OGDCL

SAFETY HANDBOOK

For Oil & Gas Well Drilling and Servicing Operations

OCTOBER 2022

This handbook is based on API Recommended Practices and is intended as reference only. It may not be all encompassing. Ask your Location HSE Representative/ Coordinator for specificity. HSE Management System procedures are available in the latest revision of OGDCL's Integrated HSE System Manual.

Occupational Health, Safety, Environment & QA/ QC Department

Policy Reference: AA0102-16 (HSEQ) Dated 19th February 2021 (Revised)

OIL AND GAS DEVELOPMENT COMPANY LIMITED

Occupational Health, Safety, and Environment

Policy Statement and Commitment

As a responsible oil and gas E&P company, we are committed to embrace Health, Safety and Environment (HSE) in all our activities. The emphasis on HSE management is crucial to our operational requirement and to maintain market repute. In carrying out our multidimensional activities, we also ensure welfare of indigenous communities, protection of ecosystems and environment. As we continue to avail exploration and production opportunities on a sound foundation of technical and financial prudence, we intend to:

- Exhibit visible leadership at each level and ensure necessary resources, trainings and infrastructure are in place for aiming HSE excellence.
- Identify hazards and ensure effective controls to manage operational risks.
- Ensure that our entities meet or exceed applicable HSE laws, regulations, standards and other requirements.
- Set objectives and targets to safeguard humans & assets, protect environment and conserve energy & natural resources.
- Ensure that Contingency Plans are in place for business continuity.
- Provide employees with self-assured methods & practices, authority to stop unsafe work & motivation through rewards and recognition.
- Employ contractors and service companies who aspire to the high HSE standards at all times, and recognize that HSE is everyone's responsibility.
- Improve HSE system by continually focusing on Leading Indicators and disseminating lessons learned from Lagging Indicators.
- Assess HSE KPIs regularly & share performance accordingly.

Through observance of this policy, we aim to assist in protecting the environment and the overall wellbeing of our stakeholders, specifically our employees, clients, shareholders, partners, contractors, subcontractors, service companies and communities.

Managing Director / CEO

Important

Following safety precautionary guidelines will be strictly enforced to ensure the safety of our people at all Locations and our communities. Everyone who works for or on behalf of OGDCL is responsible for his/ her own safety and the safety of those around. However, Senior Management is accountable for timely communicating, training, implementing, and devising system of auditing for these guidelines to assure continuity in the compliance and performance.

- **Work (both routine and non-routine) will not be conducted without a pre-job risk assessment and a safety discussion (formal meeting/ toolbox talk) appropriate for the level of risk.**
- **All authorized persons will be trained and competent in the work they conduct.**
- **Personal protection equipment will be worn as per risk assessment and minimum site requirements.**
- **Emergency response plans, developed through a review of potential emergency scenarios, will be in place before commencement of work.**
- **Everyone has an obligation to STOP work that is unsafe.** *(**STOP Intervention Cards** are available on every prominent area along with the Drop Boxes)*

- **Location InCharge, Section InCharges, Shift InCharges and Supervisors to ensure that all workforce members have been communicated the substance of this Safety Handbook.**

- **Every Workforce Member to a) comply with the precautionary guidelines in this Safety Handbook; b) work safely and to promote positive safety culture; c) attend & participate in scheduled safety meetings; d) report all hazards, unsafe work behaviors and conditions to the Location InCharge and HSE & e) timely report accidents & nonconformities to the Location InCharge and HSE Representative.**

Outline of OGDCL's HSE Management System

		Plan			Do	Check	Act
		HSE Framework's Core Element					
Preamble OGM/P-HSE-1.1		First Leadership	Second Planning	Third Support	Fourth Operation	Fifth Performance Evaluation	Sixth Improvement
Terms & Definitions OGM/P-HSE-2.1		HSE & ERM Policy Statements OGM/P-HSE-4.1	Enterprise Risk Management OGM/P-HSE-5.1	Competence & Awareness OGM/P-HSE-6.1	Operational Planning and Control OGM/P-HSE-7.1	Hazards & UBsUCs Identification & Reporting OGM/P-HSE-8.1	Opportunities For Continual Improvement OGM/P-HSE-9.1
Context OGM/P-HSE-3.1		OGDCL's Lifesaving Golden Rules OGM/P-HSE-4.2	Job Vulnerability /Hazard Analysis OGM/P-HSE-5.2	Communication & Consultation OGM/P-HSE-6.2	Permit to Work System OGM/P-HSE-7.2	Monitoring, Measurement & Compliance Evaluation OGM/P-HSE-8.2	Management of Change OGM/P-HSE-9.2
		*OGDCL's Process Safety Fundamental (PSFs) OGM/P-HSE-4.3	Legal & Other Requirements OGM/P-HSE-5.3	Documented Information OGM/P-HSE-6.3	Handling, Segregation and Disposal of Waste OGM/P-HSE-7.3	Analysis of Data OGM/P-HSE-8.3	Incident Investigation OGM/P-HSE-9.3
		Roles, Responsibilities Accountabilities and Authorities OGM/P-HSE-4.4	Objectives & Management Program OGM/P-HSE-5.4	Control of Records OGM/P-HSE-6.4	Journey Management OGM/P-HSE-7.4	Reward, Recognition & Penalties OGM/P-HSE-8.4	
		Crisis Management OGM/P-HSE-4.5			Hydrogen Sulfide Management Framework OGM/P-HSE-7.5	Internal HSE Audits OGM/P-HSE-8.5	
		Structure OGM/P-HSE-4.6			Management of Project Contractors & Service Companies OGM/P-HSE-7.6	Management Reviews OGM/P-HSE-8.6	
					Use of Personal Protective Equipment OGM/P-HSE-7.7		
					Framework for Site Restoration OGM/P-HSE-7.8		

*New Procedure

Basic Safety Rules

Stop Unsafe Work

- Immediately STOP any unsafe work that has the potential to injure personnel, damage equipment, or harm the environment.

Report Incidents

- Immediately report all work related injuries/illnesses, no matter how minor, to your supervisor.
- Immediately report all fires, spills, or releases, no matter how small, to your supervisor.
- Immediately report any unsafe condition, unsafe act, near hit, or vehicle collision to your supervisor.

Follow Safe Practices

- Comply at all times with all safe driving requirements, particularly speed limits, when operating a vehicle.
- Ensure that all persons in vehicles wear seat belts at all times.
- Avoid entry / driving of vehicles without adequate control measures in prohibited areas e.g. Rig foundation, flare pit / Well site etc.
- Use the handrail and take only one step at a time when going up or down stairways, following 3-point contact method.
- Erect barricades and flagging around hazardous work areas, such as holes in decking and floor surfaces, trenches, road crossings, and overhead hazardous work.
- Use only proper tools and equipment maintained (pre-inspected) in a safe working condition. Do not use homemade, modified, or damaged tools.
- Do not use / operate the equipment / tools at Rig site unless trained and authorized for operating.

- Store the tools and equipment at their designated place / rack /cabinet / tool bin before and after use.
- Maintain good housekeeping in your work area at all times.
- Rest and dine (eat/ drink) only in designated areas.
- Use color coded waste bins for storage and segregation of solid waste at work place.
- Use proper manual lifting techniques, or obtain assistance or mechanical lifting aids when lifting heavy loads.
- Ensure all safety guards, switches, and alarms are in place and functional on operating machinery and electrical switchgear.
- Lock, tag, clear, and try equipment to ensure proper isolation before working on energized equipment that has the potential for injury to personnel.
- Obtain approval from Location In-charge (in written form), notify and involve the appropriate supervisor and affected parties, tag the device, and document the action properly whenever a safety device is removed from service and/ or defeated.
- Chain-lock or car-seal open all block valves on in-service pressure relief systems.
- Inspect all fire extinguishers and other emergency equipment and keep them clear of any obstructions.
- Properly label (in indigenous language as well) and store all chemical or hazardous material containers. Where specified, store drums in secondary containment areas or on drum containment pallets.
- Properly Barricade the Toxic and Flammable Chemicals at Rig / Well site and display warning Signs (in local Language).

- Properly store and dispose off the empty plastic bags of hazardous solid chemicals.
- During Rig shifting the crane operations (Loading / un-loading) must be carried out during day light only to avoid any un-wanted incident.

Avoid Unsafe Activities

- Do not enter Rig Operational Area (Area within Radius of 90 Meter around wellhead/ Cellar), without basic PPE (Coverall, Safety Shoes& Hard Hat).
- Do not climb or stand on equipment, piping, valves, or unstable surfaces (e.g., chairs or barrels) to perform work.
- Use approved (& pre-inspected) fall protection measures (e.g., personal fall arrest system or scaffolding) if the working height is greater than 1.8 m (6 ft) from the floor or platform level.
- Drilling crew (Derrick man & Helper) should always use climbing belt engaged / hooked up with Counter weight line during climbing up Monkey board ladder.
- Do not step or cross the high pressure lines of Mud Pumps, Koomey Unit / BOP Controls and kill line / bleed off / flare lines of choke manifold.
- Do not wear finger rings, wristwatches, jewelry, loose clothing, unsecured long hair, or loose accessories within an arm's reach of rotating equipment or electrical switchgear.
- Do not apply compressed industrial gases to yourself or others.
- Do not operate equipment having a "DANGER, DO NOT OPERATE" (hold) tag.
- Do not start work in any area, or on any equipment, without consent of the supervisor.

- Do not use electronic devices (e.g., mobile phones, smart watches, and instruments) that are not listed as safe for use in classified locations without proper approval.
- Do not engage in horseplay or fighting.
- Do not run in work areas.

Protect Yourself

- Wear approved hard hats, safety eyewear with side shields, and safety footwear in all restricted areas, project sites, and in areas where specifically designated.
- Use approved additional hazard-specific personal protective equipment (PPE), including goggles, face-shield, respiratory protection equipment, and body/hand protection where specific hazards requiring their use have been identified.
- Wear adequate PPE prescribed by the chemical hazard bulletin (CHB) or material safety data sheet (MSDS) when handling chemicals or hazardous materials.
- Use approved hearing protection in designated high noise areas.
- Use proper hand protection (e.g., gloves) when performing tasks that may present a hand injury risk.

LIST OF CONTENTS

ANNEXURES

DEFINITIONS

acidizing (acid job): The act of pumping an acidic solution into a wellbore to remove materials from the perforations, pipe, and walls of the producing formation or pumping the solution into formations to improve permeability.
adequate ventilation: Adequate ventilation, is for the prevention of fire and explosions. Adequate ventilation is air volume and velocity (natural or artificial) that is sufficient to prevent the accumulation of significant quantities of vapor-air mixtures in concentrations above 10% of their lower explosive limit (LEL).
annular space: Space surrounding pipe in the wellbore. The outer wall of the annular space may be open hole or pipe.
approved: Sanctioned, endorsed, accredited, certified, or accepted by a duly constituted and recognized authority or agency.
authorized person: A person assigned by an employer to perform or supervise the performance of a specific type of duty or duties at the work site.
back up: Refers to the act of "backing up" or preventing rotation of one section of pipe or rods while another is screwed out of or into it. Also applied to screwing nuts on or off bolts. A backup wrench refers to any wrench being used to hold the pipe, rods, or bolt. Backup tongs refer to the pipe tongs suspended in the derrick and used to hold a section of pipe while another section is screwed out of or into it by use of other tongs. The backup man is the crew member who operates the backup tongs. The backup position refers to the workstation of the backup man.
blocks, crown, and traveling: The fixed upper and movable lower blocks, respectively, of the block and tackle assembly on a rig that raises and lowers the drill string or tubing.
blooey line: Return line for air drilling
blowout: An uncontrolled flow of well fluids and/ or formation fluids from the wellbore or into lower pressured subsurface zones (underground blowout).
blowout preventer (BOP): A device attached to the wellhead or Christmas tree that allows the well to be closed in with or without a string of pipe or wireline in the borehole.
blowout preventer remote control: A set of control tools that can be used to actuate the blowout preventer from a position some distance away from the blowout pre-venter, usually the rig floor or accumulator.
breaking out pipe: Operation of unscrewing a pipe section (joints of drill pipes / drill collars / casing pipe joints).
bypass: Usually refers to a pipe connection around a valve or other control mechanism. A bypass is installed in such cases to permit passage of fluid through the bypass line while adjustments or repairs are made on the control that is bypassed.
casing: Pipe installed in the wellbore and usually cemented in place to retain the borehole dimension and seal off hydrocarbon and water-bearing formations.
a. surface casing: The outside and first pipe string installed in the wellbore,

except for drive pipe or conductor pipe, to seal off surface sands; provide support for blowout prevention equipment and blowout protection; prevent loss of circulation while drilling deeper; and to protect fresh water sources. This casing is normally run to a depth below the base of the freshwater zones and cemented in place.
b. protective (intermediate) casing: A pipe string extending to the wellhead and installed inside of surface casing in wells of such depth without which drilling fluid cannot be balanced because of simultaneous lost circulation and high-pressure entry of another zone, or in regions where abnormal pressure gradients are encountered.
c. production casing: The full-length pipe string extending between the wellhead and an elevation at or below the producing formation, inside of protective or surface casing, and cemented in place to seal off productive zones and water-bearing formations.
cathead spool: A concave, rotating, pulley-type device mounted on the end of the cat shaft of the draw-works.
catline: A line powered by the cathead used to lift or pull equipment around a rig. (It is a concave, rotating, pulley-type device mounted on the end of the cat shaft of the draw works.)
catwalk: Elongated platform adjacent to the rig floor where pipe is laid out and lifted into the derrick. The catwalk is connected to the rig floor by a pipe ramp.
cellar: Excavation around the wellhead to provide space for items of equipment at the top of the wellbore.
cementing: Making cement into a slurry and pumping it into a wellbore to perform functions such as supporting casing, isolating formations behind casing, protecting freshwater sands, and sealing perforations in casing.
christmas tree: The valves and fittings assembled at the top of a completed well to control the flow of hydrocarbons and other fluids.
circulate: Cycling fluid from the surface through the pipe and back to the surface through the annular space.
combustible liquid: Any liquid having a flashpoint at or above 100°F (37.8°C).
confined space: A tank, excavation, or space that meets the following:
— is large enough and configured so that personnel can bodily enter and perform assigned work;
— has limited or restricted means for entry or exit (e.g. tanks and vessels, storage bins, hoppers, vaults, cellars, excavations, and pits);
— is not designed for or meant to be continuously occupied by personnel.
competent person(s): A person having the necessary qualification and experience, in particular process or type of operation and equipment to which the job relates, to render him capable of the work involved.
conductor pipe: A relatively short string of large diameter pipe that is set to keep the top of the hole open and provide a means of returning the upflowing drilling fluid from the wellbore to the surface drilling fluid system until the first casing string is set in the well. Conductor pipe may also be used in well control. Conductor pipe is usually cemented.
contractor: Any person or company that contracts to perform all or any part of oil and gas well drilling or servicing.

critical equipment: Equipment and other systems determined to be essential in preventing the occurrence of or mitigating the consequences of an uncontrolled event. Such equipment may include vessels, machinery, piping, blowout preventers, wellheads and related valves, flares, alarms, interlocks, fire protection equipment, and other monitoring, control, and response systems.
deadline (drilling operations): The end of the drilling line that is not reeled onto the hoisting drum of the rig. (This end of the drilling line is anchored and does not move as the traveling block is hoisted.)
deadline (well servicing operations): The tension line between the crown and mast base used to secure the power swivel stiff-arm.
derrick (mast): The steel lower component of a drilling or well servicing rig that supports the crown block, traveling block, and hoisting lines. Derricks and masts may be stationary structures normally requiring dismantling and disassembly when moved from location to location or may be portable with the capability of being laid down and raised to and from ground level fully assembled.
derrickman: Person whose workstation is usually up in the derrick while pipe or rods are being hoisted or lowered into the hole.
driller: First line supervisor whose main duties are to control the activities of his crew and to train those crew members in the proper way to perform their assigned tasks. The driller is responsible for operation of the drilling and hoisting equipment. This person is also referred to as the "crew chief" or "rig operator" in well servicing operations.
drilling (hoisting) line: The wire rope used in the rig's main hoisting system.
drilling out: Refers to drilling and removal of material that normally remains in the casing or wellbore after cementing.
drilling rig: Equipment and machinery assembled primarily for the purpose of drilling or boring a hole in the ground.
drill pipe: The heavy seamless tubing used to rotate the drill bit and circulate the drilling fluid. Usually in 30-ft lengths, the joints of drill pipe are coupled together with special threaded connections called tool joints.
drill stem: The drilling assembly from the swivel or top drive to the bit composed of the drill string (work string), subs, drill collars and other downhole tools such as stabilizers and reamers.
drill stem test: A test taken by means of special testing equipment run into the wellbore on the drill string (work string) to determine the producing characteristics of a formation.
drill string: Several sections or joints of drill pipe joined together. May also refer to sections or joints of threaded tubing or casing joined together to be used for drilling.
drive pipe: A relatively short string of large diameter pipe driven or forced into the ground to function as conductor pipe.
electrical classification of areas: Any place in which an explosive atmosphere may occur in quantities such as to require special precautions to protect the safety of workers → locations are classified according to API RP 500: Classification of Locations for Electrical Installations at Petroleum Facilities; or API RP 505: Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1, and Zone 2.

elevators: A mechanical device attached to the traveling block that latches around and supports the pipe during hoisting or lowering operations.
energy isolation device: A mechanical device that physically prevents the transmission or release of energy.
energy source: A source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.
external guylines: Lines which provide stability and run from some point in the derrick, mast, or pole to ground anchors, or to a special substructure or derrick base that provides a substitute for ground anchors.
flame arresters: A device for preventing the passage of flame into or out of any apparatus, vehicle, or equipment.
flammable liquid: Any liquid having a flashpoint below 100°F (37.8°C).
floorman (rigman): Member of the rig crew whose workstation during hoisting is on the rig floor. Also performs numerous other operating and maintenance duties as directed by the supervisor. May also be referred to as rotary helper, roughneck, driller's helper, or well puller.
flowback operation: The process of allowing fluids to flow from the well following a treatment, either in preparation for a subsequent phase of treatment or in preparation for cleanup and returning the well to production.
freezing operation: Creation of a plug by freezing a liquid in a pipe or fitting to confine the pressure while removing defective or inadequate equipment downstream of the plug.
full body harness: Straps which may be secured about a person in a manner that will distribute the fall arrest forces over at least the thighs, pelvis, waist, chest, and shoulders, with means for attaching it to other components of a personal fall arrest system.
ground anchor (deadman): Static holding device installed in the ground separate from the rig structure and to which guyline(s) may be attached.
guarded: Covered, shielded, fenced, enclosed, or otherwise protected by means of suitable covers or casings, barrier rails, or screens to eliminate the possibility of accidental contact with or dangerous approach by persons, animals, or objects.
guyline: Wire rope(s) that is attached to elevated structures, such as derricks or mast, and ground anchors for stability.
guyline anchors: The ground components of the guyline system to which the wire rope(s) is attached.
hazardous atmosphere: Atmosphere that has the potential to expose entrants to the risk of death, incapacitation, impaired ability to self-rescue (e.g. escape unaided from a permit required confined space), injury, or acute illness.
The potential risks from exposure to a hazardous atmosphere could be caused from one or more of the following:
— atmospheric oxygen concentrations below 19.5 % and above 23.5 %;
— flammable gas, vapor, or mist in excess of 10 % lower explosive limit (LEL);
— airborne combustible dust at a concentration that meets or exceeds its LEL;
— atmospheric concentration of a substance for which a permissible

exposure limit (PEL) is published in applicable government regulations, safety data sheets (SDS), standards, or other published or internal documents and could result in responder exposure in excess of its PEL;
— other immediately dangerous to life or health (IDLH) atmospheric conditions.

hazardous substance: Any substance that, by reason of being explosive, flammable, toxic, corrosive, oxidizing, irritating, or otherwise harmful, has the potential to cause injury, illness, or death.

hole: Common term that usually refers to the well-bore.

hot work: An operation that can produce enough energy from flame, spark or other source of ignition , with sufficient energy to ignite flammable vapors, gases, or dust.

hot oil treatment: The act of heating oil and pumping it into the piping, tubing, casing, or formation to remove paraffin and asphaltines.

hot tapping (pipe tapping): The act of drilling a hole through the wall of pipe that is under pressure. A special saddle is used to attach a valve and lubricator to the pipe.

hydraulic fracturing: The propagation of fractures in a rock layer, as a result of the action utilizing one or more of the following: a pressurized fluid; chemical additives; physical proppants, in order to release petroleum, natural gas, or other substances to be extracted.

immediately dangerous to life or health (IDLH): The Immediately dangerous to life or health air concentration values (IDLH values) developed by the National Institute for Occupational Safety and Health (NIOSH) characterize high-risk exposure concentrations and conditions and are used as a component of respirator selection criteria. IDLH values are established (1) to ensure that the worker can escape from a given contaminated environment in the event of failure of the respiratory protection equipment and (2) to indicate a maximum level above which only a highly reliable breathing apparatus, providing maximum worker protection, is permitted.

joint: A length of pipe that can be either drill pipe, casing, or tubing.

kelly: The square, hexagonal or other shaped steel pipe connecting the swivel to the drill pipe. The kelly moves through the kelly bushings, rotary table and rotates the drill string.

kelly swivel valve (kelly cock or upper kelly valve): A valve located between the kelly swivel and the kelly, used for well control when the kelly is in the hole. It works like a check valve when engaged.

lanyard: A flexible line of rope, wire rope, or strap which generally has a connector at each end for connecting the body belt or body harness to a deceleration device, lifeline or anchorage.

liner: The partial length pipe string extending between the bottom of the borehole to an elevation above the bottom of the previous casing string. The liner may perform the same function as protective or production casing in sealing off producing zones and water-bearing formations. Liner may or may not be cemented in place. This term can also refer to a partial length pipe string set inside casing as a patch string.

load guylines: Stabilizing guylines that run from a point on the mast, derrick, or pole to a point at or near the base supporting the mast or pole or to ground anchors. (Sometimes referred to as "internal guylines" when

attached to the base.)
location: The point at which a well is to be drilled. Also referred to as "wellsite."
lockout/tagout: A process to specify that equipment is out of service until locks and/or tags are removed by the authorized person.
lubricator: A fabricated length of tubular pipe equipped with a packoff and bleed valve that is installed to provide access while working on a well under pressure with wireline or other tools and equipment.
making a connection: Act of screwing a section of pipe or rods onto the string suspended in the wellbore.
making a trip: Consists of hoisting (pulling) the pipe or rods to the surface and lowering (running) the pipe or rods into the wellbore.
making up a joint: Act of screwing a joint of pipe into another joint.
mast: See derrick (mast).
monkey board: Platform on which the derrick-man works during the time a trip is being made. Also referred to as the tubing board or racking board on well servicing rigs.
mud bucket (mud box): Device used to enclose pipe connections to deflect fluid released when a joint or stand of pipe containing liquid (wet string) is unscrewed.
NFPA: National Fire Protection Association of U.S.
near miss (near hit, near loss): An unplanned event that did not result in injury, illness or damage, but which had the potential to do so.
open hole: Uncased part of the wellbore.
operator: Lease owner or his designated agent who is responsible for the overall operation of the lease.
perforating: Making holes in pipe, cement, or formation at desired depths usually performed with an explosive device utilizing bullets or shaped charges.
personal fall arrest system (PFAS): A system designed to provide protection to a person from falls. The PFAS should consist of an anchorage, connector and a synthetic webbing full body harness which may include a lanyard and a deceleration device.
piping and instrument diagram (P&ID): A diagram that shows the details about the piping, vessels and instrumentation.
pipe racking board guylines (tubing board guylines): Lines (guylines) which run from the racking board to ground anchors; or a special substructure or base that provides a substitute for ground anchors.
pole mast: Structure consisting of one or more tubular sections, telescoping or not telescoping, that are the load-bearing members. The structure, when erected to working position, usually requires guylines. It may be attached to a carrier, skid base, or substructure.
production casing: See casing.
protective (intermediate) casing: See casing.
pumping unit: Surface equipment used for the purpose of mechanically lifting fluids from a well.
qualified person: A person who, by possession of a recognized degree, certificate, or professional standing, or who by knowledge, training, or experience, has successfully demonstrated the ability to solve or resolve

problems relating to the subject matter or the work.
rabbit: An instrument or device that is dropped, pulled, or pushed through a section of pipe to ensure that it is free of obstruction.
racking pipe or rods: Act of placing stands of pipe or rods in an orderly arrangement in the derrick.
rated working pressure: The maximum internal pressure that equipment is designed to contain and/or control. Working pressure is not to be confused with test pressure.
reverse circulation: Reverse circulation occurs when fluid is pumped down an annular space and returns to the surface through the tubular forming the inner wall of the annular space. This is opposite of normal circulation wherein fluid is pumped down the inner tubular pipe and returns up the annular space.
rig-up/ rig-down: The on-site erection and connection of equipment and components in preparation for drilling or well servicing operations and the taking apart of equipment for storage and portability prior to moving off the rig floor or location.
risk assessment: A systematic process to identify the potential causes of harm or hazards, and the precautions that can be taken to prevent or mitigate the hazards.
rod (sucker rod): A length of steel, aluminum, fiberglass, or other suitable material, a number of which are screwed together to make up the mechanical link (rod string) from the surface pumping unit to the pump in the well.
safety valve (stabbing valve): A full opening valve available for quick installation in the pipe string to prevent flow.
simultaneous operations (SIMOPS): Two or more independent operations (such as drilling, workover, wireline, facilities construction, and so forth) conducted under common operational control in which the activities of an operation may impact the safety of personnel, equipment or the environment of the other(s), or a combination thereof. (Failure to coordinate can result in the potential clash of activities that can cause an undesired event or set of circumstances.)
single: One joint of drill pipe, rod, or other tubular goods.
snubbing: Pulling or running pipe under pressure through a sealing element where special equipment is used to apply external force to push the pipe into the well, or to control the pipe movement out of the well.
special services: Those operations utilizing specialized equipment and personnel to perform work processes to support well drilling and servicing operations.
stabbing board: A platform in the derrick on which personnel work while casing is being run to aid in guiding a tubular joint into another tubular joint for makeup.
stabbing a valve: Aligning and screwing a valve onto the end of a pipe.
stand of pipe: One, two, or three joints of pipe screwed together, and sometimes referred to as a single, double, or triple, respectively.
strand: Several round or shaped wires helically laid about an axis.
stuck pipe: A condition in which the pipe sticks or hangs while in the hole and cannot be moved.

substructure: Structure on which the derrick sits. The substructure may provide space for wellhead and well control equipment.
supervisor: Person who has been given the control, direction, or supervision of work performed by one or more personnel.
surface casing: See casing.
swabbing: Lifting of well fluids to the surface using a piston-like device installed on a wireline. Swabbing may inadvertently occur due to piston action as pipe or assemblies are pulled from the well.
swing rope: A vertically suspended rope that is hung above the boat landing on an offshore platform and is used to facilitate transfer between boat and platform, and vice versa.
swivel: Device at top of the drill stem that permits simultaneous circulation and rotation.
tree: The valves and fittings assembled at the top of a completed well to control the flow of hydrocarbons and other fluids
tour: Designates the work period of a rig crew and is usually pronounced as if it were spelled "t-o-w-e-r."
tripping: The process of removing and/or replacing tubulars from the well.
tubing: Pipe installed in the wellbore inside casing strings and extending from the wellhead to a depth below, at, or above a producing, disposal, or injection formation through which the produced or injected fluids flow.
tugger line: Tugger line is a wire rope powered by a winch and used for the controlled moving of light loads around a rig.
valve drilling operation: Drilling of a hole through the blocking element of a valve that is stuck in the closed position with pressure on the well side of the valve. The drilling is accomplished through a lubricator assembly that confines the pressure after the blocking element is penetrated.
V-door: The opening in the derrick leading from the derrick floor to the catwalk and pipe rack area.
V-door ramp: A slide-like ramp used to pick up and lay down tools to and from the catwalk/pipe rack area. Also used to pick up drill pipe, drill collars or any other heavy equipment that could not be done safely because of the height of the substructure and close proximity to the blowout pre-venters, electric and hydraulic lines, and other equipment in the area.
well servicing rig: Equipment and machinery assembled primarily for the purpose of well work involving pulling or running tubulars or sucker rods, to include but not be limited to redrilling, completing, recompleting, workover, and abandoning operations.
welder (certified): A person who can provide documentation attesting to that person's capability to create welds of acceptable qualityfollowing a defined welding procedure
welder (qualified): A person who has demonstrated the capability to create welds of acceptable quality following a defined welding procedure
winch (tugger) line: A wire rope powered by a winch and used for the controlled moving of loads around a rig
wire line: A special wire, strand, or wire rope of high strength steel used to convey a tool(s) into a hole (also called "well measuring wire" and "well measuring strand"). An electromechanical cable that is an electrical

cable armored with high strength steel wires is also called a wire line.
wire rope: Several wire strands helically laid about an axis.

Abbreviations

BOP blowout preventer
DST drill stem test
IDLH immediately dangerous to life or health
LEL lower explosive limit
LNG liquefied natural gas
LPG liquefied petroleum gas
MODU mobile offshore drilling unit
P&ID piping and instrumentation diagram
PEL permissible exposure limit
PFAS personal fall arrest system
PPE personal protective equipment
SDS safety data sheets

Foreword

Informative elements—As used in a standard, "informative" denotes elements that identify the document, introduce its content, and explain its background, development, and its relationship with other documents or provide additional information intended to assist the understanding or use of the document.

Normative elements—As used in a standard, "normative" denotes elements that describe the scope of the document and that set out provisions that are required to implement the standard.

Normative References
The following referenced documents are indispensable for the application of API standard:

- API Recommended Practice 54, Occupational Safety and Health for Oil and Gas Well Drilling and Servicing Operations
- API Recommended Practice 500, Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class 1, Division 1, and Division 2
- API Recommended Practice 505, Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class 1, Zone 0, Zone 1 and Zone 2
- ASSE Z359.1, The Fall Protection Code
- ASTM F2413, Standard Specification for Performance Requirements for Protective (Safety) Toe Cap Footwear
- ISEA Z87.1, American National Standard for Occupational and Educational Eye and Face Protection Devices
- ISEA Z89.1, American National Standard for Industrial Head Protection
- NACE MR0175/ISO 15156-1, Requirements for Sulfide Stress Cracking Resistant Metallic Material for Oil Field Equipment
- NFPA 70, National Electrical Code
- NFPA 2112, Standard on Flame-Resistant Clothing for Protection of Industrial Personnel Against Short-Duration Thermal Exposures from Fire
- NFPA 2113, Standard on Selection, Care, Use, and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel against Short-Duration Thermal Exposures from Fire

GUIDELINE 01

PRE-DRILLING WORKS BEFORE RIG MOBILIZATION

[GENERAL CIVIL]

Following measures shall be carried out and ensured by Area and Location Management during the civil-works-phase before rig-mobilization:

- Selection / preparation of location for mini-camp / Rig site Offices out of Hazardous Area as per Mines Act (i.e., an area with radius of 90 Meter Away from Wellhead / Cellar).
- Construction materials, debris, etc. be removed and camp/ rig area be levelled for smooth movement of men, machinery, and vehicles.
- Installation of anti-snake sheet & placing of soil with anti-snake sheet to close the holes below the sheet around rig & camp area.
- Ample rig site area for installation of the emergency escape line to attain about 35-degree slope of line from derrick to ground.
- The volume of mud waste pit(s) must be sufficient w.r.t. the target depth of the well.
- Pit(s) must be lined with standardized quality geo-membrane and should be barricaded with barbed wire/ Cattle Fencing.
- Water storage reservoirs at rig & camp-site, mud waste pit, and wastewater pit near washer-man (in living camp) should be barricaded with barbed wire/ fencing and restricted to avoid falling of any person.
- Five solid wastes (garbage) pits constructed with bricks may be considered for dumping of kitchen, municipal waste, and other solid wastes (Three pits in living camp area & two at rig site with dimensions 8ft length x 6ft width & 4ft height, having 02~03 brick size openings on bottom for discharge of rain water).
- Proper arrangements be made for earthing of all rig equipment, generators, diesel storage tanks and living camp caravans.
- Provision of water line (direct water line from main

water source) be made for Water Tank connected with fire pump to meet fire emergencies.

- Retaining wall/ secondary containment/ dyke wall (more than the storage volume of HSD) around the HSD/ diesel storage tanks be constructed with concrete floor/ bed to avoid spillage during major leakages/ emergency situation.
- Ample space with hard grounds for placement of Rig-materials and/or containers for mud chemicals storage.
- Construction of raised PCC Structure for Storage of Bulk chemicals such as Barite, Bentonite, Polymers and KCL etc.
- Demarcation of isolated area with retaining wall (Secondary Containment) for storing Corrosive Chemicals like Calcium Bromide, Zinc Bromide, Caustic etc. Adequate passages/ walk-ways through potential storage points for men and machinery.
- Wood/Metal sheets be placed beneath Hopper Manifold to avoid slip, trips & falls.
- Construction and Lining (If possible) of second (2nd) pit for accumulation of processed water by Dewatering (Floc) Unit. Suitable Space for placement of floc (De-watering) unit beside 2nd Pit.
- Separate Sumps be created for rain water drain. The drain may not be allowed to run down in waste pits.
- Concrete platform (8ft x 3ft) be built in front of rig foundation (below dog-house) for placing of fire extinguishers & safety sign boards.
- Proper drainage system of wastewater from kitchens and bathrooms be maintained.
- Proper covered septic tanks for wastewater from toilets/ baths be designed & constructed to avoid mosquito's breeding/ odor/ nuisance.
- Screen doors/ windows be installed in kitchens to keep flying insects out of the kitchens, especially door in the tandoor area to keep loaf dogs and cats away to maintain hygiene.

- A pressurized fire hydrant system is recommended having three outlets (one for each camp) at the camp areas of the rig site to timely combat fires. This system may be simple to an extent that its portability is achievable with convenience. The system may have one or more valves to regulate the water flow depending on the actual firefighting requirements.
- An emergency exit / door be provided with Well site / location fencing, preferably in opposite direction of the main entrance / gate as per Location ERP Layout for contingency plan.
- Main Gate / Entrance must be provided away from Power house side of Rig to keep routine vehicle entry & movement far from main HSD Tank of Rig Powerhouse and HSD Tank of Material Store.

[TRENCHING AND EXCAVATIONS]

- Due to terrain difficulties, when operations require excavating and preparing trenches, persons should be knowledgeable regarding the hazards and precautions necessary for preparing and working in trenches.

Underground Hazards

- When preparing an excavation, consider the hazards of underground installations. These include electrical equipment, oil and gas transmission, sewers, water lines, telephone lines and other utilities.

Toxic Gas and Low Oxygen Hazards

- Any trench 4 ft or greater in depth is usually considered a confined space. Entry into these spaces is controlled by special safety procedures where oxygen deficient or toxic gas hazards can reasonably be expected, such as near landfills or near where hazardous materials are used or stored. There is concern that heavy gases can collect inside a trench.

Vehicle Traffic and Falling Loads

- Vehicles on nearby roadways and construction equipment can present hazards at an excavated site. Ensure that barricades & warnings are in place.
- Construction equipment shall not lift material over people in the trench or excavation.
- The soil from the trench is also a hazard to personnel inside the trench, for this reason it must be piled at least 2 ft from the edge of the trench.

Stability of Nearby Structures

- Before beginning an excavation, it is important that consideration be given to nearby buildings, light poles, or other structures in the area. Additional support, installed by professionals, may be needed.

Escape Means from Trenches

- A stairway, ladder or ramp should be located in any trench that is at least 4 ft (1.2m) deep. The escape means should be placed so that a person is never more than 25 ft away from an escape means.
- A qualified person should inspect the trench at least daily and more frequently if needed, such as after a rainstorm or other hazardous occurrence.
- Any trench 5 ft or deeper, that is not in entirely stable rock, must be sloped or shored in accordance with recognized engineering practices.

[LIVING CARAVANS]

- Sufficient fire/ smoke detectors must be installed in each caravan to transmit an early warning in the eve of an emerging event and be looped with a central panel or siren warning system. A unique alarm pattern shall be designated for the emergencies at camp site to differentiate from the emergencies of drilling operations.
- Two small sized (e.g. 2 kg) portable fire extinguishers of fire type A & C may be placed inside each room/ compartment of the caravan. Whereas one 10/ 12 kg fire extinguisher to be bracketed outside the wall of each room/ compartment alongside the door.

- A power cut-off switch shall be installed at the door inside of each room/ compartment so that all electrical appliances can be shut down at once while exiting the room to ensure foolproof safety.
- An Electricity Validity Program shall be established to undertake necessary electrical inspections especially during the rig mobilization/ demobilization phases and at the time of purchase/ selection of electrical appliances. Standardization in the electrical wiring scheme must be achieved for the caravans to avoid any electric current leakage and other associated mishaps. For any electrical related repair/ maintenance jobs, Ground Fault Circuit Interrupter (GFCI) must be preferred for connecting the devices/ equipment for safely performing the job(s).

GUIDELINE 02
PERSONAL PROTECTIVE EQUIPMENT

[GENERAL]

Personnel shall use personal protective equipment (PPE) at the worksite as determined by risk assessment and PPE need assessment. Efforts should be made to eliminate identified hazards through engineering or administrative controls.

[TYPES OF PERSONAL PROTECTIVE EQUIPMENT (PPE)]

Category A: The Basic PPE shall include a) Coverall/ Dangri, b) Warm Jacket/ Leather Jacket, c) Safety Shoes, d) Safety Glasses, e) Hard Hat, f) Ear Muffs and g) Cotton Gloves.

- Thermal protection: If the protective material is worn over another layer of fabric, the protective fabric shall exhibit an average Thermal Protective Performance (TPP) value of 4, before and after washing. Flame Resistant Clothing materials shall comply with EN ISO 11612 or equivalent.
- Safety shoes, safety boots, or toe guards should meet the requirements of EN ISO 20345 or equivalent standards. Safety-toed boots are required in all designated work areas outside the site office. Protective footwear shall have leather or rubber uppers that extend above the ankle, an oil resistant sole, and a distinctive heel (raised 3/8 to ½ inch across the entire heel) for climbing stairs and ladders.
- Eye protection equipment should meet the requirements of EN166-1F-or equivalent standards.
- Hard hats, or safety helmets, which meet the requirements of EN397, shall be worn in all designated work areas as outlined in the Location (Sectional) PPE Matrix. Hard hats shall be made of plastic and designed to hold chin straps. Chin straps shall be worn when working at heights.
- Hearing protection should be worn, as applicable.
- Fit-for-purpose gloves should be worn, as applicable.

Category B: The Specific PPE shall include a) Gloves (Leather, Chemical Resistant, and Latex), b) Face Shields (Welding Shields and Goggles), c) Flame Resistant Clothes, d) Long Safety Shoes, e) Gas Mask, f) Chemical Apron, g) Chemical Resistant Gum Boots and h) Safety Harness.

- Gloves, boots, apron, or other protective equipment, as appropriate, shall be worn by personnel handling chemicals that can irritate or be absorbed through the skin.

Category C: The Emergency PPE shall include complete Turnout Gear / Fire Kit (Fire Suit), SCBA/30 min., Air-Purifying Respirator (APR), and Safety Vests / Clothing with Reflective Material designed for high nighttime visibility.

[WEARING OF APPAREL, JEWELRY, AND HAIR]

- Apparel should be appropriately sized and worn in a way to avoid entanglement hazards.
- Personnel should change clothing as soon as practicable when saturated with flammable, hazardous, or irritating substance(s).
- Personnel shall not wear jewelry or other adornments subject to snagging or hanging and causing injury while in the worksite.
- Personnel with hair of such length as determined to be an entanglement hazard in worksites should keep it contained in a suitable manner while performing their duties.
- Hair (head and facial hair) shall not interfere with the effective functioning of PPE, if such equipment is required at the worksite.

[HEARING PROTECTION]

- A risk assessment shall identify and evaluate the noise exposure(s) in the worksite. Protection against the effects of noise exposure shall be provided when identified by the risk assessment. Hearing protection shall be worn in all designated high noise areas. Hearing protection shall meet the requirements EN352-1 for earmuffs and EN352-2 for ear plugs.
- Personnel should be trained in the use and operation

of hearing protection available at the worksite. Personnel shall be advised of the potential dangers of noise exposure.

- Noise surveys should be conducted, and signage posted to alert employees of any high noise areas as a result.

[RESPIRATORY PROTECTION]

- A risk assessment shall identify and evaluate the respiratory hazard(s) in the worksite; this assessment shall include potential exposures to respiratory hazard(s) and an identification of the contaminant's chemical state and physical form.
- Based on the risk assessment, the appropriate PPE shall be used. Respiratory protection shall meet the requirements outlined in OSHA 29 CFR Part 1910.134 – Respiratory Protection (or equivalent standard).
- For respiratory protection practices, including equipment selection, use, medical history review, fit testing, storage, inspection, maintenance, and training.
- Approved self-contained or supplied-air breathing equipment shall be used for those atmospheres where tests indicate toxic or hazardous gases are present in quantities immediately dangerous to life or health (IDLH) or oxygen content is less than necessary to sustain life.
- Air from the rig utility system shall not be used as the source for breathing air supply.
- Personnel shall be advised of the potential dangers of flammable, hazardous, oxygen deficient atmosphere, and toxic or hazardous gases (e.g., hydrogen sulfide, sulfur dioxide, and so forth) environments.

[FALL PROTECTION]

- A risk assessment shall identify and evaluate the fall hazard(s) in the worksite. Personnel, when engaged in work equal to or greater than 4 ft (1.2 m) above the working surface (e.g., rig floor, ground, decking) or

when immediate fall hazards are present (e.g. mud pits, cellars), should be protected from falling by guardrail systems, safety net systems, fall restraints, or personal fall arrest systems (PFAS) that comply with ASSE Z359.1, or equivalent.

- Personnel shall be trained in the selection, use, and inspection of fall protection provided.
- Where there is an identified risk of entanglement with rotating equipment, lanyards and other fall protection equipment should be restrained.

GUIDELINE 03
DESIGN

[EMERGENCY EYE OR BODY WASH STATIONS]

Where the eyes or body of personnel may be exposed to injurious materials/ chemicals, eyewash and shower equipment for emergency use shall be provided.

[CRITICAL EQUIPMENT]

- Critical equipment is defined as equipment and other systems determined to be essential in preventing the occurrence of or mitigating the consequences of an uncontrolled event.
- Such equipment may include pressure vessels, pressure relief devices, compressors, alarms, interlocks, and emergency shutdown systems.
- Critical equipment should be periodically inspected and tested as recommended by the manufacturer or in accordance with recognized engineering practices.
- When using nondestructive testing (NDT) methods, qualified persons should conduct the tests in accordance with recognized methodology and acceptance criteria. Certified NDT inspectors shall be trained per *ASNT RP No. ASNT-TC-1A*.
- Other types of inspection should be conducted by qualified persons.
- When critical equipment is removed from service, a program should be in place to ensure equivalent protection is provided.

[CHANGES TO CRITICAL EQUIPMENT]

- Procedures to manage changes (except for "replacements-in-kind") to critical equipment should be implemented, as appropriate. These procedures should address the following prior to making the change:
  a. The basis for the proposed change.
  b. Impact of change on safety and health.
  c. Modifications to operating procedures.

d. Authorization requirements for the proposed change.

- Employees whose job tasks will be affected by the change in the critical equipment should be informed of the change prior to start-up.

[GROUNDING AND BONDING]

- Drilling and well services facilities are subject to various forms of electrical hazards that must be protected against. Static electricity can be generated by fluid movement in vessels, piping, and tankage. This results in static sparks being generated which can be an ignition source. Lightning strikes to a facility are also an ignition source. Electrical equipment failure can occur exposing personnel to shock hazards.

[EQUIPMENT]

Electrical Systems

- Electrical equipment used in hazardous locations should be designed for such locations and listed or approved by a nationally recognized testing laboratory. All wiring components and electrical equipment should be maintained in accordance with the manufacturer's recommendation.
- Wiring should be replaced or properly repaired and sealed as necessary when insulation damage is detected. Because of fire and other hazards, makeshift wiring components and installations should not be used.

Classification of Areas

- Classification of areas shall be in accordance with *API RP 500 and RP 505*.

Tanks, Separators and Heater Treaters

- Tanks, separators, and heater treaters should be installed and maintained in accordance with accepted engineering practices or OEM's recommendations.
- Walking directly on the roof of a tank is discouraged. However, if personnel are required to access the roof

of a tank, roof integrity shall be checked and appropriate walking surfaces, guardrails or fall protection shall be provided.

Vapor Recovery Systems

- Vapor recovery systems should be considered potential sources of ignition; facility design shall consider system location with respect to potential sources of hydrocarbon vapors.
- Devices should be installed to prevent a flame from propagating from the vapor recovery unit into the production equipment.

GUIDELINE 04
GENERAL (HEALTH & SAFETY MANAGEMENT)

- One of the most effective ways to reduce workplace hazards and injuries is through a comprehensive, proactive safety and health management system. The safety and health management system are a systematic approach to minimize the risk of injury and illness that involves identifying, assessing, and controlling risks to workers in all workplace operations.
- A safety and health management system may include the following, but not limited to:
  a) Instruction on job hazard analysis and risk assessment.
  b) Monitoring of new personnel.
  c) Instruction of personnel on work procedures, job responsibilities, and managing changes.
  d) Regularly scheduled safety meetings in which the job tasks, probable hazards, and related safe practices are emphasized and discussed.
  e) A plan to facilitate and organize employer and employee actions during emergencies.
  f) Safety education through safety meetings, publications, training, and other media.
  g) A shift or personnel changeover process to communicate ongoing operations & potential hazards,
  h) Good housekeeping practices.
  i) Implementation of Permit to Work System.

[RISK ASSESSMENT]

- Each department/section should evaluate the workplace hazards and risks and develop and implement measures to manage identified risks.
- Job tasks, including potential simultaneous operations, shall be risk assessed before operations commence. The risk assessment shall be communicated during a pre-job meeting with the crew and other involved personnel.

[HAZARD COMMUNICATION]

- A hazard communication (HazCom) program that evaluates the presence of potential hazards of chemicals found in the workplace shall be established. Workers shall be provided with information concerning the hazard of chemicals and appropriate measures to protect themselves while working with hazardous chemicals. The program shall be written and include information about hazard evaluation, labeling, safety data sheets, employee's training, and methods to review and update changes in the program based on chemical usage.

Elements of the HazCom Program

Elements of a program may include

a) Hazard Evaluation—An inventory of all the hazardous chemicals in the work area shall be completed. An evaluation of the potential hazard of a chemical should be conducted before the hazardous chemical is handled. This evaluation may include potential wellbore fluids, drilling fluids, additives / chemicals, and so forth. Generally applicable measures including engineering controls, safe work practices and PPEs should be considered for safe handling and use of a hazardous chemical. This information shall be communicated to the workers.
b) Labeling—A labeling system shall be developed that warns of the potential hazards of working with a hazardous chemical. Hazardous chemical labels shall identify (at a minimum) the material or substance and the physical and health hazards.
c) Safety Data Sheet (SDS)—An SDS shall be available and readily accessible for each hazardous chemical used in the workplace. A system to collect and maintain information and inform workers about the chemical hazard information found on an SDS shall be a part of the program.
d) Training (required)—Personnel shall be provided

hazard communication training upon:

- Initial assignment to a work area.
- When a new chemical has been introduced.

e) Training (recommended)—Personnel should also be provided with training, as appropriate, that includes:

- Information regarding the methods and observations that can be used to detect the presence of a release of a hazardous chemical in the work area.
- Physical and health hazards information.
- Measures to protect the workers from harmful exposure, including engineering, safe work practices, emergency procedures, PPE use, and so forth.
- Specific details on how to recognize and understand the labels in the work area, SDS interpretation, and safe procedures when working with hazardous chemicals.

[INCIDENT MANAGEMENT]

Incident Reporting

- Occupational fatalities, injuries, illnesses, and near miss incidents shall be reported in accordance with OGDCL's IHSE System Manual procedure.
- The cause of injury, illness, or a near miss event should be investigated and steps taken to prevent a recurrence. When possible, consideration should be given to share lessons learned with employees and the industry following an incident.

Medical Response

- Provisions should be made for prompt medical attention in case of serious injury to include, but not limited to, transportation of the injured person to a medical treatment facility.
- Relevant information such as telephone numbers and location, pertaining to availability of medical personnel, transportation, and medical facilities should be available at drilling and well servicing sites.
- Suitable facilities for quick drenching or flushing of the

eyes or body, or both, shall be readily accessible for emergency use where personnel can be exposed to injurious corrosive materials.

First Aid

- An individual trained in first aid and cardiopulmonary resuscitation (CPR) techniques should be available at the worksite to render aid. The individual(s) should be trained using approved courses (e.g., Red Cross, Civil Defense or Rescue 1122 Service or equivalent training).
- A suitably constructed stretcher or stretchers [with blankets and hot water bottles]; especially the basket Stretcher having inside safety belts to fasten / secure the patient / injured and four certified lifting belts to shift the injured / patient from Derrick / Rig floor.
- A first aid box/kit shall be maintained and available at the worksite. The kit should contain appropriate materials and should be inspected at frequent intervals and replenished as necessary.

GUIDELINE 05
SAFE WORK PRACTICES

[HOUSEKEEPING]

- Worksites should be kept orderly to minimize hazards.
- Care should be taken to leave egress routes open, especially around the rig floor.
- Tools, equipment, and materials should be placed and stored in a secure position or manner to prevent them from falling.
- Fire extinguishing equipment shall be accessible and free of obstructions during operations.
- A way to convey fluids away from the rig floor while pulling wet strings of pipe should be provided.
- Efforts should be taken to keep accumulations of water, oil or drilling fluid out of the cellar on a routine basis. Care should be taken to keep loose equipment or materials not being used out of the cellar.

[FIRE SAFETY]

Fire Prevention

- Fire hazards / risks shall be assessed in accordance with applicable procedure. The risk assessment shall be reviewed if the fire risk changes. The fire risk assessment may include potential fuel, sources of combustible fluids or vapors, and ignition sources. Results of the risk assessment shall be communicated to the employees and implemented as applicable.
  a) Examples of potential ignition sources include the following, but are not limited to:
     - Open flames
     - Internal combustion engines
     - Lightning
     - Hot surfaces
     - Radiant heat
     - Smoking
     - Portable electronic devices
     - Cutting and welding
     - Spontaneous ignition sources (e.g. iron sulfide, discarded oily rags)

- Frictional heat or sparks
- Static electricity
- Electrical sparks
- Stray currents
- Ovens, furnaces, and heating equipment

b) Examples of potential sources of combustible fluids or vapors include the following, but are not limited to:
   - Wellbore, shakers, flow lines, flare lines
   - Tanks (e.g., frac, production, blowback)
   - Chemical storage.

- Combustible and flammable materials shall be stored in accordance with applicable procedures. (NFPA 30 for information on the proper storage of combustible and flammable materials).
- Discarded oily rags and combustible waste should be stored in metal containers with the covers kept in place.
- A fire risk assessment should be conducted when using material for cleaning with a flash point less than 100 °F (38 °C); refer to the material SDS.
- Metal or other conductive material containers should be used in handling, storing, or transporting flammable liquids. Metal parts on plastic containers used in such service should be bonded to the fill connection. (NFPA 77 and API 2003 for additional information).
- Smoking shall be permitted only in designated areas.
- Only explosion proof and intrinsically safe heaters shall be permitted on or near the rig floor, substructure, pits, or cellar (API 500 or API 505 for guidance on electrical area classification). The safety features of these heaters shall not be altered.
- Stoves and heaters using combustible fuels should only be used in accordance with the manufacturer's recommendations to prevent buildup of carbon monoxide.
- The handling, maintenance, storage, transportation,

usage, and disposal of batteries should follow manufacturer recommendations.

- The terminals of batteries installed for Generators, Diesel operated engines, fire pump in hazardous area must be covered with anti-spark fitting.

Fire Protection/Control

- Fire extinguishing equipment shall be available, suitably located, readily accessible, and plainly labeled as to their type and method of operation.
- Drilling rigs and well servicing units shall have readily accessible fire extinguishers in operating condition with an appropriate class rating for the potential application. (NFPA 10 for additional guidance).
- Crew members shall be familiar with the location of fire extinguishing equipment and shall be trained in the use of such equipment, application, and associated hazards.
- Fire extinguishing equipment shall not be tampered with and shall only be used for fire protection, firefighting purposes, and servicing. Where a fire protection water system is available, it may be used for wash down and other utility purposes only if its firefighting capability is not compromised.
- Fire extinguishing equipment shall be periodically inspected and maintained in operating condition. A record of the most recent equipment inspection shall be maintained.

FLAMMABLE LIQUIDS AND GASES

Containers

- Hand portable containers for storing flammable liquids should be Underwriters Laboratories (UL) listed or Factory Mutual (FM) approved, or equivalent.
- Tanks, drums, and other containers containing flammable liquids should be properly labeled to denote their contents and should be properly stored when not in use.
- Metal or other conductive material containers should be used in handling, storing, or transporting

flammable liquids. The handling of flammable liquids in plastic containers is potentially dangerous due to static charge buildup.

- Metal parts on any plastic containers used in such service shall be bonded to the fill connection. If plastic containers are used, the conductive fill connection or a grounded rod should be inserted prior to filling the container with any flammable liquid.

Fuel and Oil Transfers and Refueling

- A risk assessment should be performed prior to refueling and transfer operations. The risk assessment may include, but is not limited to:
  a) Engines running during refueling.
  b) Grounding and bonding procedures.
  c) Simultaneous operations.
  d) Environmental conditions and concerns.
  e) Potential ignition sources.
- Fuel and oil transfer procedures should be established and followed.
- Above ground storage tanks and equipment being refueled shall be grounded. Portable containers should be bonded back to the fuel tank during transfer operations. (API 2003 for additional information).
- One person should be designated to gauge or monitor tanks (e.g., fuel, mud, etc.) while they are being filled to prevent overfill and spillage.
- Hydrocarbon-fueled engines should be shut down during refueling operations.
- Fuel tanks and bowzers must be earthed during fuel transfer.
- Ensure nearby availability of fire extinguishing equipment during fuel transfer.
- During refueling operations, the filling nozzle should be kept in contact with the intake pipe to ensure bonding and prevent fuel spillage.

Portable Cylinders Containing Compressed Flammable Gas

- Portable cylinders that are in use or in storage shall:

a) Be secured to prevent them from falling or being knocked over.
b) Be transported, stored, and used in an appropriate position.
c) Use valve protective caps (if designed for) except when being filled or connected for use.
d) Comply with the regulations, rules, or code under which the container was fabricated for repairs or alterations.
e) Not be exposed to temperatures exceeding manufacturer's specifications. Cylinders shall not be subjected to direct heating to increase vapor pressure.
f) Not be subjected to heating methods that conflict with manufacturer's specifications.
g) Be removed from service in accordance with the pressure vessel code under which they were manufactured for denting, bulging, gouging, corrosion, or exposure to fire.
h) Be marked or labeled in accordance with the requirements of the appropriate authority having jurisdiction or by agreement where no such authority exists.

- Only qualified personnel should be allowed to fill portable cylinders. Protective gloves should be worn when refilling or replacing portable cylinders.
- SOP for checking the pressure inside Compressed Gas Cylinder (OXY, DA, Nitrogen etc) must be developed, communicated and displayed at Cylinder Storage area.
- *Ignition Source Control:* Ignition source controls shall be established in any area where flammable or oxidizing compressed gases are stored or used.
- *Protective Caps:* Where compressed gas cylinders are designed to accept valve protective caps, the user should keep such caps on compressed gas cylinders at all times except when being filled or connected for use.

- Where gas-tight valve outlet caps or plugs are provided, the user should keep such devices on the valve outlet at all times except when compressed gas cylinders are being filled or connected for use.
- Compressed gas cylinders exposed to fire shall not be used until they are re-qualified in accordance with the pressure vessel code under which they were manufactured.
- Containers that show denting, bulging, gouging, or excessive corrosion should be removed from service.
- Compressed gas cylinders shall not be placed where they could become a part of an electrical circuit.

Flammable/Combustible Liquids Storage

- A risk assessment should be performed to determine the appropriate safe location and distance from the wellbore, and appropriate safety measures for storing flammable and combustible liquids.
- Flammable liquids should not be stored within 50 ft (15.2 m) of the wellbore, except for fuel in the tanks of operating equipment. Where terrain and location configuration do not permit maintaining this distance, equivalent safety measures be taken.
- Enclosed flammable or combustible liquids storage areas shall:
  a) Maintain adequate ventilation to the outside air or engineer design to control vapors,
  b) Have unobstructed exit(s),
  c) Be maintained with due regard to fire potential with respect to housekeeping and materials storage,
  d) Be identified as a hazard, and appropriate warning signs posted,
  e) Have an appropriate fire extinguisher (NFPA 10 for information) readily available or fixed extinguishing system installed for the hazard(s) being stored, and
  f) Be properly classified for electrical installations in accordance with API 500 or API 505; if dispensing

is done within the area, it shall be classified as Class 1, Division 1 or appropriately zoned area.

g) Paint and solvents should be stored in an adequately vented area safely away from heat and ignition sources.

- Containers that are labeled flammable or combustible should be properly stored when not in use.

Liquefied Petroleum Gases

- A risk assessment should be performed to determine the appropriate safe location and distance from the wellbore, and appropriate safety measures for storing liquefied petroleum gases.
- On land locations, liquefied petroleum gas (LPG) tanks larger than or totaling more than 250 gal (0.95 m3) and liquefied natural gas (LNG) tanks should be placed at least 100 ft (30.5 m) from, and parallel to the closest side of the rig (as terrain and location configuration allow) or the appropriate distance as determined by the risk assessment.
- Handling, connecting, and transfer operations involving liquefied petroleum gas (LPG) shall conform to *NFPA 58 Standard for the Storage and Handling of Liquefied Petroleum Gases*, and *NFPA 55 Compressed and Liquefied Gases in Portable Cylinders*.
- Stoves and heaters used with LPG fuel should only be used in well-ventilated areas. Personnel should ensure proper ventilation exists before lighting the heater/ stove. All hoses and connections on LPG stove or heater systems should be checked frequently to ensure that they do not leak.
- Protective gloves should be worn when refilling or replacing LPG bottles. There is a possibility of freeze burns if propane contacts the skin.

GUIDELINE 06
OPERATIONS AND PROCEDURES

[GENERAL]

Operations and Procedures

- Well control shall be maintained as needed for the type of operation.
- A risk assessment should be performed to determine the appropriate safe location and distance from the wellbore for land operations, to include safe distance for vehicles, housing, or areas where personnel gather that are not involved with the current operation being performed, or a combination thereof.
- For land operations, a risk assessment should be performed to determine the appropriate safe location and distance from the center of a derrick or mast for vehicles, housing, and/or areas where personnel gather that are not involved with the current operation to minimize the potential of the derrick or mast striking personnel or equipment in the fall zone.

  Note: The fall zone hazards may be dependent on, but not limited to:
  a) Environmental conditions
  b) Type of rig (carrier mounted rigs warrant special consideration)
  c) Rig orientation
  d) Current operation(s) (e.g. raising and lowering the derrick/mast)
- The rig substructure, derrick, mast, and other equipment as appropriate, shall be grounded while in operation.

[HOT WORK, WELDING, AND FLAME CUTTING OPERATIONS]

General (Hot Work, Welding, Flame Cutting)

- A risk assessment should be performed and communicated to the affected crew and other personnel (as appropriate) that determines the appropriate safe location and distance from the wellbore and other potential flammable and

combustible sources, appropriate safety measures for hot work, welding, and flame cutting operations, and the requirement for a written procedure.

- Depending on the risk assessment, a written procedure covering hot work, welding and flame cutting operations shall be utilized. The written procedure should consist of the following if applicable:
  a) Pre-work stage:
    - Designation of person in charge
    - Meetings with the crew and other persons involved regarding
      - Scope of work,
      - Simultaneous operations,
      - Atmospheric testing,
      - Equipment isolation,
      - Equipment preparation,
      - Hazard identification and control,
      - Emergency procedures & response,
      - PPE requirements, and
      - Fire watch and extinguishing equipment.
    - Authorization to perform work

  b) Work-in-progress stage:
    - Atmospheric monitoring
    - Management of changes, including shift changes
    - Special procedures/precautions

  c) Return to service stage:
    - Verification of completion of hot work
    - Authorization for return to work
- A hot work permit normally is not required for work done in designated hot work areas which are separate from areas where hydrocarbons, flammable, or combustible materials may be present, but for non-designated areas hot work permit is mandatory.
- Qualified welders (certified welders where required) shall perform welding or flame cutting operations on

surface facilities, piping, and equipment for which the primary function is to contain hydrocarbons or is designated critical equipment.

Personal Protective Equipment (PPE)

- Personnel performing hot work operations shall wear appropriate PPE as per Job specific PPE need assessment matrix.
- Fit-for-purpose helmets and face shields, with shade selection, shall be used during all arc welding or arc cutting operations. Proper clear eye protection may be worn for submerged arc welding operations.
- Fit-for-purpose goggles or other suitable eye protection shall be used during gas welding, oxygen cutting, or brazing operations.
- Helpers or attendants shall be provided with and use proper eye protection.
- Filter lenses and plates used in helmets and goggles shall meet the test for transmission of radiant energy prescribed in ISEA Z87.1 or applicable regulatory requirement.

Fire Protection

- Objects to be cut or welded shall be in an area free from combustible or flammable materials. If the object to be cut or welded cannot be moved, then:
  a) Movable fire hazards in the vicinity should be removed from the area, or
  b) Guards should be used to confine the heat, sparks, and slag to protect the immovable fire hazards.
- Properly maintained fire extinguishing equipment shall be available for use during hot work unless a variance is granted under the risk assessment. This equipment is in addition to the fire protection equipment already in place.
- Fire watch~~es~~ with extinguishing equipment shall be required whenever welding or cutting is performed in locations outside of the safe welding area whenever combustibles are located within 35 ft (10.7 m) of the welding or cutting operation.

- Fire watch shall have no other job duties during the period of their watch and shall be maintained at the job site for at least one-half hour after completion of welding or cutting operations.
- Cutting or welding shall not be permitted in the following situations:
  a) In areas not authorized by the person in charge.
  b) In a hazardous atmosphere or where such atmospheres may develop. This does not preclude the use of hot tapping when proper precautions are taken. (API 2201 for additional information on hot tapping).
  c) In areas that are close to the storage of large quantities of exposed readily ignitable materials.
  d) Where ignition can be caused by heat conduction, such as on metal walls or pipes in contact with combustibles on the other side.
  e) On used containers, such as drums, storage tanks, or cargo tanks without prior atmospheric testing.
  f) Lack of proper ventilation.

Equipment (Hot Work, Welding, Flame Cutting)

- Apparatuses such as torches, regulators, hoses, and arc welding machines shall be in good operating condition and repair. Only approved and certified oxygen and acetylene cylinders shall be used.
- Oxygen and acetylene torches should be equipped with flash-back arrestors and approved strikers.
- Valve caps shall be in place except when cylinders are connected for use.
- Cylinders shall be stored in assigned places away from personnel elevators, stairs, or walkways and shall be secured to prevent overturning.
- Cylinders shall not be kept in unventilated enclosures, such as lockers and cupboards.
- Oxygen cylinders in storage shall be separated from fuel gas cylinders or combustible materials a minimum distance of 20 ft (6.1 m) or by a noncombustible barrier at least 5 ft (1.5 m) high

having a fire-resistance rating of at least one-half hour.

- Acetylene and oxygen cylinders shall be stored valve end up with protective caps affixed and properly secured. When a job using acetylene and oxygen devices is completed or prior to transporting cylinders, the valve on the cylinders shall be closed and pressure on the hoses bled to zero.
- When transporting cylinders by a crane or derrick: a cradle, bin or other suitable platform shall be used; slings shall not be used; cylinders shall not be dropped, struck, or permitted to strike each other.
- Input power terminals, top charge devices, and electrically energized metal parts shall be completely enclosed and accessible by means of tools.
- Terminals from welding leads shall be protected from accidental contact by personnel or metal objects. Damaged leads should not be repaired but should be immediately discarded.
- Cables with splices within 10 ft (3.1 m) of the holder shall not be used.
- The welder should not coil or loop welding electrode cables around parts of the person.

Welding Fumes and Ventilation

- Toxic fumes can be generated from welding on metals. Persons involved in welding operations should understand the hazards of the materials they are working with.
- Adequate mechanical ventilation shall be provided when welding is performed under the following circumstances:
  a) In confined spaces or where the welding space contains partitions, balconies, or other structural barriers to the extent that they obstruct cross ventilation.
  b) When the release of toxic fumes or gases is possible due to the nature of the welding, cutting, or brazing work or the materials being welded.

c) Respiratory protection may be required if work practices, and ventilation do not reduce exposures to safe levels.

- When torches are not being used (e.g. meal breaks, end of tour, etc.) the oxygen and acetylene valves shall be turned off at the bottle, the hoses bled down, and torches and hoses removed from an area in which fumes may accumulate.

[MACHINERY AND TOOLS]

- Machinery shall be operated by qualified personnel.
- Belts, drive chains, gears, and drives (excluding rotary table, catheads, and kelly) shall have guards installed to prevent personnel from coming in contact with moving parts. (ASME B15.1 and ASSE B11.19 for additional information on construction specifications and clearances for such equipment guards).
- Machinery shall not be operated unless the guards are secured in position and are maintained in a functional condition. During maintenance or repair work limited testing may be performed by qualified personnel without guards in place.
- There should be a process in place for the management of maintenance activities on location.
- Personnel shall not clean, lubricate, or repair machinery where there is a hazard of contact with moving parts until such machinery has been stopped, energy isolated and verified, or such parts have been properly guarded.
- Hand tools, power tools, and similar equipment, shall be maintained in a safe condition and inspected prior to use.
- Electrical hand tools shall be double-insulated or grounded in accordance with NFPA 70. Ground fault circuit interruption protection is recommended.
- Manufacturer's safety features for electric, battery-powered, or pneumatic hand tools shall not be modified or made inoperable.

- When personnel are climbing or working at heights, tools shall be secured, or the relevant risk be mitigated (barrier or buffer zone).
- Temporary lifting and rigging devices in use shall be designed to handle expected load capacity. A risk assessment shall be performed before using these devices.

[CONFINED SPACES, EXCAVATIONS, AND HAZARDOUS ENVIRONMENTS]

- Prior to commencing activities, a risk assessment shall be performed to determine if any confined spaces exist or will be created as a result of work at the site. Cellars, excavations, and other confined areas often meet the definition of a confined space.
- Spaces that are determined to be confined spaces shall be assessed to determine if any of the following hazards exist or have the potential to exist:
  a) Hazardous atmosphere
  b) Potential for engulfing an entrant
  c) Internal configuration such that an entrant could be trapped/ asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section, or
  d) Other recognized safety or health hazard(s).
- When any of these hazards exist or have the potential to exist, the Location Incharge shall implement measures necessary to isolate the space(s) and prevent unauthorized entry.
- Confined space means an space that has one or more of the following characteristics:
  a) Contains or has a potential to contain a hazardous atmosphere.
  b) Contains a material that has the potential for engulfing an entrant.
  c) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a Floor which slopes downward and tapers to a smaller cross-section or

contains any other recognized serious safety or health hazard.

- Where confined space conditions exist or have the potential to exist, a confined space entry or other permit system should be activated. The system should include the following:
  a) Posting procedures.
  b) Evaluation of permit space conditions (e.g., internal atmospheric testing, internal configuration, etc.).
  c) Procedures for safe entry.
  d) Equipment required (e.g., respiratory protection).
  e) Assignment of entrants, attendants, and entry supervisors.
  f) Emergency/rescue procedures.
  g) Multi-employer coordination.
  h) Permit cancellation procedures.
  i) Review practices.
- Prior to entry of a permit required space, completion of internal atmospheric testing by a qualified person should be done to determine:
  a) Oxygen content.
  b) Airborne combustible dust.
  c) Acceptable level of flammable gases/vapors.
  d) Potential toxic air contaminants.
  e) Entry to conduct tests shall comply with atmospheric testing procedures for confined space testing requirements.
- To maintain occupation of confined spaces, the atmosphere within the space shall be monitored continuously accordance with company operating practices.
- Mitigation, elimination, or protection from the following characteristics should be considered and implemented as appropriate:
  a) Hazardous atmosphere.
  b) A material that has the potential for engulfing an entrant.

c) An internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section.
d) Other recognized safety or health hazard.

[LOCK-OUT/TAG-OUT (ENERGY ISOLATION)]

- A documented lock-out/tag-out program shall be established and implemented. Personnel shall be trained in the program.
- Where locks and tags are utilized:
  a) Locks and/or tags should be placed on energy isolation devices to plainly identify the equipment or circuits being worked on. Tags on equipment should include the name of the person(s) installing the lock or tag.
  b) The lock or tag should be removed by the person who installed it or by that person's authorized replacement. In the event neither individual is available, the lock or tag may be removed by the supervisor after ensuring that no hazard will be created by energizing the locked or tagged equipment or circuit(s).
  c) When multiple locks are used, the process being utilized shall be communicated, understood, and agreed upon by the users.
- Examples of energy isolating devices may include, but not limited to:
  a) Manually operated electrical circuit breakers.
  b) Disconnect switches.
  c) Double block and bleed valve systems.
  d) Blanks and blinds.
  e) Threaded caps & plugs, conduit seals, and so forth.
  f) Blocks for mechanical linkages.
  g) Roof drain valves on external floating roof tanks.
- Prior to performing work on equipment where energy isolation has been applied, the equipment shall be tested to verify (try out) that energy isolation is successful and stored energy has been released.

[WORK IN PROXIMITY TO EXPOSED ENERGIZED POWER SOURCES]

General (Energized Source Proximity)

- A risk assessment should be performed prior to working near, or to moving or placing equipment when there are energized utility line hazards.
- Equipment or machines should not be operated closer to power lines, except when such lines have been de-energized and visibly grounded or when barriers are present to prevent physical contact with the lines.
- When moving equipment under power lines and an individual is designated to observe equipment clearance, that individual should communicate to the operator when clearance is not maintained.
- Overhead wires should be considered energized (live) unless either the electrical system owner reports them to be non-energized, or a qualified electrical person test and finds them to be non-energized.

Rig Electrical Systems Equipment

Electrical equipment used in hazardous locations should be designed for such locations, (API 500 or 505 for guidance for classification of areas as hazardous locations for electrical equipment). Wiring components and electrical equipment should be maintained in accordance with the manufacturer's recommendation.

- Rig wiring should be protected from abrasion, vehicular and foot traffic, burns, cuts, and damage from other sources.
- Wiring, including insulation, should be replaced, properly repaired, or sealed as necessary when damage is detected.
- Extension cords shall be fit for purpose, properly insulated, and in good condition.
- Wiring on drilling and work over rigs used on platforms in offshore waters should be in accordance with applicable regulations or standards (e.g. API 14F and API 14FZ).

Classification of Areas

Area classifications determine the type of and maintenance requirements for electrical equipment on drilling and well servicing rigs under normal operating conditions. When special service operations are being performed, the recommendations for electrical installations under the conditions of service should be followed.

Hydrogen Sulfide (H_2S) Environment and Hazardous Atmospheres

- Safety guidelines and recommendations for use in drilling and well servicing operations where hydrogen sulfide or sulfur dioxide gas may be encountered are contained in API 49. (API 55 and API 68 for additional information. These recommended procedures should be utilized, as appropriate, in applicable operations to enhance safety of personnel and the public).
- Where hazardous atmospheres are known or suspected to exist, or may be created as a result of operations, the operator shall ensure that personnel are trained and advised of the potential hazards
- When work is to be conducted in areas where hazardous atmospheres are suspected or known based on the risk assessment, atmospheric conditions should be monitored and/or mitigated.

[SIMULTANEOUS OPERATIONS (SIMOPS)]

- Where services company involved the client should evaluate the workplace hazards and risks and develop and implement specific components to mitigate identified risks.
- Prior to commencing simultaneous operations, the responsible personnel shall meet with the involved parties to verify the aspects of the operation, confirm emergency procedures, and identify any constraints, limitations, or conflicting activities.
- During SIMOPS, responsible personnel should stop work and reevaluate the operations if conditions vary from the original scope of work.

[HOT TAPPING AND FREEZING OPERATIONS]

General

A risk assessment should be performed to determine the appropriate safe location and distance from the wellbore, and appropriate safety measures should be taken for hot tapping and freezing operations.

Hot Tapping Operations

Hot tapping operation should be conducted in accordance with API 2201.

Freezing Operations

Freezing operations should be performed by and supervised under the direct supervision of a qualified person.

[RIG UP OPERATIONS]

- Prior to commencing rig up operations, a risk assessment should be performed to determine the planned arrangement of equipment to be placed on the location and should also be reviewed to identify and mitigate potentially hazardous conditions.
- Drilling and well servicing equipment shall be set up and checked for proper installation prior to commencing work in accordance with company guidelines.
- Prior to initiating well servicing operations, the well shall be checked for pressure. If pressure is indicated, the operator's authorized person should be notified; then proper steps should be taken to remove pressure or to operate safely under pressure before commencing operations.

[RIG DOWN OPERATIONS]

- Prior to commencing rig down operations, a risk assessment should be performed to identify and mitigate potentially hazardous conditions.
- Prior to initiating rig down operations, the lines and equipment shall be checked for pressure. If pressure is indicated, then proper steps should be taken to remove pressure or to operate safely under pressure before commencing rig down operations.

[AUXILIARY ESCAPE]

- The derrick or mast shall have an auxiliary means of escape installed prior to personnel working on elevated fixed platforms in and on the derrick or mast. The auxiliary escape route should use a specially rigged and securely anchored escape line attached to the derrick or mast to provide a readily available and convenient means of escape from the elevated fixed platform. The escape line route shall be kept clear of obstructions.
- Escape equipment shall not be used except during an emergency, maintenance, or training purposes. Personnel shall be trained in the proper procedure(s) for escaping the derrick or mast.
- Auxiliary escape lines and equipment shall be installed in accordance with manufacturer recommendations.

[PERSONNEL HOISTING SYSTEMS]

- Equipment used for the lifting of personnel shall be fit-for-purpose, comply with local regulations, and operated in accordance with the manufacturer's instructions by trained and authorized personnel.
- Before hoisting personnel, an assessment shall be done to determine if other non-hoisting methods are available.
- Personnel shall not ride the elevators. Exceptions for extreme emergency conditions, when other alternatives have been exhausted, may be permitted when in the judgment of the supervisor; riding the elevators with appropriate personal fall protection equipment is necessary. In this instance, the elevators shall be empty of pipe and other equipment when personnel are riding.
- Prior to utilizing equipment for personnel hoisting:
  a) An appropriate level of risk assessment for the lifting operations and surrounding conditions shall be conducted.

b) Operations that may interfere with personnel hoisting operations shall be suspended.
c) Hand signals, when used, should be reviewed and agreed upon.

- When using winches for hoisting personnel:
  a) The controls shall be attended at all times while lifting, lowering, or stabilizing personnel.
  b) Visual contact and communication shall be maintained between the winch operator and the rider; if the winch operator cannot maintain visual contact, a spotter shall be utilized.
  c) The manual brake, if applicable, should be set whenever the rider is not being hoisted.
  d) There shall not be a clutch mechanism or other means for the winch to freewheel.
  e) A load limiting mechanism, line speed limiter, automatic secondary brakes along with normal braking system, or controlled descent feature, or a combination thereof, shall be used (if applicable).
  f) A self-centering control lever, which when released, should return to the neutral position.
  g) An automatic brake should be installed that will engage when returning the control lever to the neutral position or upon loss of power.
  h) The winch should be equipped with an emergency shut-off valve within immediate reach of the winch operator.
  i) The winch should be equipped with a drum guard and a mechanism that ensures proper spooling.

[TUBULAR HANDLING]

Loading and Unloading Tubular

- Pipe should be handled at the pipe ends during manual pipe loading and unloading operations, and transfers between pipe racks or pipe tubs.
- Personnel shall not pass between joints of pipe during loading and unloading operations.
- Personnel should not stand on, walk on, or roll pipe with their feet.

- Equipment such as stops, pins, wedges, or chocks should be used to prevent tubular from accidentally rolling of pipe racks or pipe trucks. Pipe should be loaded and unloaded layer-by-layer, with each completed layer pinned of blocked securely on the four corners of the pipe rack.
- On pipe racks, layers of tubular should be separated with boards or equivalent.

Tripping and Racking

- In well servicing operations, personnel shall be out of the derrick/mast, or cellar, or both, and stand clear when a down whole assembly is being unseated or when initial pull on the tubing or rods is made.
- Rods, tubular, drill pipe, and drill collars racked or hung in the derrick or mast should be secured to prevent them from falling across the derrick or mast.
- Safety clamps (e.g., wedding band, dog collar) shall be removed from drill collars, flush joint pipe, or similar equipment before they become an overhead hazard.
- When there is a possibility of an ice plug forming in the bottom of racked tubular stands, provisions should be made to allow good drainage from the racked tubular.
- A rabbit or drift should be used to verify that tubular stands are free of plugs before pipe is run in the hole when appropriate.

[OFFSHORE AND INLAND WATERS OPERATIONS]

- A risk assessment should be performed prior to offshore and inland waters operations.
  Users of this standard should also refer to other applicable requirements and guidance, such as local regulations for onshore, inland waters, and offshore waters.
- When work is to be performed on a barge, work boat, mobile offshore drilling unit (MODU), crew boat, or platform, personnel should be instructed on station bill, abandonment procedures, emergency

signals, abandonment stations, water entry procedures, and muster list as appropriate.

- A minimum of two emergency escape means should be provided from the platform to the water.
- Personnel working over water or where the potential to fall into the water exists, shall be provided with approved personal flotation devices in serviceable condition.
- An overboard emergency rescue plan shall be established with related equipment readily available.
- Each continuously-manned-platform shall be provided with appropriate means of evacuation with sufficient capacity to accommodate each person present in accordance with regulatory requirements.
- In accordance with appropriate regulatory and company requirements, approved survival suits should be provided, and crew members should be instructed in the proper use of this equipment when operations are conducted in cold water areas.
- When a crane is being used to transfer personnel over water, personnel shall wear approved personal flotation devices and should not ride on anything other than a device designed for that purpose. The crane operator should avoid lifting or lowering personnel directly over a vessel, except to clear or land personnel. The load being lifted shall not exceed basket manufacturer's specifications. Personnel baskets shall be inspected prior to use and periodically in accordance with the manufacturer's recommendations. Personnel baskets should be used only for the transfer of personnel.
- When personnel use a swing rope for transferring from boat to landing platform and vice versa, they shall wear approved personal flotation devices during such transfer operations.

GUIDELINE 07
DRILLING AND WELL SERVICING EQUIPMENT
[DERRICKS AND MASTS]

- Derricks, masts, and their auxiliary parts shall be constructed to conform to good engineering practices and maintained in a safe condition. (API 4F and API 4G for additional information).
- Derricks and masts should have a permanent name plate attached to the structure indicating the following:
  a) Name of manufacturer,
  b) Model number and serial number,
  c) Rating including static hook load capacity with number of lines, and
  d) Whether guying is applicable and, if so, the recommended guying pattern; if the manufacturer's guying requirements are not denoted on the name plate, the derrick or mast should be guyed in conformance with recommendations of API RP 4G.
- Carrier-mounted masts should not be moved while in a raised position. This does not apply to skidding of a drilling rig or pole mast well-servicing rig.
- A person qualified in procedures for raising and lowering the mast shall be in charge of raising or lowering operations.
- A visual inspection of the raising and lowering mechanism shall be made by the qualified person prior to raising or lowering the mast.
- Prior to raising or lowering a mast, tools and materials not secured shall be removed from the mast.
- The mast base should be level and properly positioned before raising, lowering, or telescoping the mast structure, and before tightening guylines.
- Properly designed sub structures and base beams should be designed and installed according to manufacturer's recommendations. (API RP 4G and 4F for additional information.)

- During raising, lowering, or telescoping operations, observations should be made to mitigate the chance of wire ropes snagging on the braces or other portion of the mast.
- No personnel shall be allowed in or under the mast unless it is in the fully raised or lowered position. An exception may be only essential personnel may be allowed on the carrier platform, in or under the mast while being raised or lowered.
- Prior to imposing a load on a derrick or mast, required guylines shall be tensioned in accordance with manufacturer's guidelines.
- Derrick and mast platforms above the rig floor shall be constructed, maintained, and secured to the structure to withstand the weight of personnel and other forces which may be applied. (API 4F and API 4G for additional information).
- To prevent dropped object hazards:
  a) Tools, parts, and other materials:
     - Should be secured/tethered when working in the mast or derrick.
     - Shall not be kept in the derrick or mast above the rig floor unless they are in use and measures are taken to prevent them from falling.
     - Should be inventoried to ensure that they are not left in the derrick or mast, or both, at the completion of the work.

  b) A periodic inspection program should be in-place to ensure that there are no unsecured items in the derrick or mast.
  c) Personnel should not be under suspended loads.
  d) Personnel should not be under work being performed overhead without additional safeguards in place.
- Crown mounted bumper blocks should be adequately secured and protections in place to prevent a dropped object event.
- Counterweights above the rig floor, if not fully

encased or running in permanent guides, should have a safety chain or wire rope safety line anchored to the derrick or mast.

- Load bearing, hydraulic-leveling jacks shall have a safety lock device, double valves, or equivalent.

[LADDERS, STAIRWAYS, AND PLATFORMS]

- Each derrick/mast shall be equipped with a fixed ladder(s) providing access from the rig floor to the crown block platform and access to each intermediate platform.
- Permanent ladders fastened to a derrick or mast should remain securely held in place in accordance with manufacturer's specifications.
- The distance from the centerline of fixed ladder rungs, cleats, or steps to the closest object behind the ladder should not be less than 7 in. (17.8 cm). The distance between ladder rungs should be uniform throughout the length of the ladder including the landing(s) and no more than 12 in. (30.5 cm). The minimum rung clear length should be 16 in. (40.6 cm). When unavoidable obstructions are encountered, minimum clearances for the two rungs on either side of the obstruction should be measured vertically from the obstruction no less than 1.5 in. (3.8 cm) to the upper rung, and 4.5 in. (11.4 cm) to the lower rung.
- Side rails of fixed ladders should extend a minimum of 42 in. (106.7 cm) above the platform or landing.
- Cages and landing platforms are not necessary where a personal fall arrest system is used.
- Platforms shall be provided wherever fixed ladders are offset laterally unless a personal fall arrest system is utilized.
- Open stairways of four or more risers should be securely fastened and equipped with handrails and mid rails extending the entire length of the stairway.
- The width of tread and height of rise should be uniform throughout the length of a stairway and the

treads should be level.

- A minimum of two unobstructed stairways shall be installed on drilling rigs to provide alternate exits from the rig floor during operations. During rig-up and rig-down operations, one unobstructed stairway may be installed.
- Stairways, ladders, ramps, runways, and platforms (including rig floor, etc.) should be kept free of objects and substances that may create a slipping or tripping hazard and hinder or prevent emergency egress of personnel.
- Derrick, mast, or other platforms shall be adequately secured, inset, or otherwise appropriately protected against accidental dislodging during operations.
- When personnel cannot perform necessary duties from ground level, well servicing rigs should use a working platform around the wellhead. The platform should be of sufficient size and construction to support the maximum working load and the number of personnel.
- When a wellhead level working platform is in the folded (storage) position, the platform shall be secured with no less than two fasteners of a positive locking or double locking device.
- The stabbing board and each finger shall either be bolted, welded, hinged-and-pinned, or attached by other equivalent means to its support beam. A secondary retention means should be utilized to secure each of the fingers and the stabbing board.
- Guard rails, consisting of 42 in. (106.7 cm) high (nominal) top rail, mid rail, toe boards and posts, should be installed at the outer edge of a floor, platform, or walkway, that is 4 ft (1.2 m) or more above ground level or another floor or working level. A runway of 4 ft (1.2 m) or more above ground level should be equipped with a guardrail. Exceptions are as follows:

  a) Personnel egress (exit and entrance) openings.

b) Catwalk, false floor, and V-door opening when being used.
c) Work station being used to rack tubular.
d) Alternate arrangements providing equivalent safety are acceptable.

- The V-door opening should be secured when not being used to avoid personnel falling down the V-door ramp. (ASSE A1264.1 for additional information on wall opening, stairs, and railing systems).
- Standard toe boards should be a minimum of 4 in. (10.2 cm) in vertical height from the top edge to the level of the floor, platform, walkway, or runway. Toe boards should be securely fastened in place and have not more than 1/4 in (0.64 cm) vertical clearance between the bottom of the toe board and the floor level. They may be constructed of a substantial material, either solid or with openings not to exceed 1 in. (2.54 cm) in greatest dimension.
- Floor openings should be protected by a cover, a physical barrier, or constantly attended to avoid accidently walking into them and falling.

[DRAW WORKS]

- A visual inspection of the draw works and its visible moving parts should be made at least once each day.
- Draw works guards should remain in place and in good condition when in operation.
- The equipment operator shall not leave the draw works brake unattended on a lever activated brake system without tying down the brake or securing it with a catch lock unless the draw works is equipped with an automated control system.
- Shut-down switches for draw works or devices that power the draw works should be installed at the operator's control.
- Brake systems on the draw works should be inspected and maintained according to the manufacturer's recommendations.

- An auxiliary braking system should be installed on the draw works of lever activated brake system drilling rigs.
- Drilling rig draw works should be equipped with a safety device which is designed to prevent the traveling block from striking the crown block. The device should be function tested at least once per tour/shift or when moved or altered. Results of the function test shall be documented.

[CATHEAD SPOOLS AND LINES POWERED BY CATHEAD SPOOLS]

- Catlines shall not be used for hoisting personnel.
- Alternative methods of hoisting or moving equipment should be used if possible.
- Only qualified personnel shall be permitted to operate the cathead spool or lines powered by the cathead spool.
- If a cat head spool is used:
  a) If mounted on the end of a shaft that projects beyond the guard for other moving parts of machinery, the shaft end, key, or other device for securing the cathead to the shaft shall be covered with a smooth thimble. The thimble cover shall be of such design to prevent accidental entanglement.
  b) When a rope is manually operated, it shall have a rope guide to hold the on-running rope in alignment with its normal running position against the inner flange. Clearance of the rope guide from the cathead spool should be based on size of the rope in use. Consult the equipment manufacturer for recommended rope guide clearance for the specific rope size being used.
  c) It shall be checked for grooves and rebuilt and turned when necessary to prevent fouling. Cathead spool groove depth should not exceed 1/4 in. (0.64 cm).

d) Precautions shall be taken to prevent entanglement of other lines with a line in use on the cathead spool.
e) When unattended, rope or line shall not remain wrapped on or in contact with the cathead spool.
f) The draw works control shall be attended while a manually operated cathead spool is in use.
g) Rope splicing shall not be allowed to contact the cathead spool friction surface, with the exception of endless rope properly spliced.
h) A headache post or guard shall be provided for protection of the personnel at the draw works control when the line is close to the operator during operation of lines powered by the cathead spool.
i) Lines powered by the cathead spool should be of proper length and maintained in safe working condition.

[HOISTING LINES AND OTHER WIRE ROPE]

- Hoisting lines should be visually inspected at least once each day when in use. Hoisting lines should be thoroughly inspected once each month and a record made of the monthly inspection, designating noted defects.
- Wire rope used as running ropes (hoisting or hauling) should be removed from service when any of the following conditions exist:

a) Three broken wires are found within one lay length of 6x7 wire rope.
b) In other six and eight strand constructions:
   - Six randomly distributed broken wires are found within one lay length.
   - Three broken wires are found in one strand within one lay length.
c) In rotation-resistant constructions:
   - Four randomly distributed broken wires are found within one lay length, or

- Two broken wires are found in one strand within one lay length.

- Wire rope used as standing ropes, such as guylines, escape lines, and pendant lines should be removed from service when either of the following conditions exist:
  a) Three broken wires are found within one lay length.
  b) One broken wire is found at the end connection in the strand valley.
- Other conditions you can consider for removal of wire rope from service are, for example but not limited to:
  a) Marked corrosion appears.
  b) Corroded wires are observed at end connections.
  c) End connections are corroded, cracked, bent, worn, deformed, or improperly applied.
  d) Evidence of kinking, crushing, cutting, cold working (peening), or bird-caging is observed.
- When the hoisting line is wrapped on the hoisting drum, the end shall be securely fastened and there should be a sufficient number of lines wraps remaining on the drum to eliminate strain on the fastening devices.
- Deadline anchors for hoisting lines should be so constructed, installed and maintained that their strength equals or exceeds the working strength of the hoisting line.
- When calculations indicate ton-mile limits have been reached, or visual inspection shows breaks, crushing, or damage, the wire rope should be slipped, cut, or replaced. (API 9B, or the manufacturer's cutoff system for computation procedures).
- A moving hoisting line (drilling line/tubing line) under load should not be allowed to come in contact with the derrick or mast or other stationary equipment except at the crown block sheaves and traveling block sheaves.
- The hoisting line should not be removed from the hoisting drum until the traveling block is rested on the

rig floor or held suspended by a separate purpose-built, support device.

[HOISTING TOOLS, HOOKS, ELEVATOR LINKS (BAILS), ELEVATORS, AND RELATED EQUIPMENT]

- Hoisting tools and their component parts shall be constructed to conform to good engineering practice and maintained in safe condition. Equipment specifications are contained in API 8A and API 8C. Suggested inspection and maintenance procedures for hoisting tools are contained in API 8B. Equipment manufacturers' specifications and recommended maintenance procedures should be consulted.
- No element in the hoisting tool system should be subjected to a load in excess of its design limitations.
- The block hook assembly shall be equipped with a safety latch or other equivalent device to prevent accidental release of the load being hoisted or lowered.
- Traveling blocks should have line guides and should not be operated unless guides are in place to keep lines from jumping sheaves in accordance with the manufacturer's recommendations.
- Traveling blocks shall not be moved while the crown block is being lubricated. Draw works should be locked out/tagged out while lubricating the crown block.
- The pump end of the rotary hose should be securely fastened to the derrick or mast by a cable or by a chain clamped to the hose and to the derrick or mast leg. The swivel end of the hose should be secured by a similar cable or chain, with the other end of the cable or chain affixed to the swivel. Clamps and cables or chains should be used in accordance with the manufacturer's recommendations.
- Elevators, latches, latch locks, pins, and springs should be carefully inspected by rig crews. Worn or damaged parts should be replaced. (API 8B for

recommendations on inspection and maintenance of hoisting tools).

- Field welding shall not be permitted on elevators, elevator links (bails), or other heat-treated hoisting equipment.
- Slings should have permanently affixed durable, legible identification stating size, grade, rated capacity, and reach.
- Tag lines or other hands-off devices should be used to guide, and steady loads being lifted or lowered.

[ROTARY TABLE]

- The operator shall not engage the power to begin rotation until the rotary table is clear of personnel and materials.
- Rotary table power shall not be used to accomplish initial breakout of tool joints. The rotary table can be used for spinning out joints once initial breakout is affected.
- The kelly bushing shall be of smooth design to prevent catching or snagging of personnel, clothing, fall arrest lanyards, or other material.
- Openings in the rotary table, rathole, and mouse hole should be kept covered or an appropriate barrier in-place when not in use.

[DRILL STRING HANDLING EQUIPMENT]

- Appropriately sized elevators (inserts), wire rope line(s) or sling(s) should be used when lifting tubulars.
- Manual drill pipe slip handles and drill collar slip handles should be the original manufacturer's handles or equivalent engineered equipment.
- The tapered side of drill pipe slips should be maintained in accordance with the manufacturer's recommendations. Slip dies should be clean and sharp with retainers installed.
- Slips should not be kicked into place.
- Fittings snub line/stiff arm and anchor points shall have a minimum working load limit greater than the load to be applied.

- Tong safety lines should be of sufficient length to obtain full benefit of the pull from the break-out/make-up device, but short enough to prevent complete rotation of the tongs. Tong snub lines should be of such length that when securing pipe in the rotary table, a 90-degree angle is formed between the tong body and the snub line.
- Tongs should be properly maintained. Tongs and tong heads (including dies) should be inspected for size and condition before use according to manufacturer's recommendation.
- Tongs and tong heads should be greased prior to each trip or according to conditions and amount of use. Tong dies should be clean and sharp with retainers installed.
- Power tongs shall have safety devices in proper working order in accordance with the manufacturer's recommendations.
- Power tong pressure systems (hydraulic or air) should be operated according to and equipped with a safety relief valve in accordance with the manufacturer's specifications.
- Tong jaw handles should be fitted with bumper guards and with colored handles (dumb bells) to properly identify hand placement to minimize instances of hand and finger injuries.

[WEIGHT INDICATORS]

- A weight indicator should be installed and used on operating drilling rigs and well servicing rigs intended to manipulate tubulars. The indicator should be constructed, installed, and maintained to register a close indication of the hook load suspended (within 5 % of the maximum hook loading).
- If the weight indicator becomes inoperable and for rigs where a weight indicator is not installed, an alternative method to limit maximum load shall be utilized.
- The weight indicator system should be checked

periodically for calibration by comparing its reading with the calculated drill string or tubing string weight, with adjustments made as necessary.

- The weight indicator should be mounted so that the gauge is easily visible to the operator standing at the brake position.
- When the weight indicator is installed above the rig floor, it should be securely fastened to prevent it from falling. The load cell should be secured to the drill line by a secondary safety device.

[DRILLING FLUID TANKS]

- A risk assessment on land locations should be performed to determine the appropriate safe location and distance from the wellbore for pits and tanks, used to circulate flammable materials. Safety measures should be considered where terrain, location, rig configuration, or other conditions do not permit this spacing.
- Mud guns used for jetting should be secured when not in use or unattended.
- When necessary for personnel to enter a drilling fluid tank that may contain hazardous or toxic substances, applicable provisions for entering confined space shall be followed.
- Electric motor driven blowers used for ventilation should be of an appropriate electrical classification for the area in which they are located (API 500 and API 505).
- Appropriate precautions should be taken to prevent personnel from falling through open holes on walking surfaces of drilling fluid tanks.

[SOLID CONTROL EQUIPMENT
(Shale Shakers, Desilters, Desanders, Centrifuge)]

- Guards should be properly installed. Guards on mud pump couplers should be in place before pumps taken into operation. Shale Shaker belt and counter weight guards should be in place.
- Ensure electric cords are properly inserted into the

box and sealed.

- Use Lock-out/ Tag-out (LOTO) procedure and do not attempt to perform maintenance work on equipment while it is in operation. Stay Clear of Vibrators.
- Working platform: Have good footing around equipment.
- Always have guardrails or other fall prevention system in place.
- When working on a Desilter or Desander cone, shut power off and lockout and tagout the control.
- Mud tank walkways should properly be installed and keep hoses, tools, etc., picked up and off the walking surface.
- Mud lines, valves and connections should be checked for damage periodically and replaced as necessary.
- All high pressure hoses should have safety snub lines and be properly hobbled.

[PRESSURE EQUIPMENT]

- Air receivers should have the ASME pressure vessel marking and be installed by authorized personnel (for additional information ASME BPVC Section VIII).
- Pressure relief valve discharges should be located and secured to prevent a hazardous condition due to sudden discharge or piping movement.
- Based on a risk assessment, lines and hoses should be appropriately secured through whip checks of appropriate ratings, all hard piping shall be anchored, secured, through chains or slings appropriately to restrict unsafe movement that could cause serious injury or death. Other suspended hydraulic and air lines should be appropriately secured. A buffer zone based on the risk assessment is recommended to limit injury exposure.
- Pumps, piping, hoses, valves, and other fittings shall not be operated at pressures greater than their rated working pressure and shall be maintained in good

operating condition. Test pressures shall not exceed the design test pressure. Pumps, piping, hoses, and pressure relief devices shall be designed to meet the requirements of the operating conditions to be encountered and should be adequately identified.

- All pressure lines including high pressure hoses, armored hosed of accumulator, kill lines or mud pump rigid lines including stand pipe shall be periodically hydro tested, NDT inspected as per OEM recommendations.
- Hammer unions shall be made up of like halves with the same pressure ratings and thread type. Many connecting threads look alike but will fail under working conditions. "Go/No Go" rings should be used whenever there is a potential for connecting mismatched 2-in. (602/1502) style hammer unions.

Caution—Check clearance for the hammer's swing path when making/breaking hammer unions and inspect piping if accidentally hit.

- Pressure relief devices shall be set to discharge at a pressure equal to or less than the rated working pressure of the pump, piping, hose, or fitting that the devices protect.
- The inside diameter of piping on the pressure and discharge side of pressure relief devices shall at least equal the ID of the pressure relief devices. The piping shall be such as to prevent obstructions and minimize restrictions to flow.
- Positive displacement pumps should be equipped with pressure relief devices that discharge to the circulation system or other acceptable location.
- Shear pin pressure relief valves shall have the valve stem and shear pin enclosed to prevent any accidental contact and contain the shear pin from flying when sheared. The enclosure shall be designed and attached to prevent it from dislodging. Only the correct shear pin shall be used when replacement is necessary.

[GENERATORS, MOTORS, AND LIGHTING]

- Electrical conductors and switch gear shall be sized and installed in accordance with NFPA 70 or equivalent regulatory requirements.
- A risk assessment on land locations should be performed to determine the appropriate safe location and distance from the wellbore for rig generators. Safety measures should be considered where terrain, location, rig configuration, or other conditions do not permit this spacing (API 500 or API 505).
- Generators should have an overload safety device that will provide protection from shorting and burnout.
- Light fixtures should be placed and maintained to provide illumination for worksites.
- Rig lighting and fixtures shall be of appropriate electrical classification for the area in which they are located (for additional information API 500/ 505).
- Rig lighting equipment in the derrick or mast, tanks, and on the rig floor, not specifically addressed in API 500 or API 505, should be enclosed and gasketed.
- Electrical repairs to equipment shall not be performed unless the power source has been isolated, the isolation device has been locked out/tagged out and verified, and the person making the repairs is qualified and authorized to do so.
- Electric motors, and generators, shall be bonded or grounded when in use.

[INTERNAL COMBUSTION ENGINES]

- Emergency shut-down devices that will close off the combustion air should be installed on rig and skid-mounted diesel engines.
- Rig power emergency shutdown devices on each engine should, as operations allow, be function tested without load in accordance with company procedure to determine that they are in proper working condition. The testing frequency may be

prescribed by manufacturer or regulatory requirements.

- Spark arrestors or equivalent equipment should be provided on internal combustion engine exhausts.

[INSPECTION OF CRITICAL EQUIPMENT]

Critical equipment should be periodically inspected as recommended by the manufacturer or in accordance with recognized engineering practices.

GUIDELINE 08

WELL PUMPING UNITS IN WELL SERVICE OPERATIONS

- A risk assessment, including a review of manufacturer's guidelines, should be conducted prior to commencing work on well pumping units.
- Electric power to the pumping unit should be de-energized a sufficient distance from the wellhead to eliminate potential electrical hazards during service rig operations as determined by the risk assessment. In confined locations, overhead electric power to the pumping unit control panel should be deenergized. Where necessary, electric power service should be de-energized while moving the rig in or out and during rig up and rig down operations.
- Brake systems on pumping units in service should be maintained in safe working order.
- When well servicing operations require the pumping unit to be offline (i.e. wireline, service rigs, coiled tubing, etc.), the pumping unit should be turned off, the brake set, and where applicable, the power source locked out/tagged out.
- If the pumping unit is stopped with counterweights not in the down position, additional securing of the beam to a fixed member of the pumping unit should be used to prevent unintended movement of the counterweights or beam.
- An appropriately rated lifting chain or wire rope sling should be used to handle the horse head if removal or installation operations are necessary. On installation, the horse head should be bolted or latched in accordance with the manufacturer's specifications.
- Upon completion of well servicing operations and before energizing the power source, clear personnel and equipment of the weight and beam movement.
- After well servicing operations are completed, guards need not be in place until final adjustments (pump, spacing, etc.) are made, without

compromising the safety of personnel. Pumping unit guards and enclosure guards (belt and motor sheaves), or other appropriate barriers, shall be in place prior to placing the unit in full operation.

GUIDELINE 09
SPECIAL SERVICE OPERATIONS

[GENERAL (SPECIAL SERVICE)]

- Each tubing string of multiple completion wellheads shall be identified by marking.

  Caution— For multiple-completion wellheads, use special care and attention to avoid errors in opening and closing valves.

- Wherever possible, the service unit(s) should be located on the upwind side of the wellhead and spotted where the crew has optimum visibility and can work unobstructed.
- A risk assessment on land locations should be performed to determine the appropriate safe location and distance from the wellbore for discharges of oil or gas to the atmosphere. Safety measures should be considered where terrain, location, rig configuration, or other conditions do not permit this spacing.
- A frozen, plugged, or pressurized flow line should not be flexed or hit.
- When tubing is being hydrostatically tested above the rig floor, slips should be set and personnel should stand clear while pressure is applied.

[EQUIPMENT (SPECIAL SERVICE)]

- Service unit engines should be equipped with an emergency shutdown device that is conspicuously labeled and easily accessible.
- Unit operators should be trained on the proper use of emergency shutdown devices.

[COMMUNICATIONS]

- Equipment should be located so that equipment operators can see the personnel involved in the operation; or alternate specific arrangements should be made to assure adequate communication.
- Signals between supervisors, personnel, and other involved persons should be agreed upon and fully understood prior to initiation of operations.
- Communications equipment should be in good

working order before commencing operations.

- Ensure that communication equipment is appropriate for the respective area(s) in which they are being used. In perforating operations, refer to API 67 for additional communication equipment recommendations.

[DISCHARGE LINE (TEMPORARY TREATING OR CEMENTING LINES)]

- Discharge lines should not be placed under mobile equipment.
- Discharge lines (pressure lines) should include sufficient flexible joints to avoid line rigidity and minimize vibration at the wellhead.
- When using an open-ended flow line to flow or bleed-off a well, the line should be secured at the wellhead, at the end of the flow line, and at intermediate intervals along the line. The flow line should be secured prior to opening the wellhead control valve.
- Pressure shall be bled from line(s) prior to breaking out or rigging down the line(s).
- After hazardous substances have been pumped and prior to rigging down, lines should be flushed.

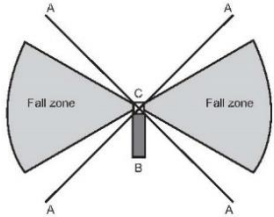
GUIDELINE 10
WIRELINE SERVICE OPERATIONS

[GENERAL (WIRELINE SERVICE]

Job tasks, including potential simultaneous operations, shall be risk assessed before operations commence. The risk assessment shall be communicated during a pre-job meeting with the crew and other involved personnel.

[PLACEMENT AND HANDLING OF WIRELINE SERVICE UNITS]

- If fracturing or hot oil units are on the location, Wireline units should be spotted as far away from them as practicable. The Wireline unit should be spotted so a path of emergency exit from the operating compartment faces away from the fracturing or hot oil units. During land operations, Wireline units, other vehicles, or portable houses should be placed outside the guy wires of the well service unit and outside the fall lane of the derrick represented by 2:00 o'clock to 4:00 o'clock, and 8:00 o'clock to 10:00 o'clock on each side of the rig.



A = Guyline anchor
B = Well servicing unit
C = Wellhead

NOTE Not to scale.

- Mobile, portable, or skid-mounted Wireline service units should be secured to prevent unwanted movement of the unit when a load is taken on the lines.
- A Wireline service unit should be spotted in such

manner that it will not interfere with the entrance or exit of personnel from that unit or other service units.

[WELLHEADS, WELLHEAD CONNECTIONS, AND ADAPTERS]

- Wireline equipment should not be rigged up on the wellhead if the surface pressure exceeds or is expected to exceed the maximum rated working pressure of the wellhead and wellhead equipment.
- In Wireline operations where the weight and pull of the tools are to be supported by the lubricator, the adapter from the wellhead to the lubricator equipment should be constructed for the intended service.

[LUBRICATORS AND WIRELINE BLOWOUT PREVENTER EQUIPMENT]

- Lubricator equipment should be manufactured and fabricated in accordance with the test/ working pressure of the equipment to which it is attached, using the safety factor indicated by the manufacturer's specifications (For further information API 6A).
- Lubricator and Wireline blowout preventer equipment should be pressure tested in accordance with manufacturer's guidelines.
- The rated working pressure of the sections of the lubricator, including stuffing box, Wireline valve connections, and adapters should not be exceeded.
- A lubricator of sufficient pressure rating should be used whenever pressure at the wellhead may be anticipated. The lubricator shall allow removal of the Wireline down hole equipment when the master valve or blowout preventer is closed.
- Materials to be used in a service that could cause sulfide stress cracking shall meet the requirements of NACE MR0175/ISO15156-1.
- Lubricators, swages, and unions shall be visually inspected for defects prior to use. Defects that could affect safe operations (i.e. cuts, corrosion, thread damage) shall be corrected prior to installation.

- Check lubricator assembly for pressure, isolate the equipment from the wellbore, and bleed pressure before working on or breaking a connection.
- When a lubricator is installed on a wellhead, a wellbore connection (kill line) below the lubricator should be provided for well control operations.
- Hammering, or otherwise striking, a lubricator or connection should not be permitted while they are subjected to pressure.
- Threaded connections or unions on lubricators should not be loosened or tightened while they are subjected to pressure.
- Due to the nature of Wireline operations and where the lubricator is needed to support the Wireline load, relatively high loads can be placed on an unsupported (free-standing) lubricator assembly. The stress resulting from side loading is normally highest at the point where the lubricator assembly is connected to the well. The lubricator assembly should be adequately supported and/or properly guyed to reduce the side loading effect of Wireline operations.

[WIRELINE OPERATIONS]

- When handling a Wireline that will recoil when released, the loose end should not be left unsecured.
- If slack line occurs while tools are in the hole, the Wireline should be clamped off at the wellhead prior to working with the slack line. Wire rope or chain should be used to tie off the Wireline clamp. The clamp should be held with a device capable of withstanding the loads to which it may be subjected.
- Hands, loose clothing, and other objects should be kept clear of sheaves while the line is in motion.
- Mast and cranes used in Wireline operations should be moved from one location to another and driven with the mast stored and properly secured.
- Use, storage, and transportation of radioactive materials shall comply with applicable standards and regulations. During Wireline operations, non-essential

personnel should stay clear from radioactive materials.

- Welding operations should not be performed in the immediate wellhead area during Wireline operations.
- Precaution(s) shall be taken to prevent personnel or vehicles from crossing under or over Wireline or pressurized lines.
- Personnel should observe a safe buffer zone on either side of the Wireline between the Wireline unit and the wellhead when the Wireline is in tension or moving.
- Wireline wipers should be adequately secured.
- Oil savers should be adjusted only by remote control while the Wireline is in motion.

[PERFORATING]

The Wireline supervisor should hold a pre-job meeting with personnel on location to review responsibilities for the operation(s) to be performed. (API 67 for additional information).

[SWABBING]

- While swabbing operations are being conducted, engines, motors, and other possible sources of ignition not essential to the operation should be shut down.
- When swabbing, the swabbing line should be packed off at the surface and have sufficient lubricator length so that fluids are routed through a closed flow system to the maximum extent possible.
- If slack line occurs while tools are in the hole, the wire line should be clamped off at the wellhead prior to working with the slack line. Wire rope or chain should be used to tie off the wire line clamp. The clamp should be held with a device capable of withstanding the loads to which it may be subjected.
- Swabbing operations should be conducted during daylight hours, or if adequate lighting is provided.
- The swabbing unit should be positioned upwind of the swab tanks or pit.
- Swab return lines should not be placed under mobile

equipment.

- When using an open-ended flow line to flow the swabbed well to a pit, the lines should be adequately secured.
- Pressure shall be bled from line(s) prior to breaking out or rigging down the line(s).
- After hazardous substances have been swabbed and prior to rigging down, lines should be cleared and, if possible, flushed.

[BAILING]

- Hydrostatic bailers should be secured prior to dumping. Sudden release of high pressure can cause the bailer to whip.
- Hydrostatic bailers should not be opened until personnel are clear of the discharge orifice.
- Use a hose and flush nozzle to attempt to clear a blocked bailer.
- Use of PPE, including slicker and face shield, is recommended to protect against pressurized fluids and solids when clearing a bailer.

GUIDELINE 11
STRIPPING AND SNUBBING OPERATIONS

- The stripping and snubbing supervisor should hold a pre-job meeting with the stripping and snubbing crew and other involved persons to review responsibilities for the operation(s) to be performed. Personnel involved in the job task(s) should be made aware of the established maximum pressure limit under which safe stripping procedures are permissible.
- The snubbing operator and rig operator shall calculate the pipe-heavy or pipe-light point before beginning snubbing operations (into or out of the wellbore).
- An individual emergency escape line shall be available for each person when working atop hydraulic snubbing equipment.
- A risk assessment should be performed to determine the appropriate safe location and distance from the well bore, and appropriate safety measures for the operation and for the location of personnel, engines and other possible sources of ignition.
- Prior to commencing snubbing operations, the snubbing work platform shall be guyed if not otherwise supported.
- Pumps, power packs, tool boxes, doghouses, and so forth, should be located away from flow lines or bleed-off lines (in the event one of these lines should burst).
- Pump units should be located where the pump operator can be seen by the snubbing operator. When this is not possible, two-way voice communications with equipment rated for the hazardous location should be established.
- Well pressure should be continuously monitored.
- Pipe snubbed into the wellbore should have at least one back pressure valve or blanking plug installed in the pipe string. A back pressure valve or blanking

plug installed in a landing nipple, preferably located closest to the lower end of the pipe string, is one way of meeting this practice.

- Snubbing operations should not be performed while welding is being done in the immediate vicinity of the wellhead.
- The volume(s) of fluids pumped into or bled from the well during snubbing or stripping operations should be measured.
- Tool joints or other connections should be lubricated as they go into the hole.

GUIDELINE 12
DRILL STEM TESTING
[PRELIMINARY TO THE DRILL STEM TEST]

- The operator's representative in-charge should hold a pre-job meeting with the crew and other involved personnel to review responsibilities for the operations to be performed.
- A risk assessment should be performed to determine the appropriate safe location and distance from the well bore, and appropriate safety measures for engines during the drill stem testing operations.
- Measures should be taken to exclude unauthorized personnel from the area during drill stem testing operations.
- Drilling fluid density and viscosity should be checked and maintained within specified limits to minimize blowout possibilities.
- A fill-up line should be installed to keep the casing full of drilling fluid and should be used only for this purpose. Provisions for the kill line should be made separately.
- Test line connections to the control head should be secured.
- Each test head used above the rig floor should be attached to the elevator links by safety cable or chain.
- One or more reversing valve(s) should be incorporated in the test tool assembly.
- The swivel/top drive and kelly hose should not be used as part of the test line.
- A safety valve of proper size and thread configuration to fit the test string and a properly sized wrench should be readily available on the rig floor for emergency use. A safety valve should not be used in the test string as a pressure control device.
- A test line should be laid to a reserve pit or test tank and anchored. If the drill stem test recovery is to be flared as produced, more than one pilot light may be

needed to assure that ignition is achieved under both high velocity and low velocity discharge conditions.

- If hydrogen sulfide is suspected or known to be present in the area, the applicable recommendations of API 49 and API 68 should be considered.
- For offshore operations and applicable onshore operations, the complete gas detection system and safety equipment including emergency shutdown systems, firefighting systems, alarms and communication systems, shall be verified as fully operational prior to the commencement of DST operations.
- The service provider should develop a diagram of the lines in the well test system, including the flow paths from the drill stem through the well test equipment, bleed off points, and emergency shutdown system.
- Connections on pressurized lines shall be secured to prevent them from swinging or kicking in case of sudden release of pressure or rupture of the line and shall be rated for the pressure intended.
- Adequate volumes of kill weight fluid shall be on location prior to flowing the well.
- Surface well tests and completion equipment shall be pressure tested with water to a set point above the maximum anticipated surface pressure prior to being exposed to the wellbore pressure. A full function test of the valves and automatic systems shall be conducted, and the well test/DST emergency shutdown system operation verified, as applicable.
- Air lines to burners shall be fitted with non-return valves. The air supply shall be independent of the rig's air supply system.

[PERFORMING THE DRILL STEM TEST]

- Fluid volume in the casing should be monitored while going in and coming out of the hole to assure that the well remains under hydrostatic control.
- The mud bucket should be hooked up and ready for

use before the drill stem test tool is pulled out of the hole.

- The rig floor should not be left unattended during the drill stem test.
- Test tools should be initially opened only in daylight hours.
- For offshore operations, support vessels and helicopters within a designated area shall be informed of the time of commencement of testing.
- The maximum anticipated temperature during the well test shall not exceed the continuous temperature rating of the BOP elastomers.
- The well test tree control station shall be continuously manned.
- For offshore operations, prior to installation and subsequent use of the burner/flare boom system, a risk assessment shall be performed to assess hazards. A permit-to-work system may be used to manage its operation thereafter.

GUIDELINE 13

ACIDIZING, FRACTURING, AND HOT OIL OPERATIONS

[GENERAL (ACID, FRAC, HOT OIL PUMPING)]

- The operator's representative in-charge should hold a pre-job meeting with the crew and other involved personnel to review the operations to be performed.
- A risk assessment should be performed to determine the appropriate safe location and distance from the well bore, and appropriate safety measures for trucks and tanks on location.

  Note: The risk assessment may include reassessing the location when there are changes in environmental conditions or potential exposure to airborne contaminants (e.g. silica, diesel particulates, caustic and hydrocarbon volatile organic compounds).
- Lines connected from the pumping equipment to the tree or wellhead should have a check valve installed as close to the well as practicable. In addition, when a multi-pump manifold is used, a check valve should be placed in each discharge line as close to the manifold as possible.
- All flow lines and relief lines should be restrained to prevent potential *whipping* of these lines or a designated buffer zone established.
- When pumping flammable fluids, the blending equipment used shall be grounded.
- Equipment unloading sand into the hopper should be bonded or grounded.
- Lines containing flammable fluids shall not be laid under vehicles.
- A pre-treatment pressure test on the pump and discharge lines should be made at a pressure no less than the maximum expected treating pressure specified by the operator, but not to exceed the rated working pressure of the equipment with the lowest rated working pressure.
- Personnel not directly involved in the operations should remain beyond a designated minimum distance during pressure testing and pumping

operations.

- The pumping supervisor, or the person designated, should check to see that valves in discharge lines are open prior to pumping.
- Unguarded openings in the top of covered frac tanks or other covered service tanks should be too small to allow personnel entry. An opening large enough to permit personnel entry should be covered by a hatch or bars mechanically secured to prevent unwanted entry. If securing the opening is not feasible, appropriate warning signs shall be prominently posted near to the tank opening.
- Engineering controls and PPE shall be used to protect personnel from silica exposure.

[PUMPING OPERATIONS (ACID, FRAC, HOT OIL PUMPING)]

- The equipment operator should remain at the controlling station while the equipment is in operation, unless relieved as directed by the pumping supervisor. Equipment operators should remain alert for communications from the pumping supervisor.
- While pumping flammable fluids, electrical equipment and internal combustion equipment not used in the job should be shut down or shut off and any fires should be extinguished. At locations where this recommendation may be impractical, appropriate safety measures should be implemented.
- Flammable fluids should not be bled back into open measuring tanks on equipment designed for pumping.
- Control measures should be in place to prevent spills or accidental releases on location.
- For additional information to consider in the planning of hydraulic fracturing operations, as well as safety guidelines and recommendations API 100-1 and API 100-2.

GUIDELINE 14
CEMENTING OPERATIONS

[GENERAL]

- A risk assessment should be performed to determine the appropriate safe location and distance from the well bore, and appropriate safety measures for trucks and tanks on location.
- The cementing supervisor should hold a pre-job meeting with the cementing crew and other involved persons to review responsibilities for the operation(s) to be performed.
- Personnel not directly involved in the operations should remain beyond a designated minimum distance during pressure testing and pumping operations.
- Prior to commencing operations, the pump and discharge lines should be tested to a pressure no less than the maximum cementing pressure specified by the operator, but not exceeding the rated working pressure of the equipment.
- The cementing supervisor or the person designated should check to see that the valves in the pump discharge lines are open prior to pumping.
- The lead-off connection to the cementing head should be secured prior to pumping operations.
- While pumping cement and displacement thereafter, normally top and bottom (Wiper) cement plugs are installed in cementing head. To ensure their release, cementing heads with plug dropping indication should be used to ensure good cement job.
- The valves and sections of cementing lines left after completion of cementing operations should be secured to prevent whipping when pressure is bled off.
- All flow lines and relief lines should be restrained to prevent potential *whipping* of these lines or a designated buffer zone established.

- Consideration should be given to personnel safety when releasing cement wiper plugs under pressure.
- When cementing at shallow depths, the tubulars should be secured to prevent pumping the tubulars from the hole.
- Engineering controls and PPE shall be used to protect personnel from silica exposure.

[PUMPING OPERATIONS]

Pump operators should remain at the controls while the pump is in operation, unless relieved as directed by the cementing supervisor.

GUIDELINE 15
GAS, AIR, OR MIST DRILLING OPERATIONS

[GENERAL]

A risk assessment should be performed to determine the appropriate safe location and distance from the well bore, and appropriate safety measures for compressors.

[TRAINING]

- Personnel directly involved in gas, air, or mist drilling operations should be trained in the use of emergency shutoff, blowout preventer, and fire-fighting equipment.
- Personnel should be familiarized with the air or gas supply and circulating system.

[EQUIPMENT]

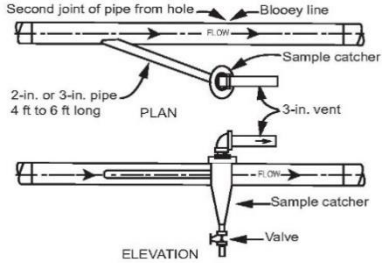
- If practicable, compressors should be visible from the driller's position.
- Compressors should have such safety features as pressure relief valves, discharge temperature and pressure gauges, engine governors, and engine shut-off valves.
- Kill switches should be provided for the drilling engines and should be mounted near to the driller's console for immediate emergency use.
- All surface lines should be rated for the maximum anticipated pressure.
- The discharge line from each compressor should be equipped with both a check valve and a block valve.
- To minimize the possibility of explosion that could result from accumulation of air cylinder lubricants in the air supply line, it is important that proper lubricants be used. For this reason, scrubbers should be used after each stage of compression to remove entrained oil.
- Compressors should be equipped with after-coolers designed to maintain temperatures within the limitations of the downstream piping system.
- A rotating head may be used on the blowout

preventer assembly with appropriate working pressure.

- The blooey and bleed-off lines should be a minimum of 150 ft (45.8 m) in length or equivalent safety measures shall be taken. The blooey and bleed-offline should be located downwind of the rig for the prevailing wind direction at the location. Equivalent safety measures should be taken for other wind conditions. These lines should be laid from the wellbore as straight and free of sags as practicable and be securely anchored.
- The blooey line should be as large as or larger than the rotating head outlet into the blooey line.
- The blooey and bleed-off lines should be securely anchored to prevent movement when pressure surges occur.

Note: This is particularly applicable in mist drilling.

- A full-opening, quick-closing valve (stopcock) should be installed at the top of the kelly to contain formation pressures in the drill string.
- There should be two valves installed in the standpipe, one accessible on the rig floor and one at ground level below the rig floor, to control the air or gas supply to the borehole.
- In gas drilling operations, a shut-off valve should be installed on the main feeder line a minimum of 150 ft (45.8 m) from the wellhead. In air drilling operations, the shut-off valve should be installed in the main feeder line closest to the compressors.
- Geological sample catchers attached to the blooey line should be of design to protect personnel from deflected solids in the air or gas flow.



[PROCEDURES]

- Sample catching by manual means at the end of the blooey line should not be permitted.
- When drilling with natural gas, a spinning chain should not be used to make up drill pipe (tool joint) connections to minimize the danger of ignition caused by mechanical sparks.
- A float valve should be installed in the drill string directly above the bit-either a heavy-duty dart or flapper-type float valve is acceptable.
- Float valves installed in drill strings should be inspected each time the bit is pulled and, if damaged, should be replaced.
- Fuel and oil storage used in compressor operations for gas, air, and mist drilling operations should be located at least 50 ft (15.2 m) from the compressor location and follow Guideline # 3.
- Liquid or LPG fuel supply lines should be equipped with shut-off valves at storage tanks and at engines and follow Guideline # 3.
- Natural gas fuel should have a master valve located on the main fuel line at least 50 ft (15.2 m) upstream from a compressor and follow Guideline # 3.
- One fire extinguisher of at least 150 lb (68kg) Class BC rating dry chemical capacity, or equivalent, should

be stationed on the job in addition to the normal minimum of four 20-lb capacity fire extinguisher with a Class BC rating (~~see~~ NFPA 10).

- The stripper rubber in the circulating head should be visually inspected according to company procedure. If leaks are found, remedial action should be taken.
- Equipment and materials for killing the well with drilling fluid should be readily available and operational before drilling commences. Precautions should be taken to ensure the drilling fluid system will not become inoperable.
- A dedicated hydrocarbon ignition source shall be kept operational at the end of the flow line, except when the stripper rubber is being removed.
- For air drilling operations, an air compressor should be kept operating during trips with a discharge of air through the blooey line.
- When making a connection, the standpipe valve should be closed, and the bleed-off line should be opened prior to breaking out the tool joint.
- Upon returning to the bottom of the hole at the conclusion of a trip in gas drilling operations, gas should be circulated to assure that air is out of the circulating system prior to lighting the flare.

[MINIMIZING SOURCES OF IGNITION]

- To prevent or minimize objectionable quantities of dust permeating areas surrounding the blooey line discharge, an appropriate amount of water should be introduced into the blooey line to wet cuttings.
- The rig substructure should have appropriate measures to prevent or mitigate the accumulation of hydrocarbon gases.

GUIDELINE 16
FLOW BACK OPERATIONS

- A risk assessment should be performed to determine the appropriate safe location and distance from the well bore, and appropriate safety measures for trucks, tanks, and other flow back equipment on location. The assessment should include the piping and instrumentation diagram.
- A meeting with involved personnel should be conducted to review the operations to be performed before starting work, anytime equipment is reconfigured or when there are significant operational changes, or both.
- Personnel involved in the operations shall perform routine equipment checks throughout the shift. These checks will involve audio, visual and olfactory observations.
- Engineering controls and PPE shall be used to protect personnel from hydrocarbon or H_2S vapor exposure, or both.
- All enclosed gas busters/separators should relieve to applicable venting or flaring options, or both, depending on local or other regulatory requirements.
- All flare lines, when in use, should have flame arrestors placed as close to the flare as possible.
- All wells equipped with remote shut-off devices (hydraulic or pneumatic operating) should have the emergency shutdown system located along the path of egress and be tested prior to commencing flow back operations.
- All flow lines and relief lines should be restrained to prevent potential *whipping* of these lines or a designated buffer zone established.
- All equipment should be pressure tested before use.
- All flow back iron shall be certified/recertified annually using nondestructive testing. Banding is required to show the test date for all flow back iron to ensure compliance. Any flow back iron with missing

or illegible bands will be taken out of service immediately and sent in for certification. The bands shall be visible after rig-up.

Note: Follow manufacturer's information / recommendations on banding.

- All equipment shall be bonded and grounded when in use.
- All tanks should have internal grounding using a static drain line for static dissipation for the incoming fluids.
- Non-metallic containers should not be used to drain or sample hydrocarbon fluids.
- Area around waste pit should be free from bushes owing to when fire is burnt to indicate well flow, nearby area may not catch fire.

GUIDELINE 17
DRILLING WASTE MANAGEMENT AND DISPOSAL

[HAZARDOUS MATERIALS]

- The operator to prepare an annual inventory of all potential and identified hazardous waste materials and to provide the inventory report, if requested, to local emergency response authorities.
- The operator will substitute where practical and feasible non-hazardous chemicals to replace hazardous chemical use.
- Drilling mud additives should be restricted to non-hazardous materials to ensure that the resulting pit waste can be easily disposed with minimal environmental impact.

[PIT DESIGN]

- The operator should design and maintain all pits to minimize adverse impact to the environment.
- No operator or person should use any pit for storage of oil or oil products
- All pits, except for the following exceptions, should be lined with an impermeable lining such as a synthetic plastic PVC liner to ensure that no horizontal or vertical leakage occurs. Exceptions include:
  a) Emergency saltwater storage pits;
  b) Drilling pits associated with wells less than 5000 feet where only freshwater drilling muds were used and have tested less for low chlorides (> 500 ppm) and have prohibited all hazardous mud additives and oil based drilling muds.
- The operator should use synthetic liners for high chloride (chloride > 5000 ppm) or oil based muds.
- Liquid level of the pits should not be permitted to rise within two feet of the top of the pit dikes.
- Liquid level of the pits should not be permitted to rise within two feet of the top of the pit dikes. Pit dikes or walls should be maintained at all times to prevent deterioration, subsequent overfill, and leakage of contents.

- If required, observation wells should be installed in sensitive areas to determine potential impact on the upper aquifer.

[NON-HAZARDOUS WASTES]

- The operator should avoid disposing of unused commercial products and should try to return them to the vendor or use them at another location.
- All non-hazardous wastes should be segregated from hazardous wastes.
- The operator should dispose of any mixture of non-hazardous and hazardous wastes as hazardous waste, and must comply with existing hazardous materials storage, use and disposal requirements.

[HAZARDOUS WASTES]

- Hazardous wastes must be stored, managed and disposed in a safe manner which will not cause harm to humans, animals, or environmental resources. The operator should comply with existing hazardous materials storage, use and disposal requirements.

Camp Site Waste

The operator should collect and treat camp site wastewater and sewage to satisfy Federal and local effluent requirements.

Sanitary Waste

The operator may use septic systems, packaged wastewater treatment units, or portable commercial containers for disposal of wastewater and sewage at a drilling or production camp site.

Refuse Disposal

The operator should comply with all local refuse disposal regulations. If no local regulations exist, the operator must comply with best management practices which may include incineration of combustible refuse, segregation of recyclable materials, or burial of biodegradable waste onsite, depending upon local waste regulations.

[OTHER ENVIRONMENTAL GUIDELINES FOR CAMPSITES]

a) Latrines should be located at a suitable distance from a water body.

b) Sewage should be handled to prevent surface and groundwater contamination.
c) No litter (i.e., food waste, packaging, etc.) should be left onsite.

GUIDELINE 18
INSTRUCTIONS FOR SITE RESTORATION

The operator must restore disturbed areas to approximately pre-existing conditions, subject to agreement with the landowner, DGPC and concerned EPA that desirable development features may be retained. Pit sites should be restored to their pre-existing condition after the pits serve their purpose.
Specific Guidelines are as follows:

[DRILLING AND PRODUCTION SITES]

- The operator should upon completion of production or drilling activities, and where DGPC, local authorities and landowner agree the facilities have no future use, return the well site to its previous condition.

[PIT CLOSURE]

- Within 12 months after drilling, unlined drilling pits should be closed by trench burial method.
- Within 6 months after drilling, lined pits containing hazardous materials should be closed through encapsulation with a geomembrane cap. Pits not containing hazardous wastes may be closed by mixing and filling.
- Other types of pits (such as flare and workover pits) should be closed within 30 days after use.

GUIDELINE 19
INSTRUCTIONS FOR OPEN AUCTION

While opting for an Open Action of critical items, Press Tender would be advertised as per company policy based on the a) the justification explicitly showing ineffectuality of the items and b) proper value determination of the items by a Committee.

Open auction would be mandatory for the following category of items:

- **Operational:** Weary assemblies and spares of engines, pumps, generators, pipes of different sizes, welding plants, rig mast structures, production tubing and other valued electrical and mechanical assets.
- **Support:** Unserviceable support vehicles including Ambulance, Dozers, Trailers, Bowzers, Fork Lifters, and Cranes.
- **Product related:** Used Chemicals/ Oil and Sludge collected from the separators/ pipelines/ tanks.

Note: The above steps may generally be taken by/ through Material Management/ Stores Section.

GUIDELINE 20
DRIVING SAFETY

- All categories of vehicle, including self-propelled mobile plant, must not be operated unless:
  a) Vehicle is fit for purpose, inspected, and confirmed to be in a safe working order.
  b) Number of passengers does not exceed manufacturer's design specification of the vehicle.
  c) Loads are secure and do not exceed manufacturer's design specifications or legal limits for the vehicle.
  d) Seat belts are installed and worn by all occupants.
  e) Safety helmets are worn by riders and passengers of motorcycles and similar types of vehicles.
- Drivers must not be authorized to operate vehicle unless:
  a) They are trained, certified/ licensed and medically fit to operate the class of vehicle.
  b) They are not under the influence of alcohol or drugs, and are not suffering from fatigue.
  c) They do not use hand-held cell phones and radios while driving (best practice is to switch off all phones and two-way radios while driving).
- All vehicles shall be equipped with the following standard emergency equipment:
  a) fire extinguisher that is approved for the type vehicle, and
  b) approved first aid kit.
- Only designated personnel shall operate a company vehicle.
- Hitchhikers may not be given rides in a company vehicle.
- Fog and Smog are burning issues that we should encounter in the winter season. Guidelines specifically to drive in these conditions are:

a) Use hazard/warning flashers when entering fog/smog.
b) Always follow road highway reflectors and try to maintain safe distance from the vehicles ahead.
c) Stay in the proper lane.
d) Do not stop alongside road unless absolutely necessary.
e) Do not drive in dark unless you have specific permission to do so.
f) Check for route security protocols before starting your journey.

GUIDELINE 21
HEALTH AND HYGIENE

Following guidelines must be complied with to maintain healthy & hygienic occupational environment among workforce:

[CATERING & HYGIENE]

- Dining tables should be covered with metal sheets.
- Floors, walls, and ceilings should be cleaned at least once a day.
- Food should be thawed in the refrigerators free of vermin.
- Water used for cooking should be of same standard as drinking.
- Food should be cooked in metal cooking pot which be immediately cleaned after every meal.
- The food once cooked should be kept hot at 63^0 Celsius or above.
- Dishes and eating utensils should be washed thoroughly with hot water containing detergents.
- Raw food should be kept separate from the cooked food.
- Food should be transported in a food container and not mixed with other goods.
- Food container should be cleaned immediately after being emptied.
- The food container should be marked 'Food Only'.
- The waste and spillage should be cleared immediately.
- Food should not be stored on the floor, but on suitable shelves.
- Detergents, soaps, insect killers and other chemical products should be stored in a separate location.
- Food handlers should have clean, short or netted hair and clean short finger nails, regular bathing habits and clean cloth wearing of closed shoes is mandatory (no sandal or slippers).
- Food handlers with skin, nose, throat problem or suffering from colds, diarrhoea or vomiting should

report immediately to the medical Rep. and should not be allowed to handle until clearance.

- Hands should be washed with soap after using the toilets or cleaning a spill, or even after smoking etc.

[CATERING CREW HYGIENE]

- Catering crew must be free of contagious diseases, cuts, sores, and colds when handling and preparing food.
- Kitchen staff should get examined often for their hygiene.
- Kitchen staff should wash their hands, properly scrubbing with soap and water, prior to handling of food, after handling uncooked food and using the toilet.
- Kitchen staff should keep their nails and hair short.
- Kitchen staff should report on duty in clean proper clothes (uniform, cook's cap, & hair nets.)
- Kitchen and dining facilities whether in tents or mobile units should have the same requirements for cleanliness and sanitation.

[HYGIENE AT LIVING QUARTER]

- Floors should be kept clean and washed with disinfection at least once a day.
- Spills should be cleaned immediately.
- Bed rooms should be tidied - kept neat and clean.
- Bed sheets and pillow cases should be systematically changed whenever the person occupying the bed is replaced, or at least one a week.
- Towels should be installed in the vicinity of the wash basins and liquid soap should be provided for washing of hands at communal places to avoid multiple contacts and spread of vectors.

ANNEXURE A
MINIMUM APPROACH DISTANCE

The closest distances an employee is permitted to approach an environmentally sensitive area or an energized or a grounded object in terms of safety are mentioned below:

From Environmental Perspective

Activity	Recommended Safe Distance
New access tracks	50m from all surface water sources; 100m from cultural sites (including graveyard and shrines); 100m from villages
Campsite	500m from communities, cultural sites (including graveyard and shrines) and surface water bodies
Soak pits (sanitary pits and biodegradable garbage pits)	300m from all surface/ground water sources
Burn pit	500m from communities
Installation of new tube wells	500m from existing wells
Exploration & production facilities should be installed	300m from protected areas; 200m from culturally sensitive sites
Drawing ground water from the wells or springs	At least 50m from sources of contamination.

From Safety Perspective

<table>
<tr><th>Activity</th><th colspan="3">Recommended Safe Distance</th></tr>
<tr><td rowspan="3">Recommended Minimum Clearances Between Power Lines and Derricks, Masts, or Guylines</td><td><u>Rig Status</u></td><td><u>Line Voltage</u></td><td><u>Minimum Clearance, ft.</u></td></tr>
<tr><td>Operating rigs</td><td>All</td><td>10 ft plus 4 in. for each additional 10 kV over 50 kV</td></tr>
<tr><td rowspan="2">In transit (lowered mast)</td><td>less than or equal to 50 kV</td><td>4 ft (1.2 m)</td></tr>
<tr><td>greater than 50 kV</td><td>4 ft plus 4 in. for every additional 10 kV</td></tr>
</table>

Flammable liquids should not be stored (except for fuel in the tanks of operating equipment)	Within 50 ft (15.2 m) of the wellbore
On land locations, vehicles not involved in the immediate rig operations should be located	A minimum distance of 100 feet (30.5 m) from the wellbore or a distance equal to the height of the derrick or mast (including attachments), whichever is greater.
A stairway, ladder or ramp should be located in any trench that is	At least 4 ft (1.2m) deep.
The escape means in a trench should be placed so that a person is never	More that 25 ft away from an escape means.
Personnel shall be protected at all times from falling by guardrail systems, safety net systems, or personal fall arrest systems (PFAS)	When engaged in work 6 ft or higher above the ground or adjacent working surfaces
Spark arrestors or equivalent equipment should be provided on all internal combustion engine exhausts located	Within 100 ft of the wellbore.
Minimum horizontal working distances to overhead power lines	Minimum 10m at both sides
Personnel to be kept clear of civil works machinery whilst it is in operation	At minimum distance of 5m
Distance between crane boom and Riggers	Barricaded around swing radius. (Keep visual contact with helpers at all time + Install audible signals on cranes)

Oxygen and Fuel cylinders to be stored with each other or be separated by a known combustible barrier	20 feet apart
Work permit required for Excavation	If excavation required below 4 feet depth
Work permit required for Work At Height	6 feet height or above
Safety harness should be worn for work	6 feet height or above (if guard rails not available)
Use of Scaffold	For working at 1.5m height or above
Work permit required for Hot Work Operations	On or near operational process areas or within 50 feet of flammable/ combustible materials, fumes, battery storage or charging areas (Fire hazard must be removed, covered with a fire-resistant/ insulating material or otherwise protected.)
Distance between ladder and wall	1:4 rule or 75 degree angle from wall (structure)
Fire extinguishers/ hydrants must be present	25 to 75 feet from flammable materials/ substances
Distance between two workers in a workplace/ workshop	10 feet
First aid box in a workplace	6 to 8 feet from the nearest worker
Distance between fire water pump and fire water reservoir in a workplace	20 to 30m
Electrical equipment/ fittings installed or operated shall be of flame proof or intrinsically safe construction	Within a radius of 15 meters of Zone 0 (Class 1 Div 1)

Note: *The above list is not exhaustive/ final.*

ANNEXURE B
STANDARDIZED COLOR CODING

PIPELINE IDENTIFICATION BAND SYSTEM AND LABELING SYSTEM

- This shall be complied where the following apply:
  - Pipe contents are hazardous, or could generate hazardous conditions.
  - The pipe serves a safety purpose, as part of hazard prevention or emergency response.
  - Flow must be redirected, shut off, or adjusted to allow for maintenance or other expected work.
  - The pipe or its contents could affect the procedures followed during an emergency.
- Standardization shall be accomplished in all facilities as follows:-

The Band System:

- All process equipment and pipe work apart from Fire Fighting System shall be finished in either Light Grey or White along its entire length as the decorative color (the base color or ground color).
- The fluid contents of all flow-lines shall be identified by tapes which are appropriately colored; the nature of the pipe contents shall be identified by means of a Color Code Identification Band System (CCIB).
- Ground colors shall be provided on the full pipe section; whereas color band width to be 25 mm up to 25 mm.
- When double color bands exist on the pipeline, then a proportional width of 4:1 to the next color band is provided.
- These color bands are provided at suitable locations such as:
  - At the beginning and termination points
  - At 25m intervals (up to 50m in case of headers)
  - At change in flow direction points and flow diversion locations.
  - At locations where the pipe enters the plant or exits from the boundary.

- Color Code Identification Band System (CCIB) is given below:

Type of Fluid	Identification Band Color
Water(Raw;Potable;Storm;Treated;Produced)	Green
Steam	Crimson Red
Firefighting	Signal Red
Oils (Combustible Liquids)	Dark Brown
Chemicals	Orange
Gases (Gaseous or Liquefied)	Yellow
Acids & Alkalis	Purple
Air (Utility; Service, Instrument)	Light Blue
Process Effluents (Drain;Vent;Flare)	Black

- The additional use of Colored Labels giving the full or abbreviated product description, temperature, pressure, and other details necessary to identify any potential hazard, together with the appropriate visual aids and hazard pictorial symbols, shall be applied where deem appropriate.
- In addition to being Color Coded, each process sub-system, pipeline and valve shall be individually identified by marking them in accordance with the Equipment Identification and Tag Numbering System.
- The line number and the flow direction shall be stenciled on each pipe section and pipeline together with the CCIB, to provide the pipe work with unique traceability.

The Labeling System

- The labels shall be placed on pipes:
  - Adjacent to all valves and flanges
  - Adjacent to all changes in pipe direction
  - On both sides of wall, floor or ceiling penetrations
  - Every 50 feet on straight runs of pipe (or every 25 feet in congested areas)
- A color code based on the type of hazard posed by a pipe's contents. The labeling color code shall be:
  - Water: White text on green text box
  - Steam: White text on crimson text box

- Fire quenching fluids: **White** text on red text box
- Combustible fluids: **White** text on brown text box
- Toxic and corrosive fluids: **Black** text on orange text box
- Flammable fluids: **Black** text on yellow text box
- Acidic fluids: **White** text on purple text box
- Compressed air: **White** text on blue text box
- Process effluents: **White** text on black text box

COVERALL AND HARD HAT/ SAFETY HELMET

Color of Coverall	Recommended Categories for Use
Grayish Blue	OGDCL Officers
Red	Firefighting Crew
Dark Blue	OGDCL staff members; laborers (other than Officers)
Not specified	Contractors shall comply as per their own company's policy

Note:- *All Coverall Uniforms shall be Fire Retardant.*

Color of Safety Helmet	Recommended Categories for Use (for working in PPE required areas)
White	OGDCL Officers (Location ICs, Sectional ICs, Engineers, etc.)
Yellow	OGDCL staff members; laborers (other than Officers)
Green	HSE Reps. (Engineers/ Officers)
Red	Firefighting Crew
Blue	Employees of Contractors / Sub-contractors working at site
Brown	Welders or workers taking up high heat or high voltage jobs
Grey	All types of Guests/ Visitors

Note:- *In addition to color coding, the selection of the helmets shall be made with the intention a) to reduce the force of impact of falling objects, b) to reduce the force of impact resulting from a blow which may be received off center or to the top of the head and c) to reduce the danger of contact with exposed high-voltage electrical conductors.*

MAINTENANCE OF LIFTING GEARS

- Lifting equipment comprises lifting appliances (equipment performing the lifting), lifting accessories (devices that connect the load to the lifting appliance 'GEARS') and lifted equipment (e.g. containers, baskets, etc). All shall be marked with the Working Load Limit (WLL) and Safe Working Load (SWL).
- An equipment register, including maintenance records and evidence of certification to be available with Operator.
- Following are some of the items used as gears in lifting activities;

Wire rope slings	Chains and chain slings	Man-made fibre slings	Shackles
Beam- and Plate clamps	Eye bolts & swivel rings	Hoist rings	Turnbuckles
Wedge sockets	Lifting harnesses	Drill pipe elevators	Casing elevators
Bail arms	Spreader beams	Hooks	Load cells
Pad eyes and bolts	Rigging screw	Pallet hook	

- Color coding shall be an add-on for visual inspection and confirm the following aspects;
  a) an inspection has been carried out;
  b) whether or not inspection is current; and
  c) to determine the inspection results by being able to link back from the physical evidence to the records.
  d) Location ICs shall ensure that all portable, circulating & fixed lifting equipment and accessories for lifting, after thorough examination, are color coded to give visual indication of their certification and fitness status:-

Color Code	Period
Green	Lifting accessories, which have been inspected and found fit for purpose should be color-coded for a maximum six months.
Yellow	Lifting accessories, which inspection is due after lapse of 06 months shall be stored separately and clearly marked/ color coded and returned for re-inspection, certification and color coding.
Red	Crimson red color to denote equipment "unsuitable for the job" shall be applied. The crimson red color code shall also be used for discarded or rejected lifting gears that need to be kept in material storage for non-prescribed period of time.

ASSURED GROUNDING

- All cords and current carrying conductors used with the portable power tools shall be protected by either a Ground Fault Circuit Interrupter (GFCI) or an Assured Grounding Program.
- Following Assured Grounding Color Code Calendar shall be used (each new year):

January	**February**	**March**
April	**May**	**June**
July	**August**	**September**
October	**November**	**December**

Note:- The colors in the form of "taped bands" shall be pasted on the wire near the plug.

LOCKOUT

- Lockout and Tagout (LOTO) devices shall be singularly identified; shall be the only device(s) used for controlling energy; and shall not be used for other purposes.
- Tags shall not be required if locks are otherwise "indelibly" marked so as to identify the person(s) to whom the lock belongs.
- For each Section/ Department, Locks shall be unique-color-coded to assist in identifying users.

Note: *The authorized person applying a lock shall keep the key for that lock in his possession until the lock is removed. No employee should be able to open a lock attached by someone else.*

WASTE DRUMS/CONTAINERS/BINS

Wastes Type	Bin Color
Hazardous	**Red**
Food/ Paper/ Wood (Organic)	**Green**
Plastic	**Yellow**

WORK PERMITS

Permit	Background Colour
Cold Work Permit	**Blue Colour**
Sour/Hot Work permit	**Red Colour**
Electrical Work Permit	**Green Colour**
Confined Space/Vessel Entry Work Permit	**Grey Colour**
Radiography Work Permit	**Yellow Colour**
Excavation & Civil Work Permit	**Brown Colour**
Working at Height Permit	**Pink Colour**
Vehicle Entry Permit	**Purple Colour**

COLOR CODING FOR HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS)

The four bars shall be color-coded, using the modern color bar symbols and the number ratings as follows:

0 = Insignificant hazard;
1 = Slight hazard;
2 = Moderate hazard;
3 = High hazard; &
4 = Extreme hazard

Type of Hazard	HMIS Color Bar
Health	**Blue**
Flammability	**Red**
Physical Hazard	**Orange**
Personal Protection	**White**

ANNEXURE C
HAZARDOUS AREA CLASSIFICATION

The classification of areas shall be made an essential design consideration: A thorough analysis shall be undertaken by the responsible designers, chemical or electrical engineers to a) acquire such equipment which is to not create sources of ignition capable of igniting these mixtures and b) determine the correct hazardous locations classification. Process areas at the design phase shall be divided into Zones or Divisions as mentioned below according to the likelihood of a potentially explosive atmosphere being present:

Zone Classification	Definition Of Zone Or Division	Division Classification
Zone 0 (gases)	An area in which an explosive mixture is continuously present or present for long periods **Typically 1000 hr/year**	**Class I Division 1 (gases)**
Zone 1 (gases)	An area in which an explosive mixture is likely to occur in normal operation **Typically 10-1000 hr/year**	**Class I Division 1 (gases)**
Zone 2 (gases)	An area in which an explosive mixture is not likely to occur in normal operation but in accidental events or abnormal operation of equipment **Typically 1-10 hr/year**	**Class I Division 2 (gases)**

Note: *Intrinsically Safe/ explosion proof equipment, apparatus and gadgets shall be used in Zone 0&1.*

ANNEXURE D

EXPLOSION PROOF PROTECTION UNDER ATEX DIRECTIVE

Ex Code		Description	Standard	Area	Use
Flameproof	d	Equipment construction is such that it can withstand an internal explosion and provide relief of the external pressure via flamegap(s) such as the labyrinth created by threaded fittings or machined flanges. The escaping (hot) gases must sufficiently cool down along the escape path that by the time they reach the outside of the enclosure not to be a source of ignition of the outside, potentially ignitable surroundings.	IEC/EN 60079-1	Zone 1 if gas group & temp. class correct	Motors, lighting, junction boxes, electronics
Increased Safety	e	Equipment is very robust and components are made to a high quality	IEC/EN 60079-7	Zone 2 or Zone 1	Motors, lighting, junction boxes

Oil Filled	**o**	Equipment components are completely submerged in oil	IEC/EN 60079-6	Zone 2 or Zone 1	Switchgear
Sand/Powder/Quartz Filled	**q**	Equipment components are completely covered with a layer of Sand, powder or quartz	IEC/EN 60079-5	Zone 2 or Zone 1	Electronics, telephones, chokes
Encapsulated	**m**	Equipment components of the equipment are usually encased in a resin type material	IEC/EN 60079-18	Zone 1 (Ex mb) or Zone 0 (Ex ma)	Electronics(no heat)

Pressurised/purged	**p**	Equipment is pressurised to a positive pressure relative to the surrounding atmosphere with air or an inert gas, thus the surrounding ignitable atmosphere can not come in contact with energized parts of the apparatus. The overpressure is monitored, maintained and controlled.	IEC/EN 60079-2	Zone 1 (px or py), or zone 2 (pz)	Analysers, motors, control boxes, computers
Intrinsically safe	**i**	Any arcs or sparks in this equipment has insufficient energy (heat) to ignite a vapour Equipment can be installed in ANY housing provided to IP54. A 'Zener Barrier', opto-isolator or galvanic un it may be used to assist with certification. A special standard for instrumentation is IEC/EN 60079-27, describing requirements for Fieldbus Intrinsicall y Safe Concept (FISCO) (zone 0, 1 or 2)	IEC/EN 60079-25 IEC/EN 60079-11 IEC/EN60079-27	'ia': Zone 0 & 'ib': Zone 1 'ic: zone 2	Instrumentation, measurement, control

Non Incendive	**n**	Equipment is non-incendive or non-sparking. A special standard for instrumentation is IEC/EN 60079-27, describing requirements for Fieldbus Non-Incendive Concept (FNICO) (zone 2)	IEC/EN 60079-15 IEC/EN 60079-27	Zone 2	Motors, lighting, junction boxes, electronic equipment

ANNEXURE E

NATIONAL ENVIRONMENTAL QUALITY STANDARDS (NEQS) (SELF MONITORING AND REPORTING BY INDUSTRY) RULES 2001, SRO 528(1)/2001

1. Quarterly basis, monitoring of Effluents for the given parameters and reporting to provincial EPA:

(i) Flow
(ii) pH = 6 – 9
(iii) Temperature Increase = < 3 C
(iv) BOD5 = 80 mg/l
(v) COD = 150 mg/l
(vi) TSS = 200 mg/l
(vii) TDS = 3500 mg/l
(viii) Oil/Grease = 10 mg/l
(ix) Phenol = 0.1 mg/l
(x) Chloride = 1000 mg/l

2. Quarterly basis, monitoring of Emissions for the given parameters and reporting to provincial EPA:

(i) CO = 800 mg/Nm3
(ii) Hydrogen Sulfide = 10 mg/Nm3
(iii) PM10 = 300 mg/Nm3
(iv) SOx = 400 mg/Nm3
(Based on one percent sulphur content in fuel oil.)
(v) NOx = 130 nanogram per joule of heat input

3. Annual basis, monitoring of Diesel Vehicle Exhausts:

(i) CO = 4.0 g/kWh [ECE R-49] for Trucks and Buses + Large good vehicles + Older Vehicles
(ii) HC = 1.1 g/kWh [ECE R-49] for Trucks and Buses
(iii) HC = 7.0 g/kWh [ECE R-49] for Large good vehicles and Older Vehicles
(iv) NOx = 7.0 g/kWh [ECE R-49 for Trucks and Buses
(v) NOx = 1.1 g/kWh [ECE R-49] for Large good vehicles and Older Vehicles
(vi) PM = 0.15 g/kWh [ECE R-49] for Trucks and Buses + Large good vehicles + Older Vehicles

4. Annual basis, monitoring ambient air quality (due to flare/ vent):

Sulphur Dioxide (SO_2)	Annual Average* = 80 ug/m^3 24 hours** = 120 ug/m^3	Ultraviolet Fluorescence method
Oxides of Nitrogen as (NO)	Annual Average* = 40 ug/m^3 24 hours** = 40 ug/m^3	Gas Phase Chemiluminescence
Oxides of Nitrogen as (NO_2)	Annual Average* = 40 ug/m^3 24 hours** = 80 ug/m^3	Gas Phase Chemiluminescence
O_3	1 hour = 180 ug/m^3	Non dispersive UV absorption method
Suspended Particulate Matter (SPM)	Annual Average* = 400ug/m^3 24 hours** = 550ug/m^3	High Volume Sampling, (Average flow rate not less than 1.1 m^3/minute)
Respirable Particulate Matter.PM_{10}	Annual Average* = 200ug/m^3 24 hours** = 250ug/m^3	B Ray absorption method
Respirable Particulate Matter. $PM_{2.5}$	Annual Average* = 25 ug/m^3 24 hours** = 40 ug/m^3	B Ray absorption Method
Lead (Pb)	Annual Average* = 1.5 ug/m^3 24 hours** = 2 ug/m^3	ASS Method after sampling using EPM 2000 or equivalent Filter Paper
Carbon Monoxide (CO)	8hours** = 5 mg/m^3 1 hour** = 10 mg/m^3	Non Dispersive Infra Red (NDIR) method

* Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.
** 24 hourly /8 hourly values should be met 98% of the time in a year. 2% of the time, it may exceed but not on two consecutive days.

5. Quarterly basis, monitoring noise levels:

Noise –dB(A) Leq* 55 (Day Time); 45 (Night Time)	Residential Camp Area
Noise –dB(A) Leq* 75 (Day Time); 65 (Night Time)	Engine Hall, Plant Premises

1. Day time hours: 6.00 a.m to 10.00 p.m.
2. Night time hours: 10.00 p.m. to 6.00 a.m.
3. Silence zone: Zone which are declared as such by the competent authority. An area comprising not less than 100 meters around hospitals, educational institutions and courts.
4. Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.

*dB(A) Leq: Time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

6. National Standards for Drinking Water Quality

#	Properties/ Parameters	Standard Values
Bacterial		
1.	All water intended for drinking (E.Coli or Thermotolerant Coliform bacteria)	Must not be detectable in any 100 ml sample
2.	Treated water entering the distribution system (E.Coli or thermotolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample
3.	Treated water in the distribution system (E.coli or thermotolerant coliform and total coliform baceria)	Must not be detectable in any 100 ml sample. In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.

Physical		
4.	Colour	≤ 15 TCU
5.	Taste	Non objectionable/ Acceptable
6.	Odour	Non objectionable/ Acceptable
7.	Turbidity	< 5 NTU
8.	Total Hardness as $CaCO_3$	< 500 mg/l
9.	TDS	< 1000
10.	pH	6.5-8.5
Radioactive		
11.	Alpha Emitters bq/L or pCi	0.1
12.	Beta emitters	1
Chemical		
	Essential Inorganics	*mg/Litre*
13.	Aluminum (Al) mg/l	≤0.2
14.	Antimony (Sb)	≤0.005
15.	Arsenic (As)	≤0.05
16.	Barium (Ba)	0.7
17.	Boron (B)	0.3
18.	Cadmium (Cd)	0.01
19.	Chloride (Cl)	<250
20.	Chromium (Cr)	≤0.05
21.	Copper (Cu)	2
Toxic		
	Toxic Inorganics	*mg/Litre*
22.	Cyanide (CN)	≤0.05
23.	Fluoride (F)*	≤1.5
24.	Lead (Pb)	≤0.05
25.	Manganese (Mn)	≤0.5
26.	Mercury (Hg)	≤0.001
27.	Nickel (Ni)	≤0.02
28.	Nitrate (NO3)*	≤50
29.	Nitrite (NO2)*	≤3
30.	Selenium (Se)	0.01
31.	Residual chlorine	0.2 – 0.5 at consumer end 0.5-1.5 at source
32.	Zinc (Zn)	5.0

7. Light Intensity

To assess whether lighting is sufficient in workplace, following light intensity ranges are used. Employees should understand the effects of lighting on their health and safety. In particular, they need to understand visual fatigue: its causes, prevention, symptoms, and recovery techniques.

Task/ Area	Range of Luminance (Lux)
Emergency lighting (at floor or tread levels) in exits, exit routes, stairs, and underground walkways	At least 10 (on average)
Simple visual tasks e.g. lobby area; washrooms; loading into trucks	30 – 100
Medium visual tasks e.g. bookkeeping; filing; material receiving and packing areas	300 – 1000
More visually demanding tasks e.g. QC/ inspection; proofreading; workshops/ machine work	3000 – 10000

ANNEXURE F
EMERGENCIES LEVELS

Emergency levels and subsequent actions are mentioned below:

Emergency Level-1:

An emergency that can be controlled by the localized action at the affected area by the available personnel and resources. This level of emergency doesn't have immediate serious injuries, potential of fatality, major equipment loss, major loss of primary containment, large fire/ explosion, major vehicular incident and/ or major environment impact.

- **Emergency siren is NOT sounded at this stage.**
- **Mustering is NOT required.**
- **LMT is NOT activated; however, the situation is critically monitored by Location InCharge (Chairman LMT) for assessment of any further escalation potential.**
- **Work activities can be suspended temporarily in the localized area which is or likely to be affected.**

Emergency Level-2:

An emergency situation which has potential to impact the affected site significantly and for which external support services may be required. It may result in serious injuries/ fatality, major equipment damage, major loss of primary containment, significant fire/ explosion, major vehicular incident, and/ or loss of controlled substance to the environment

Emergency siren is sounded with intermittent tones of 10 seconds each with 5 seconds pause, repeated 3 times. Where available, emergency announcement through Public Address system may also be made. Emergency termination would be managed through siren with continuous tone for 120 seconds.

ANNEXURE G
CRISIS LEVELS

Following are the probable emergency scenarios-consequence analysis (in conjunction with Risk Management Procedure):

Scenarios	Consequences wrt Crisis Levels
i. Fire / Explosion / Blowout ii. Roadside Accident iii. Oil Spillage iv. Gas Leakage v. Boiling Liquid Expanding Vapor Explosion (BLEVE) vi. Natural Disaster (Heavy Rains, Floods, Earthquake, etc.) vii. Terrorist Attack / Bomb Threat viii. Civil Unrest (Local Strike) ix. Others	**Catastrophic Crisis Level (5)** ▪ Multiple Fatalities ▪ Massive Effect on Environment; Persistent Severe Environmental Damage or Severe Nuisance extending over a large area of commercial, communal or recreation use; Continuous excursions beyond allowable or regulatory limits ▪ Loss of > 10 Million USD ▪ Reputation issue (International Concern)
	Critical Crisis Level (4) ▪ Single Fatality ▪ Major Effect on Environment; Severe environmental damage; the company is required to take Extensive measures to restore the damaged environment; Intermittent excursions beyond allowable or regulatory limits ▪ Loss of 2 – 10 Million USD ▪ Reputation issue (National Concern)
	Major Crisis Level (3) ▪ Multiple Injury Cases esp. Lost Time Injury(ies) ▪ Local Effect on Environment; Limited Discharges affecting the neighborhood or damaging local environment; Excursions beyond allowable or regulatory limits ▪ Loss of 0.025 – 2 Million USD ▪ Reputation issue (Provincial / Regional Concern)
	Marginal Crisis Level (2) ▪ Medical Treatment Case(s)/ Restricted Workday Injury(ies) ▪ Minor Effect on Environment; Discharge or Contamination with no lasting effect; Rare excursions beyond allowable or regulatory limits ▪ Loss up to 0.025 Million USD ▪ No substantial reputation issue (Local Concern)
	Negligible Crisis Level (1) ▪ First Aid Case/ Near hit or miss ▪ Slight Effect of Environment; Slight Damage within the premises of the facility ▪ Nil ▪ No reputation issue

EMT may be activated when an Emergency Level-2 occurs after assessing actual and possible consequences as Crisis Level (Severity) 3, 4, or 5 at any Facility.

ANNEXURE H
INCIDENT PROBABILITY TABLE

(LIKELIHOOD THAT EXPOSURE WOULD RESULT INTO LOSS)

	IN TERMS OF FREQUENCY	IN TERMS OF EFFECTIVENESS OF CONTROLS/BARRIERS
Highly Likely (5)	Incident or event occurred THREE OR MORE TIMES DURING LAST TEN YEARS within E&P oil and gas industry, Pakistan	Or NO operational control/barrier is in place
Very Likely (4)	Incident or event occurred TWO TIMES DURING LAST TEN YEARS within E&P oil and gas industry, Pakistan	Or INSUFFICIENT operational controls/barriers are IN PLACE
Likely (3)	Incident or event occurred ONCE DURING LAST TEN YEARS within E&P oil and gas industry, Pakistan	Or operational controls/barriers are IN PLACE and are NOT ROUTINELY REVIEWED
Unlikely (2)	Incident or event occurred SELDOM/ RARELY DURING LAST TEN YEARS within E&P oil and gas industry, Pakistan	Or operational controls/barriers are IN PLACE and ARE REVIEWED as per plans
Very Unlikely (1)	NEVER heard of DURING LAST TEN YEARS in E&P oil and gas industry, Pakistan	Or operational controls/barriers are EFFECTIVE to WITHSTAND their intended purpose

ANNEXURE I
5X5 RISK TREATMENT MATRIX

Consequence (C) Severity (Impact)		Incident Probability (P) (Chance of Happening): Very Unlikely	Unlikely	Likely	Very Likely	Highly Likely
		1	2	3	4	5
Catastrophic	5	**5**	**10**	**15**	**20**	**25**
Critical	4	**4**	**8**	**12**	**16**	**20**
Major	3	**3**	**6**	**9**	**12**	**15**
Marginal	2	**2**	**4**	**6**	**8**	**10**
Negligible	1	**1**	**2**	**3**	**4**	**5**

Risk Rating	Risk Treatment	Action and Timescale
Low(ALARP) **[1-6]**	**Nil**	**No action is required.**
Medium(ALARP) **[7-12]**	**Nil**	**No additional controls/barriers are required. Consideration may be given to a more cost-effective solution or improvement that imposes no additional costs. Monitoring is required to ensure that the desired controls are maintained.**
High [13-20]	**Controlling the significant risk**	**Urgent action should be taken and considerable resources be allocated to reduce the risk to ALARP through interim controls/barriers and strategic decision making/ objectives & targets by putting in place actions to mitigate or minimize the risk. When considering interim controls/barriers, *Hazards Control Hierarchy* shall apply.**
Intolerable [21-25]	**Avoiding the significant risk**	**Any planned activity should NOT be commenced whereas an ongoing activity should be immediately STOPPED until the risk has been reduced. The ultimate decision to RESUME the activity shall be conditional with the approval of top management.**
	Transferring the significant risk	**The entire activity may be outsourced; OGDCL, however, to retain governance responsibility for the monitoring of such outsourcing arrangements to include the arrangements for risk management.**

ANNEXURE J
WELLSITE CLASSIFICATION ACCORDING TO AREAS OF POTENTIAL AND/OR ACTUAL EXPOSURE TO H_2S

No Hazard Condition	Any well that will not penetrate a known Hydrogen Sulfide formation would be categorized as a "No Hazard Area". Special Hydrogen Sulfide equipment is not required.
API Condition I - Low Hazard	*Work locations where atmospheric concentrations of H_2S are less than 10ppm.* Recommended for Area: - Hydrogen Sulfide warning sign with GREEN FLAG warning device present. - Keep all safety equipment in adequate working order. - Store the equipment in accessible locations.

API Condition II - Medium Hazard	*Work locations where atmospheric concentrations of H_2S are greater than 10ppm and less than 30ppm.*
	Recommended for Area:
	- Legible Hydrogen Sulfide warning sign with YELLOW FLAG warning device present.
	- Keep a safe distance from dangerous locations if not working to decrease danger.
	- Pay attention to audible and visual alarm systems.
	- Follow the guidance of the operator representative.
	- Keep all safety equipment in adequate working order.
	- Store the equipment in accessible locations.
	  - An oxygen resuscitator.
	  - A properly calibrated, metered hydrogen sulfide detection instrument.

API Condition II - Medium Hazard

Work locations where atmospheric concentrations of H_2S are greater than 30ppm.

Recommended for Area:

- Post legible Hydrogen Sulfide warning sign with RED FLAG warning device.
- Post signs 500 feet from the location on each road leading to the location, warning of the hydrogen sulfide hazard.
- Check all Hydrogen Sulfide safety equipment to ensure readiness before each tour change.
- Establish a means of communication or instruction for emergency procedures and maintain them on location, along with contact information of persons to be informed in case of emergencies.
- Ensure usability of two exits at each location.
- Do not permit employees on location without hydrogen Sulfide safety training. (Employees may be permitted on location for specific Hydrogen Sulfide training purposes that does not include general rig training.)
- Pay attention to audible and visual alarm systems.
- Store the equipment in accessible locations.
  - Two Hydrogen Sulfide detectors should be present (one should be a properly calibrated, metered detection instrument, and the other should be a pump type with detector tubes. The maximum permissible exposure limit (PEL) is 20 ppm. Respiratory protection would be required if periodic testing indicates employee exposures to H_2S at concentrations above the PEL. Ref. OSHA Standard Respiratory Protection, [29 CFR 1910.134].
  - Oxygen resuscitator.
  - Three wind socks and streamers.
  - Two NIOSH/ MSHA 30-minute, Self-Contained Breathing Apparatus (SCBA) for emergency escape from the contaminated area only.

ANNEXURE K

PRE-DRILLING CIVIL WORKS CHECKLIST

[A *Pre-Drilling Joint Inspection Checklist* is filled at the completion of 75% of the rig building is jointly filled by Drilling Operation, Security and HSEQ Representatives.]

- ☐ DISTANCE FROM METAL ROAD TO RIG.
- ☐ DISTANCE FROM RIG TO LOCATION.
- ☐ CONDITION OF KATCHA ROAD FOR HEAVY LOADS.
- ☐ WATER SOURCE CANAL / RIVER / ETC.
- ☐ STATUS OF WATER LINE.
- ☐ DISTANCE FROM WATER PUMPING STATION TO RIG.
- ☐ PUMPS + MOTORS INSTALLED AT THE WATER STORAGE POND, IF WATER PUMPED TO RIG / CAMP SITE.
- ☐ COMPACTION IN RIG AND CAMP AREA.
- ☐ FENCING ANGLE IRONS GROUNDED.
- ☐ CHECK IF ANY AREA IS OPEN / UN-SAFE.
- ☐ FENCING WORK STATUS. REQUIRED BARBED WIRE 8 FEET HIGH.
- ☐ SNAKE SHEET 4 FEET HIGH ALL AROUND CAMP & RIG SITE.
- ☐ CHECK WIND DIRECTION TO SELECT RESIDENTIAL CAMP. CAMP SHOULD BE OPPOSITE WIND DIRECTION & 500M AWAY FROM RIG.
- ☐ STATUS OF WATER LINE FROM RIG SITE BATHROOMS + LIVING CARAVANS.
- ☐ CELLAR TO BE EXCAVATED 20 FEET DEEP FOR 30" CONDUCTOR.
- ☐ AFTER CONCRETING CELLAR BOTTOM = 10 FEET.
- ☐ MUD WASTE PIT STATUS.GEO-MEMBRANE REQUIRED AT WASTE PIT.
- ☐ RIG FOUNDATION AND DRAINS AROUND CELLAR.
- ☐ TWO TOILETS + BATHS AT RIG SITE.
- ☐ DON'T CONCRETE RAT HOLE IN RIG FOUNDATION AS PER DRAWING.
- ☐ DRAINAGE SLOPE SHOULD NOT BE TOWARDS MUD WASTE PIT.
- ☐ CAMP & RIG SITE CARAVAN'S FOUNDATION PADS.
- ☐ 10' x 40' GATE AT MAIN ENTERANCE. ALSO ONE SMALL GATE 4' x 10' AS BIG GATE WILL BE LOCKED DURING NIGHT.
- ☐ ONE SMALL GATE OPPOSITE MAIN GATE FOR EMERGENCY ESCAPE.
- ☐ ARRANGEMENTS FOR QUICK WATER CONNECTIONS (BALL VALVE + NIPPLE + HOSE) FOR LIVING CARAVANS.
- ☐ CHECK POST FOR OGDCL SECURITY AT MAIN ENTERANCE.
- ☐ ELECTRICITY FITTINGS IN SECURITY ROOM AND F.C ROOMS.
- ☐ WHITEWASH & PAINT RIG SITE BATHS, F.C ROOMS, SECURITY ROOM
- ☐ SEWERAGE LINE TO CONNECT LIVING ROOMS DRAINS TO MAIN SEPTIC TANK.
- ☐ FENCING AROUND MAIN SEPTIC TANKS AREA
- ☐ DOUBLE LINES FITTINGS IN RIG SITE BATHROOMS WITH GEYZERS.
- ☐ CONSTRUCTION OF FOUR ROOMS + KITCHEN + BATH FOR F.C.
- ☐ ONE EXTRA W.C TO BE FITTED IN F.C BATHROOM.
- ☐ PLACE FOR MASJID.

ANNEXURE L
DIAGNOSIS OF BURNS

Burn severity is dictated by % **Total Body Surface Area** (TBSA):
- Burns >20-25% TBSA require IV fluid resuscitation
- Burns >30-40% TBSA may be fatal without treatment
- "Rule of Nines" is used as a rough indicator of % TBSA

Head and neck	9%
Anterior trunk	18%
Posterior trunk	18%
Arms, including hands	9% each
Legs, including feet	18% each
Genitalia	1%

Superficial Burns

First-Degree Burns
- Damage above basal layer of epidermis
- Dry, red, painful ("sunburn")

Second-Degree Burns
- Damage into dermis
- Skin adnexa (hair follicles, oil glands, etc,) remain
- Heal by re-epithelialization from skin adnexa
- The deeper the second-degree burn, the slower the healing (fewer adnexa for re-epithelialization)
- Moist, red, blanching, blisters, extremely painful
- Superficial burns heal by re-epithelialization and usually do not scar if healed within 2 weeks

Deep Burns

Deep Second-Degree Burns (deep partial-thickness)
- Damage to deeper dermis
- Less moist, less blanching, less pain

Heal by scar deposition, contraction and limited re-epithelialization

Third-Degree Burns (full-thickness)
- Entire thickness of skin destroyed (into fat)
- Any color (white, black, red, brown), dry, less painful (dermal plexus of nerves destroyed)
- Heal by contraction and scar deposition (no epithelium left in middle of wound)

Fourth-Degree Burns
- Burn into muscle, tendon, bone
- Need specialized care (grafts will not work)
- Deep burns usually need skin grafts to optimize results and lead to hypertrophic (raised) scars if not grafted

ANNEXURE M
CONTENTS OF FIRST AID KIT
(ANSI/ISEA Z308.1-2015 STANDARD)

Minimum Fill in Class-A First Aid Kits Requirement

- ☑ 16 Adhesive Bandages, 1"x3"
- ☑ 1 Adhesive Tape 2.5 yd
- ☑ 10 Antibiotic Treatment Application, 1/57 oz
- ☑ 10 Antiseptic Applications 1/57 oz
- ☑ 1 Breathing Barrier
- ☑ 1 Burn Dressing, gel soaked, 4"x4"
- ☑ 10 Burn Treatment, 1/32 oz
- ☑ 1 Cold Pack
- ☑ 2 Eye Covering
- ☑ 1 Eye Wash, 1 oz. (29.6 ml)
- ☑ 1 First Aid Guide
- ☑ 6 Hand Sanitizer, 0.9g
- ☑ 2 Pair Exam Gloves
- ☑ 1 Roller Bandage, 2"x4 yds
- ☑ 1 Scissors
- ☑ 2 Sterile Pad, 3"x3"
- ☑ 2 Trauma Pad, 5"x9"
- ☑ 1 Triangular Bandage 40"x40"x56"

Minimum Fill in Class-B First Aid Kits Requirement

- ☑ 50 Adhesive Bandages, 1"x3"
- ☑ 2 Adhesive Tape 2.5 yd
- ☑ 25 Antibiotic Treatment Application, 1/57 oz
- ☑ 50 Antiseptic Applications 1/57 oz
- ☑ 1 Breathing Barrier
- ☑ 2 Burn Dressing, gel soaked, 4"x4"
- ☑ 25 Burn Treatment, 1/32 oz
- ☑ 2 Cold Pack
- ☑ 2 Eye Covering
- ☑ 1 Eye Wash, 4 oz. (118.3 ml)
- ☑ 1 First Aid Guide
- ☑ 10 Hand Sanitizer, 0.9g
- ☑ 4 Pair Exam Gloves
- ☑ 2 Roller Bandage, 2"x4 yds
- ☑ 1 Roller Bandage, 4"x4 yds
- ☑ 1 Scissors
- ☑ 1 Splint - min 4"x24"
- ☑ 4 Sterile Pad, 3"x3"
- ☑ 1 Tourniquet
- ☑ 4 Trauma Pad, 5"x9"
- ☑ 2 Triangular Bandage 40"x40"x56"

Class-A First Aid Kits designed to deal with most common workplace injuries, such as minor cuts, abrasions and sprains.

Class B First Aid Kits include a broader range and quantity of supplies to deal with injuries in more complex or high-risk environments.

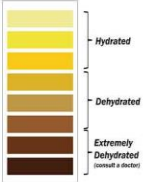
ANNEXURE N
HSE TOP CARD

Oil & Gas Development Company Ltd.

HSE INDUCTION FOR FIELD VISITORS

[to be placed or posted in every guest room]

1. Please note that the major hazards of this field/ location are of physical, chemical, and biological nature.
2. Therefore, visitors are expected to comply with all SAFETY/ ENVIRONMENT/ EMERGENCY signs and use of PPE where required.
3. In case of any emergency, inform Duty Officer by dialing 'xxx'.
4. Actions in the event of Fire or Fire Alarm:
   - If fire is detected, inform Duty officer.
   - If fire alarm sounds; Switch off any electrical/ gas appliance in use; Close doors/ windows.
   - Evacuate through the nearest Fire Exit and proceed to Muster Point.
   - Do not attempt to gather your personal belongings.
   - Do not go to the places other than the Muster Point.
   - Return to the office/ plant/ camp when allowed by Security Administrator.
5. Only use the designated areas for smoking.
6. Visitor's responsibilities towards Environment:
   - Do not litter; Use the designated waste bins.
   - Switch off the lights, fan, air conditioner, and heater when not needed.
   - Report any spark in the switch boards and water leakage in the toilets.
   - Do not use tap water for drinking.
7. Please avoid wearing open shoes or sandals while going out of the camp/ field area, since presence of snakes or poisonous insects cannot be ruled out. In case of snake/ insect bite, please call medical emergency at xxx. Necessary medicines are available at field.
8. Illegal drugs, weapons and explosives are prohibited within office/ plant/ camp premises.
9. While using toilets, you may consult the following Dehydration Chart to check your dehydration levels through urine color:



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