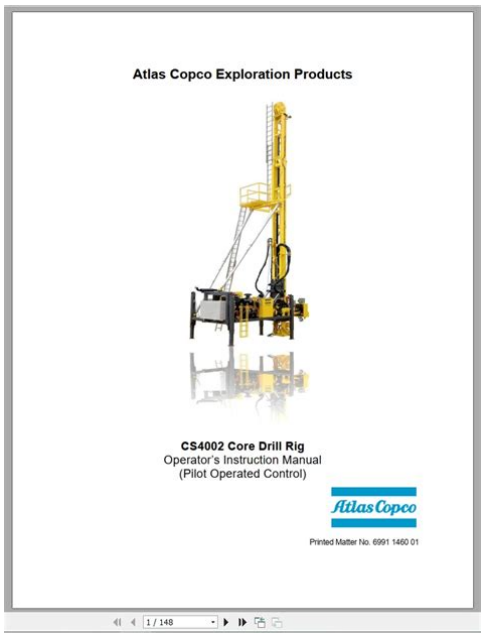
Drilling Rig Operators Manual



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Drilling Rig Operators Manual

Today, SIMCO drilling rigs, drilling rig equipment and water well equipment are working on every continent in the world. Backed by over 50 years of experience in the drilling industry, our drill rigs are used for water well and geothermal well drilling, geotechnical and environmental drilling, mineral exploration, geothermal wells, construction and utility work, and a wide range of other diverse applications. The 7000 is truly the work horse of the SIMCO water well drilling rigs stable. With an auto indexing drill rod carousel 10 or 16 drill rod and up to 1,100 foot air or wet rotary drilling depth, the SIMCO 7000 is the ideal geothermal drilling and water well drilling solution. This truly state of the art drill rig will make short work of any geothermal drilling and water well drilling jobs. Click here to view more of our drilling rigs and drilling equipment. And we support our family with whatever they may need, whenever they need it. Trying to determine which drilling rig best fits the job. Call us and we can guide you towards the best option. Our trained customer support team stands ready to assist you with whatever it is that you may need to keep your SIMCO drilling rig running like new. We have a fully stocked parts department to make that happen. Next day parts delivery will ensure that downtime is kept to a minimum and jobs get completed on time. By visiting this website, certain cookies have already been set, which you may delete and block. By closing this message or continuing to use our site, you agree to the use of cookies. Visit our updated privacy and cookie policy to learn more. Learn More By visiting this website, certain cookies have already been set, which you may delete and block. Visit our updated privacy and cookie policy to learn more.http://www.logo4you.dk/userfiles/cr-5000-manual.xml

- **drill rig operator manual, drilling rig operators manual, drilling rig operators manual pdf, drilling rig operators manual download, drilling rig operators manual free, drilling rig operators manual online.**

Source Robert Caho Source Robert Caho photos Source Robert Caho Getting the job done right is all a matter of performance, and for drillers the drilling rig plays an enormous part in determining how any given project plays out. Robert Caho, director of sales and marketing at Diedrich Drill, has spent 35 years in the industry and says the drilling crew and rig have to be at their best in order for business to boom. “ Drill rig safety and maintenance is the number one key in our industry to keep it going,” he says. “Without safety and maintenance and keeping the rigs up to date, cleaned and worked on, they’re just going to go down.” National Driller was present for his lecture, “Drill Rig Maintenance and Safety,” at the 2015 Florida Ground Water Association Convention and Tradeshow. He says that from what he sees every day, lack of rig preservation is the biggest problem out there. “Most of the time the guys don’t seem to think they have enough time to do the work that needs to be done as far as greasing the rig, checking the rig and doing any maintenance. There just seems to be a lack of that.” In a recent interview, Caho spoke to National Driller about how to address that problem, offering key best practices for drilling rig maintenance. Drillers should look for leaks, especially from hydraulic hoses. Also important to check on are the cables, to make sure they aren’t unspooled. Other things to keep in mind while scoping the rig out are loose bolts, which should be tightened right away. Another basic involves fluid levels, which should be maintained always. They should be used on a daily basis. One reason you grease a rig is to get all of the dirt out of the bearings and keep them clean. It pumps new fresh grease into them. A lot of times you’ll find different issues of safety or maintenance on a rig that need to be addressed while you’re greasing the rig.http://www.vieiras.pt/imagensprodutos/cr-7400-manual.xml

Rigs are being run up all of the time and mechanically moving, so without grease, they will wear out and they'll wear out in a pretty quick fashion if they're not taken care of." The Kelly bar is a big issue on mechanical rigs. You need to clean all of the grease off of the Kelly bar and then regrease it at a minimum of once a week as well as all of the slide bases and everything. The reason is because all the dirt that flies in the air, sand and everything else will get onto these surfaces and it's basically like sandpaper on the bearings. They will not last if they're not completely cleaned and regreased." Now what happens is it rusts and the rust goes right through and ends up ruining the frame and structure of the rig by not repainting it over. So it needs to be repainted and touched up when you've got scratches." If you put the wrong oil in it, it can really burn a pump up really quick and that's when you're down for a long time." On a closed loop system, where it flows, all of the pumps and everything run through it. If you happen to have a mechanical breakdown that comes through as far as burning the pump up or whatever, those metals on a closed loop system are going to flow all the way through the whole system and, potentially, if you don't clean the whole system out and get fresh oil in it, you end up burning the motors out of them." A lot of the newer rigs are electric and if you don't have some kind of background with electric, you need to learn it. Know your electronic system on your rig because all the way from throttle linkages to hydraulic linkages are all electrical now. You need to make sure that when you do a repair on any electronics that they are put back to factory, if not better. Also seal them up good with some type of silicon or something to keep moisture from getting into them." They both take the same amount of maintenance if done properly on a daily, weekly, monthly, annual basis.

Since drilling rigs are big, complex machines that work really hard, problems are bound to take place in the field, which means that keeping a small set of tools with the rig, including a grease gun, is essential. Although it isn't necessarily taken as seriously as it should be, Caho says safety during rig maintenance is just as big a deal as safety while drilling. Caho says the most common safety mistake he sees is maintenance being performed while the rig is still running. Deenergized means there are no hydraulic pressures anywhere. Another precaution to take during maintenance is to make sure the drilling rig isn't accidentally reenergized during the process. Making sure the rig is locked out and tagged out will assure another crew member doesn't start the drilling rig up while it's being worked on by a vulnerable teammate. That should include all drilling managers and operators, and the group should discuss the day ahead, the projects scheduled and the maintenance that needs to take place. Not only does it keep everyone in the loop, it also holds everyone accountable. That isn't the only time for upkeep though, Caho says. "If you can't do that, any standby time you have where you're waiting for a client to make a decision, a grease gun should be in your hand and you should be checking over the rig. Everybody's got time." The drill crew supervisor should be chiefly responsible for making sure it gets done. Then, depending on the size of the operation, it goes all the way down to drilling managers and assistants. Some companies even have their own mechanic. That's OK, Caho says, because every rig has a point of reference. "What they should do is make sure they have what I like to call the drill rig bible and that's the corresponding safety and service manual that you can get right from the factory, whoever built the rig.

" He says the rig manual should be with the rig at all times because anything can happen anywhere and it's easy for a tiny wrong turn to cause a huge problem. Not only does it ensure repairs are made the right way, it ultimately ensures the drilling rig operates at maximum capacity and the crew is kept safe. If you don't feel safe, make sure you stop operations and take care of it. Do not continue drilling if you don't feel safe." Tell me how we can improve. Please tell us why. How good is your jobsite with hearing protection Can you repeat the question Safety first. We have the people, capabilities, and vision to serve the needs of a challenging and evolving industry. One the world

can’t live without. We have the people, capabilities, and vision to serve the needs of a challenging and evolving industry. One the world can’t live without. They are used for suspending, moving, and rotating tubulars in and around the well center and on the drill floor. Built for simple operation to maximize your drill pipe capabilities, our tools are made with more than 150 years of combined industry experience. You may delete and block cookies from this site, but parts of the site may not function as a result. More information about cookies and your choice can be found in our Privacy Policy. The task force members identified the knowledge areas and tasks necessary for safe drill rig operation and developed examinations that are fair, valid, reliable, and legally defensible, according to NCCCOs announcement. To drill a well it is necessary to carry out simultaneously the following actions a to overcome the resistance of the rock, crushing it into small particles measuring just a few mm; b to remove the rock particles, while still acting on fresh material; c to maintain the stability of the walls of the hole; d to prevent the fluids contained in the drilled formations from entering the well. This can be achieved by various drilling techniques.

In this chapter rotary drilling rigs will be examined. These are, in practice, the only ones operating today in the field of hydrocarbons exploration and production. The drilling rigs used on land are complexes of mobile equipment which can be moved in reasonably short times from one drill site to another, drilling a series of wells. In particular, the typical rotary rig for drilling onshore medium to deep wells, indicatively more than 3,000 metres, will be described below. Rigs for shallower depths use analogous but somewhat simpler techniques because of the smaller stresses to which the rig is subject. See Chapter 3.4 for offshore drilling. In rotary drilling the rock is bored using a cutting tool called the bit, which is rotated and simultaneously forced against the rock at the bottom of the hole by a drill string consisting of hollow steel pipes of circular section screwed together. The cuttings produced by the bit are transported up to the surface by a drilling fluid, usually a liquid mud or water, or else a gas or foam, circulated in the pipes down to the bit and thence to the surface. After having drilled a certain length of hole, in order to guarantee its stability it has to be cased with steel pipes, called casings, joined together by threaded sleeves. The space between the casing and the hole is then filled with cement slurry to ensure a hydraulic and mechanical seal. The final depth of the well is accomplished by drilling holes of decreasing diameter, successively protected by casings, likewise of decreasing diameter, producing a structure made up of concentric tubular elements see Section 3.1.9. Apart from the difficulties of drilling the rocks encountered, the number of casings also depends on the depth of the well and on the reason for drilling. The drilling rig consists of a set of equipment and machinery located on the socalled drilling site.

Normally the rig is not owned by the oil company but by drilling service companies, which hire out the rig complete with operators and which construct the well according to the client’s specifications. The most important items of equipment are set out in Fig. 1. It has already been mentioned that the bit is rotated by a set of hollow pipes ending with a special pipe of square or hexagonal section the kelly which passes through the rotary table and transmits the rotational movement. The kelly is screwed to drilling swivel which in turn is connected to the hook controlled and operated by a hoist and a derrick. The drilling swivel serves to let the drilling fluid pass from the surface hydraulic circuit to the interior of the pipes. The drill string is operated with a hoisting system formed by a hook connected to a series of sheaves crown and travelling blocks operated by a wire rope or drilling line and a hoist or drawworks. The crown block is located at the top of the derrick, which is the most striking and characteristic feature of the drilling rig. The function of the derrick is to support the crown 303 DRILLING AND COMPLETION OF WELLS 27 degasser 28 reserve pit 29 mud pits 30 desander 31 desilter 32 mud pumps 33 mud discharge lines 34 bulk mud components storage 35 mud house 36 water tank 37 fuel storage 38 engines and generators 39 drilling line 14 weight indicator 15 drillers console 16 doghouse 17 rotary hose 18 accumulator unit 19 catwalk 20 pipe ramp 21 pipe rack 22 substructure 23 mud return line 24 shale shaker 25 choke manifold 26 mud

gas separator 1 crown block 2 mast 3 monkey board 4 traveling block 5 hook 6 swivel 7 elevators 8 kelly 9 kelly bushing 10 master bushing 11 mousehole 12 rathole 13 drawworks 1 2 39 3 36 37 34 4 35 38 28 31 29 32 32 27 26 24 5 7 17 29 6 33 30 23 8 33 13 9 15 16 25 10 11 14 21 12 18 20 22 19 Fig. 1. Main components of a drilling rig.

 block, and it is tall enough to permit the useful vertical operation of the travelling block, and therefore of the drill string in the hole. The drilling fluid circulates in a closed circuit it enters by way of the swivel, flows through the drill string and the bit, cleans the bottom of the hole, then rises through the space between the drill string and the hole, reaching the shale shaker which separates the cuttings from the fluid, and then arrives to the mud tanks. It is subsequently conveyed to the mud pumps which circulate it to the drilling swivel once more via a rigid pipe standpipe and a flexible one hose, closing the circuit. Circulation of the drilling fluid, commonly known as mud, is the characteristic element of rotary drilling, as it permits the continuous clearance of the cuttings from the bottom of the hole. Deepening the well calls for the periodic addition of new drilling pipes, while replacing the bit when it is worn down requires the extraction or tripout of the whole drill string. This operation, which takes a great deal of time, is called the roundtrip. Nowadays, hydrocarbon exploration and production are based on the drilling of wells whose depth, in a few cases, has even exceeded 10 km. In the last few decades the need to limit the costs entailed by considerable technical problems has led to noteworthy progress in optimizing drilling techniques, in knowledge of the problems connected with drilling and with the stability of rocks at great depths, and in the formulation of muds for high pressures and temperatures. In drilling the main concern is achieving high rates of penetration under safe conditions, and reducing the idle or down time. Operatively, the choice of the type of rig is based on the well requirements, considering that the hire cost is proportional to the capacity and the technological characteristics of the rig.

According to this classification, onshore drilling rigs fall into four groups a light rigs, down to 2,000 m; b medium rigs, to 4,000 m; c heavy rigs, to 6,000 m; and d ultraheavy rigs for greater depths. Increasing capacity is matched by increasing both maximum hook load capacity and derrick strength. The drilling rig is transported to and set up on a levelled area called the drilling site, which contains the derrick, the service equipment, the stores and the living space crew quarters. The drilling site, with a surface area of some 1 to 2 hectares is thus transformed into a fullscale operative site, which is eventually dismantled at the end of drilling operations. This period could last from just a few weeks to more than a year in the case of exploratory wells in difficult situations. The spaces where the containers for the offices, the warehouse, the workshop, the services and the crew quarters will be located are then organized, if the site is far away from inhabited centres. It is selfevident that these areas have to be arranged in a rational manner, occupying the least possible space, and fenced in to keep out persons not engaged in the operations. The site is provided with drainage ditches to collect rain water and any liquids accidentally spilt, and is fully waterproofed. Drilling site preparation entails earthworks and levelling, with the removal of the topsoil and placing a 3040 cm thick layer of coarse gravel, a sheet of PVC Poly Vinyl Chloride for waterproofing purposes, and finally a 4050 cm thick layer of sandy gravel. These granular materials must be well compacted, as it has to support heavy trucks bringing in personnel, materials and utilities to the site. A rectangular or square shaped cellar is dug in the centre of the site vertically above the well and is lined with thrustbearing walls and a reinforced concrete slab, leaving a hole where the well is to be positioned.

This cellar serves to create a clear work area where the future wellhead will be located, and its depth must be in keeping with the height of the safety equipment necessary in the drilling stage. The size of the cellar varies according to the type of rig and wellhead, and will be between 2 and 3 m in depth, with an area of about 10 to 15 square metres.

The waste pits are excavated with sloping sides, 23 m deep, and measure up to 100 square metres or more in area; they are waterproofed with sheets of PVC and sometimes with layers of bentonite. When the drilling site preparation works have been completed, the first wellconstruction operation will be carried out, i.e. the installation of the conductor pipe, a 1050 m long steel pipe having a diameter of 70100 cm. If the subsoil is composed of loose sediments, the conductor pipe is fixed using a piledriver analogous to the one used in civil engineering for fixing foundation piles. The site must, by law, be large enough to store inflammable or dangerous materials at a safe distance from the wellhead. Furthermore, it must enable a flare to be set up, to burn off any hydrocarbons that might come to the surface during drilling, and it must allow the safety line for the derrickman to be anchored at a safe distance see Section 3.1.3. At the end of drilling operations, if the well turns out to be dry, the location is restored to its preexisting environmental state and is handed back to its owner; if instead the well is productive, production equipment is installed on the wellhead and it is permanently fenced into a smaller area of a few hundred square metres. During the drilling of a well, the most important function on site is supervising and verifying the drilling operations. This job is assigned to a representative of the operator, known as the drilling assistant.

This person must be fully qualified and of proven technical and decisionmaking competence, and is assigned the task of implementing the well project as drawn up in the programming stage, fixing the working sequence for site activities. The drilling assistant orders and controls the proper implementation of every operation, supervising safety measures and informing the central control office of the progress of operations. Service companies contractors also frequently operate on the location for the execution of specialist operations cementing, logging, geological assistance, etc.. A number of contractors have their own team on site with a representative; other contractors instead operate on a call basis, for short periods. The actual handling of drilling operations is assigned to a special drilling crew, whose numbers vary from rig to rig. Generally speaking, in onshore locations there is a foreman crew chief, in charge of site equipment, a driller, a derrickman, three drill assistants, one site man, maintenance hands electrician and mechanic and one or more watchmen. The driller works on the derrick floor, is in control of all drilling machinery and carries out the sequence of operations scheduled for making 306 the hole. The derrickman operates on a platform inside the derrick and controls the pipes in the stem rack during tripping operations. The drill hands, headed by the driller, see to screwing on breakin and unscrewing breakout the joints of the pipes during drilling and tripping operations, and keeping the derrick floor clean. In offshore drilling rigs, the crew is more numerous and specialized, as higher standards are set for such operations. All drilling site personnel work in day shifts, generally of twelve hours each. In fact, drilling is never suspended, except in just a few of the phases, because of the high cost of renting the rig. 3.1.

3 Hoisting system The hoisting system is the set of equipment necessary for handling any material inside the well, in particular the drill string and the casing. It consists of a structural part derrick and substructure, the complex of the crown and travelling block, the drawworks hoist and the drilling line. The substructure is the supporting base for the derrick, the drawworks and the rotary table, and constitutes the working floor for operations, or drilling floor, being elevated with respect to ground level. The substructure is a reticular structure of steel beams, that can easily be dismantled, and rests on concrete foundations or on a base of wooden planks around the cellar. Its height varies from a few metres up to 10 m in the largest rigs, and must be such as to permit the assembly of the safety equipment on the wellhead. The derrick is an openframework structure of steel beams, whose function is to hold the ensemble of sheaves at its top, known as the crown block, on which all of the items of equipment operated in the well or on the drilling floor are suspended. It must also contain the drill string during tripping, subdivided into lengths i.e. 2, 3, or 4piece sections of drill pipes screwed together called stands depending on the height of the derrick. In fact, the height of the derrick must be such as to permit the vertical movement of the travelling block for a distance greater than the equivalent of one stand. For example, to handle a stand of 3 drill pipes

about 27 m long the derrick has to be about 40 m high. The derrick is designed to resist the loads tripped in and out of the well in the operating phases, which induce both static and dynamic stresses. Every derrick has a rated load capacity, defined by API American Petroleum Institute standards, which establish the maximum hook load.

On the basis of their construction characteristics, derricks may be classed as conventional ones derrick or mast type, according to the way in which they are assembled and dismantled. ENCYCLOPAEDIA OF HYDROCARBONS DRILLING RIGS AND TECHNOLOGIES Fig. 2. Derrick type drilling rig. A derrick Fig. 2 is a structure of steel beams or tubes that can be completely dismantled and reassembled. The elements forming the derrick are relatively small and can easily be handled; nevertheless, the assembly of the entire structure requires quite a long time. Derricks, once made of timber, were the most usual type of structures until the 1930s, when they started to be replaced by masttype structures, which were easier to operate. Facing one side of the derrick in the drilling site there is a pipe yard where all the tubular materials that have to be lowered into the well pipes, casing, etc. are placed on a rack. The pipe yard is connected to the drilling floor by an inclined slide, making it easier to pick up the pipes. About twothirds of the height of the derrick is the derrickman's platform, which stands out for about 1 m, and on which the derrickman works during tripping, helping to stack the pipe lengths tripped out from the well on a special pipe rack. The derrickman's safety line is hooked onto this platform; this is a cable anchored to the ground at a suitable distance, enabling the operator to make a quick getaway with a cableway if there is danger of a blowout. Nowadays derricks, although more stable and robust than masts, are only used on platforms for offshore drilling, where the structure never has to be dismantled. Fig. 3. Mast type drilling rig. Obviously the mast possesses all the functional capacities of a derrick. Masts are generally selfelevating.

After the girders of the substructure and of the drilling floor have been placed above the cellar these also having been preassembled in modules, and the various parts of the mast have been assembled horizontally on the site, alongside the substructure, the mast is raised into a vertical position using cables and the drawworks supplied with the rig. Light and medium rigs, with reclinable masts, can also be selfpropelled portable masts as they are mounted on trucks. They are used to carry out maintenance jobs on wells in production, or to drill water wells, that is, operations that do not take much time, and that therefore require the use of a rig that can be transferred rapidly. Portable masts have less resistance to horizontal loads e.g. due to the wind and so it is necessary to guy them with steel cables. For particular situations of difficult logistics, e.g. drilling in inaccessible or high mountain areas, blockassembled rigs are available, as they are easier to transport by helicopter or by plane. As has been mentioned, the sheaves of the crown block are situated at the top of the derrick. The mechanism, with a fixed crown block and a mobile travelling one, consists of an ensemble of sheaves linked by a wire rope, worked by the drawworks Fig. 4 B. The crown block bears the load applied at the hook and its function is to reduce the wire rope tension required to pull the tubular material used to drill the well. It at the top of the rig consists of a set of sheaves usually from 3 to 7 supported by a framework of steel beams. The travelling block consists of another set of sheaves one fewer than for the crown block, mounted on an axis connected to the hook Fig. 4 A.

The number of sheaves in the crown and travelling block is chosen on the basis of the rated capacity of the tower and the rate of pulling, which is inversely proportional to the number of lines of wire rope connecting the travelling block and the crown block; the number of lines also defines the tension to be supplied by the drawworks.The hook consists of an upper section, fixed to the travelling block, and a lower section, which is the actual hook. The two sections are not rigidly joined, but connected by a spring resting on a bearing, which allows the hook to rotate and damps hook load during lifting. In modern rigs the travelling block and the hook form a single unit. The hook is characterized by its rated load capacity, which in the largest rigs can even exceed 500 t. The

drawworks is the machine that transmits the power to operate the equipment in the well. The basic 307 DRILLING AND COMPLETION OF WELLS crown block fastline drawworks drilling line travelling block hook deadline drawworks drum drum brake deadline anchor supply reel A crown block drilling line derrick travelling block B drawworks hoist Fig. 4. Lifting system mounted on a derrick. Here are visible the drawworks, the crown block, the travelling block, the drilling line and the hook. 308 components of the drawworks are an engine, one or more drums containing a steel cable, and the brakes Fig. 5. Apart from the engine, described below, the drawworks is made up of the following elements a main drum hoisting drum, around which the drilling line used for tripping the drill string and the casing elements and for raising and lowering the mast is wound; a fast drum, smaller in diameter than the hoisting drum, around which a smaller wire rope used for the rapid manipulation of relatively light material is wound and the braking system, consisting of a main brake and auxiliary brakes, placed at the sides of the hoisting drum shaft.