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| Doc No. PS-C-XFD-PRC-053   | Author: V. J. Ghosh | Effective Date: 18Mar2016 | Version 1 |
| Title: <b>Beamline ISS (08-ID) Radiation Survey Plan</b>             |                     |                           |           |

**Approved by:**

3/21/2016

3/21/2016

X 

Mo Benmerrouche  
Physicist - Radiation Safety  
Signed by: Benmerrouche, Mohamed

X Klaus Attenkofer

Klaus Attenkofer  
ISS Lead Beamline Scientist  
Signed by: Attenkofer, Klaus

3/21/2016

3/21/2016

X John Aloï

John Aloï  
Facility Support Representative  
Signed by: Aloï Jr, John

X 

Robert Lee  
ESH Manager  
Signed by: Lee, Robert J

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### VERSION HISTORY LOG

| VERSION | DESCRIPTION  | DATE      |
|---------|--------------|-----------|
| 1       | First Issue. | 18Mar2016 |

### ACRONYMS

|      |                                  |         |                                      |
|------|----------------------------------|---------|--------------------------------------|
| BPM  | Beam Position Monitor            | ID      | Insertion Device                     |
| BTS  | Booster to Storage Ring          | ISS     | Inner Shell Spectroscopy             |
| CM   | Collimating Mirror               | LOTO    | Lockout/Tagout                       |
| ESH  | Environment, Safety and Health   | m       | meter                                |
| FE   | Front End                        | mrad    | Millirad                             |
| FM   | Focusing Mirror                  | mrem/hr | Millirem per hour                    |
| FOE  | First Optical Enclosure          | NSLS-II | National Synchrotron Light Source II |
| GB   | Gas Bremsstrahlung               | PBS     | Pink Beam Stop                       |
| HHM  | High Heat Monochromator          | PSD     | Photon Science Division              |
| HHRM | Higher Harmonic Rejection Mirror | RCT     | Radiological Control Technician      |
| HRM  | High Resolution Mirror           | SBMS    | Standards Based Management System    |
| IB   | Interface Box                    |         |                                      |

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## **Beamline ISS (08-ID, DW100)**

### **Comprehensive Commissioning Radiation Survey Plan**

Date: \_\_\_\_\_, 2016

#### **Before Survey Begins:**

- Authorization/approval from the NSLS-II Director to initiate commissioning of the beamline has been received.
- A Beamline System Readiness Checklist has been completed in accordance with PS-C-XFD-PRC-003, *Enabling Beamlines for Operations*.
- The area(s) around the beamline are posted in accordance with SBMS Program Description: *Radiological Control Manual*.
- FOE photon shutter and Front End Shutter closed.
- Front end slits wide open (near maximum extent range).  
**Note:** If FE slits cannot be wide open, record the FE slits parameter here: \_\_\_\_\_
- ID gap closed to minimum gap after first step of GB radiation survey.  
**Note:** If ID cannot be closed to minimum gap, record the gap value here: \_\_\_\_\_
- Collimating Mirrors CM1 and CM2 on Pt stripe, in nominal position.
- High Heat Monochromator (HHM) crystal adjusted to the lower limit.
- Focusing Mirror (FM) out of the beam.
- High Resolution Mirror (HRM) out of the beam.
- Higher Harmonic Rejection Mirror (HHRM) out of the beam.

#### **During Survey:**

- Authorized Beamline Staff ensure that photon beam is where it should be using the appropriate diagnostic tools.
- Authorized Beamline Staff ensure that the Front End Shutter remains open.
- If at any point during performance of this plan a radiation dose rate on contact with the FOE wall of 5 mrem/hr or higher is identified, the radiation survey shall be terminated and the cause investigated, and any hazards shall be mitigated before continuing.
- The step sequences of this procedure can be changed.
- This document, with the filled information from the measurements, will act as the "beamline radiation survey interim report," which shall be submitted to the PSD Director and the ESH Manager for review after the survey.
- Minor deviations from the procedure are allowed in the field, however the discrepancy shall be documented in this procedure and submitted to the PSD Director and the ESH Manager for review after the survey.
- During surveys performed in top-off mode, top-off will be adjusted for more frequent injections to keep the stored beam current within the allowable specifications.

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**Warning:** Execution of this Comprehensive Commissioning Radiation Survey Plan, along with the evaluation of the data collected, may only be used as a basis by the PSD Director and the ESH Manager to approve commissioning activities at an electron beam current of up to 3 times the electron beam current measured during this survey. Approval of commissioning of the beamline at a higher electron beam current requires re-execution of this Comprehensive Commissioning Radiation Survey Plan.

**Initial Settings:**

FE photon shutter open.

FE slits wide open.

Filter in.

Diamond screen in Beam Position Monitor (BPM) enclosure in.

ID gap: \_\_\_\_\_ Electron Beam Current: \_\_\_\_\_

Straight Section Vacuum Condition: \_\_\_\_\_

Injection Rate: \_\_\_\_\_ BTS Injection Efficiency: \_\_\_\_\_

Mirror CM1 settings: \_\_\_\_\_ Mirror CM2 settings: \_\_\_\_\_

HHM settings: \_\_\_\_\_ HRM settings: \_\_\_\_\_

Focusing Mirror (FM) settings: \_\_\_\_\_ HHRM settings: \_\_\_\_\_

Survey start date and time: \_\_\_\_\_

Authorized Beamline Staff & Radiological Control Technicians (RCTs): \_\_\_\_\_

Additional information if available: \_\_\_\_\_

**The following scenarios are covered:**

- I. **Hutch 08-ID-A integrity:** GB on collimating mirror and beam stop, white beam on CM1 and beam stop, white beam on CM1, pink beam on HHM and beam stop, monochromatic beam on HRM, FM and photon shutter.
- II. **Hutch 08-ID-B1 and 08-ID-B2 integrity:** Monochromatic beam on Mono beam stops in hutch B1 and B2 with and without sample target(s) (Al or Si).

**Note:** Transport pipe, interface box (IB) and BPM enclosure integrity checks are included in this survey plan.

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### Survey Conditions

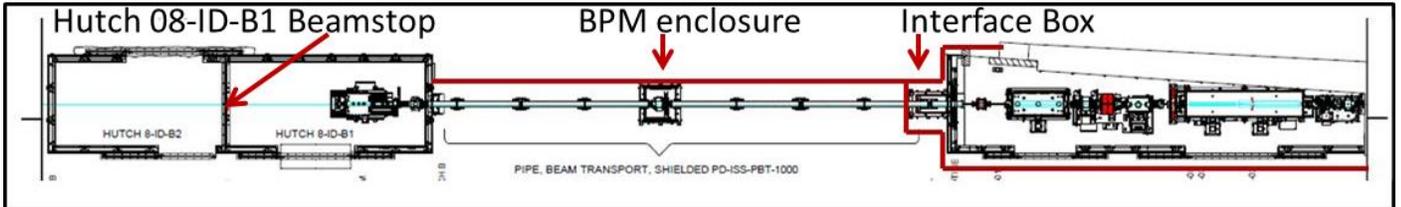
**HOLD POINT:** Evaluate and ensure that all applicable controls listed in the Commissioning Safety Approval Form are in place, including LOTO requirements for the beamline photon shutters (in accordance with PS-C-XFD-PRC-024, *Beamline Photon Shutter Centrally Controlled Lockout/Tagout Procedure*).

**HOLD POINT:** Before opening safety shutters in front end, survey upstream wall of FOE to make sure no radiation comes through.

**Note:** A detailed diagram of the 8-ID hutch A is included in Attachment A.

## **I: Check the integrity of FOE (08-ID-A), transport pipe, interface box and photon shutter.**

- 1. GB on CM1: Gap open, FOE photon shutter closed, collimating mirror CM1 at 2.2 mrad incidence angle, CM2 in nominal position, HHM adjusted to lower limit, HRM, FM out.** Survey all walls and roof of 08-ID-A, walls of the Interface Box, the downstream beam pipe, BPM enclosure and the hutch B1 beam stop.



**ID Gap:** \_\_\_\_\_

**Straight Section Vacuum Conditions:** \_\_\_\_\_

**Radiation Survey Results** \_\_\_\_\_

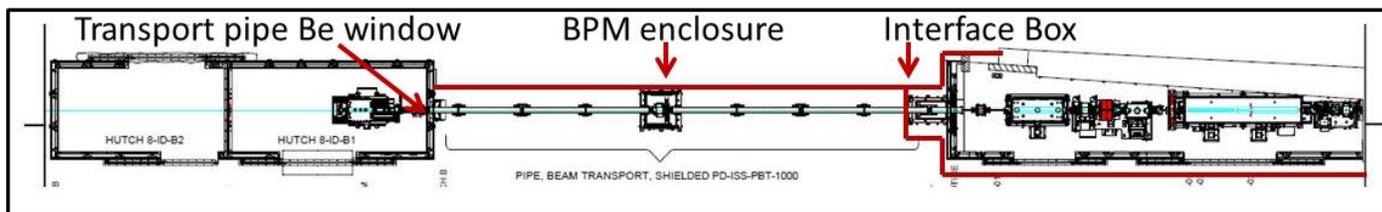
**Additional information/comments:**

**Signature (ESH)** \_\_\_\_\_ **Signature (Beamline)** \_\_\_\_\_

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**2. White beam on CM1: Gap closed, FOE photon shutter closed, collimating mirror CM1 and CM2 at 2.2 mrad incidence angle, HHM in nominal position, HRM out, FM out.** Survey all walls and roof of hutch 08-ID-A, walls of the Interface Box and BPM enclosure, transport pipe and the transport pipe Be window.



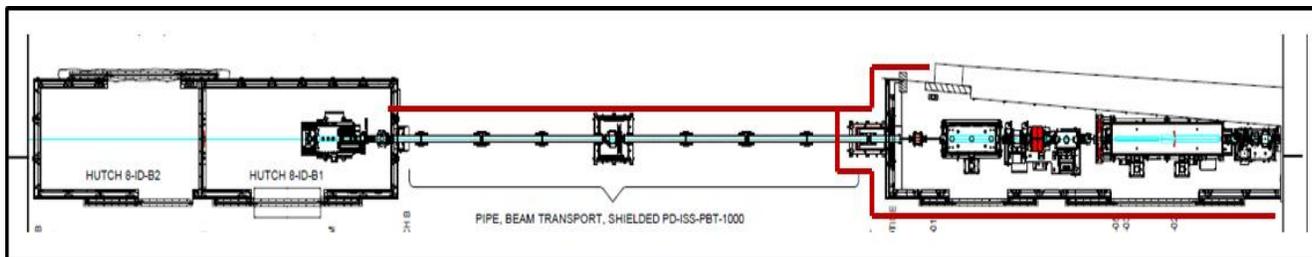
**ID Gap:** \_\_\_\_\_  
**Straight Section Vacuum Conditions:** \_\_\_\_\_  
**Radiation Survey Results** \_\_\_\_\_  
**Additional information/comments:**

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**3. White beam on Pink Beam Stop (PBS): Gap closed, filter out, FOE photon shutter closed, align mirrors and HHM to maximize the PBS.** Survey all walls and roof of hutch 08-ID-A, walls of the Interface Box, BPM enclosure and the downstream beam pipe.



**Note:** For this step, the mirrors CM1 and CM2 are adjusted to their nominal values of 2.2 mrad. The incident angle of the HHM should be adjusted to maximize the amount of pink beam striking the PBS. Based on the aperture size of the white beam stop, this incident angle should be  $\sim 4.1$  mrad (per dimensions given in the beamline ray tracing drawing). This angle may be further adjusted and the readouts from the temperature sensors could be used as an indication of the pink beam intensity as seen by the PBS. However, this temperature dependence on CM1 incident angle may not be observable when the beam current is low, or may be misleading because of the location of the temperature sensor.

Angle of CM1 \_\_\_\_\_ Angle of CM2 \_\_\_\_\_

Angle of HHM \_\_\_\_\_ Mono-beam Energy \_\_\_\_\_

**ID Gap:** \_\_\_\_\_

**Radiation Survey Results** \_\_\_\_\_

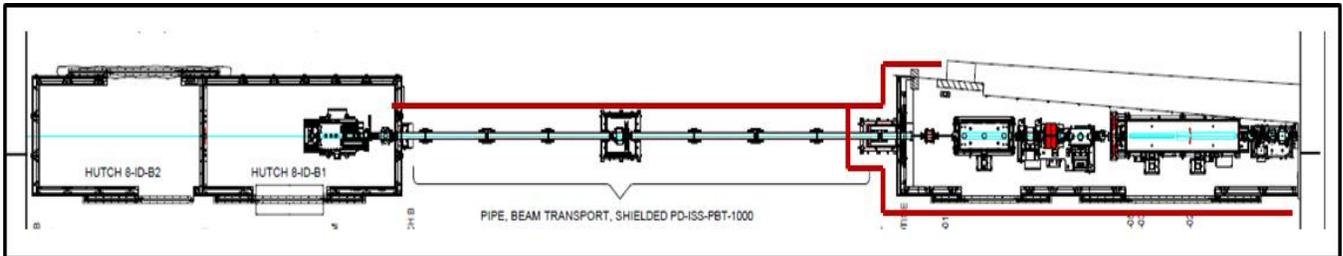
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**4. Mono-beam on FOE shutter: Gap closed, filter out, FOE shutter closed, align CM1, CM2 and HHM and HRM, FM out.** Survey all walls and roof of hutch 08-ID-A, walls of the Interface Box and BPM enclosure. Survey the exit beam pipe in 08-ID-B1 to verify the integrity of the 8-ID-A photon shutter.



**ID Gap:** \_\_\_\_\_

**Radiation Survey Results** \_\_\_\_\_

**Additional information/comments:**

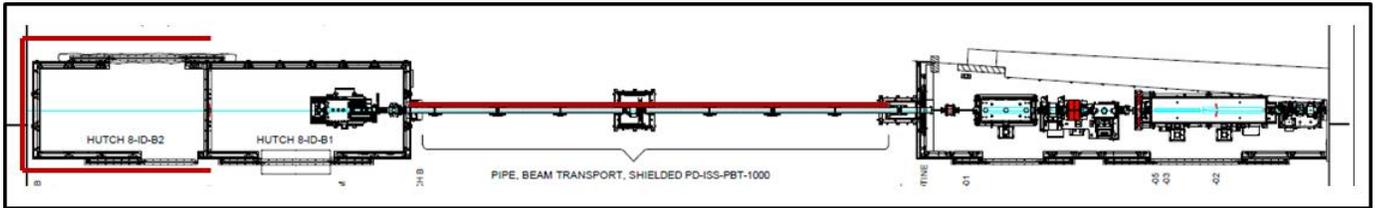
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## II: Check the integrity of hutches 08-ID-B1, 08-ID-B2, the transport pipe and the 08-ID-B1, 08-ID-B2 beam stops.

5. Beam on hutch 08-ID-B2 beam stop: Gap closed, FOE shutter open, filter out, focusing mirror FM out, open FOE (photon) shutter. Beam stop in 08-ID-B1 is also opened. Survey near the transport pipe, the BPM enclosure and the 08-ID-B2 walls and roof.



*ID Gap:* \_\_\_\_\_

*Radiation Survey Results* \_\_\_\_\_

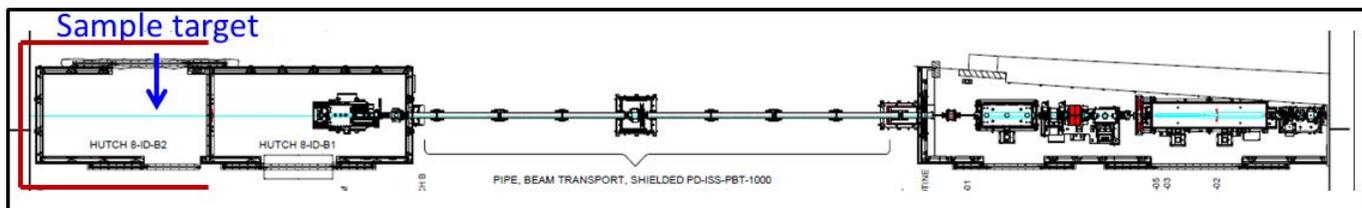
*Additional information/comments:*

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6. Beam on hutch 08-ID-B2 beam stop: Gap closed, FOE shutter open, filter out, focusing mirror FM out, open FOE (photon) shutter. Beam stop in 08-ID-B1 is also opened. Insert sample target (Al plate) in hutch 08-ID-B2 at 1 m from the separation wall. Survey the 08-ID-B2 walls and roof.



*ID Gap:* \_\_\_\_\_

*Radiation Survey Results* \_\_\_\_\_

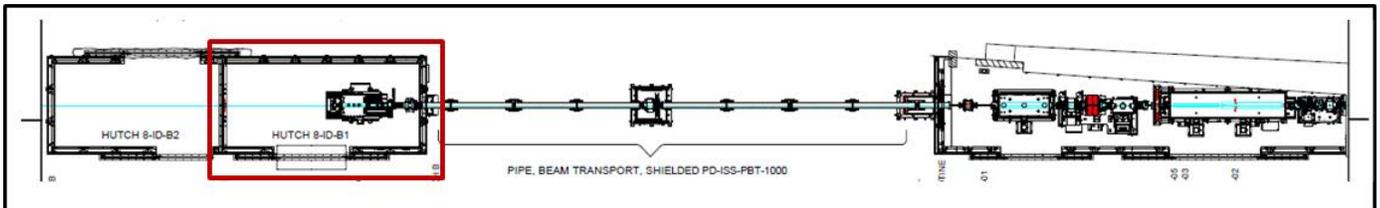
*Additional information/comments:*

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**7. Beam on hutch 08-ID-B1 beam stop: Gap closed, filter out, FM out, open FOE (photon) shutter.**  
Survey the walls and roof of 08-ID-B1 and the back of the separation wall.



**ID Gap:** \_\_\_\_\_

**Radiation Survey Results** \_\_\_\_\_

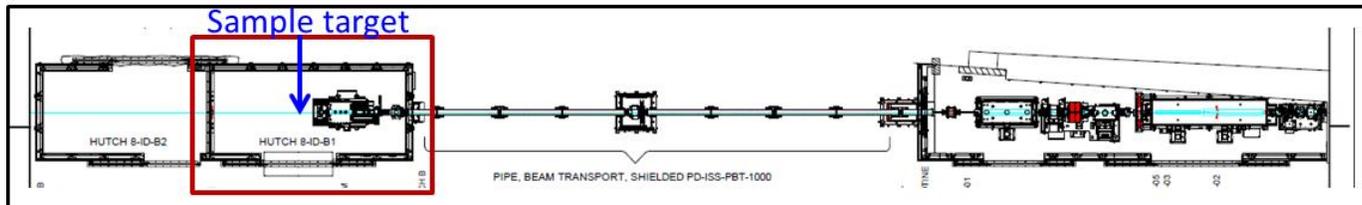
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**8. Beam hits the 08-ID-B1 beam stop: Insert sample target (Al plate) in hutch 08-ID-B1 at sample location. Gap closed, filter out, FM out, open FOE (photon) shutter. Survey back of the beam stop wall and 08-ID-B1 walls and roof.**



**ID Gap:** \_\_\_\_\_

**Radiation Survey Results** \_\_\_\_\_

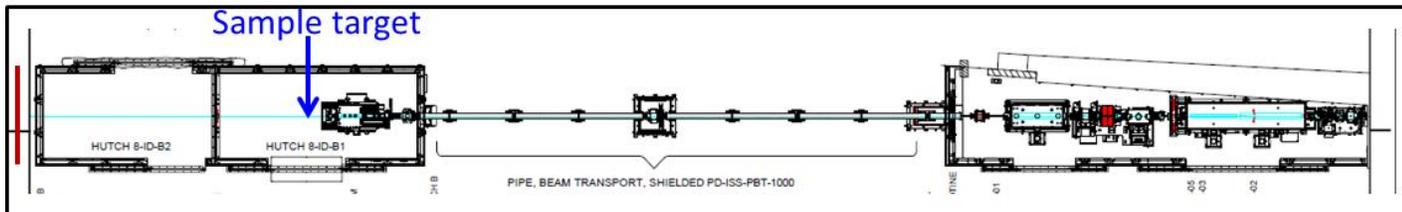
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**9. Beam on hutch 08-ID-B2 beam stop: Gap closed, FOE shutter open, filter out, focusing mirror FM out, open FOE (photon) shutter. Beam stop in 08-ID-B1 is also opened. Insert sample target (Al plate) in Hutch 08-ID-B1 at sample location. Open door between the hutches allowing beam into 08-ID-B2. Survey 08-ID-B2 back wall.**



**ID Gap:** \_\_\_\_\_

**Radiation Survey Results** \_\_\_\_\_

**Additional information/comments:**

**Signature (ESH)** \_\_\_\_\_ **Signature (Beamline)** \_\_\_\_\_

Survey end date and time: \_\_\_\_\_

Additional attachment, information or comments:

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### Attachment A - 8-ID Hutch A Diagram

