

Section 27 Reclamation Drilling Standards

This section establishes specific safety standards and safe work practices for earth and rock drilling operations. The standards do not apply to drilling powder holes for excavation.

27.1 Standards for Site Selection and Working Platforms

27.1.1 Preparation of the Work Site. Clear the work site to provide adequate room for the drill platform and supplies. In preparing a work site located on adverse topography, guard against flooding, caving, slides, and loose boulders. Stabilize the drill platform with outriggers or adequate timbering.

27.1.2 Underground Utilities and Overhead Lines. Survey the work site to determine the presence of underground or overhead utilities before setting up the drill rig. Locate and mark the underground utilities. Maintain a minimum of 15 feet of clearance from overhead utilities unless the location of the utilities is positively determined by exposing them. Meet the requirements of the "Electrical Safety" section for equipment operation adjacent to high voltage lines, except maintain a minimum 30-foot clearance between any part of the drill or mast and the powerline, regardless of voltage.

27.1.3 Drainage. Provide a drain for the drill water to flow from the work site. Extend the drain far enough to prevent undercutting of the foundation.

27.1.4 Drill Platform Design. Ensure drill platforms provide an adequate working space for the drilling operation and have a firm stable foundation. A professional engineer must design unusual drill platforms.

27.1.5 Mud Pits and Drainage Excavations. Ensure mud pits and drainage excavations are safely sloped and located to provide minimum interference with work. Where necessary, provide suitable barricades, catwalks, etc. to reduce the possibility of injury. Use ladders in pits or excavations 4 feet deep or more.

27.1.6 Lighting. Illuminate all working surfaces with a minimum of 10-foot candles.

- a. Ensure all electrical wiring for illumination purposes meets National Electrical Code. Qualified personnel must install all wiring.
- b. Use heavy duty, outdoor, nonshattering light bulbs, unless the bulbs are enclosed by the fixture.

- c. Maintain the lighting circuits in good repair. Remove defective wiring or fixtures from service.

27.1.7 **Flammable Liquids.** Store, handle, and dispense flammable liquids in accordance with the section, "Standards for Material Handling, Storage, and Disposal."

27.2 **General Requirements for Drill Rigs**

Drilling rigs must meet the following requirements regarding how they are equipped, labeled, operated, and maintained.

27.2.1 **Control Levers.** Post labels clearly indicating the function and direction of the control levers on the power unit controls of all drills. Where practicable, design operating unit controls to return to neutral when the control levers are released.

27.2.2 **Safety Shutoff.** Install at least two emergency safety power shutoff devices on all units. Locate one switch within easy reach of the operator and one within easy reach of the helpers at ground level near the drill or auger head. You may connect a safety line to an emergency stop switch instead of using the two emergency stop switches. Clearly label emergency stop devices or make them readily identifiable in some other way. Check daily to ensure that they work.

27.2.3 **Operator.** Only qualified personnel instructed in the operation of the particular equipment may operate the power unit.

27.2.4 **Lubrication and Repair.** Lubricate all drilling equipment routinely. Shut down equipment during manual lubrication and during repairs or adjustments.

27.2.5 **Preventive Maintenance.** Provide an effective preventive maintenance program for periodic inspections at such intervals as are necessary to ensure safe operation and adequate maintenance.

27.2.6 **Refueling.** Do NOT refuel internal combustion engines while they are running. Where practicable, position or shield the fuel tank to avoid accidental spilling fuel on the engine or exhaust manifold during refueling.

27.2.7 **Inspection.** A competent person must inspect drilling equipment before each shift to determine if it is in safe operating condition. Correct any damage or deficiencies before using the equipment. Maintain written records of all deficiencies and repairs.

- a. Develop an inspection checklist based on the manufacturer's recommendations and the requirements of this section for each piece of drilling equipment. Inspect drilling

equipment at least monthly and maintain a written record. Use the inspection checklist to document the monthly inspection.

- b. Give hoisting units on the drill an annual performance test to the maximum rated load.
- c. Inspect truck-mounted drill rigs annually for compliance with the applicable Department of Transportation regulations.

27.2.8 Gears and Moving Parts. Isolate or guard belts, gears, shafts, pulleys, sprockets, spindles, drums, and other type moving drives as set forth in the current edition of American National Standards Institute (ANSI) B15.1, "Safety Code for Mechanical Power Transmission Apparatus."

27.2.9 Fire Extinguishers. Carry a 2-A:40-B:C dry chemical fire extinguisher on the unit and remove it to a position within 25 feet of the work site during drilling operations. Inspect extinguishers at least once every month. A qualified inspector must conduct annual maintenance inspections and tagging.

27.2.10 Exhaust Systems. Equip engine exhaust systems with spark arresters when operated where sparks constitute a fire hazard.

27.2.11 Raising Mast. Clear personnel from the immediate area before raising the mast, except for the operator and a helper if necessary. Check to ensure safe clearance from energized power lines or equipment. Remove unsecured equipment from the mast before raising the mast. Adequately secure cables, mud lines, and cat lines to the mast before raising the mast.

27.2.12 Securing Mast to Rig. Secure the mast to the rig in an upright position using the original pins or bolts or equivalent pins and bolts, after it is raised.

27.3 Truck-Mounted Drills

27.3.1 General. Provide platforms, steps, handholds, and guardrails on the equipment to ensure safe access and footing. Coat the platform and decks with a nonskid surface.

27.3.2 Truck Movement. Do **NOT** move trucks backwards unless the driver has personally inspected the area behind the truck. Use a spotter in restricted or congested areas or in areas where workers are located. Equip trucks with serviceable automatic backup alarms.

27.3.3 Transporting Drill Equipment. Thoroughly inspect drill equipment before moving it to ensure that the mast, drill rods, tools, and other supplies and equipment are secure to prevent displacement while in transit. Observe applicable traffic laws when moving drill

equipment over public roads. Check steering mechanism, brakes, lights, load limits, and proper flagging or lighting of load extensions. Do not move trucks until the mast is secured in the transport position.

27.4 Skid-Mounted Units

27.4.1 Towing Equipment. Equipment used to skid drill units must have adequate power to safely control the intended loads. Provide an adequate means for braking the skid unit when moving a skid mounted drill down a slope. Skidding operations must meet the requirements in the section on "Mechanized and Stationary Equipment," specifically "Unusual Equipment Configurations."

27.4.2 Access. Provide employees with a safe means of access to the skid-mounted drill unit.

27.4.3 Tie Downs/Anchors. Secure the drill while raising the mast or during drilling operations with either a deadman or by weighting or bolting it down to prevent the drill from tipping over.

27.5 Drilling Operations

27.5.1 General. Before starting the power unit, disengage all gears, set the cable drum brake, and make sure no rope is in contact with the cathead.

27.5.2 Safety Chains. Use a safety chain and cable arrangement to prevent water swivel and mud line whip.

27.5.3 Water Swivels and Hoisting Plugs. Check all water swivels and hoisting plugs daily for possible frozen bearings and lubricate properly before using. A frozen bearing could cause mud line whip and injure employees.

27.5.4 Breaking Operation. The operator must have eye contact with the employee placing the tongs, forks, or wrenches when breaking drilling tools, rods or casing with the use of the drill's power.

27.5.5 Chuck Jaws. Periodically, check the chuck jaws and replace them as necessary.

27.5.6 String of Drill Rods. Do not tighten the chuck jaws against a moving drill string. Use a cat line or hoisting cable and plug for braking before tightening the chuck.

27.5.7 Supporting Drill Rods. Use mechanical means to raise or lower drill rods.

27.5.8 Drilling with Air. When drilling with air, direct the exhaust into a dust collection system, divert it through a long discharge hose away from drilling personnel, or dampen it with water or a wetting agent to control the dust. Direct the cuttings to the side away from employees.

27.5.9 Cleaning Drill Rods. When using drilling fluids, use a rubber or other suitable wiper to remove material from the drill rods when removing them from the drill hole.

27.5.10 Pipe Wrench Jaws. Check pipe wrench jaws periodically and replace them as they become worn.

27.5.11 Draining of Drill Rod. Allow drill rods to drain completely following breaking and before removing them from the working area.

27.5.12 Hoisting of Drill Rod. The operator must exercise care to avoid a sudden release of the drill rod while the rod is being carried from the hole.

27.5.13 Hoist Capacity. Determine the hoist capacity and weight of the drill rod to prevent collapse of the mast during drill string removal. Do **NOT** exceed the operating capacity of the mast and hoist.

27.5.14 Cleaning of Auger Flights. Do **NOT** clean auger flights while the auger is rotating.

27.5.15 Auger Sections. Avoid mismatching auger sections. Do **NOT** use different brands and different weights in the same auger string.

27.5.16 Fitting Pins. Use only tight-fitting pins designed for the auger. Inspect all connectors daily, and do not use any defective connectors.

27.5.17 Drill Hole Protection. Adequately cover or protect unattended drill holes to prevent animals or people from accidentally falling into them.

27.5.18 Warning Signs. On all equipment, install a durable warning sign containing the following wording in full view of the operator:

- All personnel must be clear before starting machine
- Stop the auger to clean it

- Stop engine when repairing, lubricating, or refueling
- Do not wear loose fitting clothing or gauntlet-type gloves

27.6 Underground Drilling Operations

27.6.1 General Requirements. All drilling activities conducted underground must comply with the section, "Tunnel and Shaft Construction" of this standard and 29 CFR 1926, Subpart S, "Tunnels and Shafts, Caissons, Cofferdams, and Compressed Air," of the Safety and Health Regulations for Construction.

27.6.2 Access. Provide and maintain a safe means of access to all underground working places.

27.6.3 Lowering and Hoisting Equipment in Shafts. Do not carry heavy equipment down ladders into a shaft. Provide mechanical hoisting devices to lower and hoist equipment in shafts more than 10 feet deep.

27.6.4 Unattended Shafts. Use barricades equipped with gates or doors to restrict access to unattended shaft openings. Fence and post subsidence areas that present hazards.

27.6.5 Evacuation Plan. Develop evacuation plans and procedures before startup and make them known to all employees.

27.6.6 Underground Ventilation. Mechanically ventilate underground work areas in accordance with the section, "Tunnel and Shaft Construction." Provide a minimum air velocity of 100 feet per minute (FPM) over the gross bore area of the underground workings.

27.6.7 Scaling Work Areas. Thoroughly scale work areas before any drilling operations and periodically during all underground work.

27.6.8 Walkway. Maintain a clear walkway and do not allow equipment or materials to obstruct the passageway.

27.6.9 Drainage. Provide and maintain drainage away from the work site.

27.6.10 Lighting. Install and maintain sufficient lighting in work areas and access ways. Illuminate all work areas with a minimum of 10-foot candles.

27.6.11 Electric Service Lines. All work areas must have electrical service lines that are insulated, strung on insulators, and separated from water, air, or telephone lines.

27.6.12 **Hardhats.** Employees must wear hardhats conforming with ANSI Z89.1, type I, class E.

27.6.13 **Miner's Lamps.** Provide miner's lamps to all employees who work underground and ensure all employees wear them while working underground. Install a lighting system to provide illumination.

27.6.14 **Rain Clothing.** Wear rain suits if conditions warrant.

27.6.15 **Anchors.** Install rock bolts or anchors in accordance with the manufacturer's instructions. Rock bolts or anchors used for lifting and pulling must have a safety factor of 5. Adequately torque all rock bolts in accordance with manufactures' recommendations.

27.6.16 **Column Mounted Drill Units.** Securely stabilize all column mount drills with necessary timbers and wedges adjacent to column foot plates. Drive wedges into place and nail them to adjacent timbers to prevent vibration movement.

27.6.17 **Flammable Liquids or Gases.** Do not allow flammable liquids or gases underground, except as needed for welding and cutting.