

*If you are using a printed copy of this procedure, and not the on-screen version, then you **MUST** make sure the dates at the bottom of the printed copy and the on-screen version match. The on-screen version of the Collider-Accelerator Department Procedure is the Official Version. Hard copies of all signed, official, C-A Operating Procedures are available by contacting the ESSHQ Procedures Coordinator, Bldg. 911A*

C-A OPERATIONS PROCEDURES MANUAL

7.1.42 Cold Turbines “A” 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

7.1.42 Cold Turbines “A” 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 H385A_____ and H402A_____ are closed.
- _____ 5.2 Ensure the turbine outlet valve H410M_____ is closed.
- _____ 5.3 Ensure the interstage valve H397M_____ 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 E897M and E901M. 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 turbine 5A/6A drainer gas return by opening valves H1242M_____, H1244M_____, H1243M_____, and H1245M_____.
- _____ 5.9 Ensure the following isolation valves located near the turbine 5A/6A pod are open:

E915M_____	E916M_____
E903M_____	E896M_____
H1246M_____	E900M_____
H1247M_____	E909M_____
H1250M_____	E904M_____

- _____ 5.10 Ensure 120 VAC circuit breaker #7 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 6A 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 5A/6A air regulator PR9340A to 30 psig_____.

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

E925M_____

E908M_____

E927M_____

E911M_____

E921M_____

E907M_____

E920M_____

_____ 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 5A/6A oil skid are open:

W973M_____

E931M_____

W971M_____

E924M_____

E3536M_____

E922M_____

E3537M_____

E905M_____

E929M_____

H10779M_____

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

H9182M_____

H9190M_____

H9184M*_____

H9192M*_____

H395M_____

H412M_____

H695M*_____

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

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

_____ 5.19 On turbine 5A/6A 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_____.

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.

5.19.3 Select primary oil pump by placing “Pump Select” switch to “No. 1” or “No. 2”_____.

5.19.4 Send oil to expander by placing “Lube Oil Selector” switch to “Unit 5A/6A”_____.

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 Drawing 3A995009, 25KW Helium Refrigerator P&ID.
- 7.4 Drawing 3A995705, Cold Expanders 5 and 6 System Schematic.
- 7.5 [C-A-OPM 1.5, “Electrical Safety Implementation Plan”](#).
- 7.6 [C-A-OPM 1.5.3 “Procedure to Open or Close Breakers and Switches and Connecting/Disconnecting Plugs”](#).
- 7.7 [C-A-OPM 2.36, “Lockout/Tagout for Control of Hazardous Energy”](#).
- 7.8 [SBMS Electrical Safety](#).
- 7.9 [SBMS Lockout/Tagout \(LOTO\)](#).

8. **Attachments**

None