

Brookhaven National Laboratory/ LIGHT SOURCES DIRECTORATE			
<b>Subject:</b>	<b>VACUUM PROCEDURES FOR BEAMLINE X-15B</b>		
<b>Number:</b>	LS-OPS-0142	<b>Revision:</b>	B
		<b>Effective:</b>	06/27/2011
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\*Approval signatures on file with master copy.

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The following procedures must be followed when bleeding up different beamline sections and when returning these sections to operation (refer to Beam Line Layout Drawing):

## I. FRONT-END (PROCEDURE TO BE PERFORMED BY NSLS VACUUM GROUP ONLY)

### A. Bleed-Up

1. Notify the Coordinator (Beeper 5824).
2. Refer to Front-End Vacuum Procedures (SLS-07.19-13-1).

### B. Return to Operation

1. Notify the Coordinator (Beeper 5824).
2. Refer to Front-End Vacuum Procedures (SLS-07.19-13-1).

## II. SECTION BETWEEN VALVE 1B AND VALVE 2B, SLIT BOX

### A. Bleed-Up

1. Notify the Coordinator (Beeper 5824).
2. Close and seal Valve 1B and the Front-End Valve.
3. Hook up turbo pump to this section and isolate turbo; or vent through monochromator.
4. Coordinator places Yellow Tag on Valve 1B and the Front-End Valve.
5. Slowly bleed up with N<sub>2</sub> while Coordinator monitors Front-End pressure.

### B. Return to Operation

1. Pump to  $< 2 \times 10^{-9}$  Torr.
2. Notify the Coordinator (Beeper 5824).
3. Prepare for RGA scan.\*
4. Open Valve 1B into the Front-End provided pressure  $< 2 \times 10^{-9}$  Torr downstream of the valve.
5. Perform RGA scan.\*
6. If RGA scan or pressure reading (if no RGA scan required) is satisfactory, Coordinator removes Yellow Tags from Valve 1B and the Front-End Valve.
7. Remove any unprotected turbo pump from this section or valve off the turbo pump and place a Yellow Tag on the valve.\*\*

## III. SECTION BETWEEN VALVE 2B AND VALVE 3B, PREMIRROR TANK

### A. Bleed-Up

1. Notify the Coordinator (Beeper 5824).
2. Close and seal Valve 2B and Valve 1B.
3. Hook up turbo pump to this section and isolate turbo; or vent through monochromator.
4. Coordinator places Yellow Tags on Valve 2B and Valve 1B.
5. Slowly bleed up with N<sub>2</sub> while Coordinator monitors pressure in Slit Box.

### B. Return to Operation

1. Pump to  $< 2 \times 10^{-9}$  Torr.
2. Notify the Coordinator (Beeper 5824).
3. Prepare for RGA scan.\*
4. Open Valve 2B into the Slit Box Section provided pressure  $< 2 \times 10^{-9}$  Torr downstream of the valve.
5. Open Valve 1B into the Front-End provided pressure  $< 2 \times 10^{-9}$  Torr downstream of the valve.
6. Perform RGA scan.\*
7. If RGA scan or pressure reading (if no RGA scan required) is satisfactory, Coordinator removes Yellow Tags from Valve 2B and Valve 1B.
8. Remove any unprotected turbo pump from this section or valve off the turbo pump and place a Yellow Tag on the valve.\*\*

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#### IV. SECTION BETWEEN VALVE 3B AND VALVE 4B, MONOCHROMATOR

##### A. Bleed-Up

1. Notify the Coordinator (Beeper 5824).
2. Close and seal Valve 3B and Valve 2B.
3. Coordinator places Yellow Tags on Valve 3B and Valve 2B.
4. Slowly bleed up with N<sub>2</sub> while Coordinator monitors pressure in PreMirror Tank.

##### B. Return to Operation

1. Pump to  $< 1 \times 10^{-5}$  Torr, using protected turbo pump permanently installed on monochromator tank.
2. Notify the Coordinator (Beeper 5824).
3. Prepare for RGA scan.\*
4. Open Valve 3B into the Premirror Tank (note pressure increase in Premirror Tank, and Carbon Window Valve is closed) provided pressure remains  $< 5 \times 10^{-9}$  Torr upstream of the valve.
5. Open Valve 2B into the Slit Box provided pressure  $< 2 \times 10^{-9}$  Torr downstream of the valve.
6. Perform RGA scan.\*
7. If RGA scan or pressure reading (if no RGA scan required) is satisfactory, Coordinator removes Yellow Tags from Valve 3B and Valve 2B.

#### V. SECTION BETWEEN VALVE 4B AND VALVE 5B, FOCUSING MIRROR TANK

##### A. Bleed-Up

1. Notify the Coordinator (Beeper 5824).
2. Close and seal Valve 4B and Valve 3B.
3. Hook up turbo pump to this section and isolate turbo pump, or simultaneously vent through monochromator.
4. Coordinator places Yellow Tags on Valve 4B and Valve 3B.
5. Slowly bleed up with N<sub>2</sub> while Coordinator monitors pressure in the Monochromator.

##### B. Return to Operation

1. Pump to  $< 2 \times 10^{-6}$  Torr.
2. Notify the Coordinator (Beeper 5824).
3. Prepare for RGA scan.\*
4. Open Valve 4B into the Monochromator (Carbon Window valve closed) provided pressure remains  $< 2 \times 10^{-6}$  Torr upstream of the valve.
5. Open Valve 3B into the Premirror Tank provided pressure remains  $< 2 \times 10^{-9}$  Torr upstream of the valve.
6. Perform RGA scan.\*
7. If RGA scan or pressure reading (if no RGA scan required) is satisfactory, Coordinator removes Yellow Tags from Valve 4B and Valve 3B.
8. Remove any unprotected turbo pump from this section or valve off the turbo pump and place a Yellow Tag on the valve.\*\*

#### VI. SECTION BETWEEN VALVE 5B AND VALVE 6B, DRIFT TUBE

##### A. Bleed-Up

1. Notify the Coordinator (Beeper 5824).
2. Close and seal Valve 5B and Valve 4B.
3. Hook up turbo pump to this section and isolate turbo pump, or vent through I-Zero section.
4. Coordinator places Yellow Tags on Valve 5B and Valve 4B.
5. Slowly bleed up with N<sub>2</sub> while Coordinator monitors pressure in the Focusing Mirror Tank.

##### B. Return to Operation

1. Pump to  $< 2 \times 10^{-6}$  Torr.
2. Notify the Coordinator (Beeper 5824).
3. Prepare for RGA scan.\*
4. Open Valve 5B into the Focusing Mirror Tank provided pressure  $< 2 \times 10^{-6}$  Torr downstream of the valve.
5. Open Valve 4B into the Monochromator provided pressure  $< 1 \times 10^{-5}$  Torr downstream of the valve.
6. Perform RGA scan.\*

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7. If RGA scan or pressure reading (if no RGA scan required) is satisfactory, Coordinator removes Yellow Tags from Valve 5B and Valve 4B.
8. Remove any unprotected turbo pump from this section or valve off the turbo pump and place a Yellow Tag on the valve.\*\*

## VII. SECTION BETWEEN VALVE 6B AND VALVE 7B, I-ZERO SECTION

### A. Bleed-Up

1. Notify the Coordinator (Beeper 5824).
2. Close and seal Valve 6B and Valve 5B.
3. Coordinator places Yellow Tags on Valve 6B and Valve 5B.
4. Slowly bleed up with N<sub>2</sub> or Ar while Coordinator monitors pressure in the Drift Tube Section.

### B. Return to Operation

1. Pump to  $< 2 \times 10^{-6}$  Torr, using protected endstation turbo pumping system.
2. Notify the Coordinator (Beeper 5824).
3. Prepare for RGA scan.\*
4. Open Valve 6B into the Drift Tube Section provided pressure  $< 2 \times 10^{-6}$  Torr downstream of the valve.
5. Open Valve 5B into the Focusing Mirror Tank Section provided pressure  $< 2 \times 10^{-6}$  Torr downstream of the valve.
6. Perform RGA scan.\*
7. If RGA scan or pressure reading (if no RGA scan required) is satisfactory, Coordinator removes Yellow Tags from Valve 6B and Valve 5B.

## VIII. EXPERIMENTAL CHAMBER (BLEED-UP TO $5 \times 10^{-5}$ ARGON; $10^{-7}$ OXYGEN)

### A. Partial Bleed-Up

1. Close Valve 8B.
2. Monitor upstream pressure during bleed-up.

### B. Return to Operation

1. Pump to  $10^{-9}$  Torr.
2. Open Valve 8B.
3. Monitor upstream pressure. If any rise in pressure occurs, close Valve 8B.

## IX. EXPERIMENTAL CHAMBER

### A. Bleed-Up

1. Notify the Coordinator (Beeper 5824).
2. Close and seal Valve 6B and Valve 8B.
3. Coordinator places Yellow Tags on Valve 6B and Valve 8B.
4. Slowly bleed up with N<sub>2</sub> or Ar while Coordinator monitors pressure in the I-Zero Section.

### B. Return to Operation

1. Pump to  $< 2 \times 10^{-6}$  Torr.
2. Notify the Coordinator (Beeper 5824).
3. Prepare for RGA scan.\*
4. Open Valve 8B provided pressure  $< 2 \times 10^{-6}$  Torr downstream of the valve.
5. Open Valve 6B provided pressure  $< 2 \times 10^{-6}$  Torr downstream of the valve.
6. Perform RGA scan.\*
7. If RGA scan or pressure reading (if no RGA scan required) is satisfactory, Coordinator removes Yellow Tags from Valve 8B and Valve 6B.

### \* NSLS POLICY FOR RGA SCANS (24 HOUR NOTICE REQUIRED)

An RGA scan is required before returning to operation if there is a major change of hardware in the vacuum system, i.e. changing of samples, mirrors, windows, monochromator crystals or gratings, manipulators, detectors, etc., **with the following two exceptions:**

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1. After UHV sample chambers have been bled up for replacing components, an RGA scan will not be required if the chamber pressure is returned to  $< 2 \times 10^{-9}$  Torr and the Front End pressure remains  $< 2 \times 10^{-9}$  Torr when vacuum sections upstream of the chamber are opened into the Front End.
2. If any vacuum section upstream of the bled-up section remains at a pressure of  $< 9 \times 10^{-10}$  Torr as read using a hot-filament ion gauge, when the entire beamline is opened into the Front End, and the Front End pressure does not increase, no RGA is required.

Note on RGA scans at X15B: normal operating pressure of sections upstream of valve 3B is  $< 2 \times 10^{-10}$  Torr, therefore RGA scans are not normally required for any bleed-up.

**\*\* NSLS TURBO PUMP POLICY**

An unprotected turbo pump is one not separated from the Front End by a beamline valve which automatically closes in the event of a power loss or a pressure increase at the turbo pump. **No unprotected turbo pump can share a contiguous vacuum with the Front End.**

Note on protected turbo pumps at X15B: the monochromator and endstation have integral protected turbo pumps. In addition, there is an integral protected turbo pump system that can be opened to the I-Zero section through a connecting valve.

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<b>Document Review Frequency</b>
3Years

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<b>LIGHT SOURCES DIRECTORATE REVISION LOG</b>		
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