PROJECT SITUATION REPORT
SPICE Project, South Pole Antarctica 2014-15

Project:	NSF# I-164	UW# 8341			
Project Principal Investigator:		Murat Aydin			
Report No:	1	**for period**	11/16/2015	**through**	11/23/15
Prepared by:	Jay Johnson			**Date:**	11/23/15

IDDO Personnel on Site:	Jay Johnson Grant Boeckmann Zachary Meulmans Dominic Winski Elizabeth Morton Nick Wipperfurth Shawntel Stapleton

ACTIVITIES DURING PERIOD

- Jay J., Grant B., Zach M., Dom W., and Nick W. departed the states on 11/17/15; Elizabeth and Shawntel were already in CHC
- We all check in to the Rendezvous Hotel in CHC on 11/19/15
- Attended the in brief and clothing issue at the CDC on 11/20/15
- The C17 flight to MCM was originally scheduled for a 6:00 am check in on 11/21/15, but was delayed 24 hours due to weather in MCM
- Flew to MCM on 11/22/15
- Attended the MCM in brief at the chalet upon arrival
- Bag dragged for South Pole when we picked up our bags on evening of the 22nd
- Picked up the sat phone from coms on 11/23/15
- On 11/23/15 our flight to the South Pole was scheduled as a backup mission to three other intercontinental missions; All three missions flew so didn't leave
- We have been rescheduled as a primary mission to Pole on 11/24/15
- Verified all IDDO cargo has been received at Pole

SAFETY

- We are all scheduled to attend the USAP Field Safety and Training course (Happy Camper Refresher) on 11/24 if we don't fly to Pole; This course is not required for going to Pole, however we can take it to stay current

COMMENTS (Problems, Concerns, Recommendations, Etc.)

- Nothing to report

PROJECT SITUATION REPORT
SPICE Project, South Pole Antarctica 2015-16

Project:	NSF# I-164	UW# 8341			
Project Principal Investigator:		Murat Aydin			
Report No:	2	**for period**	11/24/2015	**through**	11/29/15
Prepared by:	Jay Johnson			**Date:**	11/29/15

IDDO Personnel on Site:	Jay Johnson Grant Boeckmann Zachary Meulmans Dominic Winski Elizabeth Morton Nick Wipperfurth Shawntel Stapleton

ACTIVITIES DURING PERIOD

- Our Pole flight on 11/24 was a backup mission to Shackleton Glacier; The Shackleton Glacier flight flew, so we were delayed another day
- On 11/25 we flew to Pole; The flight was originally scheduled to depart MCM at 8:00, but was delayed to 15:00 due to weather at Pole; On the first attempt to leave there was a mechanical problem with one of the engines which resulted in a 45 minute delay while it was repaired; We arrived at the South Pole at 21:15
- Attended the arrival briefing
- Meet with Leah Street to review the status of the drill site, cargo, and equipment; Winter over drifting and been cleared, the MECC had been opened up, cargo had been taken off the spools, and the generators were in the process of being serviced; Several days of wind and blowing snow right before we arrived caused new drifting that would have to be cleared before the generators could be placed
- All cargo had been received at Pole; DNF cargo was in the Cryo building and non DNF cargo was staged at the drill site
- We were issued five radios from Coms
- Attended snowmobile and vehicle training
- Inspected the drill site on 11/26; The drill tent survived the winter without any damage; The only snow that entered the tent was through the roof vents and it no more than a cubic foot in volume
- The core storage trench is in good condition and appears to have settled very little over winter
- Our first day of work at the drill site was on 11/27
    - The generators were brought out in the morning; The MECC was powered up and the heat was on by noon
    - ASC installed and tested the fueling system
    - The DNF cargo was brought out in the afternoon
    - Started organizing the MECC and Graceland

    - Removed cases and crates stored in the drill tent over the winter and started organizing the drill tent
    - Aligned the core processing line; The plates that connect the table legs together had been removed and the rail system had been unbolted from the tables for the winter to prevent damage to the system in case there was settling; The leg connector plates were reinstalled without any adjustments indicating there was little to no shifting over the winter
    - Installed components removed from the control room ERV system for the winter
    - Buried the power feed between the MECC and power distribution panel
    - Placed the drill control box and applied power to run the internal heater
    - Checked the borehole fluid level; It was found to be at 119.2 meters from the surface; It was last measured at 87 meters on 1/28/15
- We took Saturday off (11/28) to observe Thanksgiving with the station
- We worked on Sunday this week
    - Installed the lower tower sections and drill rests
    - Installed the control system and are in the process of working out a few bugs
    - Re terminated the winch cable end
    - Installed anti-torque 1 and motor section 1 on the winch cable
    - Prepped the baler for use
    - Installed the new hollow shaft filter screen on the drilled hollow shaft
    - Installed improved air intake and exhaust ductwork outside the drill tent for the control room ventilation system
    - Tested the control room ERV system
    - Tested the slot ventilator and drill tent ridge line ventilators
    - Inspected and test ran the centrifuge
    - Inspected the drill tent; There is one small rip a little above ground level on the corner nearest core push out station; It was most likely hit with a shovel when the winter-over drifting was being cleared
    - Finished organizing Graceland

SAFETY

- Nothing to report

COMMENTS (Problems, Concerns, Recommendations, Etc.)

- Nothing to report

PROJECT SITUATION REPORT
SPICE Project, South Pole Antarctica 2015-16

Project:	NSF# I-164	UW# 8341			
Project Principal Investigator:		Murat Aydin			
Report No:	3	**for period**	11/30/2015	**through**	12/06/15
Prepared by:	Jay Johnson			**Date:**	12/06/15

IDDO Personnel on Site:	Jay Johnson Grant Boeckmann Zachary Meulmans Dominic Winski Elizabeth Morton Nick Wipperfurth Shawntel Stapleton

ACTIVITIES DURING PERIOD

- Mike Jackson, our NSF representative, arrived at the South Pole on 12/1; He was planning on only staying for two nights, but a storm came in and he was here until 12/5. His extended stay gave him plenty of time to experience what it is like to work and live at the South Pole. He visited the drill site a couple of times to meet everyone, learn about ice core drilling, see how our operation works, and even help out processing core. Unfortunately, we were in the process of setting up and troubleshooting problems, so he didn't get to see any cores being drilled.
- Set the drill up with the baler for the first trip in the borehole to see if there were chips left from last season. The drill made it to 136m before getting hung up because the A-T blades were set too tight. The baler came up empty, so we decided no additional baling was necessary because any chips should have been floating at the top of the fluid column.
- Set the drill up for reaming the borehole with the 129.6mm conical tool
- Reamed from 151m to 210m. We had intended to ream all of the way to the bottom (736m) however, due to the time it has taken to troubleshoot problems I decided to stop reaming and transition to coring to keep us on schedule. Enlarging the borehole would potentially allow the drill to descend a little faster, but the time required to do the reaming is not offset by the time gained from the increased tripping speed.
- Completed two baler runs (4m long baler) after reaming. The baler was full on the first run and half full on the second run
- Sewed Velcro closures on the cuffs of the aprons
- Worked on several small projects to keep us busy while drill issues were being troubleshoot such as snow clearing, installing apron hooks in the drill tent, organizing the MECC and Graceland, and making a cord holder for the vehicle heater cords

- We drilled our first core on 12/3. However, the core was only .05m long. The run went smooth, but the drill motor current was high the entire run. See the comments section for details about the motor.
- Completed six drill runs on Saturday! The system ran without issue all day. The head was set up with the new step cutters and 3mm shoes. The chips chamber without holes was configured with the drilled hollow shaft, filter screen, and chips valve. All drill runs went smooth with penetration rates between 3-4mm. The core lengths varied between 1.97m and 2.04m.
- 12 meters of core were drilled this week
- The current drillers bottom depth is 742.823m

SAFETY

- A complaint form was filled out for a minor hand injury one driller experienced while unloading cargo the end of last week. The injury has nearly healed and is not impacting the ability to work.

COMMENTS (Problems, Concerns, Recommendations, Etc.)

- The crown sheave encoder was not working when the system was powered up so the spare encoder was installed
- There were repeated problems with components on both the control box and console circuit boards failing. The boards would work fine for part of a day or more and then fail. The result would be the E-stop system not working, the winch controls not working or it would start running without being given a command, or the tower actuator not functioning. Zach has been trying to determine why the board will function for a short time and then fail. One issue he found and corrected is the chassis of the console was not grounded.
- Rewired the new sonde hard limit switch. The schematic was wrong, so the switch was wired wrong when assembled in Madison
- The A-T slip sensor and drill motor reverse are currently not working due to problems with the coms circuit; Zach is focusing on resolving the other control system problems first and then will address the coms issue. These features are not required to be able to drill.
- Recalibrated the crown sheave load pin. Setting for the load pin in the LCI90i were set wrong, so once corrected system was recalibrated.
- Motor section 1 began leaking after the first baling run. This resulted in ~4 cups of drilling fluid entering the motor section. It was disassembled, cleaned, the motor bearings re-greased, and then assembled with new bulkhead seals. The leak was most likely caused by contaminants that were found under the bulkhead seals. The only way to clean the seal grooves is to cut the old seals off and replace them with new ones. This problem was not experienced in initial testing or during last season, so the seals had not been replaced when the motor sections were inspected over the summer. Seal replacement will need to be a more regular practice if the motor sections are opened up
- Motor section 2 was drawing high current during reaming operations and the first coring run. This section was also found to have leaked and taken in several cups of drilling fluid. Because this unit had been run longer with fluid inside, the cooling

fan in the motor, which is made of plastic, was damaged. This motor section has also been disassembled and cleaned. The spare drill motor was installed since the fan was damaged on the other one. Final testing needs to be completed before reassembly. We only had enough new seals to replace one seal on each bulkhead. Additional seals have been ordered.

- The generators have been running well so far this season. Both units have been run to make sure the backup is ready in case one goes down.
- On Monday we will be starting three shift operations

PROJECT SITUATION REPORT
SPICE Project, South Pole Antarctica 2015-16

Project:	NSF# I-164	UW# 8341			
Project Principal Investigator:		Murat Aydin			
Report No:	4	**for period**	12/7/2015	**through**	12/13/15
Prepared by:	Jay Johnson			**Date:**	12/13/15

IDDO Personnel on Site:	Jay Johnson Grant Boeckmann Zachary Meulmans Dominic Winski Elizabeth Morton Nick Wipperfurth Shawntel Stapleton

ACTIVITIES DURING PERIOD

- Current drillers' bottom depth is 884.96 meters
- 141.78 meters of core were drilled this week
- Started 24-hour three shift operations on Monday (12/7)
- One baling run was done on Monday. Only 0.65m of chips were recovered indicating the borehole was quite clean. Most of the chips were gray colored and fine textured.
- On Wednesday the drill site was cleared of snow drifts from last week's storms
- Bearing retainer plates were made in the South Pole machine shop. The plates retain the back bearing of the drill motor so the armature stays located properly. The front bearing is supposed to keep the armature located. However, when the motors are disassembled for greasing the retaining features get damaged which allows the armature to move back and lock the motor up.
- Started running the standard 126mm cutters on Saturday after having two short coring runs due to penetration issues with the step cutters. The standard cutters are setup with 3mm shoes. The actual penetrate is around 2.3 mm/s. Cutter current is slightly lower than with the step cutters, 2.4-2.0A @ 350V.
- The electricians came out and repaired the plug that connects one of the generators to the distribution panel. They found the wires were loose in the connector and had been arcing. The other connectors on the ASC power distribution panel were also checked. One was found to have loose connections. The other two were OK.

SAFETY

- Nothing to report

COMMENTS (Problems, Concerns, Recommendations, Etc.)

- We are currently out of drilling fluid. There were four full barrels and one partial barrel left at Pole from last season. The remaining fluid is in MCM and has been listed as priority one cargo since Nov 30th yet has not arrived. Fluid was scheduled to arrive the end of the week; however there were 15 – 20 knot cross winds on the skiway so flights were canceled. The current borehole fluid level is at 182.5m. So far we have not observed any issues with core quality. However, if we start noticing surface cracking, drilling will be stopped until fluid arrives.
- Three core dogs broke on Monday. Two of them were from the batch of core dogs that had failures last season. The third one is from the new batch for this season that was heat treated with the multi-step heat treat process. We are currently running the new teardrop style core dogs. They are working well and we haven't had any of them fail yet.
- We were down for most of the day on Tuesday (12/8) and part of Wednesday (12/9) addressing problems with the MPS's in the motor sections and melted brush holders on two of the three drill motors. The motors were drawing about 470 watts while coring, which takes less than 15 minutes. The motors are rated for 350 watts continuous, 435 watts for 1 hour, and 575 watts for 15 minutes, so they should be able to handle how they were being driven. After lowering the input voltage at the surface so the motor is running at less than full speed it has run without issues the rest of the week. We estimate the motor is now drawing about 341 watts, which is about what it was running at last season. Damaged components in the MPS's have also been repaired.
- Spare motors, brush holders and brushed are being shipped from Madison along with a spare encoder and connector for the crown sheave
- Spare motor section seals have been sent from Madison

PROJECT SITUATION REPORT
SPICE Project, South Pole Antarctica 2015-16

Project:	NSF# I-164	UW# 8341			
Project Principal Investigator:		Murat Aydin			
Report No:	5	**for period**	12/14/2015	**through**	12/20/15
Prepared by:	Jay Johnson			**Date:**	12/20/15

IDDO Personnel on Site:	Jay Johnson Grant Boeckmann Zachary Meulmans Dominic Winski Elizabeth Morton Nick Wipperfurth Shawntel Stapleton

ACTIVITIES DURING PERIOD

- Current drillers bottom depth is 1063.027 meters
- 178.067 meters of core were drilled this week
- All of the remaining drilling fluid arrived at the South Pole this week. The fluid level had dropped to 207m before we received the first four drums of fluid on Monday (14-Dec) via a Basler. The remaining 76 drums arrived on three separate Herc flights during the week. This will be enough drilling fluid to finish the project. We will be maintaining the fluid level between 120 and 150 meters for the rest of the season.
- We have continued to run the standard 126mm cutters this week. The step cutters were used on a couple of runs, however the core finish wasn't as good.
- Three baling runs were done on Tuesday (15-Dec) to a depth of 350m to get a sense of how much cuttings the drill is leaving in the borehole. A total of 2.7m of fine pasty cuttings were recovered. 149m of ice had been drilled since the last baling runs. For a comparison, baling runs were being done daily, after about 20m of coring, at the end of last season. Typical recovery was about 6m of cuttings each time. The only changes to the drill are using the hollow shaft with cross drilled holes and filter screen and the chips chamber without holes.
- Added nine 3/8" holes to the bottom of the centrifuge basket to allow fluid to drain out. The centrifuge goes out of balance and faults out if the basket contains more liquid than solids. The added holes allow excess fluid to drain from the basket, after passing through the basket filter, before starting the centrifuge.
- Received the drill motor repair parts, motor section seals, and spare crown sheave encoder that were shipped from Madison last week.
- Made tooling necessary to disassemble the drill motors so the damaged parts can be replaced
- Rebuilt the two damaged drill motors. Final timing of the brushes still needs to be done once we receive instructions from the manufacture.

- Changed the output range on the load pin amplifier from 0-20V to 0-10V and recalibrated the system. The LCI-90i readout wants to see a 0-10V signal. When given an input over 10V the display reads erratic for a few seconds or until the input drops back within range.

SAFETY

- Nothing to report

COMMENTS (Problems, Concerns, Recommendations, Etc.)

- The drill was down on Saturday (19-Dec) due to a short we eventually determined to be in the winch cable. The problem initially looked like a failed drill motor as we saw last week. The motor section was inspected and found to be working properly. One of the three wires in the winch cable, which is used for power, is shorted to the cable jacket approximately 1,000m from the drill end. Each of the conductors has 107 ohms of resistance when measured from end to end. However, one of the conductors has 74 ohms of resistance between it and the cable jacket from one end and 33 ohms from the other end, indicating the location of the short. Each of the conductors is encased in DuPont FEP fluorocarbon film. The three conductors are then wrapped with a Dacron Fabric saturated with a conductive material and then two outer layers of steel wires that give the cable its strength (which I am calling the jacket). The insulation on the shorted conductor must either have a defect or has somehow been compromised to short through the conductive wrap to the jacket. The point of the short corresponds closely with our current depth meaning we have just recently started unwrapping this portion of cable from the winch drum. If the short is due to a defect in the wire insulation, maybe it took working the cable a bit before it failed. Another possibility is we are over stressing the cable; however our working load and core break tensions are less than 50% of the breaking strength, so this seems unlikely. We need two conductors to provide power to the drill motor, so our work-a-round for now is to use the two remaining good conductors for power and not have a coms channel. We can operate without the coms channel (for the A-T slip sensor and reversing the drill motor direction) as we have been doing since the beginning of the season. We will work on getting this functionality operational if and when we spool on the new longer cable later this season.
- In the process of diagnosing the cable short, we also found the ground wire disconnected in the connector on the end of the winch cable that is inside the winch drum.

PROJECT SITUATION REPORT
SPICE Project, South Pole Antarctica 2015-16

Project:	NSF# I-164	UW# 8341			
Project Principal Investigator:		Murat Aydin			
Report No:	6	**for period**	12/21/2015	**through**	12/27/15
Prepared by:	Jay Johnson			**Date:**	12/27/15

IDDO Personnel on Site:	Jay Johnson Grant Boeckmann Zachary Meulmans Dominic Winski Elizabeth Morton Nick Wipperfurth Shawntel Stapleton

ACTIVITIES DURING PERIOD

- Current drillers bottom depth is 1207.055 meters
- 144.028 meters of core were drilled this week. This was a five-day workweek instead of the usual 6 day week due to the Christmas holiday.
- Stopped netting core on Monday (21-Dec). The core processing line was realigned for use without netting.
- Machined the commutators on three of the drill motors. These three motors are the ones that had had brush holder failures in the past weeks. The commutators were machined to clean up and true the surface before being reassembled with new brushes.
- Reassembled the spare drill motors with new brush holders and brushes. The motors were then run on the bench to break in the new brushes and verify they were running properly. All three motors are running well and don't appear to have sustained any damage when the brush holders melted.
- The MAPO machine shop modified the drill motor heatsinks so they can be easily swapped between motors. They were originally designed to be press fit on the motors, which made it difficult to remove them in the field. They have been modified so they now clamp on.
- Repaired both spare MPS's
- Rebuilt and assembled motor section 2.
- Gave several tours of the drill site
- Started resharpening cutters
- Took Friday and Saturday off to observe the Christmas holiday with the station. We in turn worked Sunday this week.

SAFETY

- Nothing to report

COMMENTS (Problems, Concerns, Recommendations, Etc.)

- On Monday evening motor section 2, which we had been running for than a week, stopped working in the middle of a drill run. We found the brush holder on the drill motor severely melted. The voltage and current was the same as it had been for the past few hundred meters of drilling, so we don't fully understand why it failed. Motor section 1 was assembled and swapped in.
- On a few occasions now we have been unable to get the drill to penetrate at the beginning of a run. Every time the problem has been with the step cutters. The only method that seems to clear the problem is to do a follow-up run with the standard (full width) cutters. We can then switch back to step cutters and they will cut fine. The reason we don't keep running the standard cutters is the cutter motor will amp out before a full 2m core is drilled, where the current remains lower and steadier with the step cutters.
- The leading edge and corners of the cutters are chipping during drilling. The chipping is much less frequent and pronounced than experienced last season, but is still occurring.

PROJECT SITUATION REPORT
SPICE Project, South Pole Antarctica 2015-16

Project:	NSF# I-164	UW# 8341			
Project Principal Investigator:		Murat Aydin			
Report No:	7	**for period**	12/28/2015	**through**	1/03/16
Prepared by:	Jay Johnson			**Date:**	1/03/16

IDDO Personnel on Site:	Jay Johnson Grant Boeckmann Zachary Meulmans Dominic Winski Elizabeth Morton Nick Wipperfurth Shawntel Stapleton

ACTIVITIES DURING PERIOD

- Current drillers bottom depth is 1362.865 meters
- 155.81 meters of core were drilled this week
- Julie Palais, Elaine Hood, Howard (Twit) Conway, and Michelle Koutnik arrived at Pole on Monday and visited the drill site in the afternoon. Julie and Elaine departed Pole on Tuesday.
- Swapped in motor section 2 to compare the current draw while cutting with motor section 1. It draws just about 0.1A less, which makes it possible to run the standard cutters without hitting the current limit.
- Sharpened all dull/chipped regular and step cutters
- Replaced the vacuum canister lid because the seal had failed due to exposure to Estisol
- The remaining spare drill motor parts that were being hand carried from IDDO by Jim Koehler arrived
- Packed 50 sections of spare Geoblock flooring and put it into the cargo system for shipment back to McMurdo. It will be used with the ASIG project next season.
- We took two days off this weekend to celebrate New Year's with the station. Second and third shifts took Friday and Saturday nights off and First shift took Saturday and Sunday off.
- On Sunday we hosted an open house for the drill site and back-lit snow pit John Fegyveresi headed up constructing. It was very well attended as many people were interested in learning about the drilling, what can be learned by studying ice cores, and seeing a back-lit snow pit. Thank you to Second shift for starting 3 hours early so people could see the drill running and ice cores being processed and to John for getting up in the middle of his night to talk about the snow pit!

SAFETY

- Nothing to report

COMMENTS (Problems, Concerns, Recommendations, Etc.)

- The step cutter continued to penetrate fine for a few runs and then wouldn't penetrate. The only way to recover from this was to do a run with the standard cutters. We found we are now able to run the standard cutters for a full drill run without hitting the current limit, so as of Tuesday we have been exclusively running the standard cutters.
- The standard cutters are leaving a helical ridge on the surface of the core that is a few millimeters wide and ~0.1mm high. The pitch varies from about 42cm to a linear line down the core. We have also observed from one to three ridges on the core at one time.
- On Wednesday while ascending the drill about 200m from the surface, a cap on the side of the winch gearbox blew out draining ~3.7 liters of oil on the ground. The cap came out because the gearbox is not vented and the oil is expanding and building pressure as it warms up during the increasingly longer tripping times. The cap has a very light press fit, so it didn't take much pressure to push it out. We fabricated a vent tube with catch bottle and haven't had any problems since.

PROJECT SITUATION REPORT
SPICE Project, South Pole Antarctica 2015-16

Project:	NSF# I-164	UW# 8341			
Project Principal Investigator:		Murat Aydin			
Report No:	8	**for period**	1/04/16	**through**	1/10/16
Prepared by:	Jay Johnson			**Date:**	1/10/16

IDDO Personnel on Site:	Jay Johnson Grant Boeckmann Zachary Meulmans Dominic Winski Elizabeth Morton Nick Wipperfurth Shawntel Stapleton

ACTIVITIES DURING PERIOD

- Current drillers bottom depth is 1497.40 meters
- 134.53 meters of core were drilled this week
- On Saturday (09-Jan) evening we reached 1,500 m depth from the surface! The drillers' bottom depth is 4.39 m less than the actual bottom depth.
- Replaced the 1,600 m winch cable with the new 1,922 m cable. The cable swap was planned to be done this coming week, however a second conductor shorted to the armor jacket on Monday (04-Jan) morning making it necessary to replace the cable sooner. Unspooling the 1,600m cable went smoothly at a speed of 0.2 to 0.3 m/s. Tensioning the new cable onto the winch drum also went smoothly, however the cable was damaged during the process. Read the details in the comments section below. The drill was back operational by Tuesday afternoon.
- The fairlead rollers on the level wind were replaced at the time of the cable swap. The rollers wear with the cable so they were replaced as a good practice to prevent premature wear on the new cable.
- Two baling runs were done on Monday (04-Jan) while the cable spooling equipment was being set up. The first baling run, to a depth of 200m, recovered 2.6m of fine gray colored cuttings. The second run, to a depth of 400m, recovered 2.8m of fine gray colored cuttings.
- Shawntel was trained to operate the 953 track loader named Felisha. Felisha was brought out to the drill site and will remain there for the remainder of the season. The track loader is setup with forks and is being used to move our drifted in crates to groomed location in preparation for packing.
- Murat Aydin departed Pole on Thursday (07-Jan) on the same flight Eric Steig arrived on
- On Saturday, second shift ended at 20:00 instead of their normal end time of 23:00. This was to make up for starting early last Sunday for the open house.

- Third shift took their day off Saturday night. First and second shifts are taking Sunday off. Drilling operations will resume with third shift on Sunday night.
- 48 core boxes were removed from the ice core storage trench and palletized for shipment to MCM on Saturday (09-Jan) morning. Combined with the 32 core boxes that were palletized last week, there will be 2 1/2 Airforce pallets of ice going out on a cold deck that is scheduled for Tuesday, 12-Jan. This will be the last ice shipping out this season. All remaining ice drilled this season will be boxed and stored in the core storage trench until next season.

SAFETY

- Everyone is in good health and spirits and there are no injuries to report

COMMENTS (Problems, Concerns, Recommendations, Etc.)

- While putting the new longer cable on the winch, one outer armor wire was broken and two others were damaged. The damage is 1,400 m from the drill end of the cable. The wood spool the cable manufacturer supplied the cable on had a layer of Masonite attached to the inside of both flanges with drywall screws. Several of the screws were left protruding. One of these screws that were initially concealed by layers of cable caught the cable as it was being unspooled from the spool. I emailed pictures of the faulty spool and damaged sustained to the cable to Rochester Wire and Cable, the manufacture of the cable, and got in contact with one of their engineers. They were able to walk me through how to stabilize the broken armor wire by weaving stainless steel or brass shim stock into the outer armor wires. They estimate the breaking strength of the cable has been reduced by 1.4 – 1.8 kN. We initially did the repair using 0.003” thick by 1” wide brass shim stock, but it only lasted a little over 24 hours before the brass failed. The brass was replaced with 0.003” thick stainless steel, which has been holding out well. We are currently checking the integrity of the shims every run.
- The cutters typically need replacement after 80 meters or less of coring. At his point there is visual evidence of dulling and there are generally one or more small chips on each of the cutting edges. As a comparison, the cutters for the WAIS Divide project were routinely able to drill 300 meters before needing replacement.

PROJECT SITUATION REPORT
SPICE Project, South Pole Antarctica 2015-16

Project:	NSF# I-164	UW# 8341			
Project Principal Investigator:		Murat Aydin			
Report No:	9	**for period**	1/11/16	**through**	1/17/16
Prepared by:	Jay Johnson			**Date:**	1/17/16

IDDO Personnel on Site:	Jay Johnson Grant Boeckmann Zachary Meulmans Dominic Winski Elizabeth Morton Nick Wipperfurth Shawntel Stapleton

ACTIVITIES DURING PERIOD

- Current drillers bottom depth is 1617.07meters
- 119.67 meters of core were drilled this week
- Eric and I met with Leah Street, Scotty Smith, and Ian M. from ASC to discuss the end of season plans and camp close out.
    - All buildings will remain at the drilling site for use next season
    - All cargo returning to IDDO will be packed by the 28th
    - Any leftover Estisol 140 will remain on site for the winter
    - We have put in a request to have our redeployment date to McMurdo moved up from Feb 2nd to Jan 29th
    - All drilling equipment that will not be needed for next season will be packed and remain on site. The drill sondes and equipment needing repair will be shipped back to IDDO
- Leah Street departed Pole this week. Scotty Smith will be our ASC point of contact for the remainder of the season
- The VMF came out and performed maintenance on one of the generators
- Starting baling the entire borehole Friday morning. 33 baling runs were completed over a period of 40 hours. The drill chip loss based on the baling runs is about 7%.
- Modified the second hollow shaft in the MAPO machine shop by drilling 80 12mm diameter holes through the shaft to match the hollow shaft we have been using this season. This hollow shaft will be setup with the pump so it can be tested this season with minimum impact to the drilling schedule.
- Began looking into how much of the drill system will be packed, but left on site until next season. At this point we are planning on leaving the winch, drill tower, and control room set up as they will most likely be used for logging next season.
- Third shift took Saturday night off. First and second shifts took Sunday off. Drilling operations will resume with third shift on Sunday night.

SAFETY

- Everyone is in good health and spirits and there are no injuries to report

COMMENTS (Problems, Concerns, Recommendations, Etc.)

- As the week progressed we began to see an increasing number of drill runs stopped short due to the hollow shaft plugging with chips. When this happens, the drilling fluid above the core and in the core barrel cannot escape at the rate the drill is penetrating causing either very slow penetration or total loss of penetration. On Friday we decided it was time to bale the borehole.
- On Wednesday, in the middle of the last run on first shift, the console circuit board failed causing the drill to stop rotating and the winch to start paying cable out at 0.2 m/s. Zach was able to replace the board and restore normal operation while the drill was down hole.
- On Thursday the drill motor quit working at the start of second shift. The spare motor section was swapped in and drilling continued. Zach, Shawntel, and I stayed on and rebuilt the failed motor section. The failure was due to the brush holder starting to melt like we saw earlier in the season. A spare motor was installed and the motor section was reassembled. Third shift put the motor section back on the drill to verify it was working properly. It ran for one drill run with normal current draw, but would not start on the following run. The motor section was opened up and inspected the next day. One of the motor brushes was showing signs of getting too hot along with the early signs of a brush holder starting to melt. The final spare motor was installed and the motor section was reassembled again. We have yet to run this motor section on the drill.
- With the console board failure and two drill motor failures happening so close together, after everything had been running so well, we began questioning if this was just coincidence or if it had anything to do with swapping generators on Tuesday. Zach borrowed an oscilloscope from the South Pole Telescope group to check for potential issues. Two electricians from station also came out. They found a loose ground connection at the generator that they felt could have caused our problems. The generator we had been running on before the generator swap was also found to have a loose wire on one of the three power phases. Both issues have been resolved.

PROJECT SITUATION REPORT
SPICE Project, South Pole Antarctica 2015-16

Project:	NSF# I-164	UW# 8341			
Project Principal Investigator:		Murat Aydin			
Report No:	10	**for period**	1/18/16	**through**	1/24/16
Prepared by:	Jay Johnson			**Date:**	1/24/16

IDDO Personnel on Site:	Jay Johnson Grant Boeckmann Zachary Meulmans Dominic Winski Elizabeth Morton Nick Wipperfurth Shawntel Stapleton

ACTIVITIES DURING PERIOD

- Drilling was completed on Saturday evening! The final depth is 1,751.111 meters.
- 129.66 meters of core were drilled this week
- A total of 1,015 of core were drilled this season!
- Tested the hollow shaft configured with the pump. The pump adds significant drag while the drill is descending, reducing descent speeds by up to 0.35 m/s. The drill run went smooth with the drill motor drawing a steady 2.54 amps. The chips chamber contained an average amount of chips and packing was consistent with a run done with only boosters. Due to the reduced descent speed, the pump was only tested for one drill run.
- Tried running step cutters once again. They would not penetrate and no core was recovered on the run. Full-kerf cutters were reinstalled.
- Changed the clocking on the lower valve of the hollow shaft so it always stays open. Normally the valve is open while the drill is descending and closes once the cutter is turned on. The clocking was changed because we had a few drill runs that ended prematurely due to the hollow shaft plugging with chips. The chips are now sinking in the fluid due to the increasing borehole temperature. Changing the lower valve clocking allows the chips chamber to function like a baler once the upper valve is closed (by turning on the cutter). The upper valve was closed when the drill was ~10m above the bottom in an effort to bale any chips that are collecting near the bottom. Three coring runs were done with this configuration and on all three runs very few chips were recovered in the chips chamber. The chips valve should have prevented the chips from escaping the chips chamber while tripping the drill out of the borehole, but for some reason they were getting flushed out. The valve configuration was switched back and chip chamber came back full on each run. The issue with the hollow shaft plugging was resolved by not turning the cutter on, and therefore closing the valves, until the drill was within 0.5 meters of the bottom.

- Rebuilt motor section 2 with a newly rebuilt motor and spare MPS. After the previous motor failed due to a melted brush holder. See below for details on the failure.
- Exchanged emails with MCM-grantee travel to finalize our redeployment plans
- Third shift took Saturday night off. First and second shifts took Sunday off.
- Third shift will start the final baling of the borehole on Sunday night
- Packing will begin on Monday, 1/25

SAFETY

- Everyone is in good health. There are no injuries to report

COMMENTS (Problems, Concerns, Recommendations, Etc.)

- The height of the flights on Dry core barrel 2, which we have been running for most of the season, are getting worn down. We were starting to see the drill motor draw high current on a regular basis and this was resolved by switching to Dry core barrel 1,which has had less use.
- Motor section 2 was put into operation when we saw the high current mentioned above. This motor section ran at normal current, but the motor failed after only one run. Motor section 1 was put back in operation and ran without issue for the rest of the season paired with dry core barrel 1.
- Thursday night the console circuit board failed and had to be replaced. The replacement board failed on Friday morning. Zach found both the console and control boxes boards to have damaged parts as he began troubleshooting on Friday morning. Winch operation was restored, but the drill power supply was not responding to the console. It was determined that the console was sending the proper signal to the power supply, but there was a problem internal to the power supply. Instead of replacing the power supply, which is a time consuming job, we decided to run the drill from the controls on the power supply faceplate, which were still functioning properly. After this problem was resolved we now found the winch would not come to a complete stop when the speed knobs were set to zero speed unless the direction switch was set to stop. Console boards and components were again replaced with no resolve. Zach then determined that by unplugging the console displays for the drill power supply, which were no longer active because power supply was being operated in local mode, the winch would operate properly. The only issue now was the scaling of the winch controls had changed, but we could easily work with this and drill safely. Drilling resumed at the end of second shift. The controls system functioned without further issue for the remainder of drilling.

PROJECT SITUATION REPORT
SPICE Project, South Pole Antarctica 2015-16

Project:	NSF# I-164	UW# 8341			
Project Principal Investigator:		Murat Aydin			
Report No:	11	**for period**	1/25/16	**through**	2/2/16
Prepared by:	Jay Johnson			**Date:**	2/2/16

IDDO Personnel on Site:	Jay Johnson Grant Boeckmann Zachary Meulmans Dominic Winski Elizabeth Morton Nick Wipperfurth Shawntel Stapleton

ACTIVITIES DURING PERIOD

- Baled the borehole to remove cuttings left behind from drilling
- Packed the drill sondes and all spare parts for shipment back to IDDO
- Packed the drill control system, cabling, and spare parts for shipment back to IDDO
- The core processing line was unbolted from the tables to prevent damage if the floor moves over winter. The connections between the tables were also removed to allow for movement over winter.
- Winter-over DNF items were packed and moved to the cryo facility
- Extended the casing up to a few feet below floor level. The casing had to be left below floor level to prevent interference with the tower actuator, which extends below floor level.
- Filled in the slot and removed the handrails
- The lower half of the tower was removed. The upper half is still in place so it can be used for logging next season.
- Packed the centrifuge system. The crate was left in the drill tent and will be removed next season after the tent is taken down.
- Excavated the buried power cables running between buildings
- The borehole fluid level was brought up to 119.48m from the surface
- 11 drums of Estisol 140 remain and will be left on site for the winter
- Readied the tent for the winter. Eight cargo straps, four on each side, were run between the tent frame and snow anchors in the floor as was done last season. Both man doors were braced from the inside to ensure they will stay closed for the winter.
- All packing and was completed on Thursday. An operator came out and placed cargo that will be wintering up on cable spools as was done last season. Cargo that will be returning to IDDO was taken back to the station.
- All packing and inventory lists have been completed

- ASC shut down the generator on Saturday. They will be moving the buildings down wind of the drill site next week and taking the generators and fuel tank back to the station.
- We were scheduled to leave on Friday the 29th, but Pole did not receive any flights.
- We all flew to McMurdo on Monday (2/1) evening.
- Dom, Elizabeth, and Nick were scheduled to fly to Christ Church on 2/3, however they have been moved to Friday, 2/5.

SAFETY

- Nothing to report

COMMENTS (Problems, Concerns, Recommendations, Etc.)

- The pendent control for tilting the tower quit working during baling. The spare pendent, which was being used earlier in the season, didn't work properly either when swapped in. Since we had less than a day of operation to go, a work around was implemented to tilt the tower using the partially working pendent and the remote drive keypad.