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National Synchrotron Light Source II, Brookhaven National Laboratory			
Doc No. PS-C-XFD-PRC-063	Author: V. J. Ghosh	Effective Date: 17Jun2016	Version 1
Title: Beamline ESM (21-ID) Radiation Survey Plan			

Approved by:

6/17/2016

X 

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Signed by: Lee, Robert J

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VERSION HISTORY LOG

VERSION	DESCRIPTION	DATE
1	First Issue.	17Jun2016

ACRONYMS

ARPES	Angle Resolved PhotoEmission Spectroscopy	IB	Interface Box
BPM	Beam Position Monitor	ID	Insertion Device
BTS	Booster to Storage Ring	LOTO	Lockout/Tagout
CM	Collimating Mirror	m	Meter
EPU	Elliptical Polarized Undulator	mrad	Millirad
ESH	Environment, Safety and Health	mrem/hr	Millirem per hour
ESM	Electron Spectrum Microscopy	NSLS-II	National Synchrotron Light Source II
FE	Front End	PBS	Pink Beam Stop
FM	Focusing Mirror	PEEMS	Photo Electron Emission Microscopy
FOE	First Optical Enclosure	PGM	Plane Grating Monochromator
GB	Gas Bremsstrahlung	PSD	Photon Science Division
HHM	High Heat Monochromator	RCT	Radiological Control Technician
HHRM	Higher Harmonic Rejection Mirror	SAF	Safety Approval Form
HRM	High Resolution Mirror	SBMS	Standards Based Management System

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Beamline ESM (21-ID, EPU105/57) 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.
- FE 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: _____
- Mirror M1 in nominal position, M2 parallel to the beam and M3 out of the beam.
- Beamline 21-ID contains 2 insertion devices; EPU 105 and EPU 57. EPU105 emits soft x-rays and EPU57 emits hard x-rays. Since hard X-rays make a larger contribution to dose rates around the beamline, the following radiation surveys are based on EPU57.

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 FE 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.

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.

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Initial Settings:

ID gap: _____ Electron Beam Current: _____

Straight Section Vacuum Condition: _____

Injection Rate: _____ BTS Injection Efficiency: _____

Mirror M1 setting: _____ Mirror M2 setting: _____

Mirror M3-A setting: _____ Mirror M3-P setting: _____

Survey start date and time: _____

Authorized Beamline Staff & Radiological Control Technicians (RCTs): _____

Additional information if available: _____

Survey Conditions:

HOLD POINT: Evaluate and ensure that all applicable controls listed in the Commissioning SAF 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.

The following scenarios are covered:

I. GB Radiation Survey

- a. Integrity of FOE photon shutter and Hutch 21 ID-A .
- b. Integrity of components outside the FOE including transport pipe from FOE to PGM, PGM housing, transport pipe from PGM to M3 housing, transport pipes from M3 housing to photon shutter-A and photon shutter P.

II. White Beam radiation Survey

- a. Integrity of FOE photon shutter and Hutch 21 ID-A.
- b. Integrity of components outside the FOE including transport pipe from FOE to PGM, PGM housing, transport pipe from PGM to M3 housing, transport pipes from M3 housing to photon shutter-A and photon shutter-P.
- c. Integrity of transport pipe and end station downstream of photon shutter-A.
- d. Integrity of transport pipe and end station downstream of photon shutter-P.

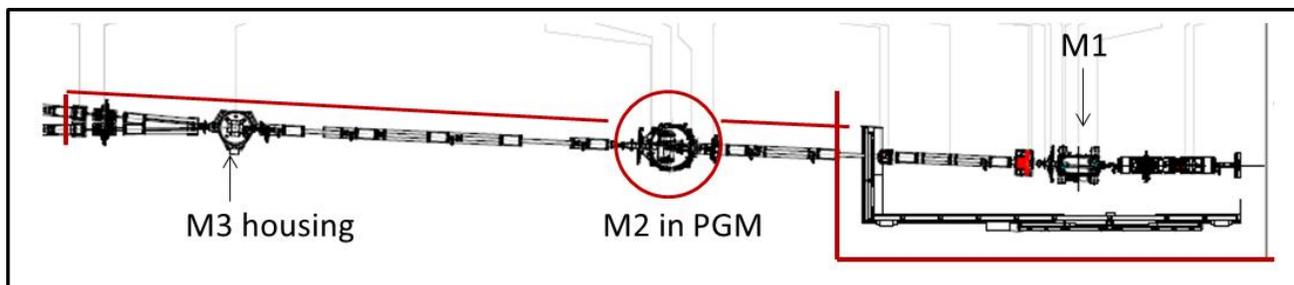
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Note: A detailed diagram of the 21-ID hutch A is included in Attachment A.

I: GB Radiation Survey

- GB radiation survey: Gap open, FE shutter open, FOE shutter closed, photon shutter-A and photon shutter-P open, white beam mirror M1 in nominal position (1.25 deg) so GB is reflected down to the FOE photon shutter.** Survey all walls and roof of 21-ID-A, as well as the area around the transport pipe and the PGM.



ID Gap: _____

Straight Section Vacuum Conditions: _____

Radiation Survey Results _____

Additional information/comments:

Angle of mirror M1 _____ Angle of mirror M2 _____

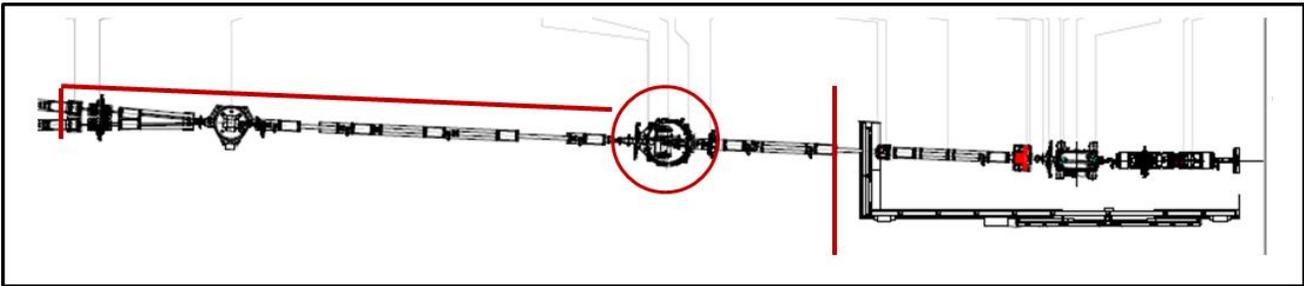
Angle of mirror M3-A _____ Angle of mirror M3-P _____

Signature (ESH) _____ **Signature (Beamline)** _____

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2. **GB radiation survey to check integrity of beam transport pipe, PGM housing and secondary beamstop: Conditions are the same as case 1, except that the FOE shutter is open and photon shutter-A and photon shutter-P are closed. Mirror M2 is parallel to the beam so that the pink beam hits the secondary beamstop in the PGM.** Survey the transport pipe, PGM housing and the transport pipe downstream of the PGM housing up to photon shutter-A and photon shutter-P.



ID Gap: _____

Radiation Survey Results _____

Additional information/comments:

Angle of mirror M1 _____ Angle of mirror M2 _____

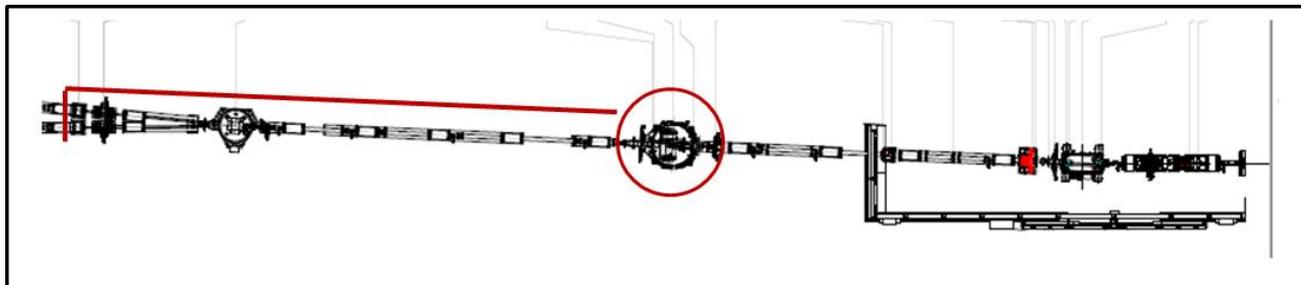
Angle of mirror M3-A _____ Angle of mirror M3-P _____

Signature (ESH) _____ *Signature (Beamline)* _____

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3. **GB radiation survey to check integrity of the PGM housing and secondary beamstop: Same conditions as case 2, except mirror M2 is at the nominal angle so that the pink beam is scattered in the PGM.** Survey the PGM housing and the transport pipe downstream of the PGM housing up to photon shutter-A and photon shutter-P.



ID Gap: _____

Radiation Survey Results _____

Additional information/comments:

Angle of mirror M1 _____ Angle of mirror M2 _____

Angle of mirror M3-A _____ Angle of mirror M3-P _____

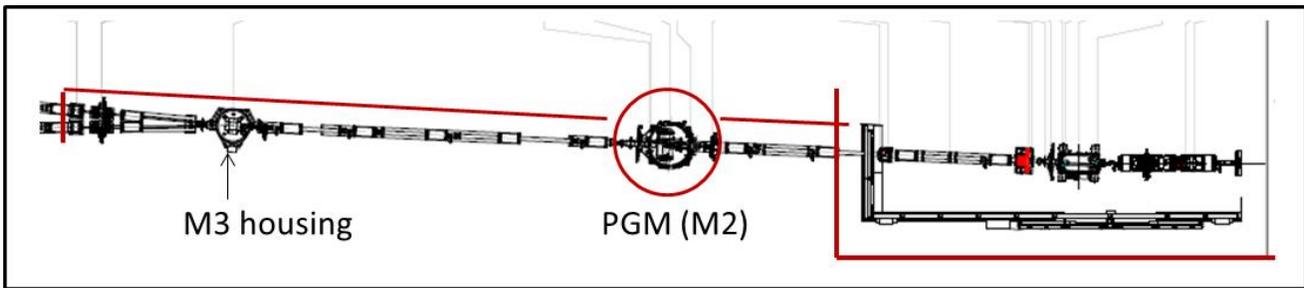
Signature (ESH) _____ **Signature (Beamline)** _____

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II: White Beam Survey

4a. White beam survey: Gap closed, FE shutter open, FOE shutter closed, white beam mirror M1 in nominal position (1.25 deg) so the pink beam is reflected to the FOE photon shutter. Photon shutter-A and photon shutter-P are closed. Survey all walls and roof of 21-ID-A, as well as the area around the transport pipe.



ID Gap: _____

Radiation Survey Results _____

Additional information/comments:

Angle of mirror M1 _____ Angle of mirror M2 _____

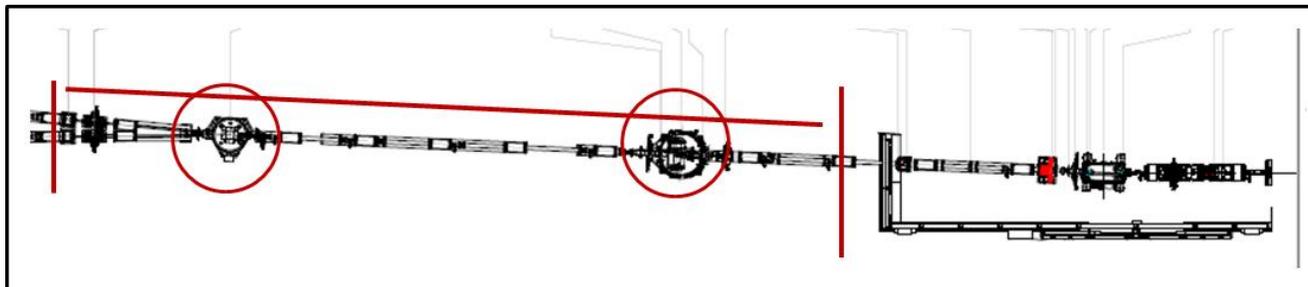
Angle of mirror M3-A _____ Angle of mirror M3-P _____

Signature (ESH) _____ **Signature (Beamline)** _____

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4b. GB beam survey: Same conditions as case 4a., except FOE Shutter open, and Mirror M2 is in the nominal position. Mirrors M3-A and M3-P out of the beam. Survey downstream wall of 21-ID-A, the transport pipe to PGM housing, the PGM housing, M3 housing and the transport pipe up to the photon shutter-A and photon shutter-P.



ID Gap: _____

Straight Section Vacuum Conditions: _____

Radiation Survey Results _____

Additional information/comments:

Angle of mirror M1 _____ Angle of mirror M2 _____

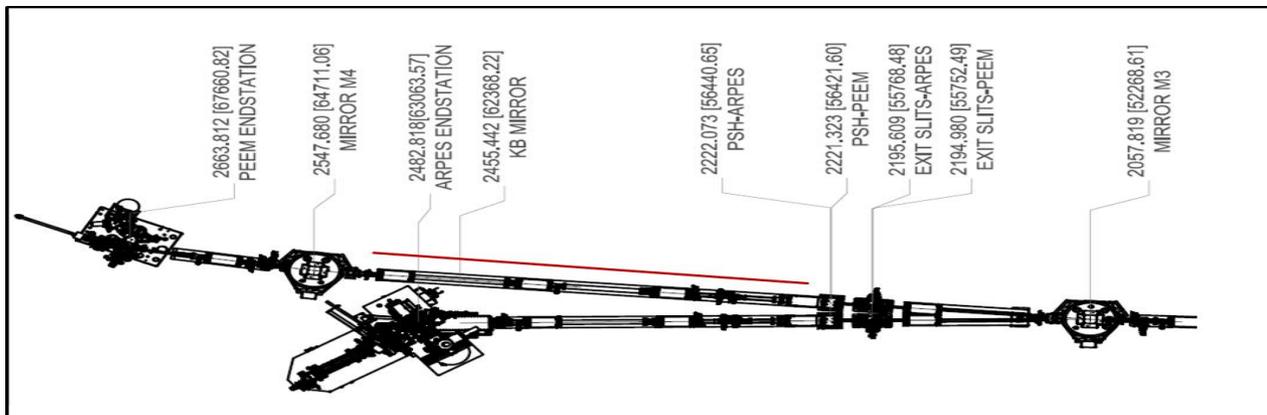
Angle of mirror M3-A _____ Angle of mirror M3-P _____

Signature (ESH) _____ **Signature (Beamline)** _____

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5a. Same settings as case 4b. Mirror M3-P in nominal position, toward photon shutter-P. Open photon shutter-P. Survey the transport pipe downstream of photon shutter-P up to and around the PEEMS end station.



ID Gap: _____

Radiation Survey Results _____

Additional information/comments:

Angle of mirror M1 _____ Angle of mirror M2 _____

Angle of mirror M3-A _____ Angle of mirror M3-P _____

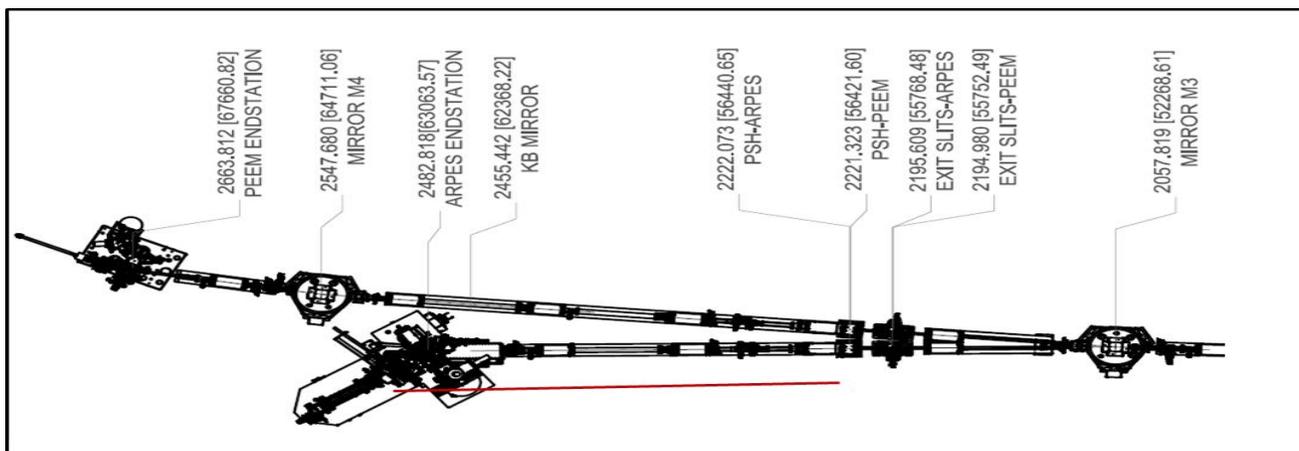
Signature (ESH) _____ **Signature (Beamline)** _____

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5b. Same settings as case 5a. Close photon shutter-P. Open photon shutter-A.

Survey the transport pipe downstream of photon shutter-A up to and around the ARPES end station.



ID Gap: _____

Radiation Survey Results _____

Additional information/comments:

Angle of mirror M1 _____ Angle of mirror M2 _____

Angle of mirror M3-A _____ Angle of mirror M3-P _____

Signature (ESH) _____ **Signature (Beamline)** _____

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Attachment A – 8-ID Hutch A Diagram

