Questions for Code of Practice Short Course: The Answers

June 13-14, 2018 • Addis Ababa, Ethiopia

Name_____

Your Organization _____

1. What are some of the critical legal, institutional framework components that need to be in place before private sector developers will move forward with project development?
   - Page # xviii
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   - Designation of responsible ministry, the application process and requirements thereof,
   - Application fees, Bonding requirements, Enforcement of the provisions of the Code, Penalties for noncompliance with provisions of the Code

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2. Is the Code of Practice primarily a regulatory system or a guidance document designed to promote best practices? - Page # xvii
   Is a guidance document, promotes best practices in geothermal drilling, some should be given serious consideration and others that shall be complied with.

3. Does the Code of Practice provide for: (Mark all that apply) Page # xv

   [X] Health and safety
   [X] Environmental protection
   [X] Well control
   [X] Data acquisition and management
   [X] Risk mitigation

4. Can the drilling plan be used for multiple wells? [ ] Yes [X] No. What are the primary What are the primary well design considerations? Explain. Page 11
   A basic well design can used for multiple wells can be used for a particular field, but every well should have its own drilling plan and casing setting depths to be modified per well as needed.
   Intended purpose, design lifetime and ongoing operation and maintenance. All the assumptions used like corrosion rates, thermal cycles etc shall be recorded a part of the documentation.

5. Explain the differences between the **drilling plan**, the **well site plan** and the **well design**.

   Drilling plan Page 11

   Drilling plan – descried the works, demonstrate adequate precautions as per provisions of the code and well control methods to be used.

   Well Site Plan Page 51
   Well Site Plan – site design and construction, managing run off during the drilling operation, Geotechnical assessment and compliance with existing environmental consents and permit applications requirements.

   Well Design Page 14
   Well Design - based on the well depth, wellhead location and well target. Expected subsurface conditions, casing setting depths and factors.

6. What are the topics to be discussed during the **Drill Well on Paper** (drilling planning stage) and who should be involved?

   DWOP is an important step in well planning. The process analyses each process of drilling the well, improving drilling efficiency, maintaining operational safety standards, focusing on time and cost of the well drilling, and reducing the non productive time.

   Attendees – Drilling or Project manager, Drilling Superintendent, Drilling Engineer, Drilling Supervisor, Logistics Manager, Geologist, Geophysicist, Geo chemist, Reservoir Engineer, Production Manager, HSE Manager, Rig manager, Toolpusher, Driller, Rig Crew, Rig Mechanic, Rig Electrician, Mud Engineer, Solid Control Mechanic, Cementing Engineer, Air Drilling Engineer, Mud Logging Engineer, Wire line Engineer, Casing Running Crew Chief, Drilling Bit Engineer, Well Testing Engineer, Directional Drilling Engineer, Other Key Stakeholders like State or County Representative, Camp Services Head.

7. What factors should be considered in ***well site*** selection? Page 50
   Surface thermal activity and geology in the immediate vicinity of the location. Sufficient open surroundings for dispersion of dangerous gases that may come from the well, requirement for lighting spill management and for noise abatement during the drilling and well testing operation.

8. What information should be included in the well site records? Page 57
   As built diagram to include – well location, cellar construction, any underground pipeworks or services, areas of cut and fill and any grouting, locations of drill cuttings and sump (existing or removed, if drilling cuttings on site, location and any chemical analysis

9. When would grouting of the pad be required? How should it be carried out? Page 127
   Necessary to improve shallow conditions at well site including increasing load bearing capacity, reduce the frequency and severity of fluid losses in the top hole section, strengthen the formation to help in diverting geothermal fluid flow in case off a shallow blowout

10. When designing the drainage and waste disposal (sump) what are the design considerations? Page 53
    To contain cuttings, liquid and cementing waste materials, isolation of part of the volume for primary settlement, maximum fluid level should be below cellar floor level, no erosion or collapse of sump walls, have the volume necessary to contain all drilled solids, waste mud and cement, holding capacity to be five times the volume of solid material expected to be drilled, should be periodically monitored in compliance with environmental permits and consents.

11. What about Cellar design considerations? Page 52
    Cellar depth to be minimized and well ventilated, withstand all direct and indirect loads imposed by drilling equipment and other subsequent installations, permanent levelling datum should be established on cellar as reference point, should be drained at floor level with 250 mm or more diameter and 1 in 40 grade.

12. What are the criteria for casing setting depths? Page 20
    Minimum casing shoe depth of each cemented casing string shall be calculated to be the vertical depth where the formation has sufficient Effective Containment Pressure to equal the Maximum Design Pressure expected to be encountered in the next open hole section. In competent formation, case out loss zones, provide reservoir isolation, and avoid possibility of interconnection with adjacent well.

13. What is the role of the drilling supervisor?

    Drilling Supervisor Or Company Man - Directs and controls all daily operational activities to drilling, workover, well completion operations carried out by the subcontractors and service companies on the rig. Directing the execution of the drilling programs including casing , cementing, directional drilling and air drilling, any changes to the plan, in a safe manner for personnel and equipment. Conformance to all local, state, and federal, and international rules and regulations. Monitoring logistics and availability of equipment and materials on time, Prepares the daily drilling report including and is responsible for the well control operations.

14. What is the role of the safety officer?

    Assurance of safer workplace environment with regard to the health of workers. Developing and communicating measures to assure personnel safety, correct unsafe acts including STOP work. Participate in morning meetings and pre job safety meetings to identify any health and safety concerns. Review the Incident Action Plan for safety implications.

    Investigate accidents that have occurred within incident areas, including spills and hazardous waste management. Ensure preparation and implementation of Site Safety and Health Plan (SSHP). Inspects the site to ensure it is a hazard-free environment and maintenance of all safety equipment like fire extinguishers, fire alarms.

    Review and approve all subcontractors safety plans. Conducts investigations of all accidents and near-misses, risk assessment and job hazard analysis.

    Prepares the accident report and reports to the concerned authorities.

    Promotes safe practices at the job site. Enforces safety guidelines and conducts emergency drills. Enforce the Permit To Work system, monitoring and review.

15. Is a water supply required for drilling operations adequate for well control?

    [ ] Yes [X] No If not, how much water is the minimum requirement??

    The on-site water reservoir should have a volume. Page 55

    To support all drilling operations, supply rate adequate for all quenching, drilling (without returns or total losses) and cementing operations.

    Have a capacity that allows continuous quenching of the well for a period of not less than 12 hours, normally 800-1000 litres per minute would be required for quenching

16. The Site Signage that is required shall include at least – Page 56
    Hazards, constraints on entry, and requirements of personal protective equipment (PPE), Waste sumps that constitute hazards and areas where hazardous gases can accumulate.

17. In considering generator capacity, what factors and/or pieces of equipment should be considered? Page 62
    It shall adequate to supply entire electrical load required by the rig and associated equipment used in drilling including Prime movers, electrically driven air compressors, BOP accumulator pump, Lighting, mud agitators and deck winches, heating, fluid cooling facility, fuel transfer and offices and accommodation.

18. Where should the control panel(s) for the blowout preventer be located relative to the drilling rig and what other design factors need to be considered? Page 69 How often and when should the BOP be tested? Page 85

    Operation of the BOP system should be possible from at least two independent locations. One of these shall be adjacent to the driller's console and other be a safe distance away from rig floor (accumulator position) which is sheltered.
    Drilling wellheads shall be pressure tested after assembly and prior to drilling out the cement from the casing. The BOP shall be function tested at least once a week as per API STD 53

19. What are the properties of Drilling Fluids that should monitored? (Mark all that apply.) Page 80

[X] Density,	[X] Funnel Viscosity
[X] Gel Strength	[X] Water loss
[X] Solid content	[X] Mud temperature IN and OUT.

    The mud coolers (fluid cooling system) should be designed to maintain mud temperature below __**60**__ degrees Centigrade? Page 66

20. Precautions when cementing a geothermal well? (Mark all that apply.) Page 92
    [X] Pressure testing cementing lines,

    [X] Cement density monitoring while pumping,

    [X] Avoid trapping water between casings,

    [X] Backfill annulus cement to get cement back to surface.

21. Back up pumps and/or generators should be provided for what pieces of equipment? Page 62
    Backup generator capacity shall be available and adequate to supply at a minimum, the electrical load for items (a) to (d) – Prime movers, electrically driven air compressors, lighting and BOP accumulator pump

22. What gases are critical to monitor at all times during drilling operations even when not making hole? In designing the gas detection system what are the design considerations and minimum requirements? Page 71

    H_2S (hydrogen sulphide) and CO_2 (carbon dioxide)
    Gas detection system shall be functioning at all times while the rig is operating, with both audible and visual alarms, A gas hazard abatement plan should be prepared and all the rig crew shall be familiar with its application.

23. What are the parameters and items to be recorded in the daily drilling report? Instructor will show a copy of a daily report

24. What is the purpose of having **wind socks** at the drilling site? What is the **muster point** and where should it be located and why?

    The wind sock on a drilling rig site helps to show the wind direction, and to escape to the upwind direction in case of release of hazardous gases from the well.
    A muster point is a designated place where all personnel on the drill site assemble in case of an emergency on the drill rig site. The two muster points are located upwind and downwind of the prevailing wind condition. This will allow the personnel to go to the upwind muster point if the wind direction changes.

25. What parameters should be continually monitored (Rig Instrumentation Minimum Requirements)? Page 71
    Minimum requirements for rig instrumentation shall be:
        (a) Total weight indicator;
        (b) Tank volume and gain-loss indicators;
        (c) Standpipe pressure gauge;
        (d) Wellhead pressure gauge; and
        (e) Indicators for temperatures of rig pump suction fluids and returning fluids.

26. Do explosives on-site need special consideration? [X] Yes [ ] No If yes, explain – Page 74

    Where explosives are to be used downhole (for example string-shots, junk charges, perforating charges), the explosives, detonators, detonating cord, detonating system, and the wireline shall all be selected for the temperature and pressure conditions likely to be encountered. Explosives and associated items shall be stored according to local or national requirements and secured against entry by unauthorized personal

27. Why is complete data acquisition and management a critical aspect of any drilling operation? Page 106
    Drilling records are a baseline for subsequent well condition monitoring, and any workover or intervention in future. To be used as offset data for correlation, help in directional drilling planning, to locate downhole formation conditions, and better under the geology and reservoir conditions.

28. How often should the conceptual model of the field be updated and why? Page 106
    Conceptual model of the field should be updated after every well is drilled, using the drilling parameter logs, well logs and well testing information. This is helpful in reservoir engineering purposes (permeable zones and formation pressure and temperature conditions), well designing for future wells and better understand the geology of the field.

29. What are the topics to be discussed during the Lesson Learnt (end of the well meeting) and who should be involved ?
    The well drilling program and the actual well drilled details, bits, mud, casing and cement, directional drilling, air drilling, nonproductive time and HSE incidents. The time, cost and incidents graphical and figures. The solutions for the problems or improvements for the next well program.

    Attendees – Drilling or Project manager, Drilling Superintendent, Drilling Engineer, Drilling Supervisor, Logistics Manager, Geologist, Geophysicist, Geo chemist, Reservoir Engineer, Production Manager, HSE Manager, Rig manager, Toolpusher, Driller, Rig Mechanic, Rig Electrician, Mud Engineer, Solid Control Mechanic, Cementing Engineer, Air Drilling Engineer, Mud Logging Engineer, Wire line Engineer, Casing Running Crew Chief, Drilling Bit Engineer, Well Testing Engineer, Directional Drilling Engineer, Other Key Stakeholders

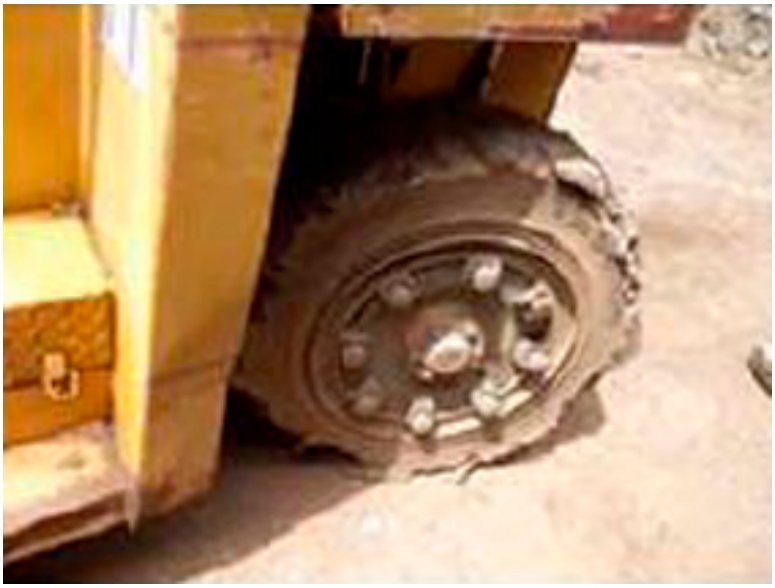
Extra Point Questions

Describe what is wrong in these photos:

Photo 1: Casings

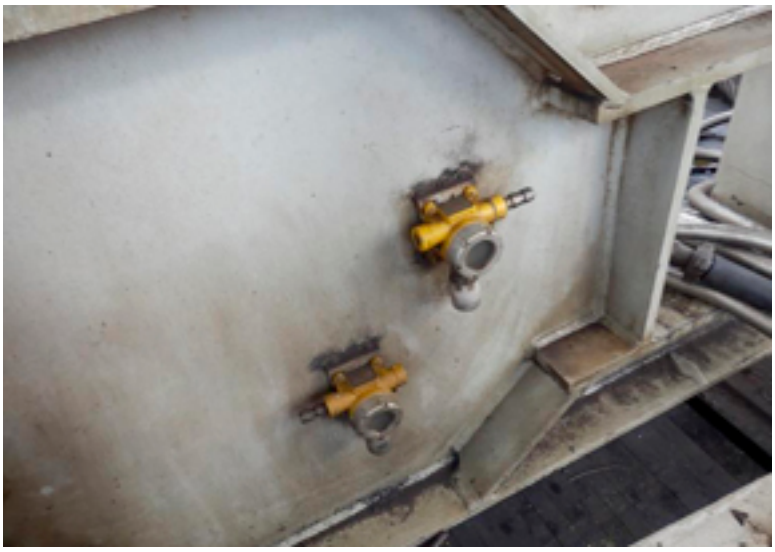
Casings are not stored properly

Photo 2: Forklift



Worn out forklift tyres

Photo 3: Sensors



Hydrogen sulphide sensor installed but not connected.

Photo 4: BOP

Missing bolts

Photo 5: Drill Rig

Wind sock is missing

Photo 6: Blow Out Preventer Activator

Incorrect location of BOP koomey accumulator.
It's too close to the well and not protected.