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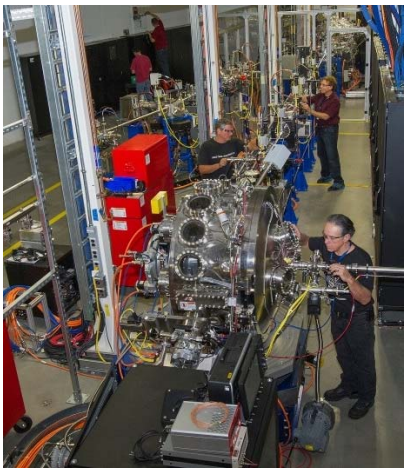
Doc No: NSLSII-28ID-PRC-001

NSLS-II PROCEDURE: BEAMLINES XPD/PDF (28-ID) RADIATION SURVEY PROCEDURE

January 5, 2018

Rev. 8

M. Benmerrouche



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National Synchrotron Light Source II, Brookhaven National Laboratory			
Doc No. NSLSII-28ID-PRC-001	Author: M. Benmerrouche	Review Frequency: 3 yrs	Rev. 8
Title: Beamlines XPD/PDF (28-ID) Radiation Survey Procedure			Effective Date: 05JAN2018

ESH Review:

1/7/2018

X Kim Wehunt

Kim Wehunt
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:

1/3/2018

X

Eric Dooryhee
XPD Lead Beamline Scientist
Signed by: Dooryhee, Eric

1/31/2018

X A. M. Milinda Abeykoon

Milinda Abeykoon
PDF Lead Beamline Scientist
Signed by: Abeykoon, Milinda

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

Authorization Basis Review:

1/8/2018

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:

1/12/2018

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
5	All	All	12DEC2014	E. Dooryhee F. Zafonte R. Lee	Added Version History Log; added new Hold Point for verifying Bremsstrahlung shields before going to an electron beam current above 150 mA; added the requirement to obtain permission from the PS PD Director and the PS ESH Manager to proceed with the radiation surveys at the Hold Points in sections II; technical edits and general formatting.
5	NA	NA	18FEB2015	E. Dooryhee F. Zafonte R. Lee	MPC No. 1. Added Note 2.
6	NA	NA	05JUN2015	E. Dooryhee F. Zafonte R. Lee	Removed hold points between different hutches. Waived low energy radiation survey, additional technical edits. Added more conditions in the under survey section. Removed mis-steering testing. Added check of Gas Bremsstrahlung. Removed a few very close-by targets.
7	NA	NA	14AUG2015	E. Dooryhee F. Zafonte R. Lee	Updated to include requirements for surveys performed in top-off mode (first bullet on page 2 and steps 1, 2 and 3). Added Injection Rate and BTS Injection Efficiency to initial settings to be recorded.
8	NA	NA	05JAN2018	M. Abeykoon S. Chitra E. Dooryhee E. Haas K. Wehunt	Reformatted/changed procedure number from PS-C-XFD-PRC-044 to meet the requirements of NSLSII-DPT-PDN-001, *NSLS-II Process Description: Management of NSLS-II Documents*. Reviewed in accordance with the required review cycle: Changed author from Z. Xia to M. Benmerrouche. Incorporated major revisions including new steps to accommodate the new PDF beamline.

ACRONYMS

BDM	Beam Diagnostic Module
BM	Bending Magnet
BTS	Booster to Storage Ring
DFF	Diffractometer
DLM	Double Laue crystal Monochromator
DW	Damping Wiggler
ESH	Environment, Safety and Health
FE	Front End
FLT	Filters
FOE	First Optical Enclosure
FS	Fluorescent Screen
GB	Gas Bremsstrahlung
HRM	High Resolution Monochromator
ID	Insertion De vice
LOTO	Lockout/Tagout
mrem/hr	millirem per hour
NSLS-II	National Synchrotron Light Source II
PDF	Pair Distribution Function
PSD	Photon Science Division
PSH	Photon Shutter
RCT	Radiological Control Technician
SAF	Safety Approval Form
SBM	Side Bounce crystal Monochromator
SBMS	Standards-Based Management System
SCW	White Beam Fluorescent screen (see attachment B)
SLM	Monochromatic Beam Slits (see attachment B)
SLT	Slits
SLW	White Beam Slits (see attachment B)
STW	White Beam Stop
VFM	Vertical Focusing Mirror
WB	White Beam
XPD	X-Ray Powder Diffraction

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1 PURPOSE AND SCOPE

The purpose of this procedure is to perform a comprehensive commissioning radiation survey of the 28-ID beamline, as directed by PS-C-XFD-PRC-004, *NSLS-II Beamlines Radiation Safety Commissioning Plan.*

The survey scenarios are covered in the *Beamline XPD/PDF (28-ID, DW 100) Comprehensive Commissioning Radiation Survey*, provided as Attachment A.

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 are closed.

2.5 FE slits are fully open (near maximum extent range).

Note: If FE slits cannot be fully open, record the FE slits parameter in Attachment A.

2.6 ID gap is closed to minimum gap after the first step of the GB radiation survey.

Note: If ID cannot be closed to minimum gap, record the gap value in attachment A.

2.7 All beamline slits are fully open.

2.8 Pre-monochomator filters (FLT1) are retracted.

2.9 Post-monochromator white-beam filters (FLT2) are retracted.

2.10 Mirrors (VFM) are 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 on contact 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.

4 PROCEDURE

Note: 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 steps of the survey may be completed out of sequence.

4.1 Authorized Beamline Staff and RCTs establish the initial conditions and record them on Attachment A, *Beamline XPD/PDF (28-ID, DW 100) 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 and with max intensity using the appropriate diagnostic tools AND ensure that the FE shutter remains open.

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 NSLSII-DPT-PDN-001, *Management of NSLS-II Documents and Records*

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 Memo from Z. Xia and E. Dooryhee to P. Zschack and R. Lee, XPD (28 ID) Monochromatic Beam Attenuation at Different Energies.

5.6 SBMS Program Description: *Radiological Control Manual*

6 ATTACHMENTS

Attachment A, *Beamline XPD/PDF (28-ID, DW 100) Comprehensive Commissioning Radiation Survey*

Attachment B, *Beamline Enclosures and Components Diagram*

7 DOCUMENTATION

The following records are generated as a result of this procedure, and shall be maintained in accordance with NSLSII-DPT-PDN-001, *Management of NSLS-II Documents and Records*:

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

8 DEFINITIONS

None.

If you have any questions or feedback regarding this document, please click this link.

Attachment A
Beamline XPD/PDF (28-ID, DW 100)
Comprehensive Commissioning Radiation Survey

Date: _____

The following scenarios are covered:

Note: The transport pipes (between 28ID-A and 28ID-B and inside hutch B) integrity check is included in this radiation survey procedure.

I. **28 ID-A Integrity:** White beam on white beam stop, filters, white beam (WB) slits, Glidcop block (FS holder), monochromator crystals, monochromatic beam on mirrors and photon shutters (monochromatic beam optimized for energy and flux).

II. **28 ID-B Integrity:** Monochromatic beam on slits, monochromatic beam stop, target (Al or Si).

III. **28 ID-C Integrity:** Monochromatic beam on slits, monochromatic beam stop, target (Al or Si).

IV. **28ID-D Integrity:** Monochromatic beam on monochromatic beam stop, target (Al or Si, location changeable).

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: If filtering happens to be insufficient, the monochromator first crystal is at risk. In this case, no monochromatic beam can be transported downstream. Therefore only a survey with an attenuated (filtered) monochromatic beam is possible.

Initial Settings:

Note: The step sequences of this procedure can be changed. Prior to executing configuration 2, the survey needs to be suspended for an extended period of time while the DLM and SBM crystals are adjusted in position and the Monochromator vessels pumped out to within the nominal operating pressure range.

Check the configuration used for the Radiation Survey: ☐**Configuration 1** ☐**Configuration 2**

Configuration 1: Nominal Beamline Operation, i.e. attenuated white (or pink) beam

Component	FE SLT	FE PSH	DLM First Crystal	SBM Crystal
Position:	Partially open	open	In the beam	In the beam

Stored Electron Beam Current: _____
Injection Rate: _____BTS Injection Efficiency: _____
Straight Section Vacuum Condition: _____ID Gap: _____
FE Slits settings: _____
FLT1 setting (1: Inserted, 0: Retracted): _____
FLT2 setting (1: Inserted, 0: Retracted): _____

Survey start date and time: _____
Signature (ESH) _____ ***Signature (Beamline)*** _____

Additional information: _____
_____
_____

Configuration 2: Maximum White Beam Power

Component	FE SLT	FE PSH	FLT1	FLT2	DLM First Crystal	SBM crystal
Position:	Fully open	open	00000 (1: Inserted, 0: Retracted)	out	Out of the beam	Out of the beam

Stored Electron Beam Current: _____
Injection Rate: _____BTS Injection Efficiency: _____
Straight Section Vacuum Condition: _____ID Gap: _____
FE Slits settings: _____

Survey start date and time: _____
Signature (ESH) _____ ***Signature (Beamline)*** _____

Additional information: _____
_____
_____

I. Check the Integrity of 28ID-A (FOE) and PSH

1. **White beam Stop as scatter target:** while GB and white beam on white beam stop survey all walls, doors and roof of 28ID-A, and downstream XPD and PDF transport pipes behind downstream wall of 28ID-A, inside 28ID-B and 28ID-C where beam exit.

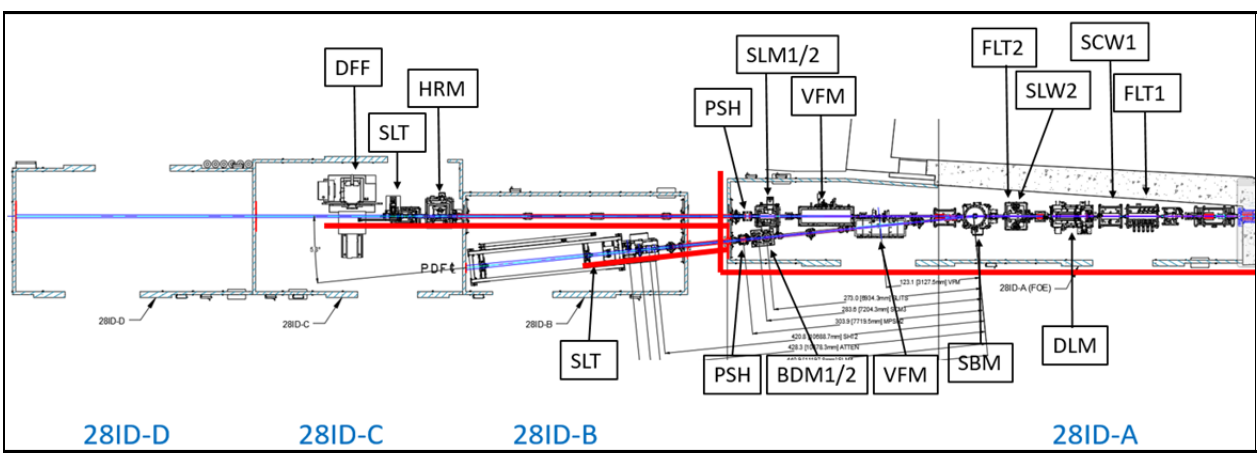
Component	FS SCW1	WB SLT SLW2	FLT2	XPD VFM	PDF VFM	XPD H/V SLT SLM1/2	PDF H/V SLT BDM1/2	XPD PSH	PDF PSH
Position:	Out	Open	Out	Out	Out	Open	Open	Closed	Closed

2. **White beam Stop as scatter target:** while GB and white beam on white beam stop survey downstream XPD transport pipe across the egress and shielded beam pipe inside 28ID-B.

Component	FS SCW1	WB SLT	FLT2	XPD VFM	PDF VFM	XPD H/V SLT	PDF H/V SLT	XPD PSH	PDF PSH
Position:	Out	Open	Out	Out	Out	Open	Open	Open	Closed

3. **White beam Stop as scatter target:** while GB and white beam on white beam stop survey downstream PDF transport pipe across the egress and 28ID-C upstream wall.

Component	FS SCW1	WB SLT	FLT2	XPD VFM	PDF VFM	XPD H/V SLT	PDF H/V SLT	XPD PSH	PDF PSH
Position:	Out	Open	Out	Out	Out	Open	Open	Closed	Open



Straight Section Vacuum Conditions: _____

Beamline moveable components settings (if different from initial settings)

FLT1 setting: _____ ***FLT2 setting:*** _____

DLM setting: _____ ***SBM setting:*** _____

XPD VFM setting: _____ ***PDF VFM setting:*** _____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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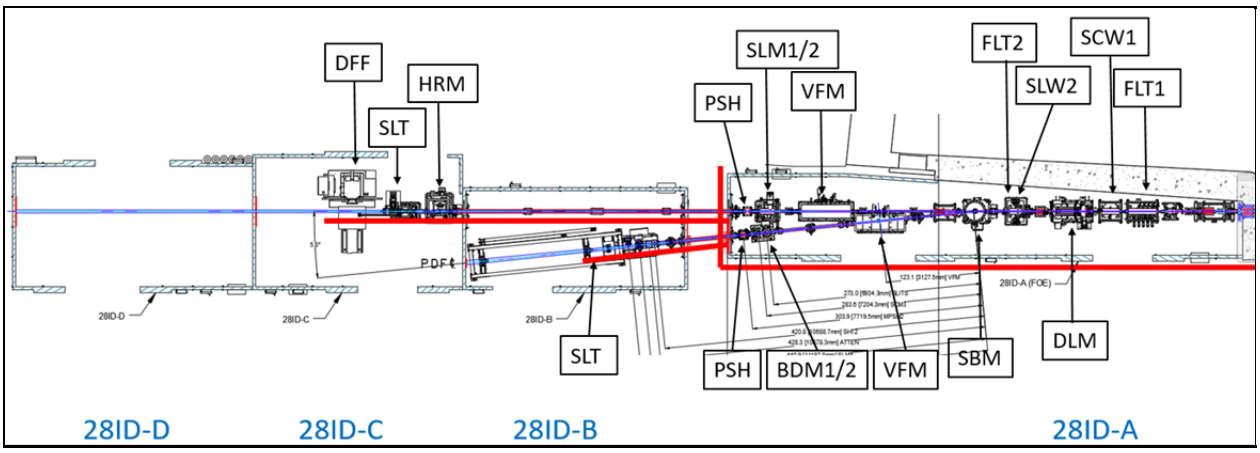
_____

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

4. **Glidcop target (FS Holder) as scatter target:** Survey all walls, doors and roof of 28ID-A, downstream XPD and PDF transport pipes behind downstream wall of 28ID-A, and inside 28ID-B and 28ID-C.

Component	FS SCW1	WB SLT SLW2	FLT2	XPD VFM	PDF VFM	XPD H/V SLT SLM1/2	PDF H/V SLT BDM1/2	XPD PSH	PDF PSH
Position:	In	Open	Out	Out	Out	Open	Open	Closed	Closed



Straight Section Vacuum Conditions: _____

Beamline moveable components settings (if different from initial settings)
FLT1 setting: _____ ***FLT2 setting:*** _____
DLM setting: _____ ***SBM setting:*** _____
XPD VFM setting: _____ ***PDF VFM setting:*** _____

Direct Frisk Survey Results: ☐IFB ☐other (described below)
Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:
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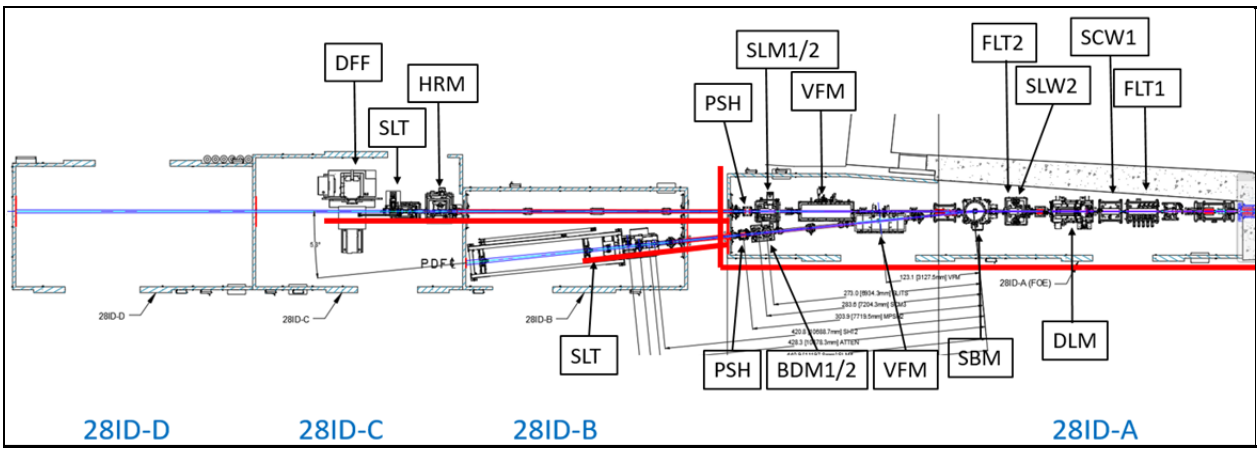
Signature (ESH) _____ ***Signature (Beamline)*** _____

5. **White beam slits as scatter target:** While GB and white beam on white beam slits survey all walls, doors and roof of 28ID-A, downstream XPD and PDF transport pipes behind downstream wall of 28ID-A, and inside 28ID-B and 28ID-C.

Component	FS SCW1	WB SLT SLW2	FLT2	XPD VFM	PDF VFM	XPD H/V SLT SLM1/2	PDF H/V SLT BDM1/2	XPD PSH	PDF PSH
Position:	Out	Closed	Out	Out	Out	Open	Open	Closed	Closed



Straight Section Vacuum Conditions: _____

Beamline moveable components settings (if different from initial settings)

FLT1 setting: _____ ***FLT2 setting:*** _____

DLM setting: _____ ***SBM setting:*** _____

XPD VFM setting: _____ ***PDF VFM setting:*** _____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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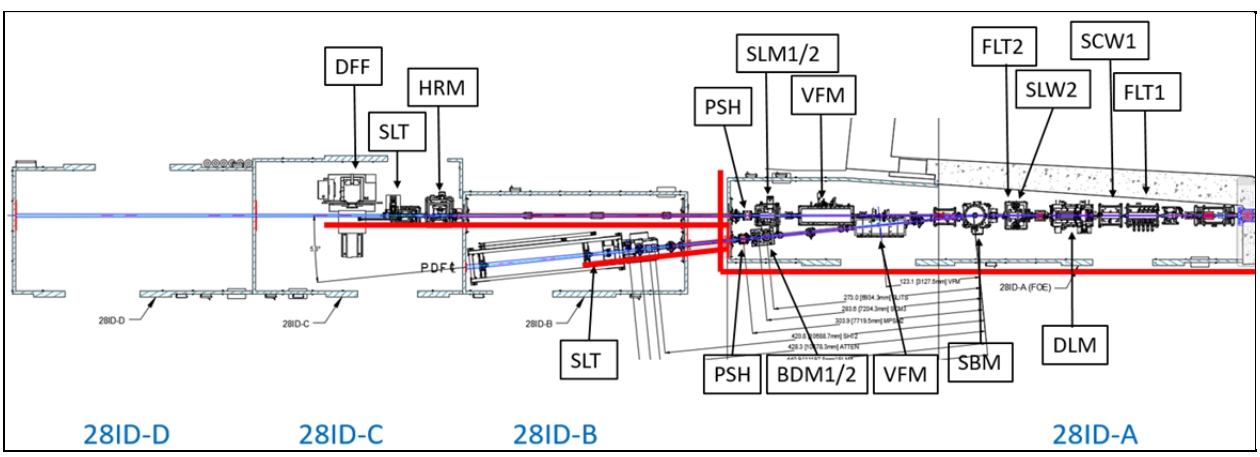
Signature (ESH) _____ ***Signature (Beamline)*** _____

<u>Note</u>: All of the following steps shall only be executed in configuration 1.

6. **DLM crystal and SBM crystal as scatter targets:** Insert as many FLT1 and FLT2 filters as DLM and SBM require (depending on ring current and FE slit opening; calculated allowed max power on the DLM and SBM crystals is 300W), DLM crystal set at the hard energy end of useful range (40 to 70 keV range), white beam on DLM, monochromatic beam (optimized for maximum Energy/Flux) on PSH. SBM crystal set at the hard energy end of useful range (35 to 120 keV range, white beam on SBM, monochromatic beam (optimized for maximum Energy/Flux) on PSH. Survey all walls, doors and roof of 28ID-A, downstream XPD and PDF transport pipes behind downstream wall of 28ID-A, inside 28ID-B and 28ID-C at beam exit port.
   Use the DLM first crystal to mis-steer the beam downward/upward and survey the roof and walls of the 28ID-A and transport pipes.
   Use the SBM crystal to mis-steer the beam toward outboard/inboard of 28ID-A walls and survey the roof and walls of the 28ID-A and transport pipes.

Component	FS SCW1	WB SLT SLW2	FLT2	XPD VFM	PDF VFM	XPD H/V SLT SLM1/2	PDF H/V SLT BDM1/2	XPD PSH	PDF PSH
Position:	Out	Open	Out	Out	Out	Open	Open	Closed	Closed



Straight Section Vacuum Conditions: _____

Beamline moveable components settings (if different from initial settings)

FLT1 setting: _____ ***FLT2 setting:*** _____

DLM setting: _____ ***SBM setting:*** _____

XPD VFM setting: _____ ***PDF VFM setting:*** _____

Direct Frisk Survey Results: ☐IFB ☐other (described below)
Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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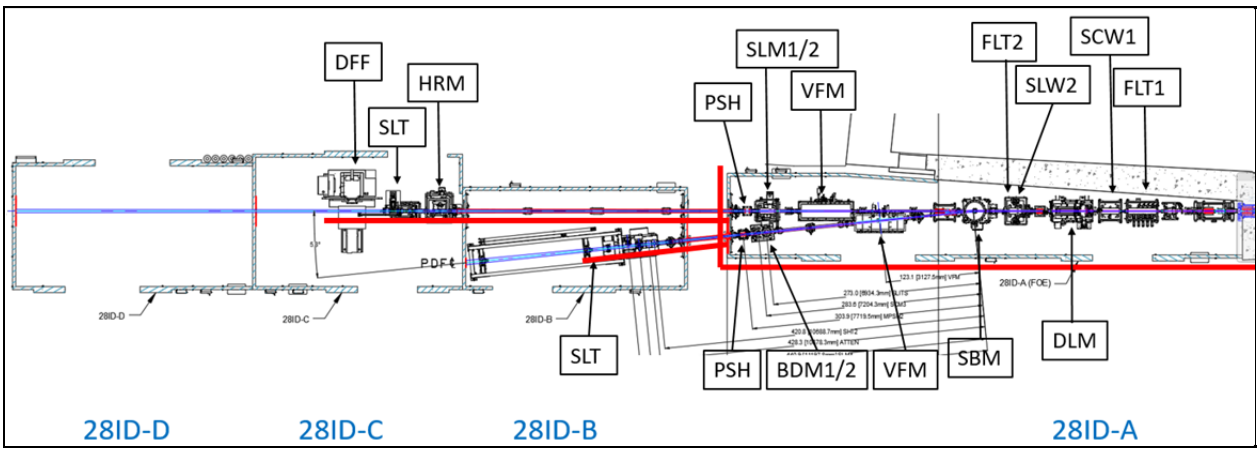
_____

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

<u>Note</u>: PDF SBM can accommodate 4 different crystals and radiation surveys should be completed for three of the crystal settings (39 keV, 64 keV, 117 keV). Radiation surveys should be completed for one crystal setting at a time and coordinated with the mounting/dismounting of crystals.

7. **XPD VFM and PDF VFM as scatter targets**. While monochromatic beam from DLM is on XPD VFM and monochromatic beam from SBM is on PDF VFM, survey all walls and roof of 28ID-A, along XPD and PDF transport pipes, and inside 28ID-B and 28ID-C.

Component	FS SCW1	WB SLT SLW2	FLT2	XPD VFM	PDF VFM	XPD H/V SLT SLM1/2	PDF H/V SLT BDM1/2	XPD PSH	PDF PSH
Position:	Out	Open	Out	In	In	Open	Open	Closed	Closed



Straight Section Vacuum Conditions: _____

Beamline moveable components settings (if different from initial settings)

FLT1 setting: _____ ***FLT2 setting:*** _____

DLM setting: _____ ***SBM setting:*** _____

XPD VFM setting: _____ ***PDF VFM setting:*** _____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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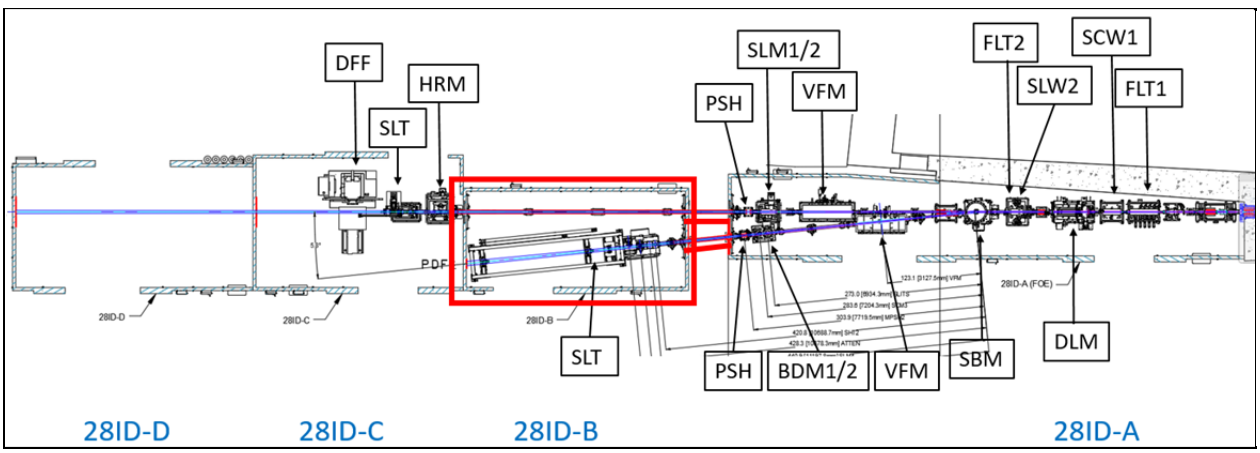
Signature (ESH) _____ ***Signature (Beamline)*** _____

II. Check the Integrity of Transport Pipes and 28-ID-B

8. **PDF and XPD monochromatic beam Slits in 28-ID-A as scatter target**. While monochromatic beam (optimized for maximum Energy/Flux) is on PDF and XPD Horizontal/Vertical slits in 28ID-A, survey all walls, doors and roof of 28ID-A and downstream PDF and XPD transport pipes behind downstream wall of 28ID-A.

Component	FS SCW1	WB SLT SLW2	FLT2	XPD VFM	PDF VFM	XPD H/V SLT SLM1/2	PDF H/V SLT BDM1/2	XPD PSH	PDF PSH
Position:	Out	Open	Out	Out	Out	Closed	Closed	Open Closed	Closed Open



Straight Section Vacuum Conditions: _____

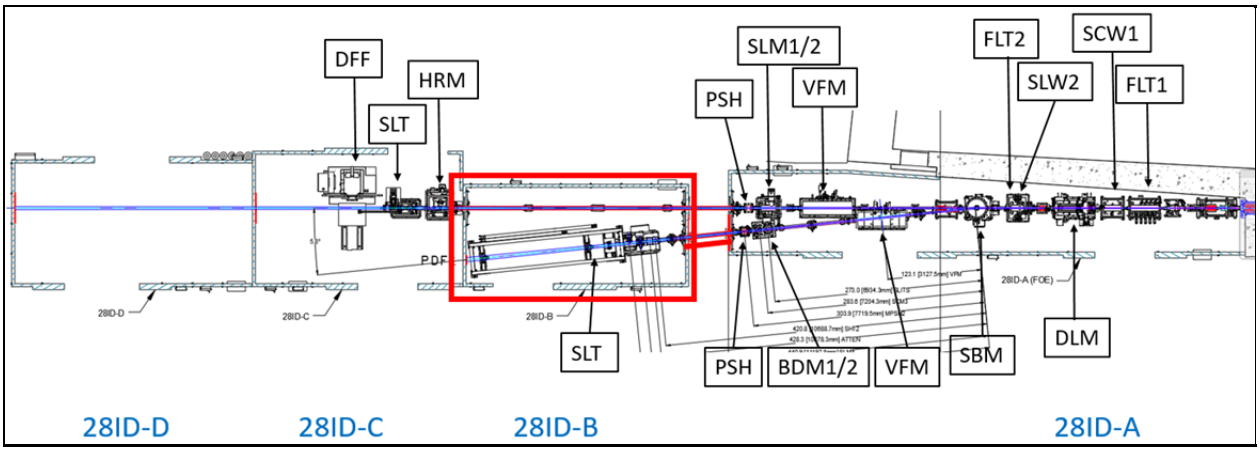
Beamline moveable components settings (if different from initial settings)
FLT1 setting: _____ ***FLT2 setting:*** _____
DLM setting: _____ ***SBM setting:*** _____
XPD VFM setting: _____ ***PDF VFM setting:*** _____

Direct Frisk Survey Results: ☐IFB ☐other (described below)
Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:
_____
_____
_____
_____
_____
Signature (ESH) _____ ***Signature (Beamline)*** _____

9. **Slits in 28ID-B as scatter target**. While monochromatic beam (optimized for maximum Energy/Flux) is on Horizontal/Vertical slits in 28ID-B, survey all walls, door and roof of 28ID-B and PDF transport pipe.

Component	FS SCW1	WB SLT SLW2	FLT2	XPD VFM	PDF VFM	XPD H/V SLT SLM1/2	PDF H/V SLT BDM1/2	XPD PSH	PDF PSH
Position:	Out	Open	Out	Out	Out	Open	Open	Open	Open



Straight Section Vacuum Conditions: _____

Beamline moveable components settings (if different from initial settings)
FLT1 setting: _____ ***FLT2 setting:*** _____
DLM setting: _____ ***SBM setting:*** _____
XPD VFM setting: _____ ***PDF VFM setting:*** _____

Direct Frisk Survey Results: ☐IFB ☐other (described below)
Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:
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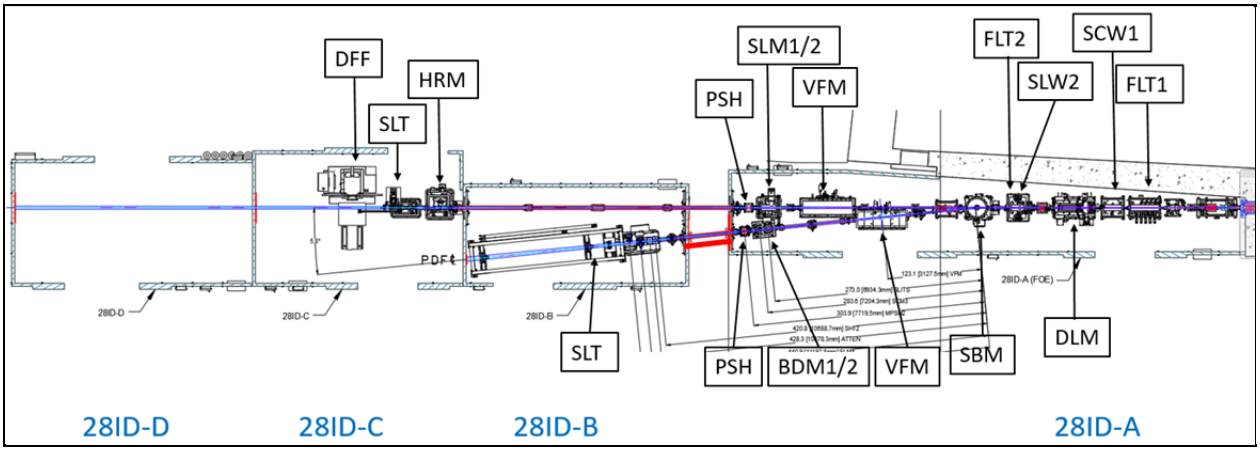
_____

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

10. **VFM in. Use the PDF VFM to mis-steer the beam toward the transport pipe and survey along the PDF transport pipe.**

Component	FS SCW1	WB SLT SLW2	FLT2	XPD VFM	PDF VFM	XPD H/V SLT SLM1/2	PDF H/V SLT BDM1/2	XPD PSH	PDF PSH
Position:	Out	Open	Out	Out	In	Open	Open	Open	Open



Straight Section Vacuum Conditions: _____

Beamline moveable components settings (if different from initial settings)
FLT1 setting: _____ ***FLT2 setting:*** _____
DLM setting: _____ ***SBM setting:*** _____
XPD VFM setting: _____ ***PDF VFM setting:*** _____

Direct Frisk Survey Results: ☐IFB ☐other (described below)
Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:
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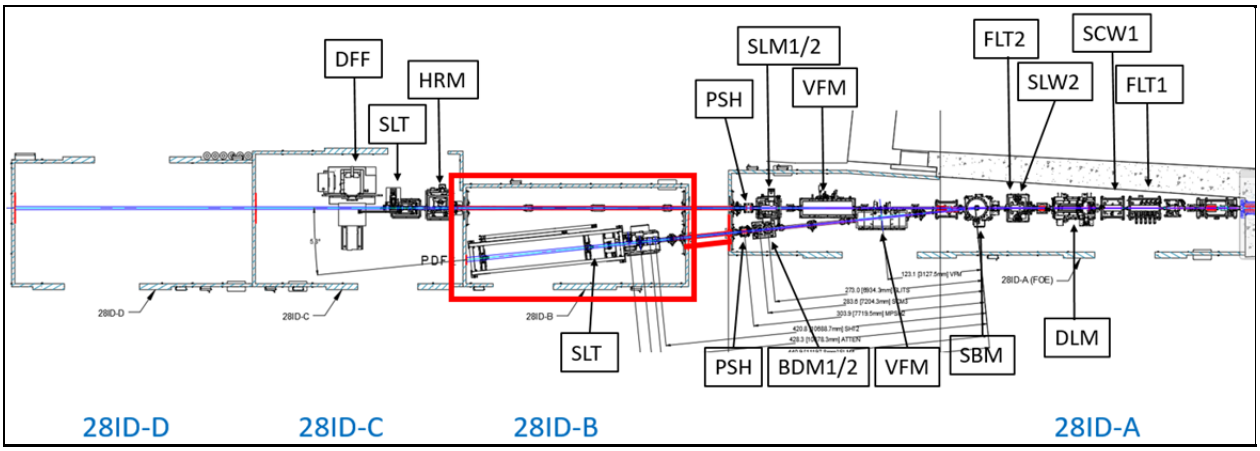
Signature (ESH) _____ ***Signature (Beamline)*** _____

11. **Sample target as scatter target**. While monochromatic beam (optimized for maximum Energy/Flux) is on sample target (Al/Si) in 28ID-B (located close to the 28ID-B door), survey all walls, door and roof of 28ID-B and upstream wall of 28-ID-C.

Component	FS SCW1	WB SLT SLW2	FLT2	XPD VFM	PDF VFM	XPD H/V SLT SLM1/2	PDF H/V SLT BDM1/2	XPD PSH	PDF PSH
Position:	Out	Open	Out	N/A	Out	N/A	Open	Closed	Open



Straight Section Vacuum Conditions: _____

Beamline moveable components settings (if different from initial settings)

FLT1 setting: _____ ***FLT2 setting:*** _____

DLM setting: _____ ***SBM setting:*** _____

XPD VFM setting: _____ ***PDF VFM setting:*** _____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

_____

_____

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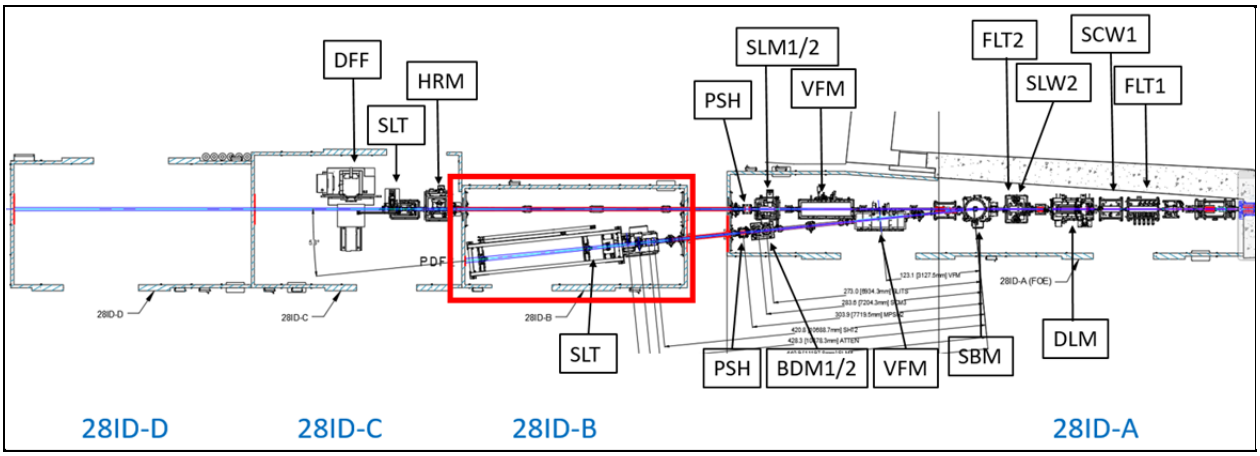
_____

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

12. **Monochromatic beam stop as a target**. While monochromatic beam (optimized for maximum Energy/Flux) is on the monochromatic beam stop located on the downstream wall of 28ID-B, survey all walls, door and roof of 28ID-B.

Component	FS SCW1	WB SLT SLW2	FLT2	XPD VFM	PDF VFM	XPD H/V SLT SLM1/2	PDF H/V SLT BDM1/2	XPD PSH	PDF PSH
Position:	Out	Open	Out	N/A	Out	N/A	Open	Closed	Open



Straight Section Vacuum Conditions: _____

Beamline moveable components settings (if different from initial settings)

FLT1 setting: _____ ***FLT2 setting:*** _____

DLM setting: _____ ***SBM setting:*** _____

XPD VFM setting: _____ ***PDF VFM setting:*** _____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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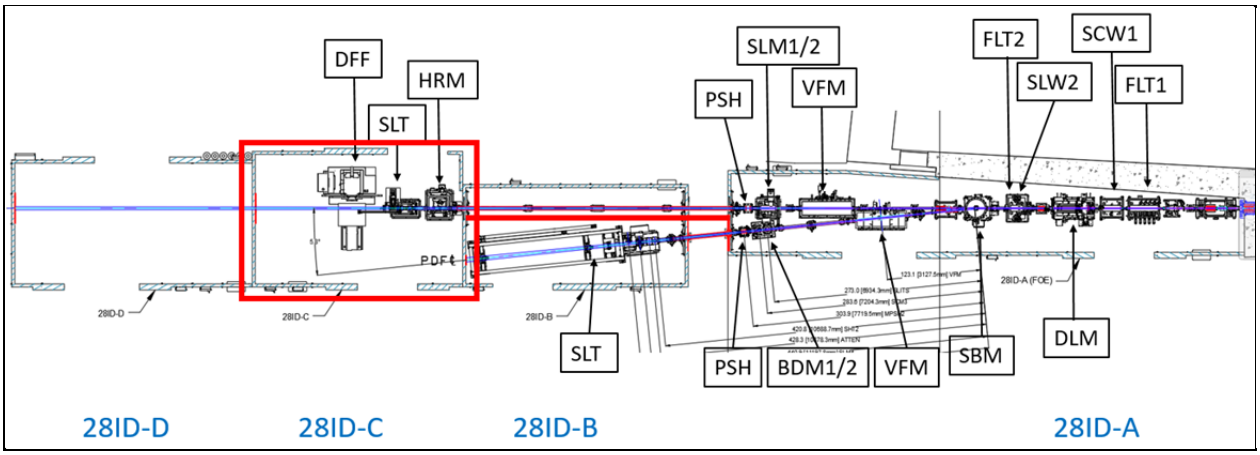
Signature (ESH) _____ ***Signature (Beamline)*** _____

III. Check the Integrity of Transport Pipes and 28-ID-C

13. **Slits in 28ID-C as scatter target**. With HRM out of the beam, FLT3 filters retracted and while monochromatic beam (optimized for maximum Energy/Flux) is on Horizontal/Vertical slits in 28ID-C, survey all walls, doors and roof of 28ID-C and XPD transport pipe in egress and 28-ID-B.

Component	FE PSH	FS SCW1	WB SLT SLW2	FLT2	XPD VFM	PDF VFM	XPD H/V SLT SLM1/2	PDF H/V SLT BDM1/2	XPD PSH	PDF PSH
Position:	Open	Out	Open	Out	Out	N/A	Open	N/A	Open	Closed



Straight Section Vacuum Conditions: _____

Beamline moveable components settings (if different from initial settings)

FLT1 setting: _____ ***FLT2 setting:*** _____

DLM setting: _____ ***SBM setting:*** _____

XPD VFM setting: _____ ***PDF VFM setting:*** _____

Direct Frisk Survey Results: ☐IFB ☐other (described below)

Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:

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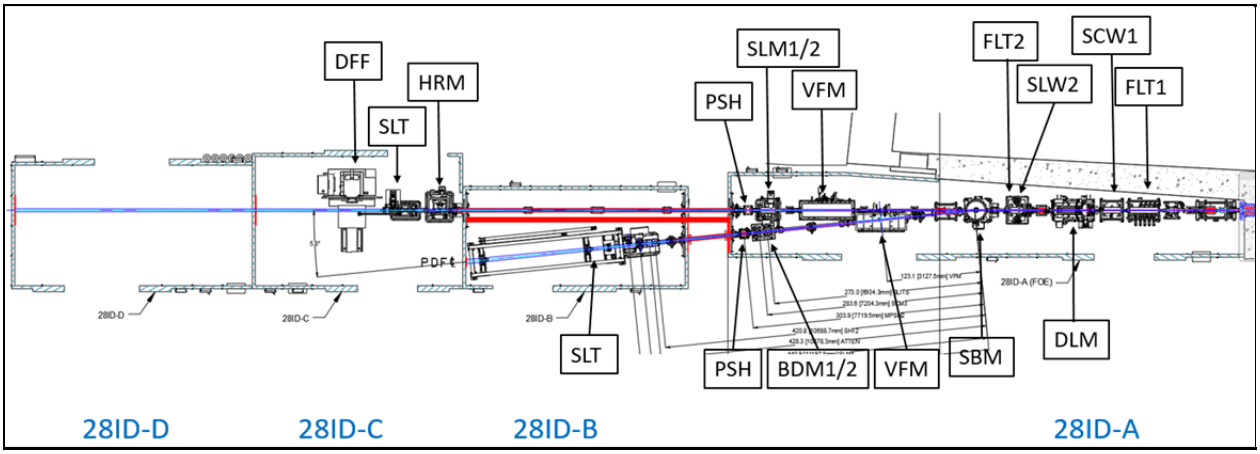
Signature (ESH) _____ ***Signature (Beamline)*** _____

14. **VFM In: Use the XPD VFM to mis-steer the beam toward the transport pipe and survey along the XPD transport pipe.**

Component	FE PSH	FS SCW1	WB SLT SLW2	FLT2	XPD VFM	PDF VFM	XPD H/V SLT SLM1/2	PDF H/V SLT BDM1/2	XPD PSH	PDF PSH
Position:	Open	Out	Open	Out	In	N/A	Open	N/A	Open	Closed



Straight Section Vacuum Conditions: _____

Beamline moveable components settings (if different from initial settings)
FLT1 setting: _____ ***FLT2 setting:*** _____
DLM setting: _____ ***SBM setting:*** _____
XPD VFM setting: _____ ***PDF VFM setting:*** _____

Direct Frisk Survey Results: ☐IFB ☐other (described below)
Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:
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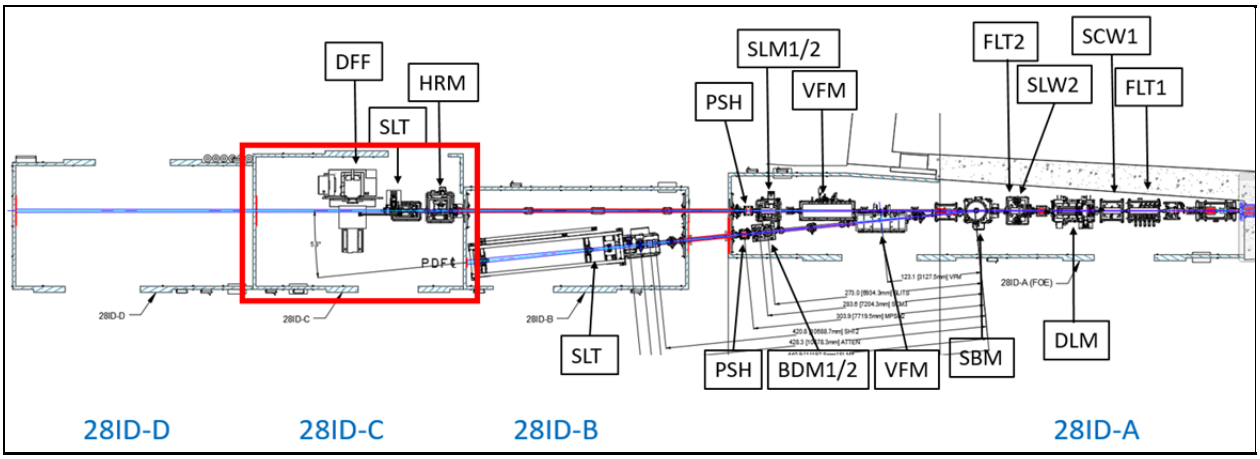
Signature (ESH) _____ ***Signature (Beamline)*** _____

15. **Sample target as scatter target**. While monochromatic beam (optimized for maximum Energy/Flux) is on sample target (Al/Si) in 28ID-C, survey all walls, doors and roof of 28ID-C.

Component	FS SCW1	WB SLT SLW2	FLT2	XPD VFM	PDF VFM	XPD H/V SLT SLM1/2	PDF H/V SLT BDM1/2	XPD PSH	PDF PSH
Position:	Out	Open	Out	Out	N/A	Open	N/A	Open	Closed



Straight Section Vacuum Conditions: _____

Beamline moveable components settings (if different from initial settings)
FLT1 setting: _____ ***FLT2 setting:*** _____
DLM setting: _____ ***SBM setting:*** _____
XPD VFM setting: _____ ***PDF VFM setting:*** _____

Direct Frisk Survey Results: ☐IFB ☐other (described below)
Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:
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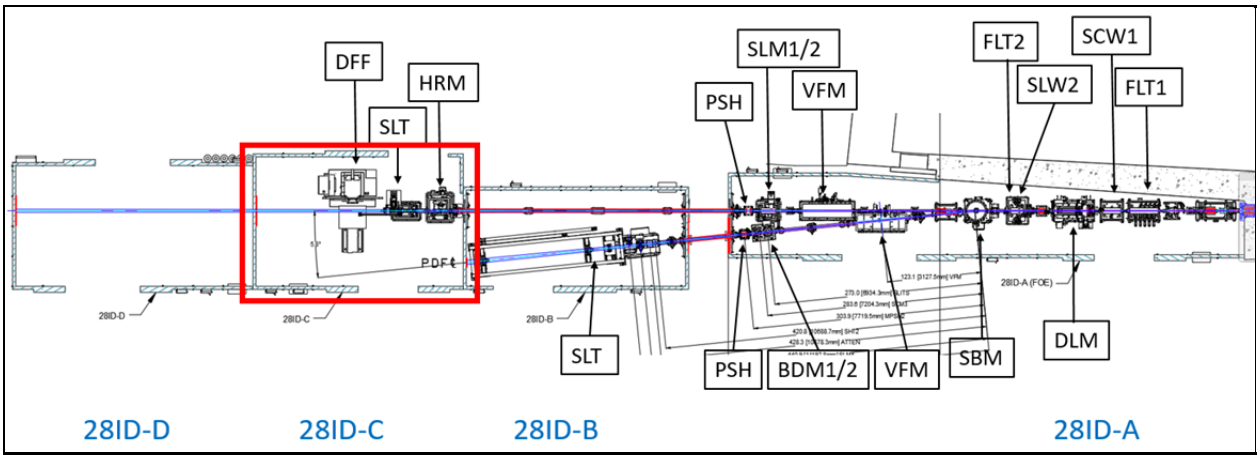
Signature (ESH) _____ ***Signature (Beamline)*** _____

16. **Monochromatic beam on monochromatic beam stop**. While monochromatic beam (optimized for maximum Energy/Flux) is on the monochromatic beam stop located on the downstream wall of 28ID-C, survey all walls, doors and roof of 28ID-C.

Component	FS SCW1	WB SLT SLW2	FLT2	XPD VFM	PDF VFM	XPD H/V SLT SLM1/2	PDF H/V SLT BDM1/2	XPD PSH	PDF PSH
Position:	Out	Open	Out	Out	N/A	Open	N/A	Open	Closed



Straight Section Vacuum Conditions: _____

Beamline moveable components settings (if different from initial settings)
FLT1 setting: _____ ***FLT2 setting:*** _____
DLM setting: _____ ***SBM setting:*** _____
XPD VFM setting: _____ ***PDF VFM setting:*** _____

Direct Frisk Survey Results: ☐IFB ☐other (described below)
Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:
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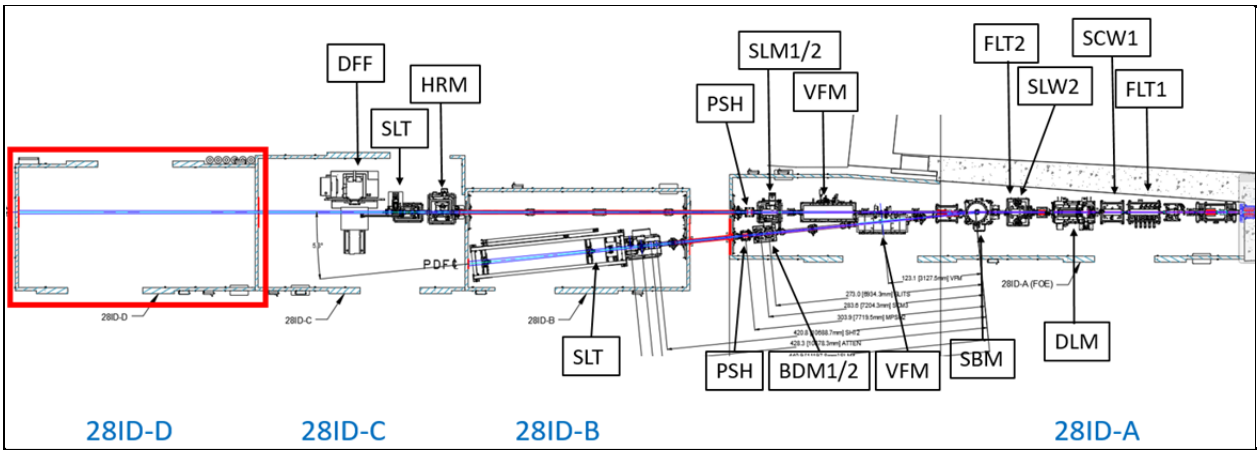
Signature (ESH) _____ ***Signature (Beamline)*** _____

IV. Check the Integrity of 28-ID-D

<u>Note</u>: this survey requires substantial configuration changes in the 28-ID-C enclosure. Therefore the following steps can be executed independently from the rest (using configuration 1), at the most convenient time prior to using 28ID-D enclosure.

17. **Sample target as scatter target. Retract or remove any 28ID-C component that might intercept the monochromatic beam (slits, collimator, beam stop, detectors, etc.), open the beam door and bring monochromatic beam into 28ID-D on a sample target (Al/Si).** The sample target location can be changed along beam path to measure radiation outside 28ID-D. Survey all walls, doors and roof of 28ID-D.

Component	FS SCW1	WB SLT SLW2	FLT2	XPD VFM	PDF VFM	XPD H/V SLT SLM1/2	PDF H/V SLT BDM1/2	XPD PSH	PDF PSH
Position:	Out	N/A	N/A	Out	N/A	Open	N/A	Open	N/A



Straight Section Vacuum Conditions: _____

Beamline moveable components settings (if different from initial settings)
FLT1 setting: _____ ***FLT2 setting:*** _____
DLM setting: _____ ***XPD VFM setting:*** _____

Direct Frisk Survey Results: ☐IFB ☐other (described below)
Dose Rate Survey Results: ☐IFB ☐other (described below)
Additional information/comments:

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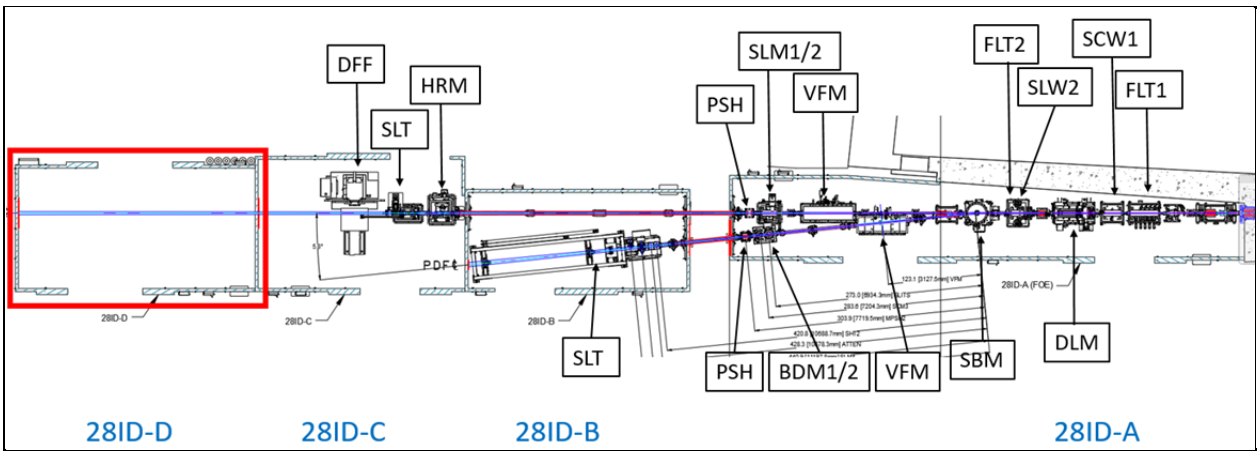
Signature (ESH) _____ ***Signature (Beamline)*** _____

18. **Monochromatic beam on monochromatic beam stop**. While monochromatic beam (optimized for maximum Energy/Flux) is on the monochromatic beam stop located on the downstream wall of 28ID-D, survey all walls, doors and roof of 28ID-D.

Component	FS SCW1	WB SLT SLW2	FLT2	XPD VFM	PDF VFM	XPD H/V SLT SLM1/2	PDF H/V SLT BDM1/2	XPD PSH	PDF PSH
Position:	Out	N/A	N/A	Out	N/A	Open	N/A	Open	N/A



Straight Section Vacuum Conditions: _____

Beamline moveable components settings (if different from initial settings)
FLT1 setting: _____ ***FLT2 setting:*** _____
DLM setting: _____ ***XPD VFM setting:*** _____

Direct Frisk Survey Results: ☐IFB ☐other (described below)
Dose Rate Survey Results: ☐IFB ☐other (described below)

Additional information/comments:
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Signature (ESH) _____ ***Signature (Beamline)*** _____

Integrated Survey Results:

*Integrated readings are performed for the duration of the survey.

1) Neutron
   a) Meter location: _____
      - Survey duration: _____
      - Result: _____
      - Dose rate: _____
   b) Meter location: _____
      - Survey duration: _____
      - Result: _____
      - Dose rate: _____
   c) Meter location: _____
      - Survey duration: _____
      - Result: _____
      - Dose rate: _____
2) Gamma
   a) Meter location: _____
      - Survey duration: _____
      - Result: _____
      - Exposure rate: _____
   b) Meter location: _____
      - Survey duration: _____
      - Result: _____
      - Exposure rate: _____
   c) Meter location: _____
      - Survey duration: _____
      - Result: _____
      - Exposure rate: _____
   d) Meter location: _____
      - Survey Duration: _____
      - Result: _____
      - Exposure rate: _____

Additional Information/Comments:

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Instrument Information:

Model Number	Serial Number	Calibration Due Date	Source Checked? (Y/N)

RCT Signature(s): _____

Date: _____

FS Rep Signature: _____

Date: _____

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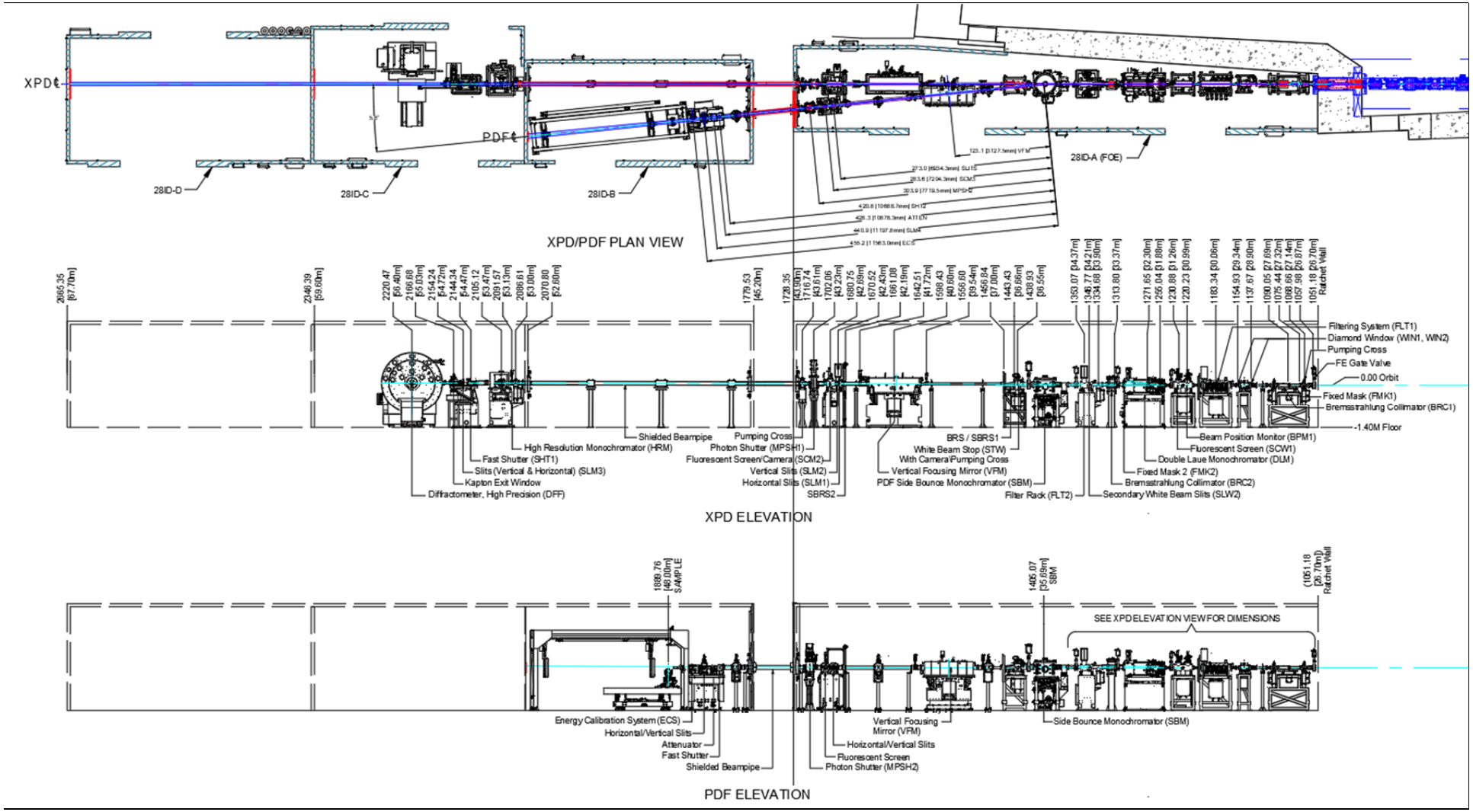
Attachment B – Beamline Enclosure and Components Diagram for 28-ID-A 28-ID-B, 28-ID-C and 28 ID-D