# Federal Wage System Job Grading Standard For Drill Rig Operating, 5729

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## WORK COVERED

This standard covers nonsupervisory work involved in moving in, setting up, operating, maintaining, and moving out heavy mobile drill rigs and associated tools and equipment which are used for geologic drilling at field locations. The work requires knowledge of the operating characteristics of core, churn, calyx, auger, or probe type drill rigs and tools; and skill in manipulating controls to adjust to any drilling condition.

## WORK NOT COVERED

This standard does not cover work that involves the operation of compressed air or percussion type machines such as wagon drills or jackhammers used for construction or demolition purposes.

## TITLE

Jobs covered by this standard are to be titled *Drill Rig Operator*

## GRADE LEVELS

This standard does not describe all possible grade levels for this occupation. If jobs differ substantially from the skill, knowledge, and other work requirements described in the grade levels of the standard, they may be graded above or below these grades based on the application of sound job grading methods.

## HELPER AND INTERMEDIATE JOBS

Helper and Intermediate Drill Rig Operator jobs are graded by the Office of Personnel Management Job Grading Standard for Trades Helper Jobs and Intermediate Jobs. (Grade 10 in this standard is to be used as the Ajourney level@ in applying the Intermediate Job Grading Table.)

# DRILL RIG OPERATOR, GRADE 8

*General*: Grade 8 drill rig operators operate power auger drill rigs which are designed primarily for shallow-depth drilling up to about 100 feet, usually through clay, sand, silt, etc., to explore the foundations of canals and small structures, perform soil surveys, or search for construction materials. Power auger rigs are mounted on heavy mobile equipment such as trucks, trailers, and skids, have relatively simple operating controls and ordinarily do not require auxiliary equipment. Typically, the work at this level involves following established procedures as to schedules and patterns for borings, depth of holes, and types of samples needed at each drill site. The work requires ability to prepare for drilling jobs, aligning the rig, aligning and installing proper bits and devices, and to operate control levers to rotate, press, auger, withdraw, and empty auger tools under normal drilling conditions. Grade 8 operators use judgment to anticipate and avoid caving problems.

Operators also keep daily drilling operation logs and records, and perform field maintenance on equipment and tools in accordance with preventive maintenance schedules and safety requirements. They also assist higher grade workers in routine core drilling operations.

*Skill and Knowledge*: Grade 8 drill rig operators apply knowledge of power auger drill rigs and tools such as the open blade and cylindrical bucket, related hand augers and shaft extensions, and the methods and techniques of working borrow areas, and on drill sites through clay, sand, silt, etc., in order to obtain samples of foundation materials. They are skilled in the operations of the drill rig and the manipulation of relatively simple machinery controls for lowering the tool, auguring, lifting, and dumping the sample. In completing each cycle which sinks the hole one foot at a time, they are skilled at swinging auger tools in and out of the hole as rapidly as the drilling is accomplished. Because samples are disturbed in the drilling, grade 8 operators are skilled at rigging up a reflecting light with a mirror to provide a clear view of the sides of the hole, or providing the necessary rigging to lower a man safely into the hole for a direct view of the geologic strata.

Grade 8 operators are skilled at changing equipment and technique as the drilling progresses, and different subsurface materials and conditions are encountered, for example, temporarily switching to fishtail or churning bits to drill through hard subsurface materials too hard for auger tools. Although drilling pressure is normally limited to the weight of the auger tool and bar, grade 8 operators are skilled at offsetting subsurface resistances to auger tools by improvising additional weights in the form of heavy rocks or steel bars. They are able to gage caving conditions caused by loose subsurface materials and use casings to prevent the entire hole from collapsing.

Grade 8 operators are skilled at performing auger boring assignments involved in construction material investigations and foundation explorations to obtain disturbed soil, sand, and gravel samples, normally to depths of 20 feet. Additional lengths of driving rod are used to go deeper when required. Grade 8 operators are skilled at performing field maintenance of auger drill rig equipment such as the drive shaft, cylindrical buckets, related bits, pumps, and motors including lubrication, control adjustments, and replacement of obviously worn or damaged parts. They are

skilled at driving the drill truck to and from designated worksites, off highways, and over terrain such as recently plowed and irrigated fields.

Grade 8 operators are able to keep chronological records of drilling activities for geologic purposes such as the depths at which changes in types of materials occur, or caving problems begin. This includes posting drill rig and mobile equipment operation logs, reporting unsafe mechanical conditions, or recommending new tools or modifications of available equipment for unusual auger boring jobs.

*Responsibility*: Grade 8 drill rig operators receive power and hand auger drilling assignments with oral or written instruction from the supervisor; the assignments indicate the location, schedules, patterns or borings required, diameter and depths of holes, and types of samples to be obtained. They may receive technical guidance from a geologist who examines the samples obtained or logs the grains of the holes for adequacy of geologic data. Grade 8 operators make practical decisions and carry out the physical operations and machinery control lever manipulations of auger boring drill rigs independently. These decisions and operations include raising and lowering auger tools, controlling drilling speed, and taking consecutive representative samples of sub-surface formations. Grade 8 operators often direct a lower grade worker who assists in transporting, setting up, maintaining, or moving drill rigs and tools. Team effort is particularly important when swinging auger tools in and out of the holes at the same rate of speed as the drilling is accomplished. Grade 8 operators also determine when to use substitute bits such as fishtail or churning bits, adapt equipment and techniques to different conditions, or discontinue drilling when serious caving is suspected. They are responsible for field maintenance of the drill rig and tools. Completed work is reviewed for satisfactory results in the samples obtained and the condition of the holes after the boring operation.

*Physical Effort*: Drill rig operation work involves standing for prolonged periods, walking, bending, pushing, reaching, pulling, and lifting. Machinery control work is done in close proximity to rotating drill shaft or tool hammering operations, requiring quick reflex action to respond to drilling problems. Grade 8 drill rig operators frequently handle objects weighing 9 to 27 kilograms (20 to 60 pounds) and, occasionally, tools, samples, and equipment weighing over 27 kilograms (60 pounds).

*Working Conditions*: Drill rig operators work outside in all kinds of weather, frequently in wet, muddy, and dirty conditions, exposed to poison growth, reptiles, and insects, and under noisy conditions. They are exposed to cuts and bruises in using tools and working around moving machinery, strains while breaking or adding joints to drive shaft, slips and falls in wet weather, and the possibility of electric shock and burns. Some operators are subject to considerable discomfort due to mud, water, grease, and from the wearing of protective devices or equipment.

# DRILL RIG OPERATOR, GRADE 10

*General*: In comparison with the grade 8 power auger drill operation, the grade 10 operators set up, operate, and perform preventive maintenance and minor overhaul on core boring drill rigs, which are also mounted on heavy mobile equipment such as trucks, trailers, and skids. The core boring rigs are designed for deeper drilling and contain a greater number of control levers than the power auger drill rigs. Their controls are more complex and are manipulated at more frequent intervals for such precision operations as driving various kinds of bits and core barrels under an A-Frame or a demountable derrick; maintaining proper balance of engine power, hydraulic pressure, winching, and auxiliary water pump system to offset unpredictable formation changes (e.g., soft to hard); and coping with overburden subsurface conditions or overcoming core recovery problems.

The operators at this grade level select and install appropriate equipment, devices, and tools required to carry out work assignments (e.g., pumps, derricks, mechanical riggings, downhole hammers). They plan and coordinate support activities such as replacement parts and supplies, geologic problems or special geologic features to be observed, and mechanical means to be used to gain access to jobsite, including movement over very rough terrain such as swamps and hillsides, and around construction sites.

Using such guides as geologic specifications, equipment blueprints, and maintenance manuals, the grade 10 drill rig operators obtain geologic foundation samples by using coring and non-coring techniques to break through consolidated materials to any normal depth and unconsolidated sediments down to a depth of about 121 meters (400 feet), using conventional core borings, rigs, and tools. They also use special hand tools to add successive lengths of drill rod to enable equipment to reach the desired depth.

The grade 10 drill rig operators may direct a crew of one or two lower grade workers in the gathering and transporting of equipment, parts, and supplies to drill sites; in the construction of temporary roads; in leveling drill sites; and rigging up and aligning equipment and tools. They maintain logs and records of drilling operations and geologic information such as depth and classification of materials recovered; they label samples and core and store cores in a series of boxes located at previously staked drill sites.

*Skill and Knowledge*: Grade 10 drill rig operators apply knowledge of most types of conventional core boring drill rigs and auxiliary equipment and knowledge of the drillability of hard rock and sediments to perform the full range of standard foundation core drilling and noncore boring operations. They exercise skill in applying core drilling and noncoring methods and techniques such as operating controls properly to lower bit and core barrels safely into hole, using special handtools to add successive lengths of drill rod 3 meter(10 feet) long until hole bottom is reached, manipulating controls to adjust water pressure and engine power precisely to any drilling condition, winching up the bit in alignment with the hole, removing and setting aside drill rods in an orderly manner, removing core series to special containers, and rigging up to go down again.

# DRILL RIG OPERATOR, GRADE 10

Grade 10 operators apply skill in adjusting and controlling bit speed and pressure and water volume and velocity precisely, so cores are protected from breaking or washing away, and using bits and equipment components safely to their maximum limit. They also apply judgment, involving a high level of reflex action to respond to unusual machinery sounds and vibrations, sudden variances in water pressure, and erratic drill rig action. They are able to recognize poor core recovery results, normally indications of formation changes which need to be brought to the attention of a geologist or a supervisor. Grade 10 operators must judge the necessity for making such adjustments as changing bits, using shorter core barrels, setting casing, or changing drilling method.

Grade 10 operators are skilled at performing standard foundation coring and non-coring assignments such as driving 5 to 15 centimeters (2 to 6 inch) diameter casings through overburden sediments, washing and dry cleaning bore holes, obtaining desired types of overburden samples from designated depths, or recovering continuous samples of rock cores. They are skilled in using and operating a combination of equipment, devices, and tools such as pumps, derricks, mechanical rigging, diamond or sawtoothed bits, core barrels and rods, downhole hammers, generators, compressors, and a variety of standard and special sampling devices in the performance of drilling operations.

Grade 10 operators are skilled at interpreting assignments in terms of types of drilling to be done, equipment to be used, crew to be assigned, and geologic problems or special geologic features to he observed, in order to plan and coordinate field requirements such as replacement parts and supplies, mechanical means to gain access to jobsite, and equipment and pipeline setups required. They are able to recognize features of most underlying formations by the action of the drill, color of the return water, and rate of coring. They know and use the proper drilling procedures to insure maximum recovery of samples and accurate recording of depths.

*Responsibility*: Grade 10 drill rig operators receive work assignments through oral or written instructions accompanied by geologic specifications, equipment blueprints and maintenance manuals, drilling tables and formulas, and instrument reading information. On the basis of drilling location, hole size and depth, sampling frequency, or other specifics concerning coring and non-coring assignments, grade 10 operators plan the work and, in certain instances, coordinate

They are responsible for proper judgment to regulate drill speed and rate of feed, and equate water pressure with drilling conditions. They assure safe operation of conventional core boring drill rigs and diamond or saw-toothed bit, core barrel and rods, while drilling through rocks or sediments to the desired depths to obtain core samples. They are also responsible for preparing clear and concise daily operation reports from equipment and vehicle log books and on occasion, logging geologic information such as depth and classification of materials recovered, labeling samples and cores, and storing cores in a series of boxes at previously staked drill sites.

Grade 10 drill rig operators work under the general direction of a supervisor who provides assistance with unusual problems. They work independently on the simpler field drilling assignments, making their own decision based on written work orders.

*Physical Effort*: Grade 10 level work, as at the grade 8 level, requires standing for prolonged periods, walking, bending, pushing, pulling, reaching, and lifting. Physical exertion, however, is greater at this level because core boring drill rigs contain more controls to manipulate, require frequent addition and removal of successive lengths of drill rods, and consistently involve a high level of reflex action in responding to unpredictable formation changes, overburden conditions, and core recovery problems. Grade 10 drill rig operators frequently handle objects weighing 18 34 kilograms (40 to 75 pounds) and occasionally as much as 45 kilograms (100 pounds). Heavy or awkward items are handled using hoists and other weight handling equipment, or with the aid of other employees.

*Working Conditions*: Working conditions are similar to those described at the grade 8 level.

## DRILL RIG OPERATOR, GRADE 11

*General*: Grade 11 drill rig operators operate core boring drill rigs under more difficult situations and to greater depths than do grade 10 operators. The types of core boring rigs used by grade 11 operators are mounted on larger trucks, trailers, special mobile equipment such as swamp buggies, marine equipment such as jackup pontoons and barges, or temporary structures such as cribs and platforms. Surface problems at this level include rougher terrain such as mountains, bayous, and deserts or difficult marine conditions such as swift mountain streams and deep tidal waters. Typically, in drilling permanent observation wells, the work involves operating large auxiliary equipment and handling interrelated large diameter bits and core barrels (normally 6 inches) and longer sections of drill rod 6 meter (20 feet) to extend the reach of drilling tools to extreme depths (e.g., 909 to 1515 meters) (3,000 feet to 5,000 feet). This type of work is performed almost exclusively in unconsolidated sediments which are difficult to core successfully and require precise bit speed and pressure control and drilling mud technology, beyond the scope of standard guidelines, to recover substantial cores.

*Skill and Knowledge*: Grade 11 drill rig operators apply a comprehensive knowledge of specialized drilling methods and techniques. They are skilled in devising special fixtures, improvising unusual setups, and applying special purpose equipment to extend the use of conventional rigs or tools at unusual angles or positions on rough land or marine surfaces. Grade 11 operators are also skilled in planning, coordinating, and organizing all equipment, tools, and precise drilling mud technology for large specialized deep well core boring drill rigs to core difficult sediments such as non-cohesive soils, irregular subsurface materials, friable deposits, or hard fragments in soft matrices.

Grade 11 operators apply a comprehensive knowledge of drilling mud technology such as combinations of mixtures possible, effects against the sides of the hole, lubrication and cooling qualities to the surfaces of the bit, and the cohesive character to the surface of the core. They

must be able to control the viscosity, sand content, and application pressure of the mud in relation to drilling progress or conditions. They must be aware of and guard against solidifying which adds to the potential for breakdowns, especially when the bit is in the hole.

Grade 11 operators are skilled at performing the more complex coring and non-coring assignments such as sampling unconsolidated sediments, coring hard rock, testing (pressure, permeability, or vane shear) for subsurface orientation, drilling reverse circulation wells, drilling calyx holes, installing geologic instruments at different points in the hole, or grouting pressure zones. They are skilled in selecting the proper casings, drill rods, diamond drill bits, roller rock conditions through "feel" alone, or indirect signals such as equipment noises, and vibrations in order to vary drill speed and downhole pressures on diamond bits so as to assure obtaining 100 bits, core barrels, dewatering pumps, grout machines, generators, air compressors, downhole hammers, core drilling systems (wire, triple tube systems, etc.) and the appropriate rig for the assignment. Grade 11 operators are skilled at interpreting machinery responses to subsurface per cent cores from porous or soft rock and over-burden materials. They are able to accurately identify formations and strata from core materials, or through the use of electric bore hole logging techniques. They are skilled in operating high pressure air compressors (250 psi to 1200 CFM) in connection with grouting and downhole hammer non-coring activities.

*Responsibility:* Assignments are received by grade 11 drill rig operators through oral or written general instructions which include any special technical and administrative orders such as geologic specifications, special authorizations, equipment blueprints, and unusual safety measures, requiring review and interpretation.

Grade 11 Operators must plan, organize and coordinate operations to meet any unusual drilling requirements or adverse terrain conditions. For example, they are responsible for the selection, safe positioning, and operation of equipment under such adverse conditions as on mountainsides, in swift mountain streams and deep tidal waters, which require the grade 11 operators to frequently assess drilling conditions to determine the exact drilling techniques required to balance viscosity and pressure, bits, bit speed and pressure, relative to the formations encountered, to assure that equipment does not topple or become trapped, causing injury to worker or damage to equipment and samplings. They determine the proper procedures for placing concrete, or mortar seals between aquifers, installing pipes and measuring devices, and winching when holes are to be electrically logged.

They are responsible for an accurate recording of the depths at which the formations change, especially where the change causes little or no core recovery which may impact geologic surveys. They are also responsible for equipment maintenance, field repairs and overhauls, and special adaptations to increase the reliability of equipment and drilling mud and minimize break-downs.

The grade 11 drill rig operator normally works in remote locations or in other work situations where there are only infrequent visits by supervisory or technical staff, (e.g., every 2 to 3 days). The work is reviewed on the basis of progress of drilling, condition of samples, and completion of assignments within reasonable time limits.

*Physical Effort*: As at the grade 10 and 8 levels, grade 11 level work requires standing for prolonged periods, walking, bending, pushing, pulling, reaching, and lifting. However, in contrast with the grade 10 level, physical exertion at this level is greater because the core boring drill rigs are bigger, heavier, and more complex to operate, involve handling larger interrelated diameter bits and core barrels, and require the use of longer sections of drill rods. Grade 11 drill rig operators frequently move objects weighing up to 68 kilograms (150 pounds) and occasionally as much as 90 kilograms (200 pounds). Heavy or awkward items are normally handled using hoists or other weight handling equipment, or with the aid of other employees.

*Working Conditions*: Working conditions are similar to those described at grade 8.