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C-A OPERATIONS PROCEDURES MANUAL

7.1.10 Compressor Room - Oil Recovery System Operation

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Hand Processed Changes

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Approved: _____ *Signature on File* _____
Collider-Accelerator Department Chairman Date

D. Lederle

7.1.10 Compressor Room - Oil Recovery System Operation

1. Purpose

1.1 This procedure covers the operation of the oil recovery system. All operations can only be performed manually at the local control panel. However, oil pump run status and oil level indicators are sent to the gas management panel and to the Cryogenic Control Computer. This OPM contains the following procedures relating to the operation of the oil recovery skid:

Sections: 5.1 Emergency Shutdown - Normal Shutdown
 5.2 Skid Initialization
 5.3 Startup
 5.4 Initial Oil Fill
 5.5 Adding Oil
 5.6 Purging

2. Responsibilities

- 2.1 The Shift Supervisor, or an Operator designated by the Shift Supervisor, is responsible for conducting this procedure and providing documentation in the Cryogenic Control Room.
- 2.2 Should a problem arise during the completion of this procedure, the Shift Supervisor shall contact the Technical Supervisor for instructions before continuing.

3. Prerequisites

- 3.1 Operators shall become familiar with the oil recovery skid P&ID 3A995025, the oil skid control panel, and the physical location of components on the skid.
- 3.2 The skid is prepared as follows:
- 3.2.1 Verify that the oil pumps have been checked for alignment and rotation, and the skid's electrical disconnect has been energized.
- 3.3 All personnel working on any electrical system or equipment in the C-AD shall be familiar with BNL [SBMS Electrical Safety](#), BNL [SBMS Lockout/Tagout \(LO/TO\)](#), C-A-OPM 1.5, "Electrical Safety Implementation Plan", C-A-OPM 1.5.3 "Procedure to Open or Close Breakers and Switches and Connecting/Disconnecting Plugs", C-A-OPM 2.36, "Lockout/Tagout for Control of Hazardous Energy". C-AD will provide on-site/work specific training to individuals in the electrical safety aspects of their job functions and assignments.

4. Precautions

- 4.1 Extra care shall be taken to avoid introducing air into the system. All lines leading to atmospheric air shall be purged with pure helium before being opened. After use, all lines leading to the atmosphere shall be capped.
- 4.2 [C-A-OPM-ATT 7.1.10.a](#) lists the equipment protective interlocks, which will stop the oil pumps from operating.
- 4.3 Hearing protection shall be worn in Building 1005H, whenever a compressor is operating.

5. Procedure

5.1 Emergency Shutdown - Normal Shutdown

In the event of an **EMERGENCY** or to simply shut down the oil recovery skid, turn off both oil pumps using the push buttons on the local control panel.

5.2 Skid Initialization

This procedure is for initialization of the oil recovery skid.

- _____ [1] CONFIRM that all valves are in their initial positions according to [C-A-ATT 7.1.10.b “Initial Valve Configuration”](#).
- _____ [2] CHECK the oil level in the tank on sight glass SG2915. If required, add oil according to section 5.5 of this OPM.
- _____ [3] CLOSE valve E2921M.

Note:

Verify that the helium system has been pressurized with pure helium. If this is not the case, the tank can be backfilled by connecting a helium bottle to valve E2900M or E2923M.

- _____ [4] OPEN valves H2903M and H2904M and backfill the system with pure dry helium to 1.2 to 1.5 atm. Valves H2902A and H2900A should be adjusted to maintain this pressure.
- _____ [5] START one of the oil pumps using its local hand switch. During normal operation, one of the oil pumps operates continuously to provide a constant pressure of 20 atm as measured by PI2907 and set by E2907A. If this condition is not met, report to the supervisor for direction. After ten minutes of normal operation, STOP the pump.

- _____ [6] REPEAT step 5 for the pump which has not been started.
- _____ [7] OPEN valve E2921M.
- _____ [8] RECORD in the Cryogenic Control Room Log Book that the skid has been initialized.

5.3 Startup

During normal operation, one of the oil pumps operates continuously to provide a constant pressure of 20 atm in the oil supply manifold as measure by PI2907 and set by E2907A. The tank pressure is maintained at 1.2 to 1.5 atm as measured by PI2901. H2900A adds helium from the high pressure helium header to maintain pressure as oil is transferred out of the tank. H2902A vents helium to the low pressure helium header as oil is returned to the tank.

- _____ [1] CONFIRM that the Compressor skid has been initialized according to section 5.2 of this OPM.
- _____ [2] START one of the oil pumps (either P2904 or P2908) using the push buttons on the local control panel.

Note:

During normal operation only one pump is needed. If oil pressure cannot be maintained, the second pump can be started. When running two pumps, the operator should carefully monitor the oil level. If the system is consuming oil, the operator should determine where the excess oil is going

5.4 Initial Oil Fill

This procedure is for filling the oil recovery system for the first time. Verify that the oil pumps have been checked for alignment and rotation, and the skid's electrical disconnect has been energized.

- _____ [1] CONFIRM that all valves are in their initial positions according to [C-A-OPM-ATT 7.1.10.b “Initial Valve Configuration”](#).
- _____ [2] CONFIRM that all valves of the oil recovery system are CLOSED. This involves checking all return and supply oil header valves from every compressor skid, the intercooler, the aftercooler, and the oil coalescers.
- _____ [3] CLOSE valves H2903M and H2904M.

- _____ [4] Prior to filling, the oil recovery tank shall be purged with heated dry nitrogen. This can be done by connecting a temporary line from the outlet of HTR3600 to valve E2923M. Open valve E2916M to vent the nitrogen gas.
- _____ [5] Connect a vacuum pump to valve E2900M. Evacuate the system to 500 microns.
- _____ [6] Purge the system in accordance with section 5.6 of this OPM
- _____ [7] Add process oil from drums using a portable oil pump. Purge the drums using a portable helium bottle and regulator prior to opening any valves to the systems. Maintain a slight positive helium pressure in the drum while filling. Add oil at E2924M. The tank will hold approximately 9 drums.
- _____ [8] Transfer oil to the skids using transfer pumps P2904 or P2908. Each pump will transfer up to 318 gal/hour. Both pumps may be operated during the transfer to minimize time required.

5.5 Adding Oil

This procedure is for adding oil to the system. It can either be performed when the system is running or when it is not.

- _____ [1] Add oil to the oil recovery tank from the oil processing system per [C-A-OPM 7.1.12 "Oil Processing System Operation"](#).
- _____ [2] RECORD in the Cryogenic Control Room Log Book the date, time, and amount of oil added.

5.6 Purging System

This procedure is for purging the oil recovery skid. It should be performed whenever the oil systems internals have been exposed to atmospheric air or after extended down time.

Note:

This procedure can only be performed when the compressor system is off line and all helium compressors are not running.

- _____ [1] CONFIRM that all valves are in their initial positions according to C-A-OPM 7.1.10.a "1 Initial Valve Configuration".
- _____ [2] CONFIRM that the low pressure helium header is pressurized with pure helium.

Note:

If the low pressure header is not pressurized, a helium bottle connected to valve E2923M can be used to backfill the oil recovery system.

- _____ [3] CLOSE valves H2904M, E2903M, and E2922M.
- _____ [4] Attach a vacuum pump to valve E2900M and evacuate the system to 500 microns then CLOSE valve E2900M.
- _____ [5] Backfill the system with helium by OPENING valve H2904M or by using a portable helium bottle.
- _____ [6] REPEAT steps 4 through 5 for one more evacuate/backfill cycle.
- _____ [7] CLOSE valve E2900M and OPEN valves H2904M, E2903M, and E2922M.
- _____ [8] RECORD in the Cryogenic Control Room Log Book that the oil recovery skid has been purged.

6. Documentation

- 6.1 The check-off lines on the procedure are for place-keeping only. The procedure is not to be initialed or signed, it is not a record.
- 6.2 The Shift Supervisor, or designee, shall document the completion of the procedure in the Cryogenics Control Room Log

7. References

- 7.1 Drawing 3A995025, "Oil Recovery Skid P&ID".
- 7.2 BNL Compressor Station Operating Manual Volume I as supplied by Koch Process Systems Inc.
- 7.3 [C-A-OPM 7.1.12 "Oil Processing System Operation"](#).
- 7.4 [C-A-OPM 1.5, "Electrical Safety Implementation Plan"](#).
- 7.5 [C-A-OPM 1.5.3 "Procedure to Open or Close Breakers and Switches and Connecting/Disconnecting Plugs"](#).
- 7.6 [C-A-OPM 2.36, "Lockout/Tagout for Control of Hazardous Energy"](#).

7.7 [SBMS Electrical Safety.](#)

7.8 [SBMS Lockout/Tagout \(LOTO\).](#)

8. Attachments

8.1 [C-A-OPM-ATT 7.1.10.a, “Equipment Protective Interlocks”.](#)

8.2 [C-A-OPM-ATT 7.1.10.b, “Initial Valve Configuration”.](#)