



PROJECT SITUATION REPORT DISC Drill 08-09 Season

Project:	T-350-M				
Project Principal Investigator:	Dr. Charles Bentley				
Report No:	7	for period	1-5-09	through	1-11-09
Prepared by:	Jay Johnson			Date:	1-11-09

ICDS Personnel on Site:	Kristina Dahnert Jay Johnson Bill Mason Paul Sendelbach John Robinson Patrick Cassidy Elisabeth Morton Dave Ferris Bill Neumeister Nicolai Mortensen Tanner Kuhl
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ACTIVITIES DURING PERIOD

- A total of 148.35m were drilled this week. The final bore hole depth as of 12:00AM Monday was 1175.485m
- A week full of challenges!
- On Monday we had the first storm of the drilling season. The Storm peaked Monday evening and then gradually let up going into Tuesday. About ½" of snow fell inside the drill arch during the storm. The snow fall inside the arch caused the humidity level to rise and frost to grow on the winch break disk. The frost build up was causing the break to slip during motor had offs. When this happened the computer would set the holding torque on the motor it was handing of to too low. Then the break would release and a few meters of cable would pay out before the winch would start paying in. The problem was mitigated by using a putty knife to scrape the frost from the break disk. By Tuesday afternoon the humidity level in the arch had dropped enough that frost was no longer forming on the disk. We also built a tarp roof over the winch to keep snow from building up on the cable because it was affecting the pay out depth.
- Also on Monday, we began having problems with the drill not penetrating. We drilled the first core without problems, did the core break, and went to drill the second core and the drill would not penetrate at all. Our first thought was the drill was spinning on some chips or piece of ice. We tried different cutter speeds, different pump speeds, different feed rates, and running the drill into the bottom and nothing worked. Finally we decided to try the rear button shoes set to the same pitch as the front shoes that we had been running up until this point. The drill started cutting right away. After doing a couple of drill runs with the rear

button shoes we decided to try the front shoes again. Once again they would not penetrate. We tried again with a courser pitch and the drill still would not penetrate. We have been running the button shoes since. The cutter current and accelerometers graphs are not quite as smooth when compared to drilling with front shoes, but the core handlers have not reported any change in core quality.

- We are suspecting that the ethanol we use to clean the barrel connections, cutter head, and screen section valve may be accumulating at the bottom of the bore hole. If you take a sample of chips from the screens and melt them, as they melt, we can see a few beads of ethanol drop out and go into solution with melt water. We are going to try and put a quantitative number on how much ethanol is present by measuring the density of the melted chips. We decided to stop using ethanol for everything except to clean the cutter head. The cutter head is cleaned over a bucket to reclaim the ethanol.
- On one of the runs on Wednesday, when the tower was tilted vertical, it didn't get parked fully on the hard stop. This allowed the top of the drill to catch the bottom tower roller as it was brought out of the hole. No real damage was done to the drill or tower; however the jolt caused a portion of the lower most core to break into "rubble" and a few cm of core to be lost out of the barrel. The upper two cores sustained no damage. The core barrel had to be taken apart so the core could be removed without further damage.
- After the core barrel had been taken apart to remove the core, it was observed that some chips had built up in the annulus between the OD of the core sleeve and the ID of the core barrel. The core barrel was separated into three pieces and put into the hot box to thaw out.
- The pump on the X motor section seized up. The pump shaft bound up in the lower bushing. I was able to rebuild it by polishing the shaft and replacing the grease seal. In the mean time we ran the Y pump.
- On Thursday at the start of third shift, when starting the pump for a run, the current maxed out and all three hall sensor lights for the pump motor came on. Only one or two hall sensor lights should be on at one time. If all or none are lit it means there is an electronics problem in the instrument or motor section. Both the instrument and motor sections were swapped out.
- The Drill ran fine until the end of second shift Thursday. On their last run of the day they were drilling a core when both the cutter and pump motors quit running and would not restart. The drill was brought back to the surface. A burnt smell was coming from the motor section. With the motor section removed we found soot and charred material at the wiring connections on the drill fluid side pressure compensator piston. We determined that water had been present in this area allowing the 300 volts that goes to the motors to arc between connector pins. We opened the motor section for further inspection. The oil and wiring inside was in fine condition. Ice chips gather in the compensator piston area over time. It would have taken heat from the motors or ethanol to generate the water. We have never seen these chips melt from motor heat in the past. Ethanol was and is routinely used to clean the electrical connectors before assembling them. Our hypothesis is that some residual ethanol from cleaning the connectors melted the ice chips and caused the arcing. The other possibility is that if ethanol is present in the bore hole it may have melted some of the chips around the electrical connections and caused the arcing. No drilling was done on third or first shifts on Friday while we diagnosed the problem and how to fix it. We decided to pot the

electrical connectors on the drill fluid side of the compensator piston in epoxy to insulate them. The second part of the fix was to prevent ice chips from entering this area. This was done by replacing the breather hole with a sintered bronze breather plug and taping over an opening used to view the oil level in the motor section. The epoxy needed to cure over night, so second and third shifts took this time as their "Sunday" off. On Saturday morning we reassembled the motor section and drill. So far everything is working well again.

- We are down to one spare instrument section and possibly one or no spare motor sections. Motor section Y that sustained the arcing might be good, but we haven't tested it yet.
- First shift worked for a half day on Sunday, our day off, to help make up for some lost drilling time.
- We have received the remainder of the drilling fluid needed to complete this season.

COMMENTS

(Problems, Concerns, Recommendations, Etc.)