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C-A OPERATIONS PROCEDURES MANUAL

7.1.43 Cold Turbines “B” Train Initialization

Text Pages 2 through 6

Hand Processed Changes

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

L. Tenreiro

7.1.43 Cold Turbines “B” Train Initialization

1. Purpose

To provide instruction on preparing the turbines for start up, this includes the start up of the oil skids.

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 during the turbine initialization, the Shift Supervisor will report to the Technical Supervisor for instructions before continuing.

3. Prerequisites

- 3.1 Turbines have been regenerated.
- 3.2 Turbines have been purged per [C-A-OPM 7.1.27, “Expander Purge Procedure.”](#)
- 3.3 Seal gas compressor running per [C-A-OPM 7.1.23, “Seal Gas Compressor Startup.”](#)
- 3.4 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 Bldg. 1005R must be ODH Class 1 qualified 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 Ensure the turbine inlet valves H785A_____ and H802A_____ are closed.
- _____ 5.2 Ensure the turbine outlet valve H810M_____ is closed.

_____ 5.3 Ensure the interstage valve H797M_____ is open.

Note:
The procedure assumes that both turbine inlet filters are clean. If a filter is not clean, that filter shall remain isolated.

_____ 5.4 If placing inlet filter “A” online, complete the following:

5.4.1 Open outlet valve H9161M_____ and inlet valve H9158M_____.

5.4.2 Close “B” filter outlet valve H9152M_____ and open inlet valve H9150M_____ as a sign that “B” filter is ready for service.

_____ 5.5 If placing “B” inlet filter online, complete the following:

5.5.1 Open outlet valve H9152M_____ and inlet valve H9150M_____.

5.5.2 Close “A” filter outlet valve H9161M_____ and open inlet valve H9158M_____ as a sign that “A” filter is ready for service.

_____ 5.6 Unless otherwise instructed, do not adjust expander brake needle valves E975M, E1012M, E1013M and E979M. They are used for fine control of the turbine speed and are normally set to the correct position.

_____ 5.7 Align turbine 5/6 oil sump to the seal gas compressor by opening valve H1241M.

_____ 5.8 Align 5B/6B drainer gas return by opening valves H1244M_____, H1242M_____, H1245M_____, and H1243M_____.

_____ 5.9 Ensure the following isolation valves located near the turbine 5B/6B pod are open:

E1002M_____	E1003M_____
E981M_____	E982M_____
H1248M_____	E972M_____
H1249M_____	E973M_____
H1251M_____	E978M_____

_____ 5.10 Ensure 120 VAC circuit breakers #37 in panel RP-2 (located next to CB3 and CB5 calorimeter local control panels) is closed.

_____ 5.11 Remove mechanical brake assemblies from turbines 5A and 6B as per [C-A-OPM 7.1.26 “Expander Brake System Installation and Removal.”](#)

_____ 5.12 Ensure the following 480 VAC circuit breakers (panel located on east wall of lower level) are closed:

Subsection E:

Breaker #2_____ Turbine Oil System #3, Pump #1.

Breaker #3_____ Turbine Oil System #3, Pump #2.

_____ 5.13 Open turbine oil skid 5/6 control air supply valve A203M_____ and adjust turbine 5B/6B air regulator PR9341A to 30 psig_____.

_____ 5.14 Ensure the following valves at turbine 5B/6B oil skid are closed:

E925M_____

E985M_____

E927M_____

E986M_____

E964M_____

E970M_____

E965M_____

_____ 5.15 Ensure the cooling water return valve W918M_____ and supply valve W903M_____ for turbine 5/6 oil skid are open.

_____ 5.16 Ensure the following valves located on turbine 5B/6B oil skid are open:

W974M_____

E931M_____

W972M_____

E924M_____

E3536M_____

E966M_____

E3537M_____

E983M_____

E955M_____

H10780M_____

_____ 5.17 Ensure the following vent valves for turbines 5B/6B are closed:

H9178M_____

H9188M*_____

H9180M*_____

H700M_____

H795M_____

H695M*_____

H9186M_____

*If found open, investigate and be suspect of air contamination.

_____ 5.18 On turbine 5B/6B oil skid, depress “Lamp Test” button to ensure all lamps work.

_____ 5.19 On turbine 5B/6B oil skid, start seal gas flow and oil pump as follows:

5.19.1 Depress “Annunciator Acknowledge” button_____.

- 5.19.2 Set seal gas pressure to approximately 200 psig by adjusting seal gas differential pressure regulator. Verify seal gas flow in flow meter ____.
- 5.19.3 On “A” train control panel select primary oil pump by placing “Pump Select” switch to “No. 1” or “No. 2” ____.

Caution:

To prevent oil migration, do not send oil to the expander unless immediate expander startup is anticipated.

Note:

If turbine train “B” is operating, it will be necessary to jog the switch in the following step to avoid starving “B” train of oil.

- 5.19.4 Send oil to expander by placing “Lube Oil Selector” switch to “Unit 5B/6B” ____.
- 5.19.5 Verify all faults cleared and “Expander Ready” light is lit ____.
- 5.19.6 Ensure “Local/Computer switch is in “computer” ____.

Caution:

- 1. To prevent overspeed of turbines the system pressure must be less than 7 atm prior to turbine start up.**
- 2. Following turbine start up, back wheel pressure must be greater than drainer pressure. This will prevent oil migration.**

6. Documentation

- 6.1 The check off lines on the procedure are for the 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 7.1.23, “Seal Gas Compressor Startup”.](#)
- 7.2 [C-A-OPM 7.1.26, “Expander Brake System Installation and Removal”.](#)
- 7.3 [C-A-OPM 7.1.27 “Expander Purge Procedure”.](#)
- 7.4 Drawing 3A995009, 25KW Helium Refrigerator P&ID.
- 7.5 Drawing 3A995705, Cold Expanders 5 and 6 System Schematic.
- 7.6 [C-A-OPM 1.5, “Electrical Safety Implementation Plan”.](#)

- 7.7 [C-A-OPM 1.5.3 “Procedure to Open or Close Breakers and Switches and Connecting/Disconnecting Plugs”.](#)
- 7.8 [C-A-OPM 2.36, “Lockout/Tagout for Control of Hazardous Energy”.](#)
- 7.9 [SBMS Electrical Safety.](#)
- 7.10 [SBMS Lockout/Tagout \(LOTO\).](#)

8. Attachments

None