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C-A OPERATIONS PROCEDURES MANUAL

7.1.59 Regeneration of Cold Turbines “A” Train

Text Pages 2 through 7

Hand Processed Changes

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

D. Lederle

7.1.59 Regeneration of Cold Turbines “A” Train

1. Purpose

To provide instructions for regenerating the cold turbine “A” train on the RHIC 25 kW helium refrigerator. The procedure is used to warm the turbines and remove moisture. The procedure contains the following sections:

- 5.1 Regeneration of turbine 5A only.
- 5.2 Regeneration of turbine 6A only.
- 5.3 Regeneration of turbines 5A , 6A and heat exchanger HX7A.

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 and in the Cryogenic Valve Log.
- 2.2 Should a problem arise in the process of the procedure, the Shift Supervisor shall report to the Technical Supervisor for instructions before continuing.

3. Prerequisites

- 3.1 Operator shall be familiar with the refrigerator P&ID drawing 3A995009, the physical location of components on the refrigerator, and the refrigerator control pages found on the CRISP control system.
- 3.2 The regeneration skid must be available for use.

4. Precautions

- 4.1 If there is liquid helium in the refrigerator pots, all personnel entering the refrigeration wing of 1005R must be ODH Class 1 qualified, have a Personal Oxygen Monitor (POM) and carry an emergency escape pack, if the refrigerator is operating.

5. Procedure

5.1 Turbine 5A Only

_____ 5.1.1 Date _____.

_____ 5.1.2 Ensure mechanical brakes are installed per [C-A-OPM 7.1.26, “Expander Brake System Installation and Removal.”](#)

_____ 5.1.3 Ensure the following valves are closed:

Process:

H385A _____

H397M _____

Valves to Atmosphere, Relief Header or Pure Helium:

H414M _____

H695M _____

H814M _____

H795M _____

H431M _____

H700M _____

H793M _____

H412M _____

H9184M _____

_____ 5.1.4 Start the regeneration (regen) skid per [C-A OPM 7.1.36, "Regeneration System Normal Operation."](#)

_____ 5.1.5 Ensure that the regulator PR9182M has been replaced with the spool piece.

_____ 5.1.6 Open the following valves:

H430M _____

H812M _____

H393M _____

H390A _____ (Vanes)

H9182M _____

H395M _____

_____ 5.1.7 Close regen manifold bypass valve H9100M.

_____ 5.1.8 Turn on regen skid pre-heater.

_____ 5.1.9 Monitor temperature at TT387H.

_____ 5.1.10 When TT387H reaches 290°K, continue to regenerate for at least one hour. Hygrometer reading must be -30°C to -40°C and improving less than 0.5°C/hour.

_____ 5.1.11 Turn off regen skid pre-heater.

_____ 5.1.12 Open bypass valve H9100M.

_____ 5.1.13 Close the following valves:

H390A_____ (Vanes)	H9182M_____
H812M_____	H393M_____
H395M_____	H430M_____

_____ 5.1.14 Secure the regen skid per [C-A OPM 7.1.36](#).

_____ 5.1.15 Install regulator PR9182M.

_____ 5.1.16 Purge expander 5A per [C-A OPM 7.1.24, "Cold Expander Purge Procedure."](#)

5.2 Turbines 6A Only

_____ 5.2.1 Date_____.

_____ 5.2.2 Ensure mechanical brakes are installed on turbine 6A per [C-A OPM 7.1.26, "Expander Brake System Installation and Removal."](#)

_____ 5.2.3 Ensure the following valves are closed:

Process:

H402A_____
H410M_____
H409M_____

Valves to Atmosphere, Relief Valve Header or Pure Helium:

H393M_____	H700M_____
H793M_____	H795M_____
H431M_____	H695M_____
H814M_____	H395M_____
H9192M_____	

_____ 5.2.4 Start the regeneration (regen) skid per [C-A OPM 7.1.36, "Regeneration System Normal Operation."](#)

_____ 5.2.5 Ensure that regulator PR9190M has been replaced with the spool piece.

_____ 5.2.6 Open the following valves:

H430M _____	H412M _____
H414M _____	H812M _____
H9190M _____	H464A _____ (Vanes)

_____ 5.2.7 Close regen skid bypass valve H9100M.

_____ 5.2.8 Turn on regen skid pre-heater.

_____ 5.2.9 Monitor temperature at TT404H.

_____ 5.2.10 When TT404H reaches 290°K, continue to regenerate for at least one hour. Hygrometer reading must be -30°C to -40°C and improving less than 0.5°C/hour.

_____ 5.2.11 Turn off regen skid pre-heater.

_____ 5.2.12 Open bypass valve H9100M.

_____ 5.2.13 Close the following valves:

H464A _____ (Vanes)	H9190M _____
H812M _____	H414M _____
H412M _____	H430M _____

_____ 5.2.14 Secure the regen skid per [C-A OPM 7.1.36, "Regeneration System Normal Operation."](#)

_____ 5.2.15 Install regulator PR9190M.

_____ 5.2.16 Purge expanders 6A per [C-A OPM 7.1.24, "Cold Expander Purge Procedure."](#)

5.3 Turbines 5A, 6A and Heat Exchanger HX7A

_____ 5.3.1 Date _____.

_____ 5.3.2 Ensure that mechanical brakes are installed on turbines per [C-A OPM 7.1.26, "Expander Brake system Installation and Removal."](#)

_____ 5.3.3 Ensure the following valves are closed:

Process:

H385A _____ H410M _____
H399M _____ H409M _____

Valves to Atmosphere, Relief Header or Pure Helium:

H414M _____ H395M _____
H814M _____ H9190M _____
H431M _____ H700M _____
H793M _____ H795M _____
H9184M _____ H695M _____

_____ 5.3.4 Start the regeneration (regen) skid per [C-A OPM 7.1.36, "Regeneration System Normal Operation."](#)

_____ 5.3.5 Ensure that the regulator PR9182M has been replaced with the spool piece.

_____ 5.3.6 To avoid spinning turbines, ensure pressure in HX7A is approximately equal to pressure in expanders (within 0.5 atm).

_____ 5.3.7 Open process valves H397M _____ and H402A _____ (air line must be jumpered at valve).

_____ 5.3.8 Open the following valves:

H430M _____ H812M _____
H393M _____ H390A _____ (Vanes)
H9182M _____ H464A _____ (Vanes)
H412M _____

_____ 5.3.9 Close regen manifold bypass valve H9100M.

_____ 5.3.10 Turn on regen skid pre-heater.

_____ 5.3.11 Monitor turbine 5A inlet temperature at TT387H.

_____ 5.3.12 When TT387H reaches 290°K, continue to regenerate for at least one hour. Hygrometer reading must be -30°C to -40°C and improving less than 0.5°C/hour.

_____ 5.3.13 Turn off regen skid pre-heater.

_____ 5.3.14 Open bypass valve H9100M.

_____ 5.3.15 Close the following valves:

H464A_____ (Vane)	H9182M_____
H390A_____ (Vane)	H393M_____
H812M_____	H430M_____
H412M_____	

_____ 5.3.16 Install regulator PR9182M.

_____ 5.3.17 Purge expanders 5A, 6A and heat exchanger HX7A per [C-A OPM 7.1.24, "Cold Expander Purge Procedure."](#)

_____ 5.3.18 Close the following process valves:

H402A_____ (return air line to normal)
H397M_____

_____ 5.3.19 Secure regen skid per [C-A OPM 7.1.36, "Regeneration System Normal Operation."](#)

6. **Documentation**

6.1 The check-off lines 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 7.1.26, "Expander Brake System Installation and Removal"](#)

7.2 [C-A OPM 7.1.36, "Regeneration System Normal Operation"](#)

7.3 [C-A OPM 7.1.24, "Cold Expander Purge Procedure"](#)

8. **Attachments**

None