Los Alamos
NATIONAL LABORATORY
EST. 1943

IWD Part 1, Activity Specific Information

IWD#: 2010-Task-Order#8-DrillingR60 Revision#: 0			Activity/Task Title **IWD for Drilling and Installation of MTOA Task Order #8 Well R-60 at LANL**
Company Name / Subcontract #: TerranearPMC Subcontract #66278-007-10 TO#8			Planner/Preparer (Name/Z No./Date) Steve White/208872/8-11-2009
TAs: 63	Building: Outdoors	Room: N/A	Additional Location Description: TA-63 east of MDA C at the corner of Pajarito Rd. and Puye Rd.

Activity Description/Overview

List Names of Hazard Analysis (HA) Team: A. Crowder, S. White, P. Baucom, R. Brounstein Date HA Performed: 6/30/10

ACTIVITY DESCRIPTION/OVERVIEW

This IWD applies to drilling regional wells awarded under the MTOA contract and related activities at Los Alamos National Laboratory.

The project may include the following activities and concerns:

This IWD breaks each of these activities into work elements and identifies hazards and controls.

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The drilling and sampling campaigns are part of several environmental investigations being conducted by Los Alamos National Security, LLC in response to the requirements set forth in the New Mexico Environment Department (NMED) Consent Order and in support of the ongoing mission to understand the impacts LANL's past operations have on the surrounding environment.

Work Tasks/Steps Identify work steps/tasks in sequence when such sequencing contributes to safety, security, and/or environmental protection.	**Hazards, Concerns, and Potential Accidents/Incidents** Identify both activity and work-area hazards for each task/step.	**Controls, Preventive Measures, and Bounding Conditions** Specify preventive measures, controls for each hazard (e.g., lockout/tagout points, specific PPE, TIDs, alarms, safes, recycle, waste minimization)	**Reference Documents** List permits, operating manuals, security plans, and other reference procedures.	**Training** List training and qualification requirements.
See next page.				

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
GENERAL FIELD WORK (GFW) -- Generally, GFW includes setup of work zones, postings, walkdowns, inspections, mapping, working at night and other non-intrusive tasks.				

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
GENERAL FIELD WORK (GFW) Setting up generator/light systems and operation around rig.	Integrated trailer-mounted generator / lighting system	➢ Use containment to catch small leaks of fuel or fluids from generator. ➢ Follow manufacturer's recommendations. ➢ Generator must have UL listing. ➢ Routine maintenance on equipment will be provided by on-site personnel. ➢ Non-routine maintenance will be performed by qualified electrician only. ➢ Ground the generator per manufacturer's specifications. ➢ If used as a 120 VAC generator to operate power tools, each circuit must include a ground fault circuit interrupter.	TPMC ES&H Plan Section 36 (Electrical Safety)	
GENERAL FIELD WORK (GFW) Setting up generator/light system	Lights "blind" drivers	Set up lights in a manner that they do not shine onto roads in a way that interferes with vehicular traffic.		
GENERAL FIELD WORK (GFW) Working at night	Alertness of workers	➢ To the extent feasible, managers will avoid making double shift assignments or rotating schedule assignments to workers within a given week. ➢ Workers should get plenty of sleep. ➢ Initially, the work schedule is 7 days/week 630 AM to 630 PM		
GENERAL FIELD WORK (GFW) Working with a generator/light system	Inadequate illumination of work area and accessory structures	➢ Set up at least two light systems around the drill rig location, or more so that they minimize shadows in the work area. ➢ Verify that the following minimum illumination levels are attained by taking foot-candle power reading 18 inches above the walking and working surfaces: ➢ An average of five (5) footcandle power on the whole of the derrick floor, with no less than three (3) footcandle power at any point; and ➢ A minimum of three (3) footcandle power at all other walking and working surfaces. ➢ Weather and other circumstances such as the need to perform fine work may warrant higher lighting values. ➢ Run the lighting system from about 30 minutes before dusk and until 30 minutes after dawn. ➢ Provide additional illumination or post and tape-off work areas where the required lighting levels are not attained. ➢ Move chemical toilets closer to illuminated work area if necessary. ➢ Take flashlights to toilet, if necessary.	OSHA 29 CFR 1926.65 (m) Table D-65-1	

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
GENERAL FIELD WORK (GFW) Working at night under lights	Sample trailer with wiring in unknown condition	Give LANL electrician the opportunity to approve trailer wiring before connecting to generator. Illuminate sample trailer using a portable or trailer-mounted generator [see controls for Trailer-mounted generator / lighting system (above)].		
GENERAL FIELD WORK (GFW) Working at night under lights	Misjudging the speed of rotating objects	➢ Mercury vapor, high pressure sodium and other gas discharge lighting systems actually have a 60 cycle flicker. Be careful around rotating equipment and think before you reach. The speed of a rotating objects can be difficult to judge under light that has a 60 cycle flicker.		
GENERAL FIELD WORK (GFW) Working at night under lights	General concerns	➢ Use integrated generator/light systems around the rig [they have no cords to trip over]. ➢ Avoid looking directly into lights as it will reduce your ability to see clearly in dim lighting. ➢ Increase your visibility by wearing brightly colored safety vests in the drilling area. ➢ Observe good housekeeping practices to reduce the risk of trips and falls in the work area. ➢ Do a meticulous job of remove protruding roots and rocks, fill in holes and mitigate other trip hazards in the work areas. ➢ Work deliberately, reposition lighting systems as necessary, or use flash lights as necessary to better illuminate critical operations. ➢ Delay to the next day those tasks that cannot be safely performed under lights. ➢ Drop light systems during extended absences from drill pad. ➢ Close motor covers when not in use to avoid rodent's nesting in engine area. ➢ Assure engine is either grounded to the frame or grounded to the grounding rod and validate the bonding of the ground lead. ESO to confirm		
GENERAL FIELD WORK (GFW) Working at night under lights	Power outage	➢ Flashlights will be kept in trailer, vehicles and other critical locations in case of power outage. ➢ Use flashlights to get around site, as necessary during power outage. ➢ Shutdown the rig and ancillary equipment. ➢ Restore lighting before resuming drilling and other site operations. ➢ If unable to restore lighting then leave the site until daylight.		
GENERAL FIELD WORK (GFW)	Operating forklift or heavy equipment at night	➢ Make sure that lights are functional. ➢ Only operate in the well illuminated areas .		

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
Working at night under lights		➢ Have workers wear reflective or high-visibility vests.		
GENERAL FIELD WORK (GFW) Refueling generators, light plants and combustion heaters	Fire or injury	See requirements for "Refueling" in the "Equipment Inspection, Maintenance, and Refueling" section of # 2007-R36-WSP:		
GENERAL FIELD WORK (GFW) Working in Cold Weather	Ice and water on work surfaces	➢ Make sure that mist discharge from rig is pointed into pit. ➢ Use hand tools as necessary to eliminate ice accumulations from work and walking surfaces. ➢ Use sand, rock salt or an approved non-hazardous de-icer on critical work surfaces (including water-truck deck, driller's platform, sampling area around pit berm, steps) and other locations where injury or slips could reasonably be anticipated. ➢ Avoid spills of fluids on work surfaces by diligent management of fluids at the job sites. Keep power cords and connectors dry.		
GENERAL FIELD WORK (GFW) Working in Cold Weather	Portable heaters	➢ Inspect each day as you would a power tool. ➢ Keep away from combustibles. ➢ Do not overload electric circuits [mostly a risk with small portable (<5 kW) generators]. ➢ Turn-off salamanders / combustion heaters and allow to cool before refueling. ➢ See requirements for "Refueling" in the "Equipment Inspection, Maintenance, and Refueling" section of # 2007-R36-WSP (Phase 1 IWD).	Manufacturer's specification	
GENERAL FIELD WORK (GFW)	Wildfire or Fire *- Only Team Members with Fire Extinguisher: Designated Worker and Fire Watch can provide Fire Watch for Spark Flame Permit Requirements*	➢ Person in Charge or Site Safety Officer will determine the LANL Fire Danger Rating Matrix (http://int.lanl.gov) daily and communicate this information to site workers. ➢ In the event of 'red" flag condition, drill pad work shall pause and re-assess the conditions for managing spark/flame operations before commencing or continuance of those activities. ➢ Work to the requirements of: • The LANL Fire Matrix (http://int.lanl.gov/fire_matrix.html); check daily during high wind season or dry conditions • The site-specific Fire Protection and Prevention Plan • Any case-by case instructions from the Area's Fire Marshall,	Spark- or Flame-Producing Operations Permit (Form 1563) TPMC ES&H Plan section 22 (Welding, Cutting, Brazing and Grinding) Project-specific ES&H Plan section 21 (Site Specific Fire Protection & Prevention Plan)	PS-13 courses 15672 (Designated Worker and Fire Watch) and 9893 (Hands on Fire Extinguisher Training), or equivalent.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
		and • Spark flame permit conditions. ➢ At least one person on-site shall have a 2-way radio or cell phone. ➢ Call for emergency services (911) or use 2-way radio to summon help. ➢ A portable fire extinguisher (10 BC minimum) must be provided for the Fire Watch by those conducting the activities. (Inspect monthly) ➢ If weather conditions change adversely, stop work until safe conditions are re-established. ➢ Keep exhaust hoses and catalytic converters away from flammables such as tall grass. ➢ Before welding of grinding, wet the areas downwind of the welding site. In particular, if slash debris is in close proximity to the spark/flame site and on the edge of the drill pad. ➢ Ensure that the operations do not cause a fire or hot spot. Observe the work area(s) following cessation of the operation. ➢ Operate the smallest feasible number vehicles off-road. ➢ Vehicles deployed off-road shall be provided with a currently inspected portable fire extinguisher commensurate with the potential fire hazards that may be present. ➢ Off-road vehicles and fuel-fired equipment (e.g., chain saws, chippers, etc) must have approved spark arresters or suitable safety devices, if required by Fire Marshall. ➢ Portable generators: ❖ Clear away combustible material from the generator for an area of at least ten feet. ❖ Workers are to remain in the general area of the generator while it is in operation. ❖ Portable generators may not be used in undeveloped areas during Red Flag conditions. ➢ No outdoor cooking activities in undeveloped areas. ➢ Arrange work area so that fire roads, fire lanes and access for emergency response vehicles is not restricted.) ➢ Evacuate to a safe location in the event of wildfire.	LANL Wildland Fire Hazard Matrix	
GENERAL FIELD WORK(GFW)	Exposure to Nuisance Dust	➢ Drill with water or foam where possible to eliminate airborne dust levels.	Drilling and Installation of wells	

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
		➢ Avoid working immediately downwind of airborne dust sources to the extent feasible. ➢ Perform representative real-time aerosol monitoring when there is visible dust in the breathing zones of workers. ➢ Conduct operations in a manner that time-weighted average real-time aerosol monitoring readings do not exceed **3 mg/m^3**. ➢ In the event dust suppression is ineffective, TPMC respiratory protection program will be invoked and will used to manage any respiratory exposure.	at LANL ES&H Plan parts 51.2. TPMC Respirartory Protection Program	
GENERAL FIELD WORK (GFW)	Eye injury from branches, twigs, and other objects	➢ Safety glasses with side shields meeting requirements of 29 CFR 1910.133, Eye and Face Protection, where the possibility of eye injury exists.	29 CFR 1910.133, Eye and Face Protection	TPMC's PPE Training or equivalent.
GENERAL FIELD WORK (GFW)	Sudden severe illness (heart attack, seizure, etc.); injury	➢ Use the buddy system. No one is permitted to work alone in the field. ➢ At least one person on-site shall have a 2-way radio or cell phone. ➢ First Aid kit. ➢ Call for emergency services (911) or summon help on the 2-way radio, if appropriate. ➢ Make sure that personnel requiring medical TREATMENT for a serious condition are sent directly to an emergency room, not to LANL Occupational Medicine. ➢ Bloodborne pathogen kit. ➢ Preserve the scene of an accident. ➢ Verbally notify the STR of the incident as soon as possible.	TPMC ES&H Plan Section 56, (Biological Safety) TPMC ES&H Plan Section 5, (Incident Reporting Requirements)	Pre-job briefing. First aid/CPR-certified person on-site during site operations. TPMC's PPE training or equivalent.
GENERAL FIELD WORK (GFW)	Forklift operation, accident or injury	➢ Inspect upon arrival, departure, and before the first use of the day. ➢ Be familiar with operation and function of all controls and instruments before using the vehicle. ➢ Operator must be trained and licensed for the equipment he/she will be operating. ➢ Ensure forklift has sufficient capacity to handle the determined load weights. ➢ Evaluate work area hazards, obstacles, and clearances before starting work. ➢ Operate the forklift in a manner that avoids the following hazards: ❖ falling loads caused by overloading:	TPMC ES&H Plan Section 16, (Motor Vehicles and Powered Industrial Trucks) 29CFR 1926.600 and .602	PS-13 20299 - Forklift Safety Fundamentals, or equivalent PS-13 20300 - Forklift Examination, or equivalent PS-13 28151 Hands-on proficiency training or equivalent. Certification by employer that operator has current training per 29 CFR 1910.178(L), Operator

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
		❖ unbalanced loading, or ❖ other improper loading, i.e., free rigging a load,; ❖ obstructions to the free passage of the load or to the operator's view in the direction of travel; platforms, curbs, or other surfaces, which could cause the vehicle to veer or fall; ❖ poor maintenance; ❖ driving the vehicle at excessive speed ❖ using equipment for a purpose for which it was neither intended nor designed. ➢ Perform and document pre-operational inspection before each shift during which the vehicle is used. Use Form 1568, Inspection Checklist for Forklifts and Powered Industrial Trucks (Checklist - http://enterprise.lanl.gov/forms/1568.pdf), or equivalent. ➢ Only use internal combustion powered forklifts in well-ventilated spaces. ➢ Use personal restraint devices, including seatbelts, if provided. ➢ Use a spotter with 2-way radio when backing-up, if rear view is obscured. Spotters for forklifts must also have forklift training. ➢ Ensure the backup alarm is fully functional and used . ➢ See "Overhead Hazards" under **General Field Work**.		Training.
GENERAL FIELD WORK (GFW)	Lifting heavy objects	➢ Before moving or carrying a heavy or bulky object to another location, check the routes to ensure that obstructions and/or slip and trip hazards are removed. Choose an alternate route if clearance is not adequate. ➢ Assess the potential lift against the parameters of a "critical" lift per the ESH Plan and implement the program is the criteria for such a lift is met. ➢ Evaluate the load location, task repetition, and load weight to determine if the material can be lifted safely ➢ Inspect materials for slivers, jagged or sharp edges, and burrs, rough or slippery surfaces before handling. ➢ Use a handling aid, such as a hand truck or cart, a hand tool, or a jack, to lift and/or move heavy objects, if possible. ➢ Use proper lifting technique to safely lift the load: ❖ Place feet close to load and lift mostly by straightening the legs, keeping the load	DHHS Publication #94-110 (Applications Manual for the Revised NIOSH Lifting Guidelines)	TPMC's General PPE training.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
		❖ Close to the body. ❖ Get a good grip on the load. ❖ Do not twist the back or bend sideways. ❖ Do not lift or lower awkwardly. ❖ Do not lift with the arms extended. ➢ Get mechanical help or help from another person if the load is too heavy. ➢ Wear gloves, hand leathers, or other hand protectors to prevent hand injuries. ➢ Wear protective footwear, such as steel-toed shoes where foot injury could occur.		
GENERAL FIELD WORK (GFW)	Heavy equipment operation: general	➢ Inspect heavy equipment upon its arrival to the site and daily prior to start of work. ➢ Be observant as to your location with respect to heavy equipment. ➢ Maintain daily equipment inspection forms on site. ➢ Use a spotter and 2-way radios if backing-up and rear visibility is limited.	Manufacturer's Specification. 29 CFR 1926.601 Motor Vehicles. 29 CFR 1926.602 Material Handling Equipment	TPMC's PPE Training, or equivalent.
GENERAL FIELD WORK (GFW)	Heavy equipment operation: working on inclined surface	➢ Equipment must be equipped with a rollover protective structure. ➢ If equipment, as delivered by the manufacturer, included seat belts then they shall be worn while the equipment is operated. ➢ Stay clear of the down hill side of the equipment. ➢ To the extent warranted proceed directly up/down steep slopes rather than traversing them in a diagonal manner. ➢ Set outriggers, lower blades, forks and buckets to the ground. Set parking brake to stabilize equipment on un-even surfaces and slopes. ➢ If necessary, construct an earthen ramp and pad to safely access the required position on the slope.	29 CFR 1926.601 Motor Vehicles. 29CFR1926.602 Material Handling Equipment.	
GENERAL FIELD WORK (GFW)	Electric shock: use of a generator	➢ Follow manufacturer's recommendations. ➢ Generators must have UL listing. ➢ Routine maintenance on equipment will be provided by on-site personnel. ➢ Non-routine maintenance will be performed by qualified electrician only.	Manufacturer's recommendations. TPMC ES&H Plan Section 30 (Lockout/Tagout Procedure) TPMC ES&H Plan	Pre-job briefing.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
		➢ Proper grounding of all portable generators only where required by manufacturer's specifications or 29 CFR 1926.404(f), Wiring Design and Protection: Grounding. ➢ Ground the trailer-mounted generator per manufacturer's specifications and 29CFR 1926.404(f), Wiring Design and Protection -Grounding. ➢ **STR through the ESO must approve all temp. wiring including extension cords**	Section 36 (Electrical Safety)	
GENERAL FIELD WORK (GFW)	Injury, spill or sample loss due to poor housekeeping	➢ Keep work area organized. ➢ Do not allow tools, materials or equipment to become a tripping/impalement hazard.	29 CFR 1926.25 Housekeeping	Pre-job briefing.
GENERAL FIELD WORK (GFW)	Mishap related to motor vehicle use	➢ Inspect vehicle daily. ➢ Do not use vehicles with obvious problems on the project. ➢ Do not transport a passenger unless he/she is in a seat. ➢ Wear seatbelts in vehicles that are equipped with them. ➢ Abide by posted speed limits. ➢ Determine the safest route to the site prior to mobilization. ➢ Use a spotter with 2-way radio when backing-up, if rear view is obscured. ➢ Wear brightly colored (e.g. orange) vests in vicinity of motor vehicles. Immediately notify STR and TPMC program manager if an accident occurs ➢ If an overhead power line comes in contact with any vehicle, including a forklift, drill rig, motorized vehicle, or any other piece of driven equipment, the operator is to remain inside the vehicle, call for help, and wait for emergency response assistance. ➢ Do Not park vehicles on drill pad unless necessary and in support of operations being conducted on the drill pad.	TPMC ES&H Plan Section 16 (TPMC Motor Vehicle Safety Program). 29 CFR 1926.955 Over Head Power Lines	Valid and current driver license for the type of vehicle driven. TPMC's PPE training or equivalent. TPMC approved Boart Forklift Training 29 CFR 1910.178(1) TPMC Motor Vehicle Safety Program
GENERAL FIELD WORK (GFW)	Overhead hazard	➢ Secure overhead objects. ➢ Prior to raising mast, inspect to ensure there are no loose tools or parts, which could fall. ➢ Watch out for overhead obstructions or objects falling from mast. ➢ Wear hardhat to protect head from falling objects (ANSI Z89.1-1986) in areas where overhead hazards are present. ➢ Pay attention to hazards such as trees and/or large limbs that may fall into work area.		TPMC's PPE training or equivalent.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
		➢ Pay attention to hazards such as overhead power lines. Maintain minimum safe distances from all high voltage lines. Ensure that the equipment or any part thereof does not have the capability to come within the following distances from the energized lines: Minimum distances for operation of equipment near high voltage power lines (2300 meters altitude): • 11 feet from lines of 50 kV or less • 17 feet from lines of 51 kV to 200 kV • 23 feet from lines of 201 kV to 350 kV • 28 feet from lines of 351 kV to 500 kV • 39 feet from lines of 501 kV to 750 kV • 51 feet from lines of 751 kV to 1000 kV Minimum distances for equipment in transit with no load and the boom and-or mast lowered (2300 meters altitude): • 5 feet from lines of 0 kV to 50 kV or less • 13 feet from lines of 51 kV to 345 kV • 18 feet from lines of 346 kV to 750 kV • 23 feet from lines of 751 kV to 1000 kV ➢ Notify LANL Operations of overhead hazards so that proper warning signs/flags can be emplaced.	TPMC ES&H Plan section 32.17.2 (Minimum distances for equipment in transit) 29 CFR 1926.955 OSHA Overhead Hazards	Pre-job briefing.
GENERAL FIELD WORK (GFW)	Trailer: inadvertent movement	➢ Block tires and set stabilizer jacks if equipped.		
GENERAL FIELD WORK (GFW)	Trailer: towing	➢ Ensure that the brake, taillights, and trailer brakes are functioning properly before moving the vehicle. ➢ Connect the trailer safety chains to the vehicle. ➢ Ensure that the towing vehicle and associated equipment have the rated capacity to handle the trailer. ➢ Use a spotter with 2-way radio when backing-up, if rear view is obscured. ➢ Use a spotter when backing or staging trailer to work location.	TPMC ES&H Plan Section 16 (Motor Vehicle Safety Plan)	Valid and current driver license for the type of vehicle driven.
GENERAL FIELD WORK (GFW)	Biting and venomous plants and animals	➢ Designated first aid / CPR trained personnel on field team. ➢ First aid kit with supplies on site. ➢ Watch out for and avoid poisonous plants and animals.	TPMC ES&H Plan Section 56, (Biological Safety)	First aid / CPR
GENERAL FIELD	Wild animals	➢ Avoid wild animals.	TPMC ES&H Plan	Pre-job briefing controls

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
WORK (GFW)			Section 56, (Biological Safety)	
GENERAL FIELD WORK (GFW)	Hanta virus	➢ Look for and avoid rodent droppings and nests. ➢ If droppings or nests must be disturbed to complete work, notify the STR to schedule the removal of the droppings and/or nest(s).	TPMC ES&H Plan Section 56, (Biological Safety)	
GENERAL FIELD WORK (GFW)	Bloodborne pathogens	➢ Bloodborne pathogen exposure control kit.	TPMC ES&H Plan Section 56, (Biological Safety)	Annual TPMC Bloodborne Pathogen training Course:7292 or 11776 (Self Study) or equivalent, for designated first aid/CPR providers. First Aid/CPR training TPMC's PPE training or equivalent.
GENERAL FIELD WORK (GFW)	Hypothermia, cold stress	➢ Use the buddy system. ➢ Dress properly and for the weather ➢ Several thinner layers of clothing are better than one heavy layer. ➢ Avoid getting your skin or clothing wet. ➢ Take breaks as necessary to stay warm. ➢ Consult ES&H Representative about the need for additional protective measures and protocols if equivalent chill temperature is below 20 ^{o}F. This corresponds to about: ❖ 20^{o} F - calm conditions ❖ 25^{o} F - 5 mph wind speed ❖ 30^{o} F - 7 mph wind speed ❖ 35^{o} F - 10 mph wind speed ❖ 40^{o} F - 17 mph wind speed ❖ 45^{o} F - 30 mph wind speed ➢	Current ACGIH TLV booklet TPMC ES&H Plan Section 18 (TPMC Temperature Extremes Program) TPMC ES&H Plan Section 18 (Inclement Weather)	Complete PS-13 Thermal Stress Awareness self-study course (#18649), or equivalent
GENERAL FIELD WORK (GFW)	Heat exposure	➢ Take breaks as needed to cool down. ➢ Use the buddy system ➢ Beware that PPE increases your heat exposure. ➢ Drink plenty of water. ➢ Obtain a heat stress evaluation from ES&H Representative and implement recommended controls if air temperature exceeds 70^{o}F,	ACGIH TLV booklet, current year. TPMC ES&H Plan Section 18 (Inclement Weather)	PS-13 course, Thermal Stress Awareness (Course #18649), or job-specific briefing on heat stress conducted by a qualified person.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
		you are working in direct sunlight, you are wearing coveralls, or other heat exposure exists. ➢ ES&H Representative shall prescribe physiological monitoring and/or work-rest regimen based on outdoor wet-bulb globe temperature, when conditions and activities could result heat illness or unacceptable heat strain. ➢ ES&H Representative will follow ACGIH guidelines for heat stress to the degree warranted by the prevailing weather conditions.	TPMC ES&H Plan Section 18 (TPMC Temperature Extremes Program)	
GENERAL FIELD WORK (GFW)	Lightning/flash flood	➢ Comply with the AMS Lightning Recommendations including the "30-30 Rule": if the time between the flash and the boom of a lightning stroke is 30 seconds or less, stop work and take shelter in the field trailer or other designated safe area. Do not resume work until 30 minutes after the last lightning/thunder. ➢	TPMC ES&H Section 18 (Inclement Weather)	Pre-job briefing.
GENERAL FIELD WORK (GFW)	High Winds	➢ A "Stop Work" shall be enforced when continuous wind velocities reach 25 mph or gusts of 45 mph (defined as "Near-Gale" and "Gale" conditions, respectively). ➢ The TPMC PIC or ES&H Rep shall obtain weather information from the National Weather Service (http:www.wrh.noaa.gov/pqr/info/wind.php). ➢ All spark and flame producing operations shall cease (hot work) and re-assess conditions when LANL issues a "Red Flag" condition	TPMC ES&H Plan, Section 18(Inclement Weather)	Pre-job briefing.
GENERAL FIELD WORK (GFW)	Portable power tools	➢ Work to the requirements of the General ES&H Plan Chapter 17 (Tools and Equipment) ➢ **STR through the ESOmust approve all temporary wiring and extension cords.**	TPMC ES&H Plan Section 17 (Tools and Equipment)	TPMC (or employer's) PPE training.
GENERAL FIELD WORK (GFW)	Hand tools	Work to requirements of General ES&H Plan Chapter 17 (Tools and Equipment)	TPMC ES&H Plan Section 17 (Tools and Equipment)	None
GENERAL FIELD WORK (GFW)	Sharp edges and points	➢ Personnel shall wear leather or equivalent work gloves. ➢ Use scissors where feasible. ➢ Knife blades shall be retracted or sheathed when not in use. ➢ Cut away from body. ➢ Wear a leather apron or other protective clothing when it is not possible to cut away from your body.	TPMC ES&H Plan, Section 17 (Tools and Equipment)	TPMC's PPE training or equivalent. Pre-job briefing.
GENERAL FIELD	Sunburn	➢ Wear sunscreen or clothing that minimizes exposure to the sun, as	none	Pre-job briefing.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
WORK (GFW)		needed. ➢ Re-apply sunscreen throughout the work day. ➢ PPE requires that employees wear shirts at least 4" sleeves, i.e., t-shirts with the sleeves cut off are not permitted.		
GENERAL FIELD WORK (GFW)	Slips, Trips and Falls	➢ Be aware of surroundings. ➢ Be cautious on muddy, icy or leaf-covered slopes. ➢ Follow good housekeeping practices by stabilizing the ground, using absorptive materials to control mud, and cleaning surfaces with slippery substances. ➢ Be cognizant of fall hazards when down climbing from elevated surfaces. ➢ Don fall arrest PPE when working from an elevated surface more than 6' from the ground and ensure an adequate anchor is being secured when using fall arrest system(s). ➢ Clearly mark slip/trip/fall hazards that cannot be eliminated, if feasible. ➢ Do not walk on unstable objects such as pipe, auger stem or core barrels.	none	Pre-job briefing
GENERAL FIELD WORK (GFW)	Small spills and drips	➢ Prevent spills by using secondary containment below equipment with plastic sheeting, oil pans, hydraulic systems, etc., where feasible, ➢ Check spill control kit daily and replenish supplies as needed. ➢ Prevent spill from spreading to larger areas, if feasible. ➢ Clean-up small spills yourself, if you can safety do so. ➢ **Immediately notify the STR and follow ES&H Plan incident reporting requirements**. ➢ Contact Waste Management Coordinator to identify and obtain appropriate containers. ➢ For spills that you cannot easily respond to, call EM&R (667-6211).	TPMC ES&H Plan Section 5, (Incident Reporting Requirements)	Pre-job briefing.
GENERAL FIELD WORK (GFW)	Chemical and chemical products	➢ Consider non-hazardous, non-toxic alternatives; purchase only what is needed for project. ➢ **STR approval required for bringing chemicals on site.** ➢ **Provide STR with chemical inventory information.** ➢ Follow the PPE requirements on the MSDS. ➢ Segregate incompatible chemicals. ➢ Follow chemical container labeling requirements in the TPMC	MSDS file on-site TPMC ES&H Plan Section 19, (Chemical and Hazardous Materials Management)	TPMC's HAZCOM training TPMC's PPE training or equivalent.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
		HAZCOM Plan ➢ Comply with handling, use, storage and disposal requirements established by "Additional TerranearPMC Handling, Use, Storage, and Disposal Requirements." ➢ Portable eyewash station meeting requirements of ANSI Z358.1 immediately available in the work area when corrosive materials (for instance acids, bases, Portland cement, Portland or cement wash water) are used or stored on-site. ➢ Smaller, 32 ounce or 1 liter sealed eyewash bottles can be used in place of an eyewash station when corrosive materials are neither used nor stored on-site.		
GENERAL FIELD WORK (GFW)	Drilling Activities may take place at active sites where other heavy equipment is being operated or traffic is a concern	➢ Check in with Site Representative ➢ Complete site training as required by Site Representative ➢ Wear PPE ➢ Check in with LWSP Operations and Site-Specific Access Control ➢ Ensure that activities are on LWSP POD CAP-FS and the landowning FOD, if necessary	TPMC ES&H Plan Section 12 (Personal Protective Equipment)	TPMC's PPE Training or equivalent.
GENERAL FIELD WORK (GFW)	Release from pressurized container of Investigative Derived Waste	➢ Inspect drums before opening. ➢ Open carefully slowly. ➢ Use drums with bung on lid. ➢ Loosen bung slowly to relieve pressure before opening container. ➢ Monitor for organic vapors, if they have the potential to be present. ➢ Wear safety glasses with side shields, gloves, and apron, if necessary.		
GENERAL FIELD WORK (GFW)	Mismanaging Investigative Derived Waste	➢ Consult with Waste Coordinator, as necessary ➢ Comply with approved Waste Characterization Strategy Form in the Project-specific ES&H Plan Attachment 39 ➢ Comply with all applicable waste requirements: These include, but are not limited to: requirements for Satellite Accumulation Areas and <90 Day Accumulation Areas: ❖ Volume limits ❖ Labeling ❖ Time Constraints ❖ Location	TPMC ES&H Plan Section 39 (Waste Management Plan)	LANL RCRA Personnel Training Course: 7488. RCRA Refresher Course: 28582. Waste Generation Overview (Live) Course: 23263.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
		❖ Inspections ❖ Signs/positing. ➢ Refer to reference documents for further details.		
GENERAL FIELD WORK (GFW)	Injury from exposure to chemical reagents and standard solutions during waste sampling. Injury from slips/trips/falls in and around drilling pits.	➢ No bottles of bulk chemical reagents will be used. ➢ Chemical reagents will be packaged and used in a manner which provides no potential for employee exposure. ➢ Emergency eye-wash required within 100 ft of point of use of chemicals or testing reagents. ➢ Minimum PPE for using chemical reagents is safety glasses w/ side shields, face shield, and nitrile gloves. ➢ Use caution around excavations. Temporary collapsible ladders to be installed at pits for egress. Work with a buddy.	TPMC ES&H Plan Section 12 (Personal Protective Equipment) Sample in concurrence of applicable Waste Characterization Strategy form	None
GENERAL FIELD WORK (GFW)	During waste sampling poly tanks, drums, containers, etc of waste become pressurized Fall hazard from tanks 1500 gal. and above	➢ Inspect drums before opening. ➢ Open slowly. Do not stand directly over lid. ➢ Use drums with bung on lid. ➢ Loosen bung slowly to relieve pressure. ➢ Wear safety glasses with side shield. ➢ Do not use ladder on uneven surface. ➢ Do not stand on top rung. ➢ Ensure ladder weight requirements for personnel and materials are not exceeded. ➢ Look out for overhead obstructions. (Power lines, tree limbs etc). ➢ Use a spotter and the three point contact when climbing up and down ladders. ➢ Only use non-electric conducting ladders around powerlines or where there is a potential for lighting strikes. ➢ Monitor changing weather conditions.	Site specific ES&H Plan TPMC ES&H Plan Section 12 (Personal Protective Equipment) Sample in concurrence of applicable Waste Characterization Strategy form Daily Tailgate Safety Meeting	Waste Generation Overview (WGO) Ladder Safety Training
GENERAL FIELD WORK (GFW)	During waste sampling in Frac Tanks: Fall hazard Pinch points Sharp objects	➢ Do not enter Frak Tanks for any reason. ➢ Do not climb on top of tank. ➢ Look for overhead hazards. ➢ Use Manufacture provided steps and handrails to access tank openings. ➢ Do not break the plane of the tank's opening with the face. ➢ Wear PPE as required by site-and activity specific hazards such as	Site specific ES&H Plan TPMC ES&H Plan Section 12 (Personal Protective Equipment) Sample in concurrence of	Waste Generation Overview (WGO)

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
		safety shoes, safety glasses, leather gloves, etc. ➢ Pinch points may exist at openings and valves. ➢ Look for sharp objects. ➢ Monitor changing weather conditions.	applicable Waste Characterization Strategy form Daily Tailgate Safety Meeting	
GENERAL FIELD WORK (GFW) Performing work tasks outdoors. Access field locations by vehicle and by foot.	General field hazards include: irregular terrain, seasonal heat and cold extremes, snow, ice, floods, wind, sun exposure, lightning, insects, reptiles, large animals, poison ivy, falling trees and/or limbs, animal holes, stump holes, fire, and exposure to environmental contamination.	➢ Check fire danger daily (when restrictions apply). ➢ When in the field: • Maintain awareness of surroundings and terrain. • Postpone work in poor weather. • Use the buddy system. • Wear appropriate clothing, including work boots, long pants, and sleeved shirt. • Be aware of potential contamination areas, contamination reduction, and personal hygiene. • Follow specific controls for each general field hazard as listed in RRES-EWS-Field, General Field Safety for All. ➢ When driving: • Maintain vehicles in safe condition and wear seat belts. • Obey posted speed limits. • On remote, single lane roads with blind corners, drive slowly and be observant for other vehicles pedestrians, and bicycles. ➢ Emergency Services/Support: • All field locations (directions and lat./long.) will be established and provided to LA Fire and TA-64 access center. • TA-64 Access Center to confirm directions are available prior to work authorization.	RRES-EWS-Field, General Field Safety for All. ENV-WQH-SOP-004, Radio and Cellular Phone Use. P101.7 Vehicle and Pedestrian Safety.	Valid Driver's License. First Aid/CPR. ENV-WQH-SOP-004, Radio and Cellular Phone Use Policy.
MOBILIZATION/DEMOBILIZATION This step includes activities related to the moving persons, equipment and supplies to the site and caching them onsite and getting electric power to the trailer.				
MOBILIZATION/ DEMOBILIZATION	Minimum distances to power lines during transit	➢ Conduct site survey prior to mobilizing any equipment onsite. ➢ Observe the minimum distances given in the TPMC General ES&H Plan and/or see "Overhead Hazards" under **General Field Work**.	TPMC ES&H Plan section 32.16.2 (Minimum distances for equipment in	Pre-job briefing.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
		➢ Designate a person to observe clearances of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means. ➢ Use 2-way radios and a spotter, if clearances are tight.	transit)	
MOBILIZATION/ DEMOBILIZATION	Electrocution due to improper connection of trailer to power grid or generator	➢ Have a licensed electrician install electric meter and connect trailer to power grid or generator	TPMC ES&H Plan section 36 (Electrical Safety)	Licensed electrician
MOBILIZATION/ DEMOBILIZATION	Unstable stacks of materials	➢ Bagged materials shall be cross-keyed and shall not be more than 10 bags high. ➢ Drill rods, core barrels, casing, and pipe shall be stacked and blocked to prevent spreading and rolling. ➢ Avoid staging materials in close proximity to work activities where they may be knocked over or fall on personnel.	none	none
MOBILIZATION/ DEMOBILIZATION	Off-loading/loading equipment from transport vehicles;)	➢ Offload equipment from trailer in a safe and controlled manner. ➢ Assure the delivery driver has the appropriate PPE or does not exit from the truck cab unless donning the PPE, i.e., hard hat and safety shoes. ➢ Use spotters to help direct the operator while driving equipment off the trailer. ➢ Remove all unauthorized personnel from the off-loading area. ➢ Notify STR and Complete New Equipment Declaration forms. ➢ Use only appropriate vehicles in transportation across any distance other than directly on drill pad (i.e. pick-up or flat bed service trucks) in movement and support operations.	TPMC ES&H Plan section16 (Motor Vehicles and Powered Industrial Equipment)	
MOBILIZATION/ DEMOBILIZATION	Exposure to nuisance dust	➢ Refer to the real-time dust monitoring and limitation commitments in the Drilling and Installation of wells at LANL-specific ES&H Plan, Chapter 51.2, "Limiting Dust Exposure," and see General Field Work conditions	Project-specific ES&H Plan section 51.2, (Limiting Dust Exposure) Real-time aerosol monitor user manual	Pre-job briefing.
MOBILIZATION/ DEMOBILIZATION	Taking down and putting back up temporary fencing.	➢ Inspect hand tools before use. ➢ Observe requirements for heavy equipment use provided in the General Field Work section of this IWD ➢ Wear leather gloves or equivalent ➢ Wear safety glasses and hard hat.	29CFR1926.602 Material Handling Equipment.	TPMC's PPE Training, or equivalent. Pre-job briefing. Competent person designation for sling

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
		➢ Watch out for wire snags and sharp hand tools. ➢ Slings will be inspected by a competent person before each use. ➢ Slings shall not be loaded in excess of its safe working load. ➢ All synthetic slings shall be marked with the name of the manufacturer, serial number, type of material, and rated load		inspector.
MOBILIZATION/ DEMOBILIZATION	Contractor exposure to excessive noise	➢ Participate in the T-PMC's Hearing Conservation Program if the noise exposure is at or above the ACGIH TLV of 85 dBA TWA (3 dB exchange). The Hearing Conservation Program includes baseline and annual audiograms, evaluation and training. ➢ Notify the ES&H Representative of any other areas with excessive noise levels (noise levels in the work area that cause workers to raise their voices when speaking). ES&H Representative or designee will conduct noise monitoring as follows: ❖ Perform a preliminary noise survey to characterize operations that might be excessively noisy. Adjust construction zone boundaries, if necessary, so that hearing protection is not required outside of the construction zone. ❖ Use Noise Dosimeter to conduct representative noise dosimetry when the 8-hour TWA is suspected of being greater than the ACGIH TLV. ❖ Determine the adequacy of hearing protectors using a method listed in 29 CFR 1910.95 Appendix B. *"Methods for estimating the adequacy of hearing protector attenuation"* in instances where the 8-hour TWA has the potential to exceed 95 dBA. ➢ ES&H Representative or designee will post areas with noise levels at or above the occupational exposure limit (29 CFR 1910.95, Occupational Noise Exposure) with Noise Warning signs and entry requirements. ➢ ES&H Representative will determine the types of hearing protection to be used, or whether double hearing protection is required based on their evaluation this information will be conspicuously posted at the entrance to the work area. ➢ Workers shall wear hearing protection in the areas where the 8-hour TWA could exceed 85 dBA.	TPMC ES&H Plan Section 14 (TPMC Hearing Conservation Program) Manufacturer's specification 1910.95, Occupational Noise Exposure 29 CFR 1910.95 Appendix B. Methods for estimating the adequacy of hearing protector attenuation	TPMC's PPE training, or equivalent. TPMC's Hearing Conservation training

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
SETTING UP THE DRILL RIG AND ANCILLARY EQUIPMENT (DUAL ROTARY) Steps include: A) Unloading and staging materials for later use, B) Position rig, support truck, and ancillary trailers, C) Set any cribbing necessary and level the rig and support truck, D) Set outriggers , E) Cut plastic and wood for secondary containments, construct, and set beneath rig and support truck, F) Set up generators, air compressor system, and dust suppression unit (G) Raise mast.				
Setting up the dual rotary drill rig and ancillary equipment, activity A. **(Unloading materials)**	Using drill rig as a crane.	➢ Do not use the drill rig as a crane! Use crane on support truck or fork lift for moving heavy equipment, materials, or supplies. ➢ Pipe must be staged very near the drill rig so that moving the pipe is essentially a vertical lift. ➢ Do not lift items in a manner that causes them to swing wildly. Use tag lines whenever possible.	None	Pre-job briefing
	Forklift Operation, Accident or Injury	See "Forklift Operation, Accident or Injury" under General Field Work.		
Setting up the dual rotary drill rig and ancillary equipment, activity A. **(Unloading materials)**	Unstable stacks of materials and piping	➢ Pipe shall be cribbed, stacked and blocked to prevent spreading and rolling. ➢ Avoid staging materials in close proximity to work activities where they may be knocked over or fall on personnel.	None	None
Setting up the dual rotary drill rig and ancillary equipment, activity B, C, and D. **(Position rig , support truck, and ancillary trailers),** **Level the rig and support truck set any cribbing necessary.** **Set outriggers.**	Improper rig setup	➢ Maintain the minimum distances provided in the General ES&H Plan during equipment operation. ➢ Level the equipment ➢ Set brakes, block wheels, set cribbing, and outriggers ➢ Use outrigger pads as necessary in soft soil. ➢ Do not set outriggers directly over any underground utility line.	TPMC ES&H Plan section 32.16.1 (Minimum distances for operation of equipment near high voltage power lines)	Pre-job briefing.
Setting up the dual rotary drill rig, support truck, and ancillary equipment, activity B. **(Position rig, support truck, and ancillary trailers)**	Improper rig setup	➢ Excavate / dig in accordance with excavation permit. ➢ Schedule Utility Locate through UMAP. ➢ Do not collect, dig, drill, power auger, or excavate directly over underground utilities. ➢ Do not place outriggers directly over underground utilities and maintain the designated distances noted in the General Field Work section for mobilization and erection of the rig and any other heavy	Project-specific ES&H Plan Section 28, (Excavations & Trenching)	LANL Excavation/Soil Disturbance (self study) training Course:31419 for everyone involved in excavation

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
		equipment.		

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
Setting up the dual rotary drill rig, support truck, and ancillary equipment, activity E. **(Cut plastic and wood for secondary containments and construct; place containments under rigs and major stationary equipment.**	Portable power tools and hand tools	➢ Work to the requirements of the General ES&H Plan Chapter 17 (Tools and Equipment) ➢ **STR through the ESO must approve all temporary wiring and extension cords.**	TPMC ES&H Plan Section 17 (Tools and Equipment)	TPMC (or employer's) PPE training.
	Sharp Edges and Points	➢ Personnel shall wear leather or equivalent work gloves. ➢ Knife blades shall be retracted or sheathed when not in use. ➢ Cut away from body. ➢ Wear a leather apron or other protective clothing when it is not possible to cut away from your body.	TPMC ES&H Plan Section 17 (Tools and Equipment)	TPMC (or employer's) PPE training.
Setting up the dual rotary drill rig, support truck, and ancillary equipment, activity F. **Set up generators and air compressor system**	Air compressor system, compressed air tools, and hose whip	➢ Inspect all hoses, fittings, valves, safety valves and regulators before the first use of the day and periodically throughout their use. ➢ Inspect compressed air tools before the first use of the day and periodically throughout their use. ➢ Assume compressors will start automatically and without warning. ➢ Do not expose body parts to compressed air, do not walk over, stand on, or straddle hoses. ➢ A positive means shall connect the hoses to tools. ➢ Couple hosing into place and use whip checks to secure hose connections. Hoses shall not be used for hoisting or lowering tools, and ensure those systems, i.e., cable guards, are fully engaged/extended down the length of the hose lines. ➢ Hoses exceeding ½-inch in diameter shall have a safety device at the source of supply or branch line to reduce pressure in case of hose failure. ➢ Protect workers from excessive noise exposure (see controls for "Excessive noise exposure; hearing loss" under "heavy equipment operation".	Compressor manufacturer's specification. Tool manufacturer's specification.	Pre-job briefing.
Setting up the dual rotary drill rig, support truck, and ancillary equipment, activity F. **Set up generators and air compressor**	Setting up and configuring dust suppression system	➢ Inspect system before mobilizing. ➢ Securely connect hose between drilling air exhaust to cyclone inlet and use whip checks at hose connections. ➢ Inspect existing connections between cyclone exhaust and filter housing inlet, also between filter housing outlet and air mover. ➢ Attach blow down capture bags/containers to filter housing and cyclone.	Manufacturer specification.	None.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
system				
Setting up the dual rotary drill rig, support truck, and ancillary equipment, activity F. **Set up generators and air compressor system**	Electric shock: generator	➢ Use containment to catch small leaks of fuel or fluids from generator. ➢ Follow manufacturer's recommendations. ➢ Assure the generator is grounded to the frame or to a grounding rod and assure the bond is protective. ➢ Routine maintenance on equipment will be provided by on-site personnel. ➢ Non-routine maintenance will be performed by qualified electrician only. ➢ Each 120-volt circuit must have a ground fault interrupter. ➢ Ground the generator per manufacturer's specifications; generally all generators ≥ 5 kW must be grounded. See requirements for "setting grounding rods under "Site Preparation". ➢ See requirements for refueling equipment listed under "Equipment inspection, maintenance, and refueling"	TPMC ES&H Plan Section 36 (Electrical Safety) TPMC ES&H Plan Section 30 (Lockout/Tagout procedure). Manufacturer's User Manual	Pre-job briefing.
Setting up the dual rotary drill rig, support truck, and ancillary equipment, activity G. **(Raise mast)**	Failure of rig hoisting and rigging equipment	➢ Competent person will inspect the drill rig each day and complete the LANS Drilling Operations Verification Checklist, or equivalent. ➢ Drill rig shall be operated per manufacturer specifications. ➢ Determine the load weight prior to hoisting, and verify that the lifting equipment is rated higher than the load weight. ➢ Wire rope shall be removed from service when any of the following conditions exists: ➢ In hoisting ropes, six randomly distributed broken wires in one rope lay or three broken wires in one strand in one rope lay; ➢ Abrasion, scrubbing, flattening, or peening, causing loss of more than one-third of the original diameter of the outside wires; ➢ Evidence of any heat damage resulting from a torch or any damage caused by contact with electrical wires; ➢ Reduction from nominal diameter of more than three sixty-fourths inch (3/64") for diameters up to and including three-fourths inch (3/4"). ➢ Other signs of damage are observed. Also remove any tape that may be on top of wire rope damage. ➢ Inspect for correct number and orientation of wire rope clamps (if used) or other wire rope terminations. ➢ Synthetic rope shall be removed from service when any of the	Manufacturer specifications	TPMC's PPE training or equivalent. Pre-job briefing. Competent person designation by drilling subcontractor

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
		following conditions exists: ➢ Abnormal wear ➢ Powder between fibers is generated, ➢ Broken or cut fibers, ➢ Variations in size or roundness of strands, ➢ Discoloration or rot, ➢ Distortion of hardware in sling ➢ Synthetic slings shall be removed from service when any of the following conditions exists: ➢ Acid or caustic burns ➢ Melting or charring of any part ➢ Snags, punctures, tears, of any part ➢ Broken or worm stitches, or ➢ Distortion of fittings. ➢ Establish a cone of safety with physical barriers prior to hoisting and use tag lines when ever possible, ➢ Any damage or deficiencies shall be corrected prior to use. ➢ Personal protective equipment shall include hard hats, safety glasses, leather gloves (or equivalent) and safety toe boots when working in vicinity of hoisting and rigging equipment. ➢ Check for suspect or counterfeit parts ➢ Stop work and contact STR in case of unusual event.		

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
Setting up the dual rotary drill rig, support truck, and ancillary equipment, activity G (Raising mast, Operating the hoist)	Crushing hazard and rotating parts	➢ Do not operate machinery without guards in place. ➢ Keep hands away from meshing surfaces and rotating parts. ➢ Wear leather gloves or equivalent. ➢ Do not wear rings around equipment with rotating parts. ➢ Wear safety toe boots. ➢ Keep loose clothing and hair away from rotating drill stem and other rotating objects. ➢ Badge lanyards, neck ties, and other items worn around the neck shall not be worn, but if necessary they shall be "breakaway" style.		
Use of the lined retention pond (cuttings pit):	Use of ladder	Work to the ladder use procedure given in TPMC General ES&H Plan	TPMC ES&H Plan Section 25, (Ladders)	TPMC Ladder Training or equivalent
Use of the lined retention pond (cuttings pit)	Falling into pit at any time	➢ No one can enter the fenced area around the pit without having a buddy observe them. ➢ Stay out of the excavation itself. ➢ A floatable life ring and rope ladder will be readily accessible to field personnel in the case of someone falling or slipping into the lined retention pond. ➢ Wire fencing 6' in height will be installed at or near the perimeter of the bermed area encircling the lined retention pond. There will be one gated access point to allow for sampling activities and egress from the pit. Life ring and rope ladder will also be located at the gated area.		

DUAL ROTARY DRILLING

Setup of the dual rotary drill rig will involve the following sub-steps:

(a) Moving drill pipe, tools, and casing. (b) Connecting and disconnecting drill pipe and drive head and assembling and disassembling drill tooling. (c) Drilling. (e) Collecting, drill cuttings and water samples from drill system discharge, (f) Welding and installing temporary casing, e) removal and cutting temporary casing.

(a) Moving drill pipe, tools, and casing	Lifting Heavy Objects	Refer to the controls for this hazard under **general field work**		
(a) Moving drill pipe, tools, and casing	Crushing hazard and rotating parts	Refer to the controls for this hazard under "**Setting up the dual rotary drill rig and ancillary equipment".**		
(a) Moving drill	Forklift Operation,	See "Forklift Operation, Accident or Injury" under **General Field Work**		

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
pipe, tools, and casing	Accident or Injury			
(a) Moving drill pipe, tools, and casing	Using rig as a crane.	➢ Do not use well work-over rig or development rig as a crane! ➢ Pipe must be staged very near the well development/ work-over rig so that moving the pipe is essentially a vertical lift. ➢ Do not lift items in a manner that causes them to swing wildly. Use tag lines whenever possible.	None	Pre-job briefing
(a) Moving drill pipe, tools, and casing	Trailer moves or runs away	➢ Block tires and set stabilizer jacks if equipped after relocating trailer.		
(a) Moving drill pipe, tools, and casing	Trailer: towing	➢ Ensure that the brake, taillights, and trailer brakes are functioning properly before moving the vehicle. ➢ Connect the trailer safety chains to the vehicle. ➢ Ensure that the towing vehicle and associated equipment have the rated capacity to handle the trailer. ➢ Use a spotter when backing or staging trailer to work location. ➢ Pre-job briefing.	Project-specific ES&H Plan Section 16, (TPMC Motor Vehicle Safety Program)	Pre-job briefing
(a) Moving drill pipe, tools, and casing	Pinch Points	➢ Do not operate machinery without guards in place ➢ Keep fingers away from pinch points ➢ Wear leather gloves or equivalent when pinch points are present.		TPMC (or employer's) PPE training.
(a) Moving drill pipe, tools, and casing	Lifting and moving materials with backhoe and lifting strap, or forklift with lifting attachment, or equivalent (Contingency)	In order to exercise this contingency the following is required: ➢ Equipment must be included on the Major Equipment Declaration and inspected by LANL. ➢ Pre-use inspection which requires both a visual and operational check. ➢ **Lift plan (or IWD) for the specific equipment must be submitted to STR and approved prior to use of this equipment to perform lifts**; it must identify: o The team members and responsibilities. o The item(s) to be lifted, including the weight and dimensions. o The lifting equipment and hardware selected . o Hazards and controls.	• TPMC ES&H Plan Section 32, (Cranes and Material Handling Equipment) • Documentation of annual inspection by a qualified person • Equipment and lifting attachment owners manuals / specifications. • Manufacturer authorization	Qualified operator trained on specific equipment and lifting attachment.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
			that attachment can be used as an assembly with heavy equipment.	
(b) Making and breaking drill pipe connections and assembling and disassembling tooling	Crushing hazard and rotating parts	Refer to the controls for this hazard under **"Setting up the dual rotary drill rig and ancillary equipment".**		
(b) Making and breaking drill pipe connections and assembling and disassembling tooling	Exposure to Chemicals and Chemical Products (rod dope and lubricants)	➢ Avoid un-necessary contact with skin and clothing, ➢ Approved safety glasses with side shields ➢ Use the minimum amount of material required. ➢ Wipe excess material off of tooling after connections are made.	MSDS TPMC ES&H Program Section 19 (TPMC Hazard Communication Program)	TPMC HAZCOM training TPMC (or employer's) PPE training, or equivalent.
(b) Making and breaking drill pipe connections and assembling and disassembling tooling	Failure of rig hoisting and rigging equipment	Refer to the controls for this hazard under **"Setting up the dual rotary drill rig and ancillary equipment".**		
(b) Making and breaking drill pipe connections and assembling and disassembling tooling	Portable power tools and hand tools	Refer to the controls for this hazard under **Setting up the dual rotary drill rig and ancillary equipment**, activity E.		
(b) Making and breaking drill pipe connections and assembling and disassembling tooling	Injury from wrenches	➢ When tightening threaded connections with a wrench, ensure you have a firm grip and stable footing. ➢ Use the correctly sized wrench to the diameter of the pipe being manipulated. ➢ Use caution and keep knuckles clear in case of wrench slipping off pipe and ensure other workers and objects are clear of work area. ➢ Inspect tools and only use tools in good working condition. Wrenches with worn jaws or bent or damaged handle shall be taken	TPMC ES&H Program Section 17 (Tools and Equipment)	TPMC (or employer's) PPE training.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
		out of service. ➢ Wear leather work gloves or equivalent to protect hands.		
(b) Making and breaking drill pipe connections and assembling and disassembling tooling	Overhead hazard	➢ Secure overhead objects. ➢ Prior to raising mast, inspect to ensure there are no loose tools or parts, which could fall. ➢ Determine what overhead activities are in progress before entering work area; remain outside of work area if possible ➢ Watch out for objects falling from mast. ➢ Wear head protection (hard hat to protect from falling objects; bump cap to protect head in limited headspace areas).	ANSI Z89.1-1986, Protective Headwear for Industrial Workers TPMC ES&H Plan Section 12 (Personal Protective Equipment)	TPMC (or employer's) PPE training.
(b) Making and breaking drill pipe connections and assembling and disassembling tooling	Pinch Points	Refer to the controls for this hazard under **"Moving drill pipe, tools, and casing"**		
(c) Borehole Drilling	Excavation permit requirement	Obtain and comply with excavation permit.	IHS-IP web-based Excavation/Soil Disturbance Permit Review Process	
(c) Borehole Drilling	Exposure to Chemicals and Chemical Products (rod dope and lubricants)	➢ Avoid un-necessary contact with skin and clothing, ➢ Approved Safety glasses meeting the requirements of ANSI Z87.1 and having side shields.	MSDS TPMC ES&H Plan Section 19 (Chemical and Hazardous Materials Management)	TPMC HAZCOM training TPMC (or employer's) PPE training.
(c) Borehole Drilling	Potential inhalation exposure hazard from airborne VOCs	➢ A PID with an 11.7 eV lamp shall be used to monitor airborne concentrations of organic vapors. An action level of **10 ppm** for a 2-minute period shall be established. ➢ When PID concentrations exceed **10 ppm**, for a continuous 2-minute period, a "STOP WORK" shall be conducted and controls including revised work practices (i.e. working upwind from the source) and respiratory protection shall be considered. .	VOC action level based on an IH expertise using the immediate exposure concentration as opposed to a 8-hour TWA;	Pre-job briefing to inform field employees of monitoring methods and action levels. Persons using the PID shall be trained per TPMC Training.
(c) Borehole	Contractor Exposure to	➢ Refer to the controls, documents and training requirements under		

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
Drilling	Excessive Noise	Participate in the T-PMC's Hearing Conservation Program if the noise exposure is at or above the ACGIH TLV of 85 dBA TWA (3 dB exchange). The Hearing Conservation Program includes baseline and annual audiograms, evaluation and training. ➢ Notify the ES&H Representative of any other areas with excessive noise levels (noise levels in the work area that cause workers to raise their voices when speaking). ES&H Representative or designee will conduct noise monitoring as follows: ❖ Perform a preliminary noise survey to characterize operations that might be excessively noisy. Adjust construction zone boundaries, if necessary, so that hearing protection is not required outside of the construction zone. ❖ Use Noise Dosimeter to conduct representative noise dosimetry when the 8-hour TWA is suspected of being greater than the ACGIH TLV. ❖ Determine the adequacy of hearing protectors using a method listed in 29 CFR 1910.95 Appendix B. *"Methods for estimating the adequacy of hearing protector attenuation"* in instances where the 8-hour TWA has the potential to exceed 95 dBA. ➢ ES&H Representative or designee will post areas with noise levels at or above the occupational exposure limit (29 CFR 1910.95, Occupational Noise Exposure) with Noise Warning signs and entry requirements. ➢ ES&H Representative will determine the types of hearing protection to be used, or whether double hearing protection is required based on their evaluation this information will be conspicuously posted at the entrance to the work area. ➢ Workers shall wear hearing protection in the areas where the 8-hour TWA could exceed 85 dBA.		
(c) Borehole Drilling	Crushing hazard and rotating parts	Refer to the controls for this hazard under Section (a)		
(c) Borehole Drilling	Exposure to nuisance dust	➢ A particulate monitor shall be used to ensure airborne particulate levels will be controlled to an airborne exposure concentration of 3mg/m3 for a continuous 2 minute period. ➢ When airborne particulate concentrations exceed 3mg/m3 for a 2 minute continuous period, controls including wetting methods will be considered in addition to other controls per assessment.	ES&H Plan, Chapter 51.2, "Limiting Dust Exposure"	Pre-job briefing to inform field employees of monitoring methods and action levels.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
(c) Borehole Drilling	Failure of rig hoisting and rigging equipment	Refer to the controls for this hazard under **"Setting up the dual rotary drill rig and ancillary equipment".**		
(c) Borehole Drilling	High Wind Exposure	➢ If the crew shuts down due to high winds and it is safe to do so, the mast shall be lowered. ➢ Refer to the controls for this hazard under General Field Work ➢ Keep work area free of debris that can easily blow away.		
(c) Borehole Drilling	Electric Shock: trailer-mounted generator	See "Electric Shock: trailer-mounted generator" under section (b)		
(c) Borehole Drilling	Air compressor system, compressed air tools, and hose whip	➢ Compressor must be declared on Major Equipment Declaration, Form F16-1 ➢ No job-made or improvised pressure systems or tools are permitted. ➢ Inspect all tools, hoses, fittings, valves, safety valves and regulators prior to the start of work and periodically during the work period. ➢ Inspect compressed air tools before the first use of the day and inspect periodically throughout the work day. ➢ Assume compressors will start automatically and without warning. ➢ Do not expose body parts to compressed air. ➢ A positive means shall connect the hoses to tools. ➢ Couple hosing into place and use whip checks to secure hose connections. Hoses shall not be used for hoisting or lowering tools. ➢ Compressors and Manifolds that supply air to hoses exceeding ½-inch in diameter shall have excess flow valves to relieve excess pressure. ➢ Protect workers from excessive noise exposure (see controls for "Excessive noise exposure; hearing loss" under "heavy equipment operation".	Compressor manufacturer's specification. Tool manufacturer's specification.	Pre-job briefing.
(c) Borehole Drilling	Fall from elevation	➢ Work on unprotected elevated surfaces (6 feet or more above next level) without fall protection is not permitted except pursuant to a LANL approved Boart Longyear Fall Protection Program. Boart Longyear will document what training has been provided to fall protection users and supervisors. The Boart Longyear shift supervisor is responsible for ensuring that current fall protection personnel qualification documentation is on-site for inspection before activities requiring fall protection begin and for the duration of the project. Activities requiring the use of fall protection can be performed only	TPMC Approved Boart Longyear Fall Protection Program	Boart Longyear employees receive training per section 6.6 of the TPMC approved Boart-Longyear fall protection program DBI/Sala Self Retracting Lifeline on rig derrick.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
		when a Boart Longyear fall protection supervisor is present on-site to directly supervise the activity. ➢ No other TPMC team members are permitted to use fall protection or to work in locations where a 6' freefall could occur.		
(d) Welding drill casing joints together and other drilling activities to be determined	Using a man-lift, scissor-lift to perform elevated work	➢ Inspect full body harness before each use. ➢ Include the lift on the Major Equipment Declaration form. ➢ LANS must approve the manlift prior to use. ➢ Work to the Boart Longyear Fall Protection Program. ➢ The Boart Longyear drilling supervisor or designee will obtain training on the specific lift from the vendor that supplies the lift and will train other crew members in use of the aerial lift. ➢ Follow manufacturer's user manual, Person(s) being lifted will wear a full body harness that has been tethered to an anchor point recommended by the lift manufacturer or has been approved by a qualified person.	TPMC ES&H Plan Section 34 (Aerial Work Platforms) Project-specific ES&H Plan Section 23 (Fall Protection Program) Manufacturer's User Manual	Fall protection competent person /qualified person designation by Boart Longyear. TPMC approved Boart Longyear fall protection training Manlift vendor-supplied training.
(d) Welding drill casing joints together	Fire from spark- or flame-producing operation	➢ Check LANL homepage, or contact Emergency Management and Response (7-6211), for the latest fire conditions if spark- or flame-producing operations will be conducted outside. Complete a Spark- or Flame-Producing Operations Permit. The permit is available at http://enterprise.lanl.gov/forms/1563.pdf ➢ Work to the requirements of: • The LANL Fire Matrix (http://int.lanl.gov/fire_matrix.html) • The site-specific Fire Protection and Prevention Plan • Any case-by case instructions from the Area's Fire Marshall, and • Spark flame permit conditions. • In the event of a "red" flag condition, spark/flame operations will pause and be re-assessed before commencing or continuance of the activity. Some steps may include the application of water to any area downwind of the spark/flame operations, especially if slash is adjacent to the drill pad. ➢ Ensure a fire extinguisher (minimum 10 BC) is present and in working condition. ➢ Ensure that containers/pipes are emptied, cleaned using non-flammable cleansers and/or purged of flammable and other materials before performing spark- or flame-producing operations on them.	Spark- or Flame-Producing Operations Permit TPMC ES&H Plan, Section 21 (Fire Protection & Prevention) TPMC ES&H Plan, Section 22 (Welding, Cutting, Brazing and Grinding)	Fire watch and designated worker: Pre-job brief to discuss appropriate PP, job responsibilities and other controls. LANL Course 15672 (Fire Extinguisher: Designated Worker and Fire Watch) or equivalent LANL Course 9893 (Fire Extinguisher Hands-on Training) or equivalent

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
		Provide trained fire watch whenever spark- or flame-producing operations are performed in locations where other than a minor fire might develop, or any of the following conditions exist: • combustibles are more than 35 ft away but are easily ignited by sparks or hot slag; • combustible materials are adjacent to the opposite side of metal and are likely to be ignited by conduction or radiation. Appropriate PPE shall be prescribed by TPMC S&H personnel and documented on daily tailgate meeting form. Fire watch will observe area for incipient fires for 30 minutes after end of spark flame activity and will be in direct line-of-site when activity is being conducted.		
(d) Welding drill casing joints together	Welding and brazing	➢ Obtain a spark-flame permit. ➢ Comply with reference documents. ➢ Inspect welding equipment before each use and periodically during use. ➢ Perform only within a building or approved area. ➢ Avoid breathing the fume plume directly (fume plume is the smoke-like cloud containing minute solid particles arising directly from the area of melting material). ➢ Only arc-weld on a dry, non-combustible surface. ➢ Do not arc weld in the rain. ➢ Check electrode connections before each weld and during the welding process. ➢ Coiled leads should be spread out to avoid overheating and damage to insulation. ➢ Ensure work piece is properly grounded. ➢ Select the correct filter lens for the welding process; consult with ES&H Representative if you are unsure of the welding shade requirements for your work. ➢ Wear Safety glasses meeting the requirements of ANSI Z87.1 having side shields. When operation produce flying debris, safety glasses with a full face shield shall be worn. ➢ Wear protective clothing as prescribed by TPMC S&H personnel to	Spark-flame permit TPMC ES&H Plan Section 22 (Welding, Cutting, Brazing and Grinding) TPMC ES&H Plan Section 35 (Gas Cylinder Use and Storage Procedure) MSDS for filler metal TPMC ES&H Plan, Section 21 (Protection & Prevention)	Welding Safety Self-Study course (Course #9519), or equivalent employer training. TPMC (or employer's) PPE training. Pre-job brief to discuss appropriate PP, job responsibilities and other controls.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
		protect from heat and radiation ex. flame-resistant gauntlet gloves and aprons, etc.) ➢ For heavy work, fire-resistant leggings, high boots or similar protection, or safety shoes. ➢ Provide shielding to protect personnel in the vicinity from bright light rays or exposure to flame or sparks. ➢ Appropriate PPE for the specific daily operation shall be prescribed by TPMC S&H personnel and documented on daily tailgate meeting form		
(d) Welding drill casing joints together	Oxygen-Acetylene Torch Cutting	➢ Obtain a spark-flame permit. ➢ Use of a fire watch per spark-flame permit. ➢ Inspect equipment, including compressed gas cylinders and hoses, connections, before each use and periodically during use. ➢ Perform work only within the approved area (no flammables combustibles within area specified in spark-flame permit). ➢ Worker shall situate upwind from operation so to avoid breathing airborne metal fumes. ➢ Operate on a dry, non-combustible surface. ➢ Stop work during severe weather conditions (heavy rains, lightning, etc.). ➢ Appropriate PPE shall be prescribed by TPMC S&H personnel and documented on daily tailgate meeting form. ➢ Wear Safety glasses meeting the requirements of ANSI Z87.1 having side shields. When operation produce flying debris, safety glasses with a full face shield shall be worn. ➢ Wear protective clothing as prescribed by TPMC S&H personnel to protect from heat and radiation ex. flame-resistant gauntlet gloves and aprons,etc.) ➢ For heavy work, fire-resistant leggings, high boots or similar protection, or safety shoes. ➢ Provide shielding (i.e. welding curtains) to protect personnel in the vicinity from UV light rays or exposure to flame or sparks. ➢ Compressed gas cylinders shall be properly stored on-site when not in use, including properly capped, with oxygen and acetylene cylinders being separated by 20 feet or having a ½-hour rated partition.	Spark-flame permit TPMC ES&H Plan Section 22 (Welding, Cutting, Brazing and Grinding) MSDS for oxygen and acetylene. TPMC ES&H Plan, section 35 (Pressure safety Including Compressed Gases). TPMC ES&H Plan, Section 21 (Fire Protection & Prevention)	Welding Safety Self-Study course (Course #9519), or equivalent employer training. TPMC (or employer's) PPE training. Pre-job brief to discuss appropriate PPE, job responsibilities and other controls.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
(d) Welding drill casing joints together	Failure hoisting and rigging equipment	Refer to the controls for this hazard under **"Setting up the dual rotary drill rig and ancillary equipment".**		
(d) Welding drill casing joints together	Crushing hazard and rotating parts	See "Crushing hazard and rotating parts " under section (a)		
(d) Welding drill casing joints together	Portable power tools and hand tools	Refer to the controls for this hazard under **Setting up the dual rotary drill rig and ancillary equipment**, activity E.		
(d) Welding drill casing joints together and other drilling activities to be determined	Use of explosives during "BackOff "Activity to retrieve drill: ➢ Tight quarters, pinch points, potential power sources ➢ Premature firing ➢ Exposed explosives, bending tool string, working sat heights ➢ Possible misfire	➢ Use spotters to stage equipment. Workers shall identify hand, body and equipment contact points prior to, and during operations. Radios shall not be in operation (post signs). Identify overhead suspended loads in relation to power sources. ➢ Notify operations, personnel in the area and potential personnel that may enter area that all cell phones, radios and unnecessary electrical equipment are turned off. ➢ Shot going into pipe shall not be pinched. Tool string and shot must go into hole straight.	"Recommended Practices for Oilfield Explosives Safety" (American Petroleum Institute) Subcontractor JSA for "BACKOFF" activities.	Persons performing this work shall be qualified per Subcontractor and TPMC verification, prior to work activity. Pre-job tailgate meeting
(e) Collecting drill cuttings and water samples from drill system discharge	Air compressor system, compressed air tools, and hose whip	See "Air compressor system, compressed air tools, and hose whip" under Section (C)		
(e) Collecting drill cuttings and water samples from drill system discharge	Injury from exposure to nitric acid, chemical reagents and standard solutions	➢ No bottles of bulk chemical reagents will be used. ➢ Chemical reagents will be packaged and used in a manner that provides no potential for employee exposure. Examples include: ➢ Using chemically-impregnated test media such as Dip-and-Read tests where a reagent strip is dipped into the specimen to be tested and the results are interpreted by comparing the color reaction to a color chart supplied by the manufacturer of the test strip, and ➢ Emergency eye-rinse required within 100 ft of point of use of chemicals or testing reagents. ➢ Minimum PPE for using chemical reagents is Safety glasses meeting the requirements of ANSI Z87.1 having side shields, nitrile gloves and lab coat.	TPMC's HAZCOM Program. TPMC ES&H Plan, section 12 (Personal Protection Equipment). MSDS file on-site	TPMC's HAZCOM training TPMC (or employer's) PPE training.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
(e) Collecting drill cuttings and water samples from drill system discharge	Drowning in cuttings pit	➢ Do not enter the pit. ➢ A floatable life ring and rope ladder will be readily accessible to field personnel in the case of someone falling or slipping into the lined retention pond. ➢ Wire fencing 6' in height will be installed at or near the perimeter of the bermed area encircling the lined retention pond. There will be one gated access point to allow for sampling activities and egress from the pit. Life ring and rope ladder will also be located at the gated area. ➢ Use the buddy system when working inside the safety fence around pits.		Pre-job briefing

WELL CONSTRUCTION, SETTING SURFACE CASING, AND BOREHOLE ABANDONMENT

Major sub-steps are:

a) Moving casing manually, with lifting equipment, or with drill rig hoist.

b) Welding and cutting casing.

c) Hoisting casing into borehole.

d) Mixing and emplacement of grout.

e) Emplacing sand filter pack.

f) Constructing wood forms.

g) Mixing and finishing concrete pad.

h) Welding and cutting surface and grinding casing.

i) Installing bollards.

****Borehole abandonment.****

All boreholes will be abandoned by pressure grouting, in accordance with the procedures outlined in SOP-5.03 and documented. A bentonite/cement expanding grout will be mixed at each borehole and pumped from the total depth to ground surface through a tremie pipe.

WELL CONSTRUCTION AND SETTING SURFACE CASING	Compressor and grout pump	➢ Inspect all hoses, fittings, valves, safety valve and regulators prior to the first use on each work shift and periodically throughout their use. ➢ Assume that compressors will start automatically.		Pre-job briefing.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
		➢ Do not expose body parts to compressed air or grout stream. ➢ Do not walk on, walk over, or straddle hoses. ➢ A positive means shall connect the hoses to the pump. ➢ Secure hoses to prevent whipping using whip checks at hose connections. Fully engage the whip checks by sliding the cable down the hoses. ➢ Hoses exceeding ½-inch in diameter shall have a safety device at the source of supply or branch line to reduce pressure in case of hose failure.		
WELL CONSTRUCTION AND SETTING SURFACE CASING	Drilling: loose item falls off of mast	➢ Prior to raising mast inspect mast for loose objects, such as wrenches or grease guns. ➢ Wear hardhat in construction zone and where possibility of head injury exists.		Pre-job briefing TPMC's HAZCOM and PPE training, or equivalent.
WELL CONSTRUCTION AND SETTING SURFACE CASING	Lifting and moving materials with backhoe, lifting strap, or forklift with lifting attachment, or equivalent	Refer to controls for "Lifting and moving materials with backhoe and lifting strap, or forklift with lifting attachment, or equivalent" under Dual Rotary Drilling.		
WELL CONSTRUCTION AND SETTING SURFACE CASING	Failure of rig hoisting and rigging equipment	Refer to the controls for this hazard under **"Setting up the dual rotary drill rig and ancillary equipment".**		
WELL CONSTRUCTION AND SETTING SURFACE CASING	Grinding: sparks, rotating parts, flying debris	➢ Spark/flame permit and .approved designated area required. ➢ Inspect grinder prior to use and periodically during use mainly for damaged housing, conductor insulation, and plug prong conditions	TPMC ES&H Plan section 22 (Welding, Cutting, Brazing and Grinding) Project-specific ES&H Plan, Section 21 (Site Specific Fire	TPMC's PPE training. PS-13 courses 15672 (Designated Worker and Fire Watch) and 9893 (Hands on Fire Extinguisher Training), or

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
		➢ All guards shall be in place and no modifications shall be made. ➢ Personnel shall wear safety glasses and face shield, long sleeved shirt, and leather (or equivalent) gloves. ➢ Do not mix aluminum grinding dust with iron or steel grinding dust. Such a mixture may explode. ➢ Do not exceed the maximum rated speed of grinding wheel or blade	Protection & Prevention Plan)	equivalent.
WELL CONSTRUCTION AND SETTING SURFACE CASING	Heavy equipment operation (e.g. bobcat or small front end loader)	➢ Inspect heavy equipment upon its arrival to the site and daily prior to start of work. ➢ Be observant as to your location with respect to heavy equipment. ➢ Maintain daily equipment inspection forms on site. ➢ Manufacturer's Specification. ➢ Use a spotter with 2-way radio when backing-up, if rear view is obscured. ➢ Wear brightly colored (e.g. orange) vest, and safety toe boots in area where heavy equipment is being operated ➢ Do not cross into path of equipment without first obtaining eye contact with equipment operator.	29 CFR 1926.601 Motor Vehicles. 29 CFR 1926.602 Material Handling Equipment. TPMC General ES&H Plan Section 16, (Motor Vehicles and Powered Industrial Equipment)	TPMC's PPE training, or equivalent.
WELL CONSTRUCTION AND SETTING SURFACE CASING	Welding and brazing	Refer to the controls for this hazard under "Welding drill casing joints together"		
WELL CONSTRUCTION AND SETTING SURFACE CASING	Potential inhalation exposure hazard from airborne VOCs	➢ A PID with an 11.7 eV lamp shall be used to monitor airborne concentrations of organic vapors. An action level of **10 ppm** for a 2-minute period shall be established. ➢ When PID concentrations exceed **10 ppm**, for a continuous 2-minute period, a "STOP WORK" shall be conducted and controls including	VOC action level based on an IH expertise using the immediate exposure concentration as	Pre-job briefing to inform field employees of monitoring methods and action levels.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventive Measures, and Bounding Conditions	Reference Documents	Training
		revised work practices (i.e. working upwind from the source) and respiratory protection shall be considered. .	opposed to a 8-hour TWA;	Persons using the PID shall be trained per TPMC Training.
WELL CONSTRUCTION AND SETTING SURFACE CASING	Falling object or bentonite spill due to failure of a flexible intermediate bulk container (FIBC) straps during off-loading/ transportation process.	Use accepted lifting/transportation techniques per the "Flexible Intermediate Bulk Container Association." (Fibca) ➢ Use forklift tines appropriately spaced ➢ Lifting loops shall not be twisted ➢ Transport FIBCs on pallets to the degree possible; use lifting eyes for product installation. ➢ FIBCs shall be transported at the time of product installation with tines horizontal, load as low as possible w/o dragging on ground, and w/o obstructing operator view and mast slightly tilted backwards. Inspect the condition of the FIBCs (including straps) and do not use if degradation, fraying, excessive wear, etc. is noted. ➢ Keep FIBCs covered and out of direct sunlight while being stored.	"Common Sense Handling Guidelines for Flexible Intermediate Bulk Containers" *Fibca*	Pre-job briefing and/or Project Readiness Review.
BOREHOLE ABANDONMENT	Compressor and grout pump	Refer to the controls for Compressor and Grout Pump under WELL CONSTRUCTION AND SETTING SURFACE CASING.		Pre-job briefing.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventative Measures, and Bounding Conditions	Reference Documents	Training.
DOWNHOLE LOGGING The boreholes will be geophysically logged continuously or on 5' intervals. This activity is concerned with the general operations of insertion or removal and raising or lowering of objects from a borehole .Personnel involved include Schlumberger contract logging operations or the LANS geophysical logging team. If the LANS geophysical logging team does the logging, they will take control of the site during the logging operation, work to their own IWD, work authorization documents and training requirements. TerranearPMC personnel who must work in the immediate vicinity of the LANS geophysical logging operation will be briefed and supervised by LANS. The following steps are involved: a) A crane or overhead lift is not required for this activity. b) Set up the trailer/vehicle at the borehole. c) Set up the test assembly (could be a radioactive source/detector assembly, video camera, or other device). d) Use the winch on the trailer/vehicle to insert the test assembly into the bore of the well. e) Lower to the desired level and obtain an observation or reading. f) Reposition and obtain the additional readings, as necessary. g) Use the winch to extract the test assembly. h) Stow the test assembly. The following assumes that Schlumberger will perform the logging.				
DOWNHOLE LOGGING	Inadequate work planning for Schlumberger work	Schlumberger must obtain approval from Gilbert Estrada (LANL/RP-3, 505-665-5298 or 505-231-5188) prior to bringing radioactive sources onto LANL property. TerranearPMC must follow this procedure to get Schlumberger authorized to begin downhole logging activities. ➢ Before start of work Schlumberger will submit documentation to TerranearPMC in advance establishing that their equipment usage procedures have been reviewed and approved by LANS. This documentation will be provided to the STR. ➢ Any equipment usage procedures that Schlumberger cannot demonstrate have been approved by LANS will be submitted in advance to TerranearPMC. They will be forwarded to the STR for approval. ➢ Schlumberger will complete a Major Equipment Declaration and it will be submitted to TerranearPMC for transmittal to the STR. ➢ Schlumberger will submit their hazardous materials list, MSDS, and hazardous materials inventory to TerranearPMC. This documentation will be forwarded to the STR for approval, and ➢ This IWD will be reviewed by TerranearPMC in light of Schlumberger's scope of work, hazardous materials list, and Major Equipment Declaration. If necessary a supplemental IWD will be	Schlumberger SOPs TPMC ES&H Plan Chapters 3 and 58.	GET Training TerranearPMC HAZCOM Training Schlumberger-required training in applicable Schlumberger SOPs

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventative Measures, and Bounding Conditions	Reference Documents	Training.
		modified and submitted to the STR for approval. LANS will have the opportunity to review the same information. ➢ LANS will inspect and approve equipment on the declaration for use. ➢ The Schlumberger downhole logging activity can begin once the STR authorizes this task to proceed.		
DOWNHOLE LOGGING	Use of accountable sealed source (radiation exposure);	➢ Handling and use of a radioactive source is covered by a separate hazard analysis, which is pending. ➢ Schlumberger will work to their written procedures. works to it own procedures ➢ LANS logging team will provide a copy of their approved hazard analysis for handling sealed sources to the PIC prior to performing work on-site.	Schlumberger SOPs	Schlumberger radiation worker training.
DOWNHOLE LOGGING	Wire lines and wire ropes	➢ Inspect each day before using and periodically during use. ➢ Wear leather gloves (or equivalent) and safety glasses with side shields. ➢ Be careful of the wire rope, it can whip dangerously if it becomes knotted or snagged. ➢ Keep away from rotating parts and pinch points. ➢ Use in accordance with manufacturer's recommendations. ➢ Rated load capacities, recommended operating speeds, and special hazard warnings or instructions shall be posted. ➢ Wire rope shall be removed from service when any of the following conditions exists: ❖ In hoisting ropes, six randomly distributed broken wires in one rope lay or three broken wires in one strand in one rope lay; ❖ Abrasion, scrubbing, flattening, or peening, causing loss of more than one-third of the original diameter of the outside wires; ❖ Evidence of any heat damage resulting from a torch or any damage caused by contact with electrical wires; ❖ Reduction from nominal diameter of more than three sixty-fourths inch (3/64") for diameters up to and including three-fourths inch (3/4"); ❖ Other damage is observed. ➢ Check for suspect or counterfeit parts ➢ Hoisting ropes shall be installed in accordance with the wire rope	Minimum PPE requirements in column 3.	Pre-job briefing. Competent person designation by employer for winch operator. TPMC's PPE training, or equivalent

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventative Measures, and Bounding Conditions	Reference Documents	Training.
		manufacturers' recommendations. ➢ Winch operator shall be designated as a competent person by the employer. ➢ Schlumberger will follow its SOP-based requirements.		
Borehole Geophysical Logging (Schlumberger logging)	Exposure to radiation from radiation generating device	➢ Only personnel trained to Schlumberger's radiation program are permitted in the work area when their radioactive source is in use. The area will be posted and controlled by Schlumberger to prevent entry. ➢ Non-Schlumberger personnel will maintain "observer" status while logging operations are performed.	Schlumberger radioactive material license and procedures	Schlumberger radiation worker training
Borehole Geophysical Logging	Portable power tools and hand tools	➢ Inspect before use ➢ Use tools only for their intended purpose. ➢ Use the tool in accordance with manufacturer's operating rules or safe practices. ➢ Wear required personal protective equipment (PPE): safety glasses with side shields, leather gloves or equivalent, steel-toe boots. ➢ If sound pressure level is above 85 dBA, wear hearing protectors	TPMC ES&H Plan, Section 17, (Tools and Equipment)	TPMC's PPE training or equivalent.

WELL DEVELOPMENT, AQUIFER TESTING, AND GROUNDWATER WELL SAMPLING

Groundwater Screening and Sampling: If saturation is encountered as a borehole is advanced, drilling will be stopped to determine whether sufficient water volume is available to analyze the water quality. Generally, a total volume of 0.5 to 1.0 L is required for the sample. If a zone is saturated sufficiently to test, the borehole will be advanced to the base of the saturation, and a monitoring well designed. The design will be submitted to NMED for approval. After the design has been approved, the well will be installed. A borehole will be drilled and the saturated zone isolated with a dual rotary casing advancement drilling method to isolate the known saturated zone.

Well Development: Once the well is installed, the well will be developed through swabbing/surging, bailing, and pumping until water quality parameters stabilize. Development procedures involve running various tools in the well on wirelines in order to move water through the filter pack as an initial step. Pumping with an electric submersible pump is then utilized to purge the well until specified turbidity values are obtained.

Aquifer Testing: Aquifer testing, typically several "mini" tests followed by a 24-hr test will be performed on all monitoring wells installed as part of this project. Aquifer testing involves pumping the screened interval at a constant rate for up to 24-hrs. Typically packer are lowered in the well and inflated to seal off the interval for testing.

Groundwater Sampling: Groundwater Samples will be collected from monitoring wells drilled under the MTOA contract as part of a groundwater monitoring program. Groundwater sampling involves using the drill rig or small winch to lower a submersible pump into the well, and pumping or bailing until the produced water becomes clear and specific water chemistry criteria are satisfied. The pump or bailer is then removed from the well. Depending upon the analyses, some groundwater samples are preserved with acids. This activity may use a crane, boom, or an overhead lift instead of the drill rig. Groundwater samples may be collected during drilling, well development, and aquifer testing.

WELL DEVELOPMENT, AQUIFER TESTING, AND GROUNDWATER	Failure of rig hoisting and rigging equipment	Refer to the controls for this hazard under **"Setting up the dual rotary drill rig and ancillary equipment".**		

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventative Measures, and Bounding Conditions	Reference Documents	Training.
WELL SAMPLING				
WELL DEVELOPMENT, AQUIFER TESTING, AND GROUNDWATER WELL SAMPLING WELL SAMPLING	Pneumatic: compressor and pneumatic tools;	➢ Refer to controls for "Air compressor system, compressed air tools, and hose whip" discussed under DUAL ROTARY DRILLING [c] Borehole Drilling.		Pre-job briefing.
WELL DEVELOPMENT, AQUIFER TESTING, AND GROUNDWATER WELL SAMPLING	Exposure to acids	➢ Personnel shall obtain and review manufacturer MSDS ➢ Wear required PPE as follows: ➢ Safety glasses with side shields and face shields. ➢ Long pants and sleeved shirt. ➢ Nitrile or other suitable gloves for handling acids. ➢ Emergency eye-rinse shall be immediately available (within 100 feet of work area). ➢ Preservative (acid) is procured in ~2 ml ampoules. ➢ Proper storage requirements for acids shall be followed. ➢ Proper ventilation shall be provided in work area.	Onsite MSDS file TPMC ES&H Plan Section 19 (TPMC's Hazard Communication Program)	Pre-job briefing. TPMC's HAZCOM Training TPMC PPE training, or equivalent
WELL DEVELOPMENT, AQUIFER TESTING, AND GROUNDWATER WELL SAMPLING	Wire lines and wire ropes	➢ Inspect each day before using and periodically during use. ➢ Wear leather gloves (or equivalent) and safety glasses with side shields. ➢ Be careful of the wire rope, it can whip dangerously if it becomes knotted or snagged. ➢ Keep away from rotating parts and pinch points. ➢ Use in accordance with manufacturer's recommendations. ➢ Rated load capacities, recommended operating speeds, and special hazard warnings or instructions shall be posted. ➢ Synthetic slings shall be removed from service when any of the following conditions exists: ❖ Acid or caustic burns ❖ Melting or charring of any part ❖ Snags, punctures, tears, of any part ❖ Broken or worm stitches, or ❖ Distortion of fittings. ➢		Pre-job briefing. Competent person designation by employer for winch operator. TPMC's PPE training, or equivalent

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventative Measures, and Bounding Conditions	Reference Documents	Training.
		➢ Wire rope shall be removed from service when any of the following conditions exists: ❖ In hoisting ropes, six randomly distributed broken wires in one rope lay or three broken wires in one strand in one rope lay; ❖ Abrasion, scrubbing, flattening, or peening, causing loss of more than one-third of the original diameter of the outside wires; ❖ Evidence of any heat damage resulting from a torch or any damage caused by contact with electrical wires; ❖ Reduction from nominal diameter of more than three sixty-fourths inch (3/64") for diameters up to and including three-fourths inch (3/4"); ❖ Other damage is observed. ➢ Check for suspect or counterfeit parts ➢ Hoisting ropes shall be installed in accordance with the wire rope manufacturers' recommendations. ➢ Winch operator shall be designated as a competent person by the employer.		
WELL DEVELOPMENT, AQUIFER TESTING, AND GROUNDWATER WELL SAMPLING	Moving drill pipe, tools, and casing	Refer to the hazards and controls for this work step under "**Setting up the dual rotary drill rig and ancillary equipment" and "Dual rotary drilling".**		
WELL DEVELOPMENT, AQUIFER TESTING, AND GROUNDWATER WELL SAMPLING	Making and breaking drill pipe connections and assembling and disassembling tooling	Refer to the hazards and controls for this work step under **"Setting up the dual rotary drill rig and ancillary equipment" and "Dual rotary drilling".**		
WELL DEVELOPMENT, AQUIFER TESTING, AND GROUNDWATER WELL SAMPLING	Potential inhalation exposure hazard from airborne VOCs	➢ A PID with an 11.7 eV lamp shall be used to monitor airborne concentrations of organic vapors. An action level **of 10 ppm** for a 2-minute period shall be established. ➢ When PID concentrations exceed **10 ppm**, for a continuous 2-minute period, a "STOP WORK" shall be conducted and controls including revised work practices (i.e. working upwind from the source) and respiratory protection shall be considered. .	SSHASP VOC action level based on an IH expertise using the immediate exposure concentration as opposed to a 8-hour TWA;	Pre-job briefing to inform field employees of monitoring methods and action levels. Persons using the PID shall be trained per TPMC Training.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventative Measures, and Bounding Conditions	Reference Documents	Training.
AQUIFER TESTING (Using packer)	Pressure system and gas cylinder used to inflate packer.	➢ Inspect before the first use of the day. ➢ Do not perform maintenance or repair while system is pressurized ➢ Wear leather gloves and safety shoes when handling cylinders. ➢ Wear safety glasses w/ side shields. ➢ Comply with requirements of reference documents. ➢ Secure cylinders to a fixed object or gas cylinder cart. ➢ Secure flexible (e.g., braided) tubing such that whipping in the event of breaking does not cause injury. ➢ Complete leak test. ➢ Not to be used in a confined space. ➢ Never use a fitting adaptor or improper fittings between the regulator and cylinder. ➢ Never use sealing tape, such as Teflon, on the connection between the regulator and the gas cylinder. ➢ Regulators or their relief devices must not be considered safety devices for the rest of the pressure system. ➢ Do not lift cylinders by protective caps or with a lifting magnet. ➢ Do not drop or slide cylinders or roll long distances. ➢ When cylinder not in use, remove regulators, close valves, and install protective caps. ➢ Store compressed gas regulators that are not in use in plastic bags and pelican case. Indicate on label the gas they regulate. ➢ Regulators used must be appropriate for the gas in question. ➢ Protect regulators and association pressure system components from potential damage.	Project-Specific ES&H Plan Section 35 (Gas Cylinder Use and Storage Procedure)	
AQUIFER TESTING (Prepare and use submersible pump and transducer).	"Rogue" electrical wiring of high voltage equipment (submersible pump).	➢ A LANL-SSS licensed electrician must inspect the submersible pump wiring each time it is re-wired. Initial wiring of a pump system must be conducted by a LANL-SSS licensed electrician	Project-Specific ES&H Plan Section 36 (Electrical Safety).	Pre-job briefing

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventative Measures, and Bounding Conditions	Reference Documents	Training.
USING HEAVY EQUIPMENT This step involves: a) Moving the heavy equipment to the location that will be worked.				
USING HEAVY EQUIPMENT	Contractor exposure to excessive noise	➢ Refer to the controls, documents and training requirements under "Contractor Exposure to Excessive Noise" under Site Preparation and Restoration.		
USING HEAVY EQUIPMENT	Underground utilities	➢ Excavate / dig in accordance with excavation permit. ➢ Schedule Utility Locate through UMAP. ➢ Do not collect dig, drill, scrape, or excavate directly over underground utilities. ➢ Do not place outriggers directly over underground utilities.	Project-specific ES&H Plan Section 28, (Excavations & Trenching)	
USING HEAVY EQUIPMENT	Limited visibility when operating heavy equipment (e.g., dozers, , backhoes and dump trucks)	➢ Use spotter or 2-way radio when maneuvering around structures or near edges of work area. ➢ Stay clear of moving equipment and do not cross into pathway of equipment. If necessary to cross into pathway of equipment, maintain eye contact with operator. ➢ Wear brightly colored (e.g. orange) vest, and safety toe boots in area where heavy equipment is being operated. ➢ Wear hardhats if overhead hazards exist.		
USING HEAVY EQUIPMENT	Crushing hazard	➢ Wear brightly colored (e.g. orange) vest, and safety toe boots in area where heavy equipment is being operated Refer to the controls for this hazard under **"Setting up the dual rotary drill rig and ancillary equipment"** Be observant as to your location with respect to heavy equipment.		
USING HEAVY EQUIPMENT	Forklift Operation, Accident or Injury	➢ Refer to controls for this hazard under "**General Field Work".**		
USING HEAVY	Heavy equipment operation (e.g. bobcat or	➢ Refer to the controls for this hazard under **"Using Heavy**		

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventative Measures, and Bounding Conditions	Reference Documents	Training.
EQUIPMENT	small front end loader)	**Equipment"**		

MAINTENANCE AND REFUELING

This could include the following activities such as refueling and adding fluids to equipment, arc welding, grinding, jump starting, charging batteries, equipment repairs, and repairs to systems involving hazardous energy. Sub steps for repairs to systems involving hazardous energy are:

a) Isolate from hazardous energy (lockout/tagout if possible; otherwise block/chock/tagout).

b) Repair or refuel.

c) Remove lock/block/chock and tag

MAINTENANCE AND REFUELING	Fall from elevation	➢ Boart Longyear will work to their approved written Fall Protection Program	Project-specific ES&H Plan, Section 23, (Fall Protection)	TPMC Approved Boart Longyear Fall Protection training
MAINTENANCE AND REFUELING	Battery charging	➢ Jump starting shall be performed at least 50 feet from structures and 50 feet from any waste accumulation area, or combustibles. ➢ Battery charging shall be allowed outside any structure but not within 50 feet from any structure. ➢ Battery charging areas shall be equipped to provide for the following: ❖ Emergency Eye-rinse, ❖ Flushing spilled electrolyte, ❖ Fire extinguisher (minimum rating 10 BC) , ❖ Protection of charging apparatus against damage by trucks, ❖ Adequate ventilation for dispersal of fumes from gassing batteries. ➢ When adding electrolyte to batteries or when handling a leaking battery, personnel shall wear the following personal protective equipment: ❖ Acid resistant, long cuff gloves and apron. ❖ Safety glasses and face shield. ➢ Never add water to acid. ➢ When charging batteries, the vent caps shall be kept in place to avoid electrolyte spray. ➢ Trucks shall be positioned properly and brakes shall be applied before attempting to charge batteries. ➢ If equipment does not have a brake system, a chock will be used on at least one wheel/tire.	Project-specific ES&H Plan Section 21: (Site Specific Fire Protection & Prevention Plan)	TPMC's PPE training. PS-13 courses 15672 (Designated Worker and Fire Watch) and 9893 (Hands on Fire Extinguisher Training), or equivalent. Pre-job briefing

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventative Measures, and Bounding Conditions	Reference Documents	Training.
		➢ The battery compartment cover(s) shall be open to dissipate heat and gas. ➢ No open flame or spark shall be permitted during battery charging. ➢ Tools and other metal objects such as watches and rings shall be kept away from the tops of uncovered batteries. Use the buddy system. ➢		
MAINTENANCE AND REFUELING	Grinding: sparks, rotating parts, flying debris; --	➢ Spark/flame permit and approved designated area required. ➢ Inspect grinder prior to use for damaged housing, insulation of the conduct and prong presence. ➢ All guards shall be in place and no modifications shall be made. ➢ Personnel shall wear safety glasses and face shield, long sleeved shirt, and leather (or equivalent) gloves. ➢ Emergency eye rinse within 100 feet of work location. ➢ Do not mix aluminum grinding dust with iron or steel grinding dust. Such a mixture may explode. ➢ Do not exceed the maximum rated speed of grinding wheel or blade.	TPMC ES&H Plan section 22, (Welding, Cutting, Brazing and Grinding) Project -specific ES&H Plan Section 21: (Site Specific Fire Protection & Prevention Plan)	TPMC's PPE training.
MAINTENANCE AND REFUELING	Hazardous energy control: contractor owned equipment	➢ Work to the Lockout/Tagout procedure given in the General ES&H Plan	TPMC ES&H Plan Section 30 (Lockout/Tagout)	LANL-required Lockout/Tagout Training
MAINTENANCE AND REFUELING	Maintenance: hot surfaces	➢ Exhaust pipes and other hot surfaces shall be guarded or insulated in areas where contact by employees is possible in the performance of normal duties. ➢ Allow hot equipment to cool off before servicing or fueling it.		none
MAINTENANCE AND REFUELING	Maintenance of equipment with rotating parts	➢ See requirements for "Hazardous Energy Control: Contractor owned equipment)". ➢ Maintenance/repair of equipment while energized is forbidden.	none	Pre-job briefing.
MAINTENANCE AND REFUELING	Refueling equipment	➢ Contact Contractor's ESH personnel for assistance, as appropriate. ➢ Review the MSDS. ➢ Adequate precautions shall be taken to prevent the ignition of flammable vapors. Sources of ignition include, but are not limited to, open flames, lightning, smoking, cutting and welding, hot surfaces, frictional heat, static, electrical, and mechanical sparks, spontaneous ignition, including heat-producing chemical reactions, and radiant heat. ➢ Fire Extinguisher (20 BC) within 75' of refueling location.	TPMC ES&H Plan Section19 (TPMC Hazard Communication Program). 29 CFR 1910.106 (Flammable and Combustible Liquids) Project-specific ES&H Plan Section	TPMC's HAZCOM Training or equivalent PS-13 courses 15672 (Designated Worker and Fire Watch) and 9893 (Hands on Fire Extinguisher Training), or equivalent. Any site and/or facility-specific requirements.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventative Measures, and Bounding Conditions	Reference Documents	Training.
		➢ Shut off equipment and let cool before refueling. ➢ Use UL-listed and approved dispensing devices when flammable liquids are dispensed from drums. ➢ Fuel cans shall meet OSHA requirements (no more than 5 gallons, spring closure). ➢ Observe OSHA regulation 29 CFR 1910.106 (Flammable and Combustible Liquids) requirements for separation and maximum quantities.	21: (Site Specific Fire Protection & Prevention Plan) On-site MSDS file	
MAINTENANCE AND REFUELING	Welding and brazing	➢ Refer to the controls for this hazard under "Welding drill casing joints together"		

DECONTAMINATION

Decontamination activities may consist of dry wiping, brushing, washing with detergent and water, or pressure washing. Decontaminate sampling equipment using dry decontamination procedures (Fantastic spray or equivalent and paper towels.) If dry decontamination proves inadequate, wet decontamination using alconox detergent and DI water rinses may be required.

Decontamination	Exposure to contaminants and decontamination fluids	➢ Wear required PPE as follows: ❖ Long sleeved shirt and long pants. ❖ Nitrile or other suitable gloves for examining samples. ❖ Safety glasses with side shields. ➢ Avoid direct contact of sample media or decontamination fluids with skin. ➢ Avoid hand-to-face contact. ➢ Wash hands upon exiting the contamination reduction zone. ➢ MSDS required for chemicals used on-site.	MSDS file on-site TPMC ES&H Plan Section 49 (Radiological Requirements)	TPMC HAZCOM PPE training
Decontamination	Generation of decontamination waste	➢ Manage in accordance with approved Waste Characterization Strategy form	Waste Characterization Strategy form TPMC ES&H Plan, Section 39 (Waste Management / Disposal)	LANL RCRA Personnel Training Course: 7488. RCRA Refresher Course: 28582. Waste Generation Overview (Live) Course: 23263.
Decontamination	Pressure washer injury;	➢ Follow manufacturers operating limits for pressure and temperature.	Manufacturer's	Pre-job briefing.

Work Tasks/Steps	Hazards, Concerns, and Potential Accidents/Incidents	Controls, Preventative Measures, and Bounding Conditions	Reference Documents	Training.
		And do not point at another employee. Face shield, chemical gloves.	specifications	TPMC's PPE training or equivalent
Decontamination	Incompatible materials;	➢ Do not place incompatible materials in the same waste container (e.g. acetone or (samples mixed with acetone) and oxidizers such as nitric acid). ➢ Comply with approved waste Characterization strategy documents.	TPMC ES&H Plan Section19 (Hazard Communication Program) MSDS file on-site	TPMC's HAZCOM and general PPE training, or equivalent
OTHER CONCERNS **PRID, ECOLOGICAL, CULTURAL, WETLANDS PROTECTION, ENDANGERED SPECIES, ETC.**				
OTHER CONCERNS	Violating PRID requirements for protection of Environmental, Ecological, Cultural, Wetlands, Endangered Species, and other resources and requirements.	➢ Comply with all requirements as specified in permits and plans for this project.		

APPROVAL

The SUBCONTRACTOR line manager approves work based upon confidence that this IWD has been properly prepared, that the work will be performed within ES&H/S&S requirements, facility requirements and capabilities, and will be performed in accordance with this IWD.

(Signature/Z#/Date)

114967 06/30/10

IWD Type		**Reviewed by subcontractor ES&H Representative** (Signature/Z#/Date)
☒ Moderate-hazard ☐ High-hazard/complex ☐ Standing IWD	Name of Primary PIC **Steve White** Name of Alternate PIC **Ryan McGuill** Name of Alternate PIC _____