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C-A OPERATIONS PROCEDURES MANUAL

7.1.14 RHIC Ring Scrub

Text Pages 2 through 6

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

A. Reuter

### 7.1.14 RHIC Ring Scrub

#### 1. Purpose

This procedure provides instructions for scrubbing the yellow and blue RHIC rings. The purpose of scrubbing is to remove contaminants such as air and water from the rings prior to cooldown and operation.

#### 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 regenerating the heat exchanger, the shift supervisor shall report to the technical supervisor for instructions before continuing.
- 2.3 The technical supervisor shall report all problems to the appropriate engineer.

#### 3. Prerequisites

- 3.1 Prior to scrubbing the ring, the ring shall be pumped and purged.
- 3.2 The operator shall be trained by the shift supervisor.
- 3.3 Operator shall be familiar with the following drawings:

Drawing 3A995009	25 KW Helium Refrigerator P & ID
Drawing 3A995061	Sextant 12/1 Yellow Ring P & ID
Drawing 3A995062	2:00 Yellow Ring P & ID
Drawing 3A995063	Sextant 2/3 Yellow Ring P & ID
Drawing 3A995064	4:00 Yellow Ring P & ID
Drawing 3A995065	Sextant 4/5 Yellow Ring P & ID
Drawing 3A995066	6:00 Yellow Ring P & ID
Drawing 3A995067	Sextant 6/7 Yellow Ring P & ID

Drawing 3A995068	8:00 Yellow Ring P & ID
Drawing 3A995069	Sextant 8/9 Yellow Ring P & ID
Drawing 3A995070	10:00 Yellow Ring P & ID
Drawing 3A995071	Sextant 10/11 Yellow Ring P & ID
Drawing 3A995072	12:00 Yellow Ring P & ID
Drawing 3A995073	RHIC Helium Storage P & ID
Drawing 3A995081	Sextant 12/1 Blue Ring P & ID
Drawing 3A995082	2:00 Blue Ring P & ID
Drawing 3A995083	Sextant 2/3 Blue Ring P & ID
Drawing 3A995084	4:00 Blue Ring P & ID
Drawing 3A995085	Sextant 4/5 Blue Ring P & ID
Drawing 3A995086	6:00 Blue Ring P & ID
Drawing 3A995087	Sextant 6/7 Blue Ring P & ID
Drawing 3A995088	8:00 Blue Ring P & ID
Drawing 3A995089	Sextant 8/9 Blue Ring P & ID
Drawing 3A995090	10:00 Blue Ring P & ID
Drawing 3A995091	Sextant 10/11 Blue Ring P & ID
Drawing 3A995092	12:00 Blue Ring P & ID
Drawing 3A995032	HCS Block Diagram
Drawing 3A995078	RHIC Helium Gas Storage

3.4 Operator shall be familiar with the physical location of components on the drawings listed under 3.2.

3.5 Operator shall be familiar with the control pages found on the CRISP control system.

#### 4. **Precautions**

4.1 All personnel entering the compressor building (1005H) should wear hearing protection if compressors are operational for any reason.

#### 5. **Procedure**

- \_\_\_\_\_ 1. Verify valve positions as specified in [C-A-OPM-ATT 7.1.14.a](#).
- \_\_\_\_\_ 2. On the CRISP compressor control page, set H3065A in automatic to control on PI3001 with a set point of 1.10 atmospheres.
- \_\_\_\_\_ 3. On the CRISP compressor control page, set H3025A in automatic with a set point of 1.20 atmospheres.
- \_\_\_\_\_ 4. On the CRISP compressor control page, set H3007A in automatic with a set point of 15.0 atmospheres.
- \_\_\_\_\_ 5. On the CRISP compressor control page, open H3019A manually to 50%.

- \_\_\_\_\_ 6. Start the utility compressor.
- \_\_\_\_\_ 7. Set H3045A to maintain the discharge of the utility compressor at 15 atmospheres.
- \_\_\_\_\_ 8. Set H3044A to maintain the suction pressure of the utility compressor at 1.05 atmospheres.
- \_\_\_\_\_ 9. Open H3063M.
- \_\_\_\_\_ 10. At the 6:00 Blue and Yellow valve boxes, open valves H4538A, H4639A, H6639A and H6738A in 5% increments to introduce helium gas into the rings while monitoring compressor bypass. Compressor bypass must stay positive.
- \_\_\_\_\_ 11. Circulate helium in the rings with the valve configuration specified in [C-A-OPM-ATT 7.1.14.a](#) while monitoring the gas purity levels to the inlet of the purifier. The gas purity levels can be monitored on page D11 of the CRISP control system. Scrubbing with this configuration is complete when the oxygen monitor shows less than 10 ppm and the hygrometer shows a dew point less than -60 C.
- \_\_\_\_\_ 12. To stop scrubbing the magnet line and start setting up for scrubbing the supply line, CLOSE the following valves:
  - H6630A and H6730A at the 6:00 Yellow valve box
  - H6200A at the 2:00 Yellow valve box
  - H7000A at the 10:00 Yellow valve box
  - H4530A and H4630A at the 6:00 Blue valve box
  - H4200A at the 2:00 Blue valve box
  - H5000A at the 10:00 Blue valve box
- \_\_\_\_\_ 13. To scrub the supply and heat shield lines, OPEN the following valves:
  - H6716A and H6621A at the 6:00 Yellow valve box
  - H6401A at the 4:00 Yellow valve box
  - H6005A and H6030A at the 12:00 Yellow valve box
  - H6801A at the 8:00 Yellow valve box
  - H4616A and H4521A at the 6:00 Blue valve box
  - H4401A at the 4:00 Blue valve box
  - H4030A and H6036A at the 12:00 Blue valve box
  - H4801A at the 8:00 Blue valve box
- \_\_\_\_\_ 14. Circulate helium through the supply and heat shield lines while monitoring the gas purity levels to the inlet of the purifier. The gas purity levels can be monitored on page D11 of the CRISP control system. Scrubbing with this

configuration is complete when the oxygen monitor shows less than 10 ppm and the hygrometer shows a dew point less than  $-60$  C.

- \_\_\_\_\_ 15. To allow circulation through the coolers, open the following cooler J-T valves to 15 % while continuing to monitor the gas purity levels:
- H6451A at the 4:00 Yellow valve box
  - H6224A at the 2:00 Yellow valve box
  - H6009A at the 12:00 Yellow valve box
  - H7009A at the 10:00 Yellow valve box
  - H6809A at the 8:00 Yellow valve box
  - H4409A at the 4:00 Blue valve box
  - H4209A at the 2:00 Blue valve box
  - H4073A at the 12:00 Blue valve box
  - H5009A at the 10:00 Blue valve box
  - H4809A at the 8:00 Blue valve box
- \_\_\_\_\_ 16. To allow circulation through the warm return (WR) line, open H4658A at the refrigerator and open some of the lead flows at the 12:00 Yellow and Blue valve boxes. Continue to monitor the gas purity levels.
- \_\_\_\_\_ 17. When the oxygen monitor shows less than 10 ppm and the hygrometer shows a dew point less than  $-60$  C, secure the utility compressor. Scrubbing is complete.

## 6. **Documentation**

- 6.1 As the procedure is being executed, the designated operator(s) shall make entries in the cryogenic control room log. Entries shall include the date, time, work (steps) completed, signature of person performing procedure, title or number of procedure performed, and other pertinent information.
- 6.2 The shift supervisor shall review the completed procedure and acknowledge completion via a notation in the cryogenic control room log.

## 7. **References**

- 7.1 Drawing 3A995009
- 7.2 Drawing 3A995032
- 7.3 Drawing 3A995061
- 7.4 Drawing 3A995062
- 7.5 Drawing 3A995063
- 7.6 Drawing 3A995064

- 7.7 Drawing 3A995065
- 7.8 Drawing 3A995066
- 7.9 Drawing 3A995067
- 7.10 Drawing 3A995068
- 7.11 Drawing 3A995069
- 7.12 Drawing 3A995070
- 7.13 Drawing 3A995071
- 7.14 Drawing 3A995072
- 7.15 Drawing 3A995073
- 7.16 Drawing 3A995078
- 7.17 Drawing 3A995081
- 7.18 Drawing 3A995082
- 7.19 Drawing 3A995083
- 7.20 Drawing 3A995084
- 7.21 Drawing 3A995085
- 7.22 Drawing 3A995086
- 7.23 Drawing 3A995087
- 7.24 Drawing 3A995088
- 7.25 Drawing 3A995089
- 7.26 Drawing 3A995090
- 7.27 Drawing 3A995091
- 7.28 Drawing 3A995092

8. **Attachments**

[C-A-OPM 7.1.14.a “Refrigerator Scrub Valve Lineup”](#)

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