

## **DEFINITIONS**

**1. Conductor Hole**

**A large diameter hole bored to facilitate steel pipe. May be cemented in place to allow conventional oil and gas well drilling operations ,and also allows fluid returns to a mud system when drilling surface hole.**

**2. Rathole**

**A shallow bored hole under the derrick substructure in which the kelly is temporarily stored during tripping operations.**

**3. Mouse Hole**

**A shallow bored hole under the derrick substructure in which a single drill pipe joint is temporarily set to facilitate easier connections.**

**4. Cellar Hole/PoorBoy Cellar**

**A large diameter hole drilled or dug 1 - 1 1/2 (One to one and a half) meters deep and approximately 2 meters in diameter to facilitate a cellar crib.**

**5. Conductor Pipe**

**A large diameter pipe set vertically in the conductor hole and cemented around the exterior of the pipe.**

**6. Liner Pipe**

**A large diameter pipe placed vertically in an unstable bored hole to stabilize the formation until conductor is set and cemented. The liner may then be recovered if possible. With rat holes or mouse holes liners may be required until the drilling operation is completed. These liners can generally be recovered.**

## **DEFINITIONS cont.**

### **7. Cellar Crib**

**A large diameter 1 - 1 1/2 (One to One and a half) meters deep pipe or culvert set into and level to the ground. Surfaced and spaced uniformly around the conductor pipe, or offset to accommodate the mouse hole.**

### **8. Cellar Drain**

**A small 8" diameter culvert approximately 6 meters in length that can be coupled together. Generally placed near the bottom of cellar crib and placed in a ditch dug from the crib to the drilling sump.**

### **9. Rat hole Drilling Rig**

**A rotary drive drilling rig or earth boring machine used to drill shallow, large diameter surface holes in preparation for an oil/gas well drilling rig.**

### **10. Service or Chase Truck**

**A support truck designed to transport pipe, cement, water, augers and any other miscellaneous equipment required.**

### **11. Drop Hammer/Pile Driver**

**A truck mounted cable lift drop hammer used to pile drive heavier wall conductor pipe in sand and gravel conditions.**

### **12. Air Hammer**

**A truck mounted compressor unit with an air assisted hammer unit that sets inside the conductor barrel.**

### **13. Driller**

**The person in charge and operator of the rathole drilling rig.**

### **14. Swamper**

**Assistant to the driller on a worksite, and qualified operator of the service truck.**

## **SAFETY OPERATIONS**

1. All rathole drilling rigs shall be used and operated in accordance with Provincial regulations.
2. Prior to the start of any drilling operation, the rathole drilling rig shall be inspected to ensure that the equipment is suitable for the operation to be performed. These inspections are to be completed on a daily basis.
3. A rathole drilling rig shall only be operated to its capabilities with due regard to the machine itself, the job being done, and all personnel within the range of its operations.
4. The driller is to ensure that all controls are locked, disengaged, or shut down at the completion of operations as per the manufacturer's specifications.
5. No drilling operations shall be undertaken during darkness or limited visibility without adequate lighting.
6. Any bored or drilled hole shall be adequately covered or guarded when left unattended to prevent any person from stepping or falling into the hole. Complete open excavated area is to be staked and flagged prior to exiting location.
7. **UNDER NO CIRCUMSTANCES** shall any person enter a hole unless:
  - a) A person entering a drilled or bored hole shall be protected by the installation of a steel casing of sufficient strength to resist shifting of the surrounding earth, and the steel shall extend at least 300mm above ground level.
  - b) A person entering a drilled or bored hole shall wear a safety belt with shoulder harness attached to a lifeline extending beyond the top of the hole and the lifeline shall be attended at all times by another worker at the top of the hole.
  - c) Approved ventilation or self-contained breathing apparatus shall be provided for and used by any person downhole.
  - d) Sufficient illumination shall be provided or available for any worker entering a hole.

**AT NO TIME ENTER A HOLE UNLESS APPROVAL HAS BEEN RECEIVED FROM BOTH THE OWNER AND THE CONTRACTOR'S MANAGEMENT.**

## **OPERATING PROCEDURES**

1. When drilling conductor, mouse, and rat holes each hole should be plumb-bobbed every three digs to ensure a straight hole is being

drilled.

2. Pipe should be set in a minimum of 3 meters of good ground if possible (clay or sandstone).
3. Conductor pipe should stick up .3 meters above ground level.
4. **IF IT IS IMPOSSIBLE TO SET THE PIPE IN 3 METERS OF GOOD GROUND, THE SUPERVISOR SHOULD ADVISE THE DRILLING DEPARTMENT OF THIS CONDITION; THE RIG CAN THEN MUD UP AND IDLE THE PUMPS FOR AT LEAST 3 TO 4 CONNECTIONS.**
5. When placing the pipe in the hole, and if the pipe lays against the wall of the hole, remove the pipe, ream the hole and then cement the pipe in place.
6. If there is more than 3 meters of water in the hole you should displace the water by mixing cement and picking up the pipe. This causes the cement to push the water up into the pipe and the cement then goes to the bottom of the hole. When displacing water try and leave .6 meters of cement inside the pipe.
7. Pipe should be plumb-bobbed before and after cementing to ensure it is set straight. Re-check conductor pipe for plumb after digging cellar hole.
8. When the level of sand and water in the hole does not allow or cannot be cleaned enough to get to bottom with the auger, or the mixture cannot be displaced by U-Tubing the cement, it is necessary to pressure cement.
9. Minimum amount of pipe that should be set is 9 meters, this allows most rigs to pick up one collar.
10. Always use Class "G" cement or Type 10 Normal Portland, not class "A" .
11. **TEETH CAN BREAK OFF AND BE LOST IN THE HOLE. IF THEY ARE NOT RECOVERED NOTIFY THE DRILLING DEPARTMENT.**
12. When a liner is used, it is important to start it straight. Once started straight it will normally stay straight.
13. It is imperative to pull all liners. A cat or bed truck may be required to assist . All personnel should be clear of the equipment.
14. When running liners over 13 meters, recovery is more difficult. An option at this point is to drive the conductor pipe.
15. If driving conductor pipe, the wall thickness should be a minimum of 375 mm.

- 16. If driving the conductor, rat hole or mouse hole pipe, the pipe should be equipped with shoes.**
- 17. All welds on driven pipe should be triple welded and strapped. First, weld root, second, filler, and finally a cap.**
- 18. Pipe that has been driven should be drilled out past the bottom of the pipe to ensure that the pipe has not collapsed.**
- 19. When driving pipe, refusal should be no less than 1/8" to the blow, or 20,000 ft/lbs.**
- 20. When pressure cementing, the pipe should have dollar sized holes cut in the pipe .5 meters from the bottom and in a circle 15 cm apart.**
- 21. A safety line should be attached to the top of the pipe and rig before any pumping takes place.**
- 22. The conductor and rat hole pipe used is commercial reject pipe with no bursting pressure guarantees. Do not place more than 400-600 lbs pressure on this pipe.**
- 23. Air drilling is used when formations become very hard. Tooth bits are used, cooled by circulating compressed air down the kelly through the bit and back up the annulus carrying the cuttings to surface.**

## **TOPICS FOR DISCUSSION**

### **OPERATING PROCEDURES:**

- 4. When the conductor is set in poor ground:**
  - a) Normal drilling operations would be to spud with water.**
  - b) Most drilling rigs are on meterage, so for penetration purposes will drill with high circulating volumes and pressure immediately when spudding.**
  - c) By making everyone aware the conductor is set into poor material the drilling operation may then mix some drilling mud, reduce circulating volumes and pressures, until they have drilled 3- 4 singles below the bottom of the conductor barrel. By doing so will possibly avoid washing out around the conductor barrel.**
  
- 6. Three meters or more of water in the hole:**
  - a) Place conductor barrel into hole and plumb.**
  - b) Mix up heavy slurry of cement and dump around barrel (1 - 2 tubs).**
  - c) With rig, lift conductor sufficiently to allow cement to go to bottom and push up into conductor barrel.**
  - d) Reset barrel and plumb.**
  - e) Finish cementing around barrel.**
  - f) Run into conductor barrel with auger or bucket and clean out to cement.**
  
- 8. When unable to clean hole of sand and water, or water is flowing, it is advisable to pressure cement the conductor pipe.**
  - a) Required: cementers, welders, water truck, vacuum truck, valve for pressure cap.**
  - b) Arrange for a cementing company (Sanjel, Halliburton, etc.) to bring a sufficient amount of cement.**
  - c) Arrange for a welder to weld pressure cap on conductor pipe.**
  
- 8. cont.**
  - d) Tie cementers into valve on top of pressure cap.**

- e) **Set heavy piece of equipment on top of conductor to prevent conductor pipe from lifting out of hole.**
- f) **Have cementers pump warm water cushion followed by cement slurry. Pump cement slurry till good cement returns come to surface.**
- g) **Once good returns are present, begin displacing cement slurry out of pipe until conductor pipe volume has been almost displaced, close valve on pressure cap and allow cement to set for 8 hours.**
- h) **Release pressure, cut cap off and inspect to see if water stays stable inside the conductor barrell. (Note pressure should not exceed 400-600 PSI)**
- i) **Be sure to arrange for a vacuum truck to clean up excess cement and water.**

**REMEMBER TO CALL 1-800-661-5254 (343-8860)**

**12. When to Run Liner Pipes:**

- a) **Welder will be required.**
- b) **The formation being drilled may become unconsolidated to the point of continually sloughing into your bore hole. At this point a larger hole is drilled and a liner pipe is placed into the bore hole. Be sure liner pipe is started straight, then continue to clean through inside of liner, allowing the liner to settle into the cleaned out hole. Once the bore hole is back into good material, discontinue setting liner and drill ahead to specified size and depth of conductor hole.**
- c) **Cement conductor into place then pull liner before cement sets.**

**Note: Liners to 40' or deeper maybe difficult to recover. Attention to materials penetrated prior to and during setting liner pipe will indicate what may be required to pull liner after conductor is cemented.**

**14. If bore hole conditions are unstable at 12 meters, a deeper pile driver or air hammer may be most economical approach.**

- a) **A welder, air hammer or pile driver, 375 mm heavy wall pipe, drive shoe for pipe.**
- b) **Pile driver, secure drive pipe complete with drive shoe**

into derrick with the leads, commence driving pipe to ground level, weld on additional pipe and continue driving till pipe refusal.

- c) Drive pipe should be drilled out to bottom of driveshoe to ensure that the pipe has not collapsed.
- d) Air hammer - set drive pipe into open bore hole secure to derrick of rat hole rig insuring pipe is plumb.
- e) Pick up and place air hammer into top of heavy wall drive pipe.
- f) Start compressor and begin driving pipe; air drive rate can be varied to ensure maximum penetration of pipe.
- g) Drive pipe to refusal.

### **23. Air Drilling**

- a) Rat hole rig equipped with air compressor, rotary rock bits, all air equipment tools.
- b) We prefer to use our own welders or someone who has worked with us.
- c) This method of drilling is very time consuming.
- d) When the rig arrives on location, rigging up takes half a day or more.
- e) Drilling speed is dependant on rock hardness, surplus water in the well bore creates situations where the annulus has to be cleaned out.
- f) It is suggested to arrange drilling rig moves once we are loading out equipment.
- g) Liners are a larger size to accommodate to air tools.  
Example: 16" Conductor - 30" Liner; 20" Conductor - 36" Liner.