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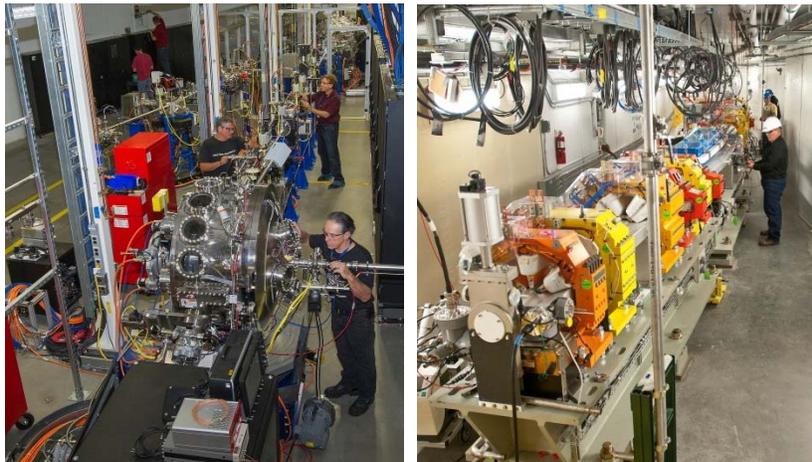
Doc No: NSLSII-11BM-PRC-001

NSLS-II PROCEDURE: BEAMLINE CMS (11-BM) RADIATION SURVEY PROCEDURE

August 4, 2016

Rev. 1

M. Benmerrouche



**Think Safety. Act Safely.**

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ESH Review:

8/5/2016

8/5/2016

X 

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

X Kim Wehunt for

John Aloï
Facility Support Representative
Signed by: Wehunt, Kimberly

By signing this Procedure I acknowledge that it complies with all ESH requirements and if performed correctly, will not present a significant hazard to personnel or equipment.

Beamline Review:

8/3/2016

X Masafumi Fukuto

Masafumi Fukuto
CMS Lead Beamline Scientist
Signed by: Fukuto, Masafumi

By signing this Procedure I acknowledge that it is comprehensive and can be performed as written at the beamline.

Authorization Basis Review:

8/4/2016

X 

Steve Moss
Authorization Basis Manager
Signed by: Moss, Steven H

By signing this Procedure I acknowledge that a USI Screening/Evaluation has been performed and this Procedure does not adversely impact the NSLS-II Authorization Basis Documents.

Approved:

8/5/2016

X 

Robert Lee
ESH Manager
Signed by: Lee, Robert J

By approving this Procedure I agree that the appropriate personnel have reviewed this document and I authorize this work to commence as written.

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REVISION HISTORY

REVISION	SECTION(S)	PAGE #	DATE	List of Reviewers	DESCRIPTION
1	All	All	04AUG2016	A. Ackerman, K. Rubino, K. Wehunt	First Issue. Validation waived by the author M. Benmerrouche and the Acting Conduct of Operations Manager, S. Moss on 8/2/16.

ACRONYMS

3PW	Three Pole Wiggler	KB	Kirkpatrick-Baez
Be	Beryllium	LOTO	Lockout/Tagout
BIM	Beam intensity Monitor	mrad	Millirad
BM	Bending Magnet	mrem/hr	Millirem per hour
BPM	Beam Position Monitor	MSK	Mask
BTS	Booster to Storage Ring	MSLT	Mono Beam Slit
BRS	Bremsstrahlung Stop	NSLS-II	National Synchrotron Light Source II
CMS	Complex Materials Scattering	PFM	Primary (toroidal) Focusing Mirror
CO	Collimator	PSD	Photon Science Division
DMM	Double Multilayer Monochromator	PSH	Photon Shutter
ESH	Environment, Safety and Health	RCT	Radiological Control Technician
FE	Front End	SAF	Safety Approval Form
FOE	First Optical Enclosure	SAXS	Small-angle X-ray Scattering
FS	Fluorescent Shutter	SBMS	Standards-Based Management System
GB	Gas Bremsstrahlung	SR	Synchrotron Radiation
GV	Gate Valve	WAXS	Wide-angle X-ray Scattering
IP	Ion Pump	WBS	White Beam Stop

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National Synchrotron Light Source II, Brookhaven National Laboratory			
Doc No. NSLSII-11BM-PRC-001	Author: M. Benmerrouche	Review Frequency: 3 yrs	Rev. 1
Title: Beamline CMS (11-BM) Radiation Survey Procedure			Effective Date: 04AUG2016

1 PURPOSE AND SCOPE

This purpose of this procedure is to perform a comprehensive commissioning radiation survey on the 11-BM beamline, as directed by PS-C-XFD-PRC-004, *NSLS-II Beamlines Radiation Safety Commissioning Plan*.

The following scenarios are covered in the *Beamline CMS (11-BM, 3PW) Comprehensive Commissioning Radiation Survey*, provided as Attachment A:

- I. GB Radiation Survey
 - a. Integrity of FOE (11-BM-A) and FOE photon shutter.
 - b. Integrity of components outside the FOE including transport pipe from 11-BM-A to 11-BM-B and inside 11-BM-B.
- II. White/Mono Beam Radiation Survey
 - a. Integrity of enclosure 11-BM-A and FOE photon shutter.
 - b. Integrity of transport pipe from 11-BM-A to 11-BM-B.
 - c. Integrity of enclosure 11-BM-B and beam stop on the downstream of 11-BM-B.

2 PREREQUISITES

- 2.1 Authorization/approval from the NSLS-II Director to initiate commissioning of the beamline has been received.
- 2.2 A Beamline System Readiness Checklist has been completed in accordance with PS-C-XFD-PRC-003, *Enabling Beamlines for Operations*.
- 2.3 The area(s) around the beamline are posted in accordance with SBMS Program Description: *Radiological Control Manual*.
- 2.4 All shutters closed.
- 2.5 FE slits wide open (near maximum extent range).

Note: If FE slits cannot be wide open, record the FE slits parameter here: _____

- 2.6 All beamline slits fully open.

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- 2.7 Monochromator Bragg angle moved to the lower limit (~0 degrees)
- 2.8 All mirrors retracted out from beam.

3 HAZARDS, CONTROLS AND LIMITS

- 3.1 If at any point during performance of this procedure a radiation dose rate 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.
- 3.2 Minor deviations on Attachment A are allowed in the field; however the deviation shall be documented and submitted to the PSD Director and the ESH Manager for review after the survey.
- 3.3 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.

4 PROCEDURE

Warning: Execution of this Comprehensive Commissioning Radiation Survey, 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.

Note: The step sequences of this procedure can be changed.

- 4.1 Authorized Beamline Staff and RCTs establish the initial conditions and record them on Attachment A, *Beamline CMS (11-BM, 3PW) Comprehensive Commissioning Radiation Survey*.
- 4.2 Authorized Beamline Staff and RCTs complete the comprehensive commissioning radiation survey in accordance with Attachment A.
- 4.3 Throughout the radiation survey, Authorized Beamline Staff ensure that the photon beam is where it should be using the appropriate diagnostic tools AND ensure that the FE shutter remains open.

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Note: Attachment A, with the filled information from the measurements, acts as the “Beamline Radiation Survey Interim Report.”

4.4 After the survey, the RCT provides the completed Beamline Radiation Survey Interim Report to the PSD Director and the ESH Manager for review.

5 REFERENCES

- 5.1 PS-C-CMD-PRC-002, *Records Management Procedure*
- 5.2 PS-C-XFD-PRC-003, *Enabling Beamlines for Operations*
- 5.3 PS-C-XFD-PRC-004, *NSLS-II Beamlines Radiation Safety Commissioning Plan*
- 5.4 PS-C-XFD-PRC-024, *Beamline Photon Shutter Centrally Controlled Lockout/Tagout Procedure*
- 5.5 SBMS Program Description: *Radiological Control Manual*

6 ATTACHMENTS

Attachment A, *Beamline CMS (11-BM, 3PW) Comprehensive Commissioning Radiation Survey*

Attachment B, *Beamline Enclosure Diagram, 11-BM-A (FOE)*

Attachment C, *Beamline Enclosure Diagram, 11-BM-B (Endstation)*

7 DOCUMENTATION

The following records are generated as a result of this Procedure, and shall be maintained in accordance with PS-C-CMD-PRC-002, *Records Management Procedure*:

- Completed Comprehensive Commissioning Radiation Surveys / Beamline Radiation Survey Interim Report

8 DEFINITIONS

None.

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Attachment A
Beamline CMS (11-BM, 3PW)
Comprehensive Commissioning Radiation Survey

Date: _____

Initial Settings:

Electron Beam Current: _____ Injection Rate: _____

BTS Injection Efficiency: _____

Straight Section Vacuum Condition: _____

DMM settings: _____

PFM settings: _____

KB Mirrors settings: _____

Survey start date and time: _____

Authorized Beamline Staff & RCTs:

Additional information if available: _____

The following scenarios are covered:

I. GB Radiation Survey

- a. Integrity of FOE (11-BM-A) and FOE photon shutter.
- b. Integrity of components outside the FOE including transport pipe from 11-BM-A to 11-BM-B and inside 11-BM-B.

II. White/Mono Beam Radiation Survey

- a. Integrity of enclosure 11-BM-A and FOE photon shutter.
- b. Integrity of transport pipe from 11-BM-A to 11-BM-B.
- c. Integrity of enclosure 11-BM-B and beam stop on the downstream of 11-BM-B.

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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 the FE, survey the upstream wall of the FOE to make sure no radiation comes through.

Note: Detailed diagrams of 11-BM-A and 11-BM-B are included in Attachments B and C.

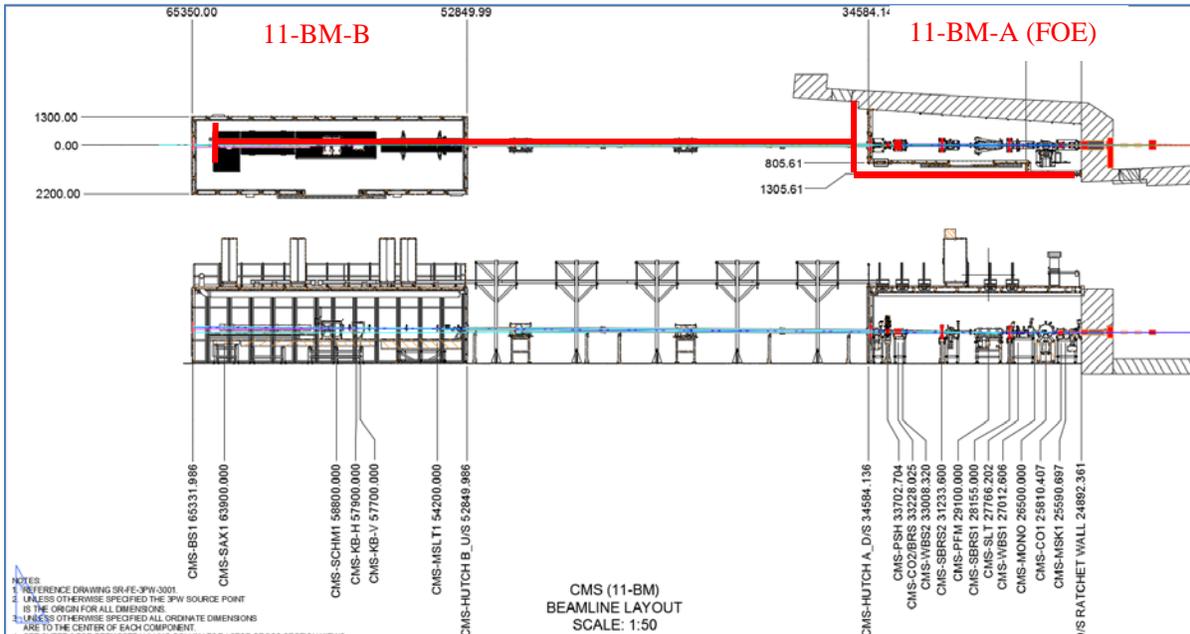
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I. Check the integrity of FOE (11-BM-A), transport pipe, and Photon Shutter.

- GB/SR radiation survey: FE slits fully open, FE shutters open, FOE photon shutter closed, DMM monochromator in 'out of the beam" position (both crystals flat to maximize beam on WBS1). Survey all walls and roof of 11-BM-A, the area around the transport pipe as well as exit mono beam transport pipe inside the 11-BM-B enclosure to verify the integrity of 11-BM-A PSH.**

Set DMM to nominal position.



Straight Section Vacuum Conditions: _____

Radiation Survey Results _____

Additional information/comments:

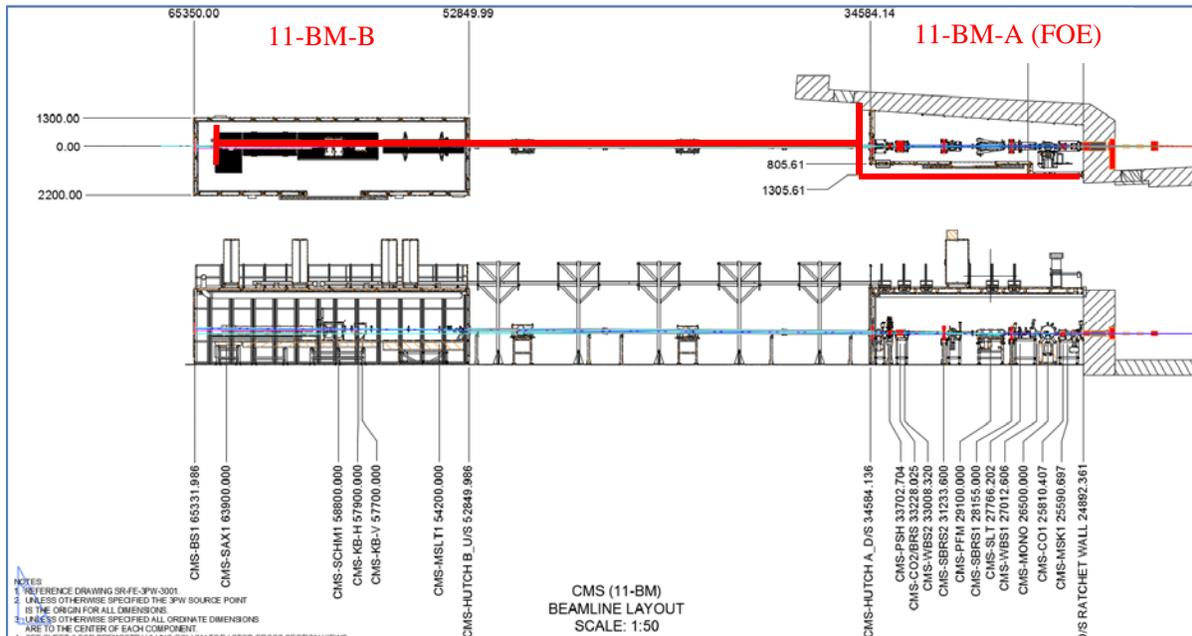
Angle of DMM _____ **Angle of PFM** _____

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

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2. **GB/SR radiation survey: FE slits fully open, FE shutters open, FOE photon shutter closed, DMM monochromator in nominal position (nominal incident angle is 23.2 mrad).** Survey all walls and roof of 11-BM-A, the area around the transport pipe as well as exit mono beam transport pipe inside the 11-BM-B enclosure to verify the integrity of 11-BM-A PSH.



Straight Section Vacuum Conditions: _____

Radiation Survey Results _____

Additional information/comments:

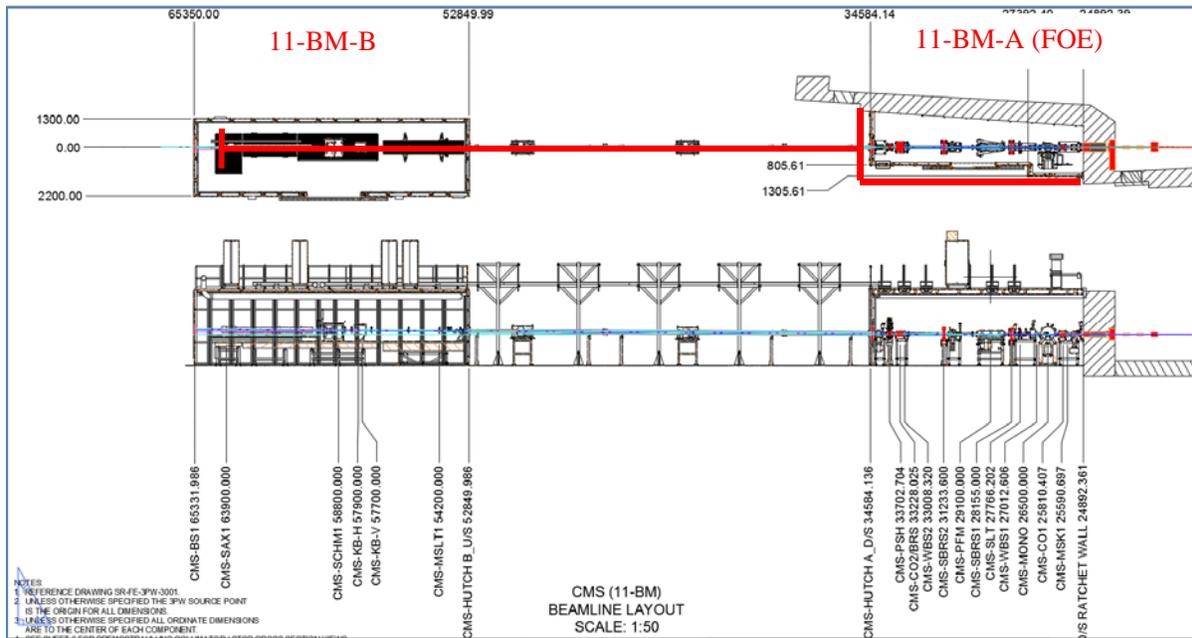
Angle of DMM _____ Angle of PFM _____

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

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- GB/SR radiation survey: FE slits fully open, FE shutters open, FOE photon shutter closed, DMM monochromator in nominal position, insert PFM at nominal incident angle, monochromatic beam on 11-BM-A PSH. Survey all walls and roof of 11-BM-A, the area around the transport pipe as well as exit mono beam transport pipe inside the 11-BM-B enclosure to verify the integrity of 11-BM-A PSH.**



Straight Section Vacuum Conditions: _____

Radiation Survey Results _____

Additional information/comments:

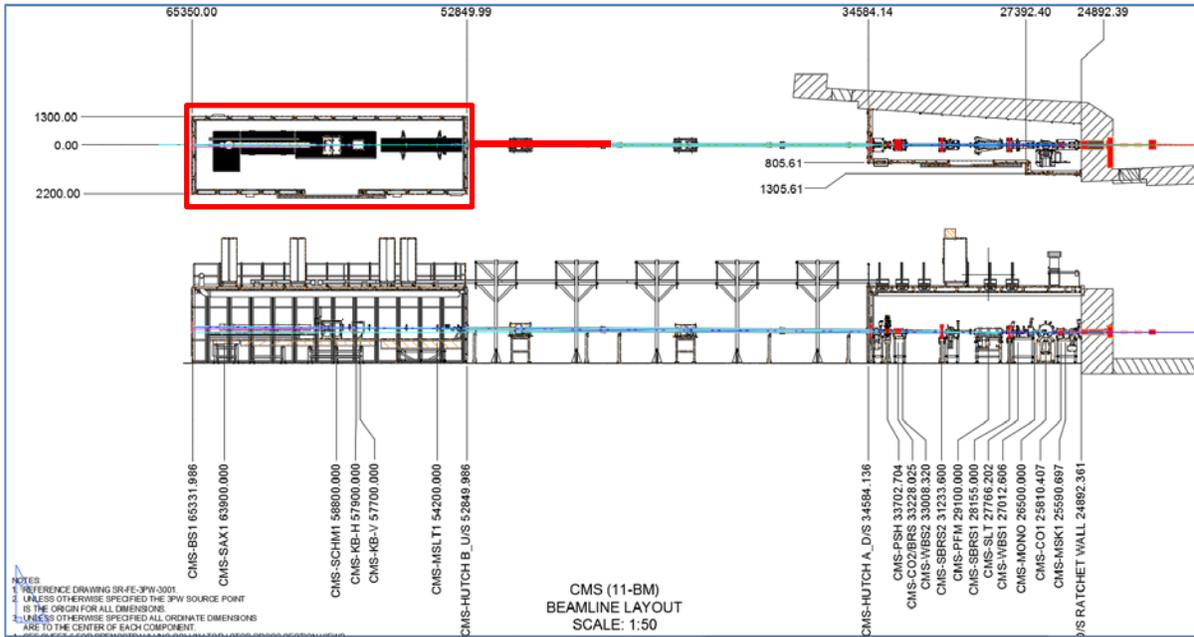
Angle of DMM _____ **Angle of PFM** _____

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

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6. Same as step 5, but close the mono beam slits (MSLT1). Survey all walls and roof of 11-BM-B and upstream transport pipe.



Straight Section Vacuum Conditions: _____

Radiation Survey Results _____

Additional information/comments:

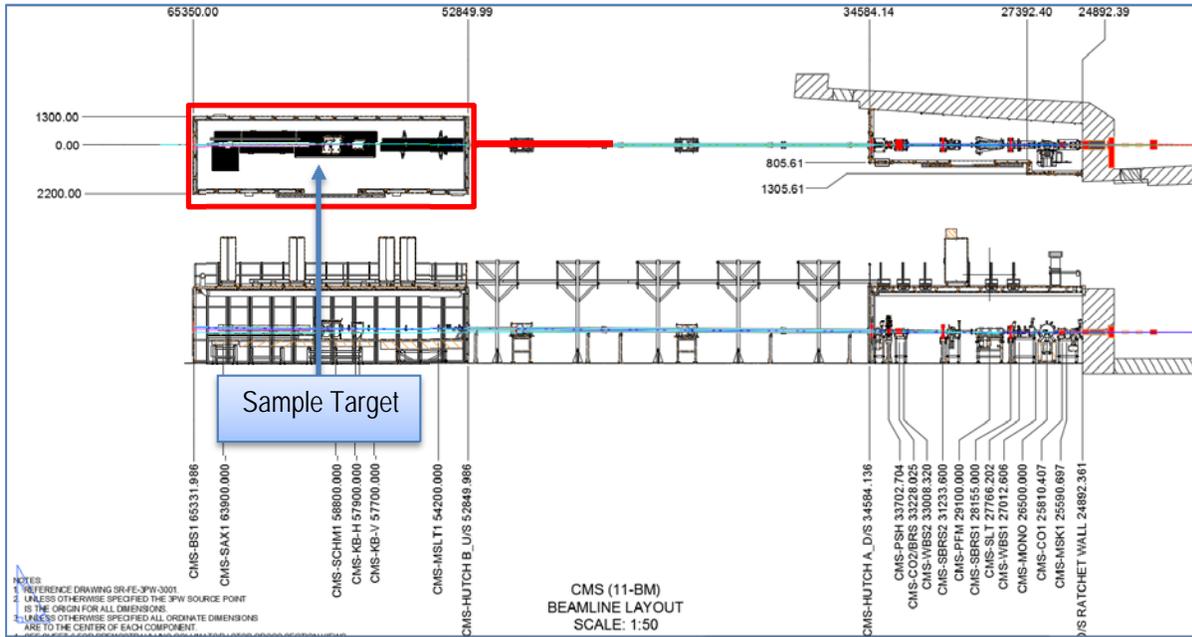
Angle of DMM _____ *Angle of PFM* _____

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

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7. Same as step 5, but insert standard aluminum sheet (1-2mm thick) sample target at sample location. Survey all walls and roof of 11-BM-B and upstream transport pipe.



Straight Section Vacuum Conditions: _____
Radiation Survey Results _____
Additional information/comments:

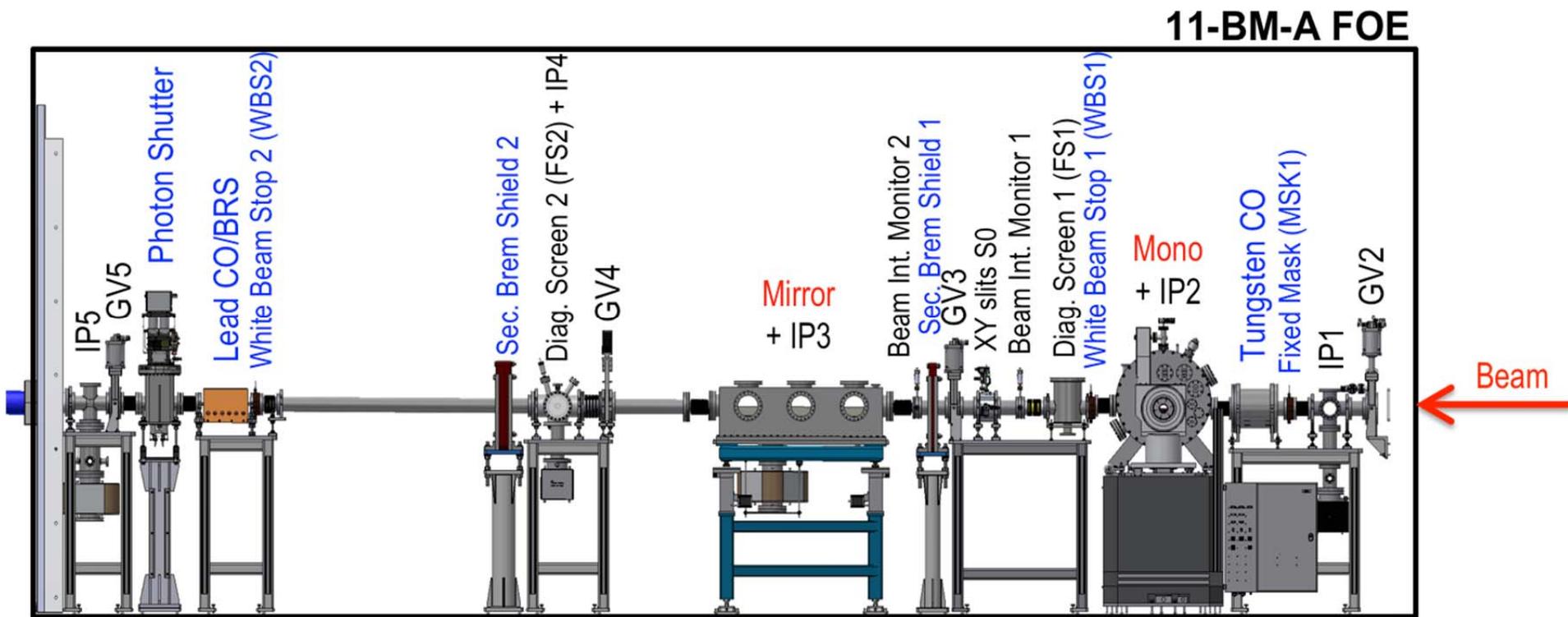
Angle of DMM _____ **Angle of PFM** _____

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

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Attachment B – Beamline Enclosure Diagram, 11-BM-A (FOE)



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Attachment C – Beamline Enclosure Diagram, 11-BM-B (Endstation)

