

Annual Plant Service Outage

Update – Tuesday August 19 The BLM is pleased to announce today that the CHEU is back in full production. The CHEU is producing at 3.0 million cubic feet per day in the pipeline. Pipeline pressure is building and allocation calculations will be updated as soon as possible. A review of the root causes of the recent extended delay to start up is in progress.

August 18 This morning the Crude Helium Enrichment Unit (CHEU) is producing about 2.2 million cubic feet of crude helium into the pipeline. We are going to let the plant line out with the flows we have and add field compressors this morning. Plant is looking good and responding quickly to changes (sensitive). The K600 is up and running and so far appears to be fully operational. The No. 5 cylinder piston clearances were off and Exterran had to change out the batteries on the south lubricator counter and also cleaned the terminals. This was odd as the batteries were just changed earlier this week. The BLM plans to ramp up the feed gas flow today.

August 17 The BLM did start putting helium product into the pipeline at 6PM with a flow of 1.3 million cubic feet. When we attempted to start the K600 unit it went down due to No. 5 cylinder "noise" (but not a banging noise) and it fell off on vibration. The K600 when down at 5:00 AM Exterran has been called back to look at the piston to head and crank end clearances. On the K600 two compressor rod packings and wiper packings were replaced, fortunately the items were in stock, so we have the plant cooling down and are about to put the methane pump on.

August 16 The BLM got the plant back up but K600 does have two cylinders with rod packing leaks. Exterran is going to order new rod packing for it. Sometime in the near future when they get the packing in a decision will need to be made on when to take the K600 down and replace the packing. HEU Status: The plant is still up and running, we are going to put on the field compressors this morning and up the flow. However, the packing vent lines are still hot this morning and it did blow some oil out on the side of the building and ground underneath the vent stack. We will have to monitor it and if it gets worse we will have to take it down. It appears that the rod packing on cylinders No. 3 and 5 on the K600 compressor are blowing by oil. We have about 4.2 million cubic feet gross gas to the pipeline.

August 15 The BLM has started the methane pump, and the K600 is on line at 6 pm and doing well so far. Once we get the box stabilized, we will be bringing in more flow. We still are flowing 1.7 million cubic feet into the pipeline. As we head into the weekend, The BLM has restored temperatures to the cold box. Current production is flowing 1.4 million cubic feet of crude helium into the pipeline at 4pm. We have called out Exterran so they can be here to start the K600 unit (required since it has not run since its recent overhaul). Once K600 is on line, process recycle will provide more flow into the box.

August 14 The plant is still slow to cool, the front end is up to par, but the back end is still 60 degrees too warm, but it is cooling. The plant is still slow to cool, the front end is up to par, but the back end is still 60 degrees too warm, but it is cooling. Computers and operator interfaces continue to work without problems. We are getting very close to being able to produce into the pipeline.

August 13 The BLM is working the box to the operating temperature at a steady gradual rate. The DCS and trends are working within the plant. Marty and Mangan rep are troubleshooting communication issues with the Fillmore office this morning. Brent and David Reeves still can't get to information on the system at Fillmore office. Hopefully, we'll know if the issue is on our side or CRLP side in the morning and can get a fix put in for that important component. The DCS operating system repairs are working, the cold box is cooling down and tonight when the weather cools off, it should make cool down faster. If the cold box continues to cool overnight and we can get the K600 on sometime before lunch and get to full flow tomorrow afternoon.

August 12 The Cliffside Facility is still down. We are not processing gas into the pipeline and have not been since our scheduled shutdown began on July 28, with the exception of a few days of limited production before a system crash on Saturday, Aug 9. The reason is obsolete DCS servers and software and potentially full storage. These servers are owned and maintained by the CRLP and are

being repaired by the CRLP's contractor. The CRLP's contractor has been on site since Sunday afternoon working on repairing the system. Our BLM operators are ready to start the plant as soon as the CRLP's technician gets the servers repaired. While a temporary repair is still possible, CRLP has requested quotes for a complete system upgrade, both hardware and software. The DCS computers are up and running and looking good. We have started the DGA System and K100. Once the CO2 is lined out, then we will go into the TSA dryer unit. After it lines out, then we will start a cool down flow. The Cold Box is very warm.

August 11 The BLM continues to assist Jack Griffin to restore the HMI and DCS. Jack worked late and he is here this morning to continue to work on it. He has made some progress and hopefully he can get the problems corrected this morning. The historian computer is not working and may need to be replaced. The BLM operators report they are able to maneuver through the screens, but it is not communicating with the APAC, s (plant equipment).

August 10 Mangum Rep, Jack Griffin, Systems Engineer with Mangan Inc. got in and started to work on the DCS around 5:15 pm Sunday. Deward Cawthon reported to site and met with the contractor to discuss observed symptoms. Marty Smith was also called in for support. The BLM is working closely with Jim to get the HMI and DCS repaired.

August 9 The Crude Helium Enrichment Unit (CHEU) shutdown Saturday morning at 4:00 AM. The operators report that the HMI no longer communicated with the plant equipment. The BLM and CRLP have called the Mangan Inc emergency number to request expedited on-site support. The contractor is now scheduled to be on site Sunday 5:00 PM. Expected repairs to be made include repairs to the software and computers. A technical clarification is that the Human Machine Interface (HMI) composed of the software and Windows computers that show the operators what conditions exist in the plant are what are causing the current problem. The digital control system (DCS) and control cards/modules still provide protection on the critical equipment by automatically shutting down without human intervention. Without a fully functional HMI the operators cannot follow best practice to bring the plant into full production. Losing the plant to a DCS shutdown would then require more time to rebuild liquid levels in the columns. (Back to square one).

August 8 The BLM started injecting between 800,000 cubic feet to 900,000 cubic feet of helium into the pipeline of crude Helium at approximately 4:30am Friday morning. This should start to provide additional gas to the pipeline to keep private plants running. The DCS control computers are still locking up. As conditions continue to improve with the DCS the BLM plans to restore normal operations of the residue compressor and full production. The BLM and CRLP have called on the Mangan Inc contractor will be on site Monday to make repairs to the software and computer.

August 7 The plant has cooled on both the front and back ends. We are experiencing problems with the Digital Control System (DCS) around 4 am. DCS problems include losing trend data screens and complete "lock up" of the operator control screens. Operators attempted to start the methane pumps, however, they barely got the set points in, before the DCS lock up on them. The risk to potentially damaging the K600 on startup is too great. It requires a longer start time and longer time to build pressures to put controllers in play. The front of the box has warmed up some and we are working on getting it turned back around. These DCS issues are preventing us from starting the rest of the plant equipment. We have notified contractor support and they are responding to assist with the problem.

August 6 The BLM continues to monitor slow progress to build liquids on the back end of the cold box. The box is still not cold enough to produce helium into the pipeline. The BLM will send out a general e-mail and news release when we are in full production and a more complete report as to why this shutdown is taking so long.

August 5 As of this morning the cold box has risen in temperature and not cold enough to produce liquid in the "back end" of the cold box. Deward continues to monitor progress and slow cool down. The BLM will send out a general e-mail and news release when we are in full production.

August 4 Plant is in cool down, the front end is up to temp, but the back end is still pretty warm. K600 had some leaks on some valve caps, Exterran is here to make repairs, and hopefully the back end will start to get colder and build the liquid levels and get 600 running late today. The box warmed up a lot during this outage. K100 is doing well so far.

Monday (PM) Exterran repairs have been completed. Plant is still in cooldown mode, the backend is cooling slowly. K600 is leaked repaired and ready to go when we need it. Hopefully the backend will start to get colder and build levels. The BLM is now reporting that at this rate that we should be able to put a methane pump on and K600 on in the morning and hopefully put some flow into the pipeline as well.

August 3 On Sun, Aug 3, 2014 at 10:07 AM, we are having problems with the DCS and we have several calls into Marty. Hopefully he will call or come out and look over the DCS. We do have the K100 running, DGA system on line, TSA dryer is in service and have started a cooldown flow on the cold box.

K600 unit is back together, we have the plant in cool down, but it is pretty warm. Hopefully it will cool OK rest of the day and tonight. Looks like the moisture problem was a false reading, I have the portable Meeco hook up and it is showing good. I cleaned the coax cable connection on the permanent Meeco and it went back to normal. We are watching close. Startup is ongoing and Mark has 600 finished. Hopefully rest of today and tonight the cold box will cool well for us.

We did communicate with Marty and he is on his way. The plant: we had a moisture breakthrough on the TSA dryer, we had to shut in the cold box in until the bed being regenerated is finished and comes on line. It will be about 7 hours for the bed to finish its regeneration.

All machines are in service or awaiting start-up as needed in the CHEU process restart sequence. The cool down is in progress, now it's just waiting to achieve operating temperature/pressure conditions. It is still looking like we will resume production on Monday, August 4th.

August 2 K100 is finished and we put it on line around 7:30 pm and so far it looks good. K600 is almost complete they like about 2 to 3 hours to finish it.

We had a very hard time getting the DGA reboiler burners to light and stay on. We finally changed out the flame detector amplifier and we changed out no. 1 burner flame detector. We tightened all the wiring connections and it final stayed on around 8:30 pm. We started around 1 to 2 pm.

Tonight we are going to get the DGA system lined out and into the TSA dryer and regenerate the west bed. Once in the dryer and everything looks good we will start a cool down flow on the cold box.

August 1 K100 is being reassembled and it is about 65% back together, K600 is being reassembled and about 50% back together, K610 is complete and we ran the oil pump and coolant pump on it. We test ran all the after coolers fans. PM's on the Chiller unit are complete.

Contractor has completed the 10" piping tie-ins and they are working on the 2" blowdown piping from the compressor and 10" blowdown to existing blowdown line.

If things continue well should be finished tomorrow afternoon.

Got a sample of the DGA charcoal bed.

July 31 Praxair finished the overhaul of 610 compressor and tomorrow we will start the oil pump and coolant pump to check for leaks and get the coolant back in the unit. K600 unit, the overhaul of the compressors is ongoing, K100 unit, the overhaul is ongoing and they did receive on site the new parts for the No. 2 cylinder, will have to make weight adjustments on the new parts. The inspection and

maintenance to the K100 and K600 drive motors is complete and they both looked really good. It was a great thing that Praxair did to bringing in that company to inspect and perform maintenance to them. Cleaning the aftercoolers is complete. The PM's to the MCC and electrical system is complete and full electrical power is restored.

Air products is finished.

The contractor on the new compressor has made the 10" tie-inns.

The Chiller maintenance is 90% complete.

Shut down is going well and everyone is working safe. The outage may be extended to Sunday. BLM is now estimating that the plant may be back in pipeline production by Sunday evening.

July 30 Praxair has the parts on order for the K100 crosshead and should be in tomorrow. They continue to overhaul K610 compressor unit, continue to overhaul the compressors on K600, and continue to overhaul K100 unit. IPS continues to inspect and perform PM's on K100 and K600 drive motors. This was a good move on Praxair part to have them thoroughly inspected. They have finished the cleaning of the compressor aftercoolers and process coolers. Finished the PM's on the aftercooler PM's. Work continues on the Motor Control Center. The plant is to come out early tomorrow and shut down the temporary 480 volt generator, finished the PM's on the 480 volt system and put everything back to normal and energize the 4160 volt power before most start to work.

Air Products has finished installing the new High High level shutdown on the NGL tank and tested it as well. It is back to normal. Finished installing the new pressure transmitter on the TSA heater finished installing the new crossover stainless steel pipe on the Cold Box and they are currently insulating it.

Chiller Unit maintenance is ongoing and they changed out the oil pump on the unit and the screw drive compressor is OK. Several filters were changed out on the K100 unit. The new tie-inn for the new compressor is ongoing. Most likely it will be finished tomorrow. Changed out the fed gas filters on the north feed gas filter unit.

So far shutdown is going well and safely.

July 29 Duke electric took the 4160 electrical power down and hooked up a temporary 480 volt generator to the 480 side of the plant electrical system so we would have power for lights, DCS system and air compressor. Duke is currently performing PM's on the 4160 Main breaker and the 4160 main breakers for K100 and K600. They also performed PM's on the 4160 to 480 step-down transformer. So far it looks good. Cleaning of the aftercoolers is still ongoing and they are looking good. They are overhauling K610 compressor, the overhaul of K100 is ongoing and they found a bad crosshead on No. 2 cylinder, but they also found a bad wrist pin bearing on the crosshead rod and the rod itself got hot. Replacement parts have been ordered for it. It appears the bearing may have spun and lost most of the bearing oil flow. K600 unit has been disassembled taking apart the heads, compressor valves, compressor pistons and taking measurements. Things are on schedule except for K100 replacement parts which are on order. Contractors are finished performing the PM's on the Fin Fans (aftercoolers fans). They have a company inspecting the drive motors on K100 and K600 and both are looking really good.

Air Products purchased some larger hoses in order to increase the nitrogen purge on the NGL Tank level control. They are going to change out the high level shutdown on it; they installed an additional brace on the level column. They are in the process of installing a new pressure transmitter on the TSA regeneration heater. They are working on installing the stainless steel jumper line on the cold box and bracing.

We have contractor here to perform the yearly PM's on the Chiller unit, changed out the instrument air filters while we had the electrical power off.

Shutdown is going well so far, and is a thorough overhaul and inspection of the MCC equipment, K100, K600, K610, aftercoolers, and drive motors for K100 and K600.

July 28 The Cliffside CHEU was taken offline and placed on scheduled maintenance at 5:00 AM on Monday July 28, 2014. The outage is expected to last through July 31, 2014. The maintenance work is going well with contractors and BLM personnel performing various maintenance activities. Workers started cleaning the after coolers, taking the K100 unit apart. Inspection revealed a bad cross head on no. 2 cylinder that will need to be replaced. They are looking over the electric drive motor on K100 as well. An overhaul of 610 compressor unit is in progress. Electrical contractor is performing PM's on the electrical system. They are performing PM's on the fin Fans. Air products reports it is working on the new crossover pipe for the cold box, the level shutdown control on the NGL tank, and working on the TSA heater.