12855	R-12,Port2
Cyanide (Total)	METALS	CN(TOTAL)	7.98	NQ	ug/L	CASA-09-2991	SCI-2
			4.52	J	ug/L	CASA-08-12858	SCI-1
			4.14	J	ug/L	CASA-08-10658	SCA-4
			3.36	J	ug/L	CASA-08-7436	R-11
			2.84	J	ug/L	CASA-08-12884	R-36
			2.75	J	ug/L	CASA-08-10556	R-35a
			2.73	J	ug/L	CASA-09-10335	SCA-1DP
			2.67	J	ug/L	CASA-08-10575	R-12,Port1
Heptachlorodibenzodioxin[1,2,3,4,6,7,8-]	DIOXIN_FURAN	35822-46-9	28.6	J	pg/L	CASA-09-10367	SCI-2
			1.23	J	pg/L	CASA-10-3861	R-43,Port2
Heptachlorodibenzodioxins (Total)	DIOXIN_FURAN	37871-00-4	55.4	NQ	pg/L	CASA-09-10367	SCI-2
			1.68	NQ	pg/L	CASA-10-3825	R-12,Port1
			1.23	NQ	pg/L	CASA-10-3861	R-43,Port2
Heptachlorodibenzofuran[1,2,3,4,6,7,8-]	DIOXIN_FURAN	67562-39-4	0.522	J	pg/L	CASA-10-3861	R-43,Port2
Heptachlorodibenzofurans (Total)	DIOXIN_FURAN	38998-75-3	0.522	NQ	pg/L	CASA-10-3861	R-43,Port2
			14.2	NQ	pg/L	CASA-09-10367	SCI-2
Mercury	METALS	Hg	8.62E-05	NQ	mg/L	CASA-08-14846	R-12,Port1
Methylene Chloride	VOC	75-09-2	2.93	J	ug/L	CASA-08-7347	R-10, Port1
Naphthalene	VOC	91-20-3	1.52	NQ	ug/L	CASA-08-12858	SCI-1
Nickel	METALS	Ni	19.4	NQ	ug/L	CASA-10-3653	SCA-5