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Drilling Standard

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1. Introduction

1.1 Purpose

The purpose of the WesCEF Exploration Drilling Standard is to control risk exposure associated with drilling equipment and activities.

1.2 Scope

These requirements will apply to all Drilling Contractors working for WesCEF Exploration on any Projects managed by WesCEF. This document sets out a minimum guideline, it is expected that if a contractor has overarching standards that exceed these that will be mutually beneficial and WesCEF would be happy for those standards/procedures to be followed.

1.3 Roles and Responsibilities

Drilling Contractors – provide Drilling Standard Work Procedures (SWPs) for WesCEF’s review and approval.

Senior Geologists – ensure provided SWPs are appropriate and in line with this document

Exploration Manager – Approve or refute use of drilling contractor based on finding from Drilling Standard comparison.

Site Registered Manage – Final approval on use of drilling contractor when Exploration Manager is not the Registered Manager of the operational site.

2. Drilling Standards – Drill Rig

2.1 Rod Handling

An automated rod handling system shall be fitted to all Reverse Circulation (RC) drill rigs. No RC drill rig will be permitted to operate without an automated rod handling system fitted.

An automated rod handling system shall be fitted to all RAB/AC and Surface Diamond. Where an automated rod handling system is not fitted a risk assessment must be completed and safe work procedures must be developed for the task. The WesCEF Exploration Manager shall approve and sign off on the use of any drill rig that does not have an automated rod handling system fitted. At sites where the WesCEF Exploration Manager is not the Registered Manager, this approval and sign-off will be at the discretion of the Registered Manager.

There must be detailed written Safe Work Procedures (SWPs) available for the safe handling/moving of drill rods. All employees must be trained to these procedures. Where a written procedure is not available a Job Hazard Analysis (JHA) shall be completed for the task and signed off by all members of the drill crew.

2.1.1 Breakouts

An automated rod breaking system shall be fitted to all drill rigs. No modified tools designed as hand tools are to be used outside its’ intended specification and shall not be used as an automated rod breaking system.

2.2 Hand Tools

Hand Tools to be used within their intended scope of work and not outside the manufacturer’s specifications. Non-engineered, modified tooling must not be used.

Note: Note: No Stilson (Hand Tool) are to be used as back up under any mechanical or hydraulic aid. No Stilson to have cheater bars applied to aide in breaking out rods.

2.3 Guarding

All drilling equipment shall be subject to a guarding inspection prior to commencement of drilling activities that includes all fixed, temporary and portable equipment, where a person shall or could access.

The inspection shall be conducted by a competent person and shall include the following as a minimum:

- The results of hazard identification and risk assessments;
- The requirements of regulating agencies;
- Foot clamps;
- All moving parts and rotating parts (Including rotating drill rods);
- Pulleys, belts and shafts;
- Sheaves;
- Wire line spools;
- Hot components;
- Sprockets;
- Fans;
- All potential pinch points

2.4 Energy Isolation (Lock – out, Tag - Out)

Written procedures for lockout, tag-out, and de-energizing must be available. The lockout and tagging procedures shall apply to work on or near energy sources which could cause injury if the equipment were started, energized, or pressurized.

Locking devices and tags shall be provided by the contractor or if necessary, by WesCEF for individual and group application. Standard operating procedures for individual and group lockout and tagging practices shall be developed, documented, and implemented. Lockout and tagging procedures shall include the following minimum requirements:

- Who is required to follow lockout and tagging procedures;
- When lockout and tagging is required;
- What information is to be included on locks and tags;
- Where locks and tags are to be placed;
- Verification of procedural compliance prior to commencement of work;
- When locks and tags can be removed;
- Who shall be notified when locks and tags are placed and removed;
- Protocol for re-energizing equipment after locks and tags have been removed;
- Protocol for lockout and tag out in emergencies

Light and Heavy vehicle maintenance shall not be performed unless the equipment is de-energized by means of positive lock-out and tag-out and testing of the master switch.

Maintenance on Light and heavy vehicles which lacks a master switch shall not be performed unless the key is removed from the ignition switch and the equipment is tagged and the starter key and tag secured on the steering wheel.

Standard operating procedures shall be developed for situations when mobile equipment or parts of mobile equipment shall be operating for maintenance to be performed.

3. Personal Protective Equipment (PPE)

All personnel must wear or use properly fitted PPE. PPE shall conform with applicable Australian Standards and be replaced if it becomes defective.

The minimum PPE to be worn at a drilling site includes:

Surface Drill Rigs:

- Steel Toe Boots, Hard hats, Eye protection, Hearing protection, Gloves.
- High-Vis long-sleeved shirt and long pants.
- Long hair shall be restrained; jewellery shall not be worn in performance of the work.

4. Specific Risks

4.1 Fire Protection

4.1.1 Fire Risk

The fire risk assessment shall be based on a survey of each location of potential fire risk on the site, identification of potential fuel loads/ignition sources in each location, assessment of fire impact, and review of controls. The implementation of pre-event controls shall achieve the objectives of prevention and detection and post-event controls shall strengthen emergency preparedness programs.

4.1.2 Fire Protection Equipment

Fire protection equipment such as fire extinguishers fire blankets and foam injection systems shall be installed in compliance with the more stringent of either local legislative regulations or other relevant codes and standards. All drill rigs and boosters shall be fitted with a fire suppression system.

4.1.3 Training and Competency

As a minimum annual requirement, the following competency training shall be provided to all personnel:

- Basic fire prevention methods;
- Use of basic firefighting equipment;
- Emergency procedures including communication procedures

4.1.4 Inspections, Testing and Maintenance

Fire protection equipment shall be regularly inspected to ensure that the equipment is accessible, available and operable at all times.

All fire protection equipment shall be included in preventative maintenance programs that include but are not limited to:

- Regular servicing in accordance with the Original Equipment Manufacturer (OEM) specifications as a minimum
- Testing of fixed fire suppression systems and fire suppression systems which are carried on equipment
- Documentation of all inspection, testing and maintenance results
- Pre-use equipment inspections that include checks of fire protection equipment, presence of flammable materials, and leakage of flammable materials

All flammable waste and flammable products shall be managed through housekeeping programs and properly disposed of.

4.2 Hot Work

All hot work shall be subject to risk assessment prior to work. Hot work shall not be performed in areas where the risk of such work has been assessed as high or extreme consequence without a JHA being completed and the necessary controls are in place to manage the risk. All hot work equipment shall have a maintenance programme in place. Personnel must wear appropriate PPE for the hot work activity being done.

No open fires will be permitted near the drill rig, including but not limited to salamanders and other combustion heaters.

4.3 Compressed Air Safety/Pressure Systems

Hoses, couplings, seals and air lines must be appropriately rated for the compressed air system being used. All pressure systems shall undergo external inspection annually and internal inspection every five years. Safety relief valves shall be tested annually or follow local regulations.

A suitably qualified person shall perform all inspections and testing. Verification of all inspections and/or testing will be required. Test tags or test certificates sighted.

Safety sock restraints with dual lanyard fittings shall be fitted to both ends of all high-pressure air hoses. Both lanyard fittings shall be secured to independent anchor points, ideally 180° apart. Anchor points must be those originally fitted by the OEM or if modified the work must be completed by a competent person i.e. boiler maker welder.

4.4 Dust Suppression

To control occupational exposures to acceptable levels a form of operational and effective dust suppression system shall be utilized on all drilling rigs. The level of suppression must be adequate for the type of drilling and conditions.

Ad-hoc monitoring for dust exposure will occur on drill rigs with results provided to a 3rd party for assessment to ensure drill rigs are operating at a safe level according to the WHS regulations (*Work Health and Safety (Mines) Regulations 2022, Part 3.2, Div 7, r.49*).

4.5 Working at Heights

Where possible no work shall be conducted on the mast while the mast is raised.

If work must be done when the mast is raised, then a written procedure or Job Hazard Analysis (JHA) is to be completed and **MUST INCLUDE AN EMERGENCY RESCUE PLAN**. It must be reviewed and signed off by all those involved in the work including the supervising geologist.

Handrails shall be fitted to all platforms, walkways, stairways and ladders on the drill rig and support vehicles where normal work activities are conducted to prevent a person falling and they shall comply with the industry standard.

4.5.1 Fall Arrest Equipment

While working on raised mast fall restraint/arrest equipment shall be used. All personnel using fall restraint/arrest equipment must be suitably trained in the use and inspection. Fall restraint/fall arrest equipment shall comply with the design requirements of AS/NZS 1891.1:2007: Industrial Fall Arrest Systems and Devices – Harness and Ancillary Equipment and be used in accordance with the manufacturer's instructions.

4.6 Training

Personnel who are required to work at heights shall be provided with training and assessed competent in the following:

- Selection, inspection, maintenance and use of fall protection equipment
- Standard operating procedures for working at heights
- Emergency response procedures
- All relevant legislative requirements

4.7 Electricity

Electrical work must be undertaken by licensed electricians. There must be an electrical inspection, testing and tagging programme in place to ensure electrical equipment and safety devices are maintained in good working order by a competent person. Electrical equipment and installations must be correctly isolated before maintenance or repair work commences.

4.8 Mobile Equipment

Mobile equipment shall only be operated by appropriately licensed and qualified operators. All equipment shall be inspected at the start of the shift, prior to use by operators. Maintenance shall be conducted by competent persons at regular intervals and all records of inspection and maintenance shall be kept in accordance with local requirements and WesCEF Standards.

The use of ATVs shall be risk assessed and controls put in place to manage the identified hazards.

All vehicles shall be fitted with the appropriate safety equipment expected for the type of conditions and environment that it would be normally required to operate in.

4.8.1 Inspection and Maintenance

An inspection and maintenance program shall be developed for all equipment, as per manufacturer's specifications. This system shall be documented and made available by request.

All records of inspections and maintenance shall be kept. As a minimum all equipment shall be inspected pre use, weekly and monthly.

4.8.2 Emergency Shutdown

Multiple emergency shutdown devices shall be fitted to equipment by the Contractor, accessible and clearly marked. There shall be a regular testing regime in place.

4.9 Lightning Detection

It is expected that all surface equipment has access to a lightning detection system and that communications are enough that personnel at work can be notified of any local occurrences and advised to seek shelter.

4.10 Communication

The contractor must have access to suitable communication equipment, radio and satellite emergency communication methods as a minimum. All personnel shall be trained in the use of emergency communication equipment and procedures and communication equipment should be regularly tested.

4.11 Hazardous Substances

All hazardous substances to be properly stored according to manufacturer guidelines, with appropriate labelling. Hazardous substances and dangerous goods to be regularly maintained and control measures in place to manage uncontrolled release of substances.

Material Safety Data Sheets (MSDS) must be available for all hazardous substances used in the workplace.

4.12 Fibrous Minerals Management

WesCEF Exploration has a Fibrous Minerals Management system. It is expected that drilling contractors comply to this but it is preferred that contractors continue to follow their own safe work procedures. This will be reviewed by WesCEF personnel prior to commencement of the drilling programme.

Wet drilling shall be used wherever practicable if fibrous minerals are known or expected in the drilling area. If wet drilling is not possible, the drill rig must be fitted with an effective device that collects and contains the dust produced by drilling or discharges the dust through ducting to a position where it will not be breathed by any person or where it will be contained.

No person shall be authorised to enter a designated potentially hazardous area unless they have been trained. All personnel outside enclosed pressurised cabins must wear correctly fitted P1/P2 masks. Disposable respirators shall be replaced regularly to prevent build-up of dust. All personnel must follow a decontamination procedure in a designated area.

Ad-hoc monitoring for fibrous material exposure will occur on drill rigs with results provided to a 3rd party for assessment to identify fibrous minerals and confirm that the asbestos management plan is effective (*Work Health and Safety (Mines) Regulations 2022, Part 8.4, r.432*).

Refer to the WesCEF Exploration Fibrous Minerals Management Plan for further guidelines to management of fibrous dust.

4.13 Gas Monitoring

Gas monitoring equipment shall be in use on Diamond Drilling rigs. The gas monitor must be capable of detecting Oxygen (O₂), Hydrogen Sulphide, (H₂S), Methane (CH₄), and Carbon Monoxide (CO). Drilling contractors should abide by their own gas monitoring stop work procedure and implement regular testing regimes.

4.14 Noise Monitoring

Noise monitoring will be undertaken ad-hoc on drill rigs with results provided to a 3rd party for assessment to ensure drill rigs are operating at a safe level outlined by the WHS regulations. (*Work Health and Safety (Mines) Regulations 2022, Part 4.1, r.56*).

4.15 Warning Signs

Warning signs of the hazards associated with the drilling equipment and the required PPE shall be displayed by Contractor at main entrances of each drilling location.

Mandatory PPE requirements shall be clearly displayed at the drill site entrance, around drill site and communicated to all persons entering the site by way of a drill rig induction.

Hazardous areas must be clearly marked and communicated by way of the drill rig induction.

Only authorised and inducted persons shall access the working area.

5. Housekeeping

All drill sites and laydown areas must be kept organised and tidy. Tools and equipment must be properly stored, regularly checked and maintained in good condition. First Aid kits shall be fully stocked, regularly inspected, and accessible at all times.

5.1 Lighting

The Contractor will be required to provide adequate lighting to support the project and ensure safe operations.

6. Manning and Supervision

All personnel shall have received adequate information, instruction and training related to the hazards identified for the site and safe systems of work for the tasks required of them.

Senior drillers and supervisors must ensure that personnel are competent for the assigned job, understand the hazards and job requirements, and follow the established procedures.

All personnel shall be fit-for-work before commencing work.

6.1 Supervision Requirements

Number of Rigs	Supervisors	Comments
1		Senior Driller
2	1	Senior Driller back up
3	2	Back to back Supervisors
4	3	Back to back Supervisors with floating Supervisor
5	4	2 x Supervisors at all times

Note: Consideration must be given to the geographic area the rigs are spread across, and the complexity of the work being carried out.

6.2 Manning

- Three-man drill crews, 1 x Driller, 2 x Offsiders
- Drilling operations may be carried out with one offsider under certain conditions. An initial risk assessment needs to be completed for this practise, and then needs to be referenced each time the situation arises. Consideration must be given to the type of work required e.g. rod tripping etc.
- Driller or offsider not to operate the rig while working alone.
- A senior driller may assume the role of supervisor when the contractor has only one drill rig on the site
- Where a supervisor is responsible for more than one drill rig, the supervisor may fill in for a driller for no more than 3 consecutive shifts. The supervisor must fulfil supervisor duties prior to commencing drilling. Longer delays will require the rig to be shut down.

7. Minimum Drill Equipment

7.1 Diamond Drilling

- Drill Bits and Barrel Combinations: Chrome, Standard and Flexi Barrels will be required during the programme. Access to a range of soft and hard matrix drill bits with both Impregnated and Taper faces.
- NQ and HQ Orientation Gear and down-hole survey equipment. Multi-shot down-hole survey tools are a requirement and they should be "Reflex"
- Triple Tube Gear for NQ and HQ diameter core.
- A casing wedge and Haul-rowe wedge should also be accessible.
- Poly winder for the removal of surface water pipe.
- DHM equipment and tracking tools
- Equipment to pump or transport water to sites

7.2 AC and RC Drilling

- Reflex Survey tool is a requirement