Brookhaven National Laboratory/National Synchrotron Light Source					
Subject:	**VACUUM PROCEDURES FOR BEAMLINE U5UA**				
Number: LS-OPS-0050	**Revision:**	C	**Effective:**	02/13/04	**Page** 1 **of** 7

Prepared By: **E. Vescovo**	Reviewed By: John Klug	Approved By: C. Foerster	Approved By: S. Ehrlich

*Approval signatures on file with master copy.

The following procedures must be followed when bleeding up different beam line sections and when returning these sections to operation (refer to Beam Line Layout Drawing SLS-96.48-001-5 rev. B):

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 V1A AND VALVE V2A (M0A mirror chamber)

A. Bleed-Up
1. Notify the Coordinator (Beeper 5824).
2. Close and seal Valve V1A and Front End Valve.
3. Hook up turbo pump to this section.
4. Coordinator places yellow tags on Valve V1A and Front End Valve.
5. Slowly bleed-up with boil-off N_2 while Coordinator monitors front end pressure.

B. Return to Operation
1. Bake and pump to $< 2\times10^{-9}$ Torr.
2. Notify the Coordinator (Beeper 5824).
3. Prepare for RGA scan.*
4. Open Valve V1A into front end provided pressure $< 2\times10^{-9}$ Torr downstream of 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 V1A and 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 V2A AND VALVE V3A (monochromator: entrance slit (S0A), grating chamber, and exit slit (S1A))

A. Bleed-Up
1. Notify the Coordinator (Beeper 5824).
2. Close and seal Valve V2A and Valve V1A.

3. Coordinator places yellow tags on Valve V2A and Valve V1A.
4. Slowly bleed-up with boil-off N_2 while Coordinator monitors the pressure in the M0A mirror chamber.

B.   Return to Operation
1. Bake and pump to $< 2 \times 10^{-9}$ Torr.
2. Notify the Coordinator (Beeper 5824).
3. Prepare for RGA scan.*
4. Open Valve V2A into M0A mirror chamber provided pressure $< 2 \times 10^{-9}$ Torr downstream of valve.
5. Open Valve V1A into front end provided pressure $< 2 \times 10^{-9}$ Torr downstream of 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 V2A and Valve V1A.
8. Remove any unprotected turbo pump from this section or valve off the turbo pump and place a yellow tag on the valve.**

IV.   SECTION BETWEEN VALVE V3A AND VALVE V4A (circular polarizer section)

A.   Bleed-Up
1. Notify the Coordinator (Beeper 5824).
2. Close and seal Valve V3A and Valve V2A.
3. Coordinator places yellow tags on Valve V3A and Valve V2A.
4. Slowly bleed-up with boil-off N_2 while Coordinator monitors the pressure in the monochromator (entrance slit (S0A), grating chamber, and exit slit (S1A)).

B.   Return to Operation
1. Bake and pump to $< 2 \times 10^{-9}$ Torr.
2. Notify the Coordinator (Beeper 5824).
3. Prepare for RGA scan.*
4. Open Valve V3A into monochromator (entrance slit (S0A), grating chamber, and exit slit (S1A)) provided pressure $< 2 \times 10^{-9}$ Torr downstream of valve.
5. Open Valve V2A into M0A mirror chamber pressure $< 2 \times 10^{-9}$ Torr downstream of 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 V3A and Valve V2A.
8. Remove any unprotected turbo pump from this section or valve off the turbo pump and place a yellow tag on the valve.**

V.   SECTION BETWEEN VALVE V4A AND VALVE V5A (M1A refocusing mirror)

A.   Bleed-Up
1. Notify the Coordinator (Beeper 5824). .

      2.   Close and seal Valve V4A and Valve V3A.

      3.   Coordinator places yellow tags on Valve V4A and Valve V3A.

      4.   Slowly bleed-up with boil-off N_2 while Coordinator monitors pressure in the circular polarizer section.

B.   Return to Operation

      1.   Bake and pump to $< 5 \times 10^{-8}$ Torr.

      2.   Notify the Coordinator (Beeper 5824).

      3.   Prepare for RGA scan. *

      4.   Open Valve V4A into the circular polarizer section provided pressure $< 5 \times 10^{-8}$ Torr downstream of valve.

      5.   Open Valve V3A into monochromator (entrance slit (S0A), grating chamber, and exit slit (S1A)) provided pressure $< 2 \times 10^{-9}$ Torr downstream of 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 V4A and Valve V3A.

      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 V5A AND VALVE V6A (I0 Chamber)

A.   Bleed-Up

      1.   Notify the Coordinator (Beeper 5824).

      2.   Close and seal Valve V5A and Valve V4A.

      3.   Coordinator places yellow tags on Valve V5A and Valve V4A.

      4.   Slowly bleed-up with boil-off N_2 while Coordinator monitors pressure in M1A refocusing mirror chamber.

B.   Return to Operation if I0 Chamber is Ultra High Vacuum (UHV) Type

      1.   Bake and pump to 1×10^{-7} Torr.

      2.   Notify the Coordinator (Beeper 5824).

      3.   Prepare for RGA scan.*

      4.   Open Valve V5A into M1A mirror chamber provided pressure $< 1 \times 10^{-7}$ Torr downstream of valve.

      5.   Open Valve V4A into the circular polarizer section provided pressure $< 5 \times 10^{-8}$ Torr downstream of 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 V5A and Valve V4A.

      8.   Remove any unprotected turbo pump from this section or valve off the turbo pump and place a yellow tag on the valve.**

C.   Return to Operation if I0 Chamber is Non-UHV Type

      1.   Pressure interlock to valve Valve V5A must be in place and operating at a trip point $\leq 1 \times 10^{-5}$ Torr.

      2.   Notify the Coordinator (Beeper 5824).

3. Prepare for RGA scan.*
4. Temporarily open Valve V5A into M1A refocusing mirror chamber with window isolation valve VW6A closed. Valve V5A can remain open ONLY if pressure in M1A mirror chamber is $< 5 \times 10^{-8}$ Torr.
5. Open Valve V4A into circular polarizer section provided pressure $< 5 \times 10^{-8}$ Torr downstream of 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 V5A and Valve V4A.
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 V6A AND VALVE V7A (Experimental Chamber #1)

A. Bleed-Up
1. Notify the Coordinator (Beeper 5824).
2. Close and seal Valve V6A and Valve V5A.
3. Coordinator places yellow tags on Valve V6A and Valve V5A.
4. Slowly bleed-up with boil-off N_2 while Coordinator monitors pressure in I0 chamber.

B. Return to Operation if Experimental Chamber #1 is Ultra High Vacuum (UHV) Type
1. Bake and pump to 1×10^{-7} Torr.
2. Notify the Coordinator (Beeper 5824).
3. Prepare for RGA scan.*
4. Open Valve V6A into I0 chamber provided pressure $< 1 \times 10^{-7}$ Torr downstream of valve.
5. Open Valve V5A into M1A mirror chamber provided pressure $< 1 \times 10^{-7}$ Torr downstream of 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 V6A and Valve V5A.
8. Remove any unprotected turbo pump from this section or valve off the turbo pump and place a yellow tag on the valve.**

C. Return to Operation if Experimental Chamber #1 is Non-UHV Type
1. Pressure interlock to valve Valve V6A must be in place and operating at a trip point $\leq 1 \times 10^{-5}$ Torr.
2. Notify the Coordinator (Beeper 5824).
3. Prepare for RGA scan.*
4. Open Valve V6A into the I0 chamber provided pressure $\leq 1 \times 10^{-5}$ Torr downstream of valve.
5. If pressure in I0 chamber is $< 1 \times 10^{-7}$ Torr, open Valve V5A into M1A mirror chamber. However, if pressure in I0 chamber is $> 1 \times 10^{-7}$ Torr, temporarily open Valve V5A into M1A mirror chamber with window

isolation valve VW6A closed. Valve V5A can remain open ONLY if pressure in M1A mirror chamber is $< 5 \times 10^{-8}$ Torr.

6. Perform RGA scan.*
7. If RGA scan or pressure reading (if no RGA scan required) is satisfactory, Coordinator removes yellow tags from Valve V6A and Valve V5A.
8. Remove any unprotected turbo pump from this section or valve off the turbo pump and place a yellow tag on the valve.**

D. Bleed-Up of Sample Preparation Section Only

1. Sections A, B and C above apply†, as if the entire Experimental Chamber #1 were being Bled-Up and Returned to Operation, with the following exception: valve V6A and valve V5A may be opened to allow beam to pass through to experimental stations downstream provided pressure in the Sample Preparation Section is $< 1 \times 10^{-6}$ Torr. In this case, pressure interlock to valve Valve V6A must be in place and operating at a trip point $\leq 1 \times 10^{-5}$ Torr, and the valve between the Sample Preparation Section and the main section of Experimental Chamber #1 must be yellow tagged†. This yellow tag may be removed when the conditions in either section B or section C above are met when this valve is opened.

   †N.B.: for the Sample Preparation Section only, Coordinator notification and yellow tagging are NOT required for the following U5UA PRT members: Elio Vescovo (NSLS).

VIII. SECTION BETWEEN VALVE V7A AND VALVE V8A (Refocusing mirror M2A section)

A. Bleed-Up
1. Notify the Coordinator (Beeper 5824).
2. Close and seal Valve V7A and Valve V6A.
3. Coordinator places yellow tags on Valve V7A and Valve V6A.
4. Slowly bleed-up with boil-off N_2 while Coordinator monitors pressure in Experimental Chamber #1.

B. Return to Operation
1. Bake and pump to $< 1 \times 10^{-7}$ Torr.
2. Notify the Coordinator (Beeper 5824).
3. Prepare for RGA scan. *
4. Open Valve V7A into Experimental Chamber #1 provided pressure $< 1 \times 10^{-7}$ Torr downstream of valve.
5. Open Valve V6A into I0 chamber provided pressure $< 1 \times 10^{-7}$ Torr downstream of 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 V7A and Valve V6A.
8. Remove any unprotected turbo pump from this section or valve off the turbo pump and place a yellow tag on the valve.**

IX. **SECTION BETWEEN VALVE V8A AND VALVE V9A (Refocusing mirror M3A section)**

A. **Bleed-Up**
1. Notify the Coordinator (Beeper 5824).
2. Close and seal Valve V8A and Valve V7A.
3. Coordinator places yellow tags on Valve V8A and Valve V7A.
4. Slowly bleed-up with boil-off N_2 while Coordinator monitors pressure in Refocusing mirror M2A section.

B. **Return to Operation**
1. Bake and pump to $< 1 \times 10^{-7}$ Torr.
2. Notify the Coordinator (Beeper 5824).
3. Prepare for RGA scan. *
4. Open Valve V8A into Refocusing mirror M3A section provided pressure $< 1 \times 10^{-7}$ Torr downstream of valve.
5. Open Valve V7A into Experimental Chamber #1 provided pressure $< 1 \times 10^{-7}$ Torr downstream of 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 V8A and Valve V7A**.**
8. Remove any unprotected turbo pump from this section or valve off the turbo pump and place a yellow tag on the valve.**

X. **SECTION DOWNSTREAM OF VALVE V9A (Experimental Chamber #2)**

A. **Bleed-Up**
1. Notify the Coordinator (Beeper 5824).
2. Close and seal Valve V9A and Valve V8A.
3. Coordinator places yellow tags on Valve V9A and Valve V8A.
4. Slowly bleed-up with boil-off N_2 while Coordinator monitors pressure in Refocusing mirror M3A section.

B. **Return to Operation**
1. Bake and pump to 1×10^{-7} Torr.
2. Notify the Coordinator (Beeper 5824).
3. Prepare for RGA scan.*
4. Open Valve V9A into Refocusing Mirror M3A section provided pressure $< 1 \times 10^{-7}$ Torr downstream of valve.
5. Open Valve V8A into Refocusing Mirror M2A section provided pressure $< 1 \times 10^{-7}$ Torr downstream of 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 V9A and Valve V8A.
8. Remove any unprotected turbo pump from this section or valve off the turbo pump and place a yellow tag on the valve.**

* NSLS POLICY FOR RGA SCANS

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:**

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 2×10^{-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.

** NSLS TURBO PUMP POLICY

An unprotected turbo pump is one not separated from the front end by a valve which automatically closes in the event of a power loss or a pressure increase. Any unprotected turbo pump, upstream of a window, **must either be removed** from a beamline section before that section is opened to the front end or **must be valved off and the valve yellow tagged** by the Coordinator.

NSLS REVISION & PERIODIC REVIEW LOG	
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> *See NSLS Quality Control Coordinator for original revision and review signatures <*

REVISION TABLE		
Rev	**Description**	**Date**
C	MAJOR RECONFIGURATION OF BEAMLINE	02/13/04