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C-A OPERATIONS PROCEDURES MANUAL

7.1.23 Seal Gas Compressor Start-Up

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Hand Processed Changes

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Approved: \_\_\_\_\_ Signature on File \_\_\_\_\_  
Collider-Accelerator Department Chairman Date

L. Tenreiro

## 7.1.23 Seal Gas Compressor Start-Up

### 1. Purpose

This procedure provides instructions for starting the seal gas compressors (Sullaire & Dunham-Bush), associated with the turbines on the RHIC 25 kW helium refrigerator located in the refrigeration wing of 1005R.

### 2. Responsibilities

- 2.1 The shift supervisor, or an operator designated by the shift supervisor, is responsible for conducting the procedure and providing documentation in the Cryogenic Control Room Log.
- 2.2 Should a problem arise in the process of starting the seal gas compressor, the shift supervisor shall report to the technical supervisor for instructions before continuing.

### 3. Prerequisites

- 3.1 Main cooling water system operating (cooling towers).
- 3.2 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 If there is liquid helium in the refrigerator pots, all personnel entering the refrigeration wing of 1005R must have a Personal Oxygen Monitor (POM) and carry an emergency escape pack.
- 4.2 Hearing protection shall be worn when the compressors are in operation.
- 4.3 Approved eye protection and safety shoes shall be worn at all times.

### 5. Procedure

#### 5.1 Sullaire

- \_\_\_\_\_ 1. Ensure oil level is visible in the upper sight glass.

- \_\_\_\_\_ 2. Ensure open control air supply valve. Valve is located on manifold mounted to Adsorber 'A' (upper level).
- \_\_\_\_\_ 3. Ensure circuit breaker #1 of the Main Distribution Panel is in the 'On' position and the associated fused disconnect is closed. Both items are located on the lower level south wall across from the compressor.
- \_\_\_\_\_ 4. Ensure closed manual bypass valve H1273M\_\_\_\_\_.
- \_\_\_\_\_ 5. Ensure open the low pressure surge tank inlet valve H1269M\_\_\_\_\_.
- \_\_\_\_\_ 6. Open Sullaire suction valve H1274M\_\_\_\_\_.
- \_\_\_\_\_ 7. Close Dunham-Busch suction valve H1275M\_\_\_\_\_.
- \_\_\_\_\_ 8. Open Sullaire Discharge valve H1284M\_\_\_\_\_.
- \_\_\_\_\_ 9. Close Dunham-Bush discharge valve H1285M\_\_\_\_\_.
- \_\_\_\_\_ 10. Ensure open the seal gas compressor common discharge valve H2928M\_\_\_\_\_ (valve is located outside compressor Bldg. upstream of aerosol skid).
- \_\_\_\_\_ 11. Ensure open the seal gas compressor make-up valve from pure helium gas. Valve is located on the column between Adsorbers 'A' and 'B' on the lower level.
- \_\_\_\_\_ 12. Open coolant water return valve W942M\_\_\_\_\_ and supply valve W941M\_\_\_\_\_ (water supply and return to Rotoflow oil skid #1 must also be open to provide a path).
- \_\_\_\_\_ 13. On the seal gas control panel, place the Local/Remote switch in Remote.
- \_\_\_\_\_ 14. Reset any local alarms on the compressor control panel.
- \_\_\_\_\_ 15. Ensure open the high pressure surge tank isolation valve (located on tank outside of west end of refrigerator room).
- \_\_\_\_\_ 16. On CRISP control page D69, click on "Start Compressor". The seal gas compressor should start, load and switch bypass valve H1258 and discharge valve H1252 to automatic mode.

## 5.2 Procedure (Dunham-Bush)

- \_\_\_\_\_ 1. Ensure control air is available.
- \_\_\_\_\_ 2. Ensure open the low pressure surge tank inlet valve H1269M\_\_\_\_\_.
- \_\_\_\_\_ 3. Open Dunham-Bush suction valve H1275M\_\_\_\_\_.
- \_\_\_\_\_ 4. Close Sullair suction valve H1274M\_\_\_\_\_.
- \_\_\_\_\_ 5. Open Dunham-Bush discharge valve H1285M\_\_\_\_\_.
- \_\_\_\_\_ 6. Close Sullaire discharge valve H1284M\_\_\_\_\_.
- \_\_\_\_\_ 7. Ensure open the seal gas compressor make-up valve from pure helium gas. Valve is located on the column between Adsorbers 'A' and 'B' on the lower level.
- \_\_\_\_\_ 8. Ensure open the high pressure surge tank isolation valve (located on tank outside of west end of refrigerator room).
- \_\_\_\_\_ 9. Ensure all water supply/return valves are properly set, and adequate cooling water is available.
- \_\_\_\_\_ 10. On page D69 put by-pass valve H1278A in auto and set @ 1.05 atm.
- \_\_\_\_\_ 11. Press "START" from INDUSOFT work station page D69.
- \_\_\_\_\_ 12. Check suction pressure and discharge pressure indicators.

**Caution:**

Immediately shut down compressor if needle of supply-pressure indicator is pegged at 30 PSIG. Check for proper phasing of the three phase connections to compressor. Interchange any two of the three-phase wires at the starter. The compressor is uni-directional and if operated in reverse direction for more than a few seconds, severe damage could be caused to the compressor pump.

- \_\_\_\_\_ 13. Check oil level on oil sump sight glass. Oil level should read ½ a sight glass. If not, add oil to system to obtain ½ a sight glass.
- \_\_\_\_\_ 14. From page D69, Depress "LOAD" push button to load compressor, and observe suction and discharge pressures ensuring they are correct.

- \_\_\_\_\_ 15. To shut down the compressor, press the “STOP” push-button (the screw-compressor pump automatically unloads when the compressor is shut down).

**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 [C-A-OPM 1.5, “Electrical Safety Implementation Plan”](#).
- 7.2 [C-A-OPM 1.5.3 “Procedure to Open or Close Breakers and Switches and Connecting/Disconnecting Plugs”](#).
- 7.3 [C-A-OPM 2.36, “Lockout/Tagout for Control of Hazardous Energy”](#).
- 7.4 [SBMS Electrical Safety](#).
- 7.5 [SBMS Lockout/Tagout \(LOTO\)](#).

**8. Attachments**

None