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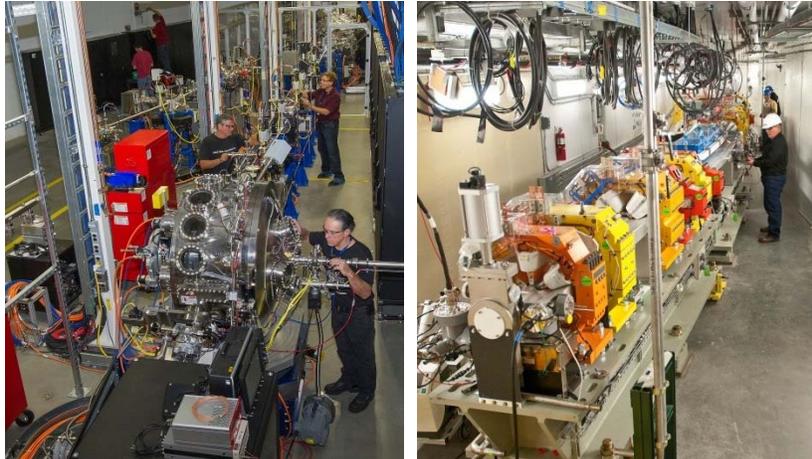
Doc No: NSLSII-8BM-PRC-001

## **NSLS-II PROCEDURE: BEAMLINE TES (8-BM) RADIATION SURVEY PROCEDURE**

August 5, 2016

Rev. 1

M. Benmerrouche



 **Think Safety. Act Safely.**

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### ESH Review:

8/5/2016

8/5/2016

X 

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

X Kim Wehunt for

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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:

8/4/2016

X Paul Northrup

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Paul Northrup  
TES Lead Beamline Scientist  
Signed by: Northrup, Paul

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

### Authorization Basis Review:

8/5/2016

X 

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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 

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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	05AUG2016	A. Ackerman E. Haas K. Rubino K. Wehunt	First Issue. Validation waived by the author M. Benmerrouche and the Acting Conduct of Operations Manager, S. Moss on 8//16.

### ACRONYMS

Be	Beryllium	mrem/hr	Millirem per hour
BLW	Bellows	MSK	Mask
BM	Bending Magnet	NSLS-II	National Synchrotron Light Source II
BPM	Beam Position Monitor	PBS	Pink Beam Stop
BTS	Booster to Storage Ring	PFM	Primary (toroidal) Focusing Mirror
CO	Collimator	PSD	Photon Science Division
ESH	Environment, Safety and Health	PSH	Photon Shutter
FE	Front End	RCT	Radiological Control Technician
FOE	First Optical Enclosure	SAF	Safety Approval Form
GB	Gas Bremsstrahlung	SBMS	Standards-Based Management System
GV	Gate Valve	SR	Synchrotron Radiation
IP	Ion Pump	SSA	Secondary Source Aperture
KB	Kirkpatrick-Baez	TES	Tender Energy Spectroscopy and Imaging
LOTO	Lockout/Tagout		
MONO	Monochromator		

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## 1 PURPOSE AND SCOPE

This purpose of this procedure is to perform a comprehensive commissioning radiation survey on the 8-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 TES (08-BM, BM) Comprehensive Commissioning Radiation Survey*, provided as Attachment A:

- I. GB Radiation Survey
  - a. Integrity of FOE (08-BM-A) and FOE photon shutter.
  - b. Integrity of components outside the FOE including transport pipe from 08-BM-A to 08-BM-B and inside 08-BM-B.
- II. SR Radiation Survey
  - a. Integrity of enclosure 08-BM-A and FOE photon shutter.
  - b. Integrity of transport pipe from 08-BM-A to 08-BM-B.
  - c. Integrity of enclosure 08-BM-B and beam stop on the downstream of 08-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.
- 2.7 Monochromator Bragg angle moved to the lower limit (~10 degrees)

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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 on the attachment 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 TES (08-BM, BM) 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 TES (08-BM, BM) Comprehensive Commissioning Radiation Survey*

Attachment B, *Elevation View inside TES FOE (Enclosure 8-BM-A)*

Attachment C, *Elevation View, Upstream half of TES Beam Transport Line (FOE to BLW10)*

Attachment D, *Elevation View, Downstream half of TES Beam Transport Line (Downstream of BLW10)*

## 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

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## 8 DEFINITIONS

None.

[If you have any questions or feedback regarding this document, please click this link.](#)

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**Attachment A**  
**Beamline TES (08-BM, BM)**  
**Comprehensive Commissioning Radiation Survey**

Date: \_\_\_\_\_

**Initial Settings:**

Electron Beam Current: \_\_\_\_\_ Injection Rate: \_\_\_\_\_

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

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

M1 settings: \_\_\_\_\_

M2 settings: \_\_\_\_\_

Monochromator settings: \_\_\_\_\_

PFM settings: \_\_\_\_\_

KB Mirrors settings: \_\_\_\_\_

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

Authorized Beamline Staff & RCTs:

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

**The following scenarios are covered:**

**I. GB Radiation Survey**

- a. Integrity of FOE (08-BM-A) and FOE photon shutter.
- b. Integrity of components outside the FOE including transport pipe from 08-BM-A to 08-BM-B and inside 08-BM-B.

**II. SR Radiation Survey**

- a. Integrity of enclosure 08-BM-A and FEO photon shutter.
- b. Integrity of transport pipe from 08-BM-A to 08-BM-B.
- c. Integrity of enclosure 08-BM-B and beam stop on the downstream of 08-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.

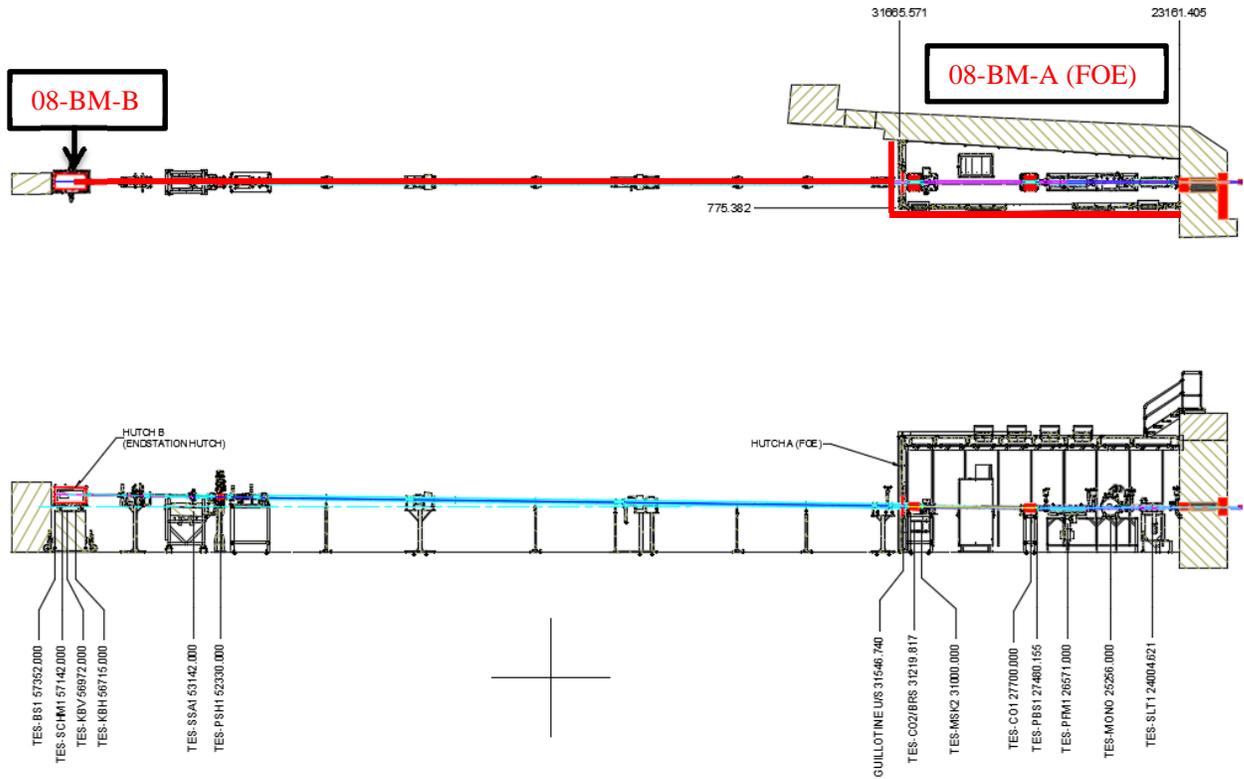
**Note:** Detailed diagrams of 08-BM are included in Attachments B, C and D.

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## I. Check the integrity of FOE (08-BM-A), transport pipe, and Photon Shutter 1.

- GB radiation survey: FE slits fully open, FE shutters open, PSH closed, mirrors M1, M2, and PFM 'out of the beam" position. Set MONO to nominal position.** Survey all walls and roof of 08-BM-A, the area around the transport pipe as well as inside 08-BM-B enclosure to verify the integrity of PSH.



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

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

**Additional information/comments:**

Angle of M1 \_\_\_\_\_ Angle of M2 \_\_\_\_\_

Angle of MONO \_\_\_\_\_ Angle of PFM \_\_\_\_\_

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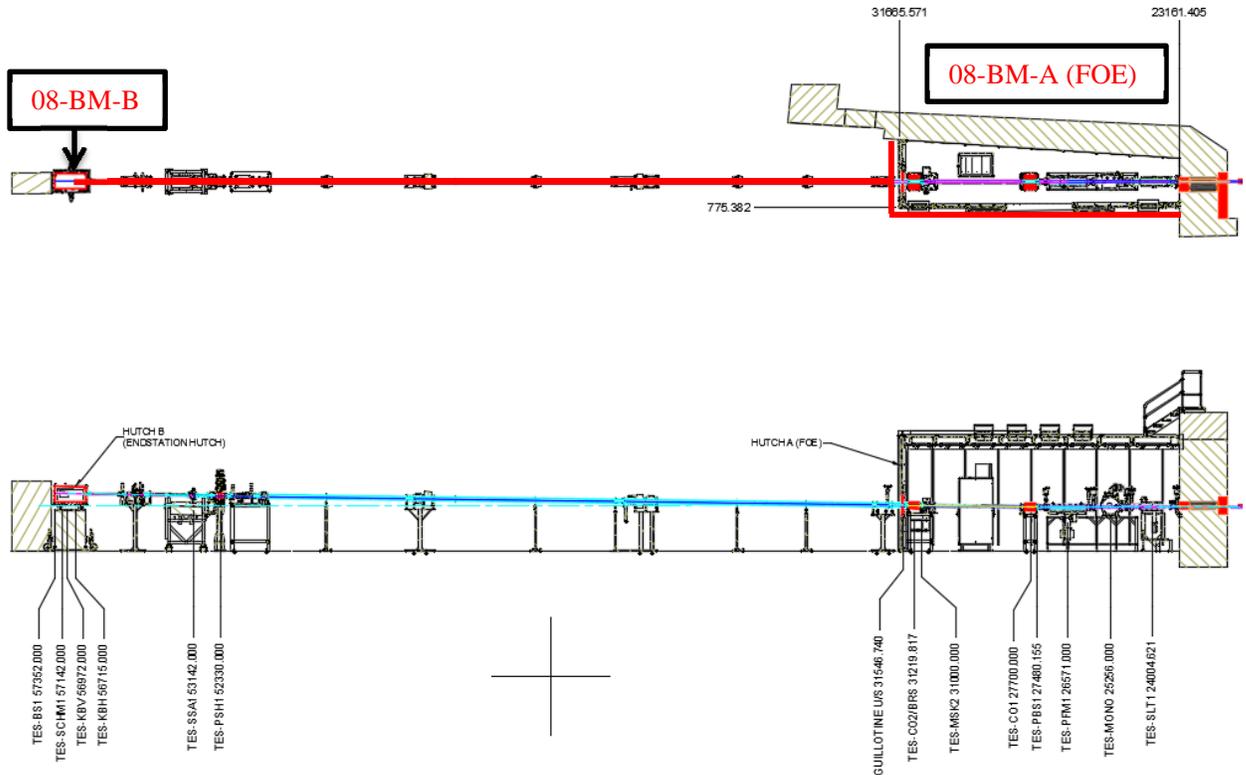
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2. **GB/SR radiation survey: FE slits fully open, FE shutters open, PSH closed, mirrors M1 and M2 and MONO in nominal positions, PFM 'out of the beam" position.** Survey all walls and roof of 08-BM-A, the area around the transport pipe as well as inside 08-BM-B enclosure to verify the integrity of PSH.



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

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

**Additional information/comments:**

**Angle of M1** \_\_\_\_\_ **Angle of M2** \_\_\_\_\_

**Angle of MONO** \_\_\_\_\_ **Angle of PFM** \_\_\_\_\_

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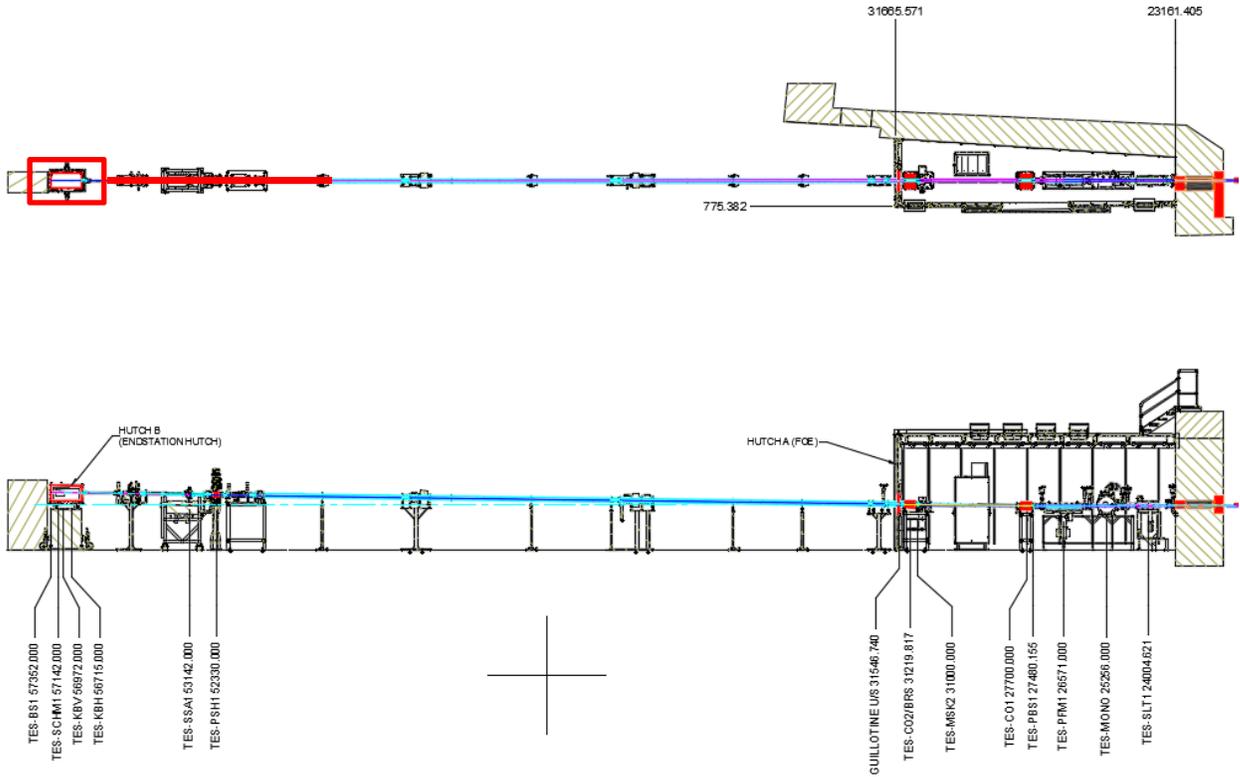
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## II. Check the integrity of 08-BM-B and transport pipe.

- GB/SR radiation survey: Repeat Step 2 with the PSH open.** Survey all walls and roof of 08-BM-B, and the area around the transport pipe downstream of the PSH.



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

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

**Additional information/comments:**

**Angle of M1** \_\_\_\_\_ **Angle of M2** \_\_\_\_\_

**Angle of MONO** \_\_\_\_\_ **Angle of PFM** \_\_\_\_\_

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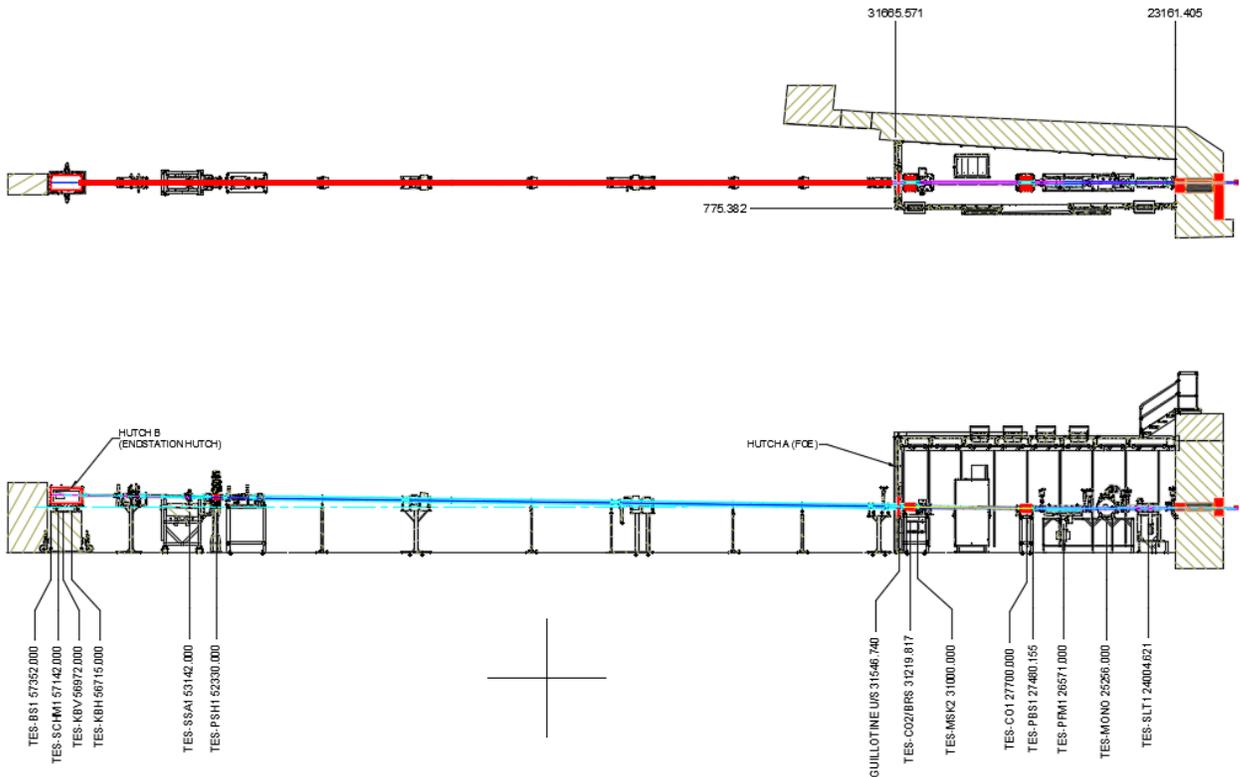
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4. **Monochromatic beam survey: FE slits fully open, FE shutters open, PSH open, mirrors M1, M2 and MONO in nominal positions, PFM in nominal position. Insert scatterers (diagnostic screens, GVs, and slits) one at a time upstream and downstream of PSH. Survey area around the transport pipe in the vicinity of the inserted target.**



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

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

*Additional information/comments:*

Angle of M1 \_\_\_\_\_ Angle of M2 \_\_\_\_\_

Angle of MONO \_\_\_\_\_ Angle of PFM \_\_\_\_\_

**Scatterers: GV8, Diagnostic 2 (insertable fluorescent screen), GV at Diagnostic 2, GV upstream of BPM, BPM entrance slits and fluorescent screen, GV downstream of BPM, PSH, SSA slits and fluorescent screen, Diagnostic 3 (slits and fluorescent screen), entrance slits (in beam pipe upstream of endstation).**

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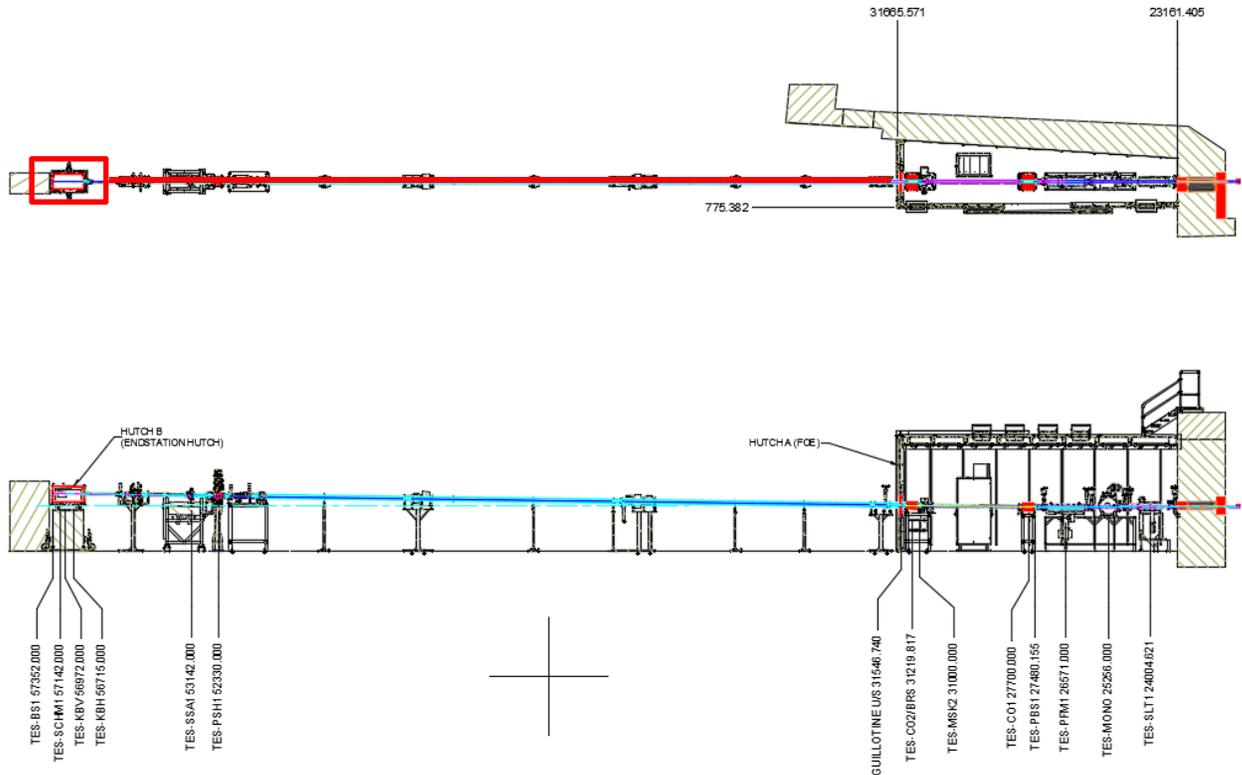
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5. **Monochromatic beam survey (mis-steering): FE slits fully open, FE shutters open, PSH open, mirrors M1 and M2 and MONO in nominal positions, set PFM to mis-steer mono beam up and down the transport pipe.** Survey all walls and roof of 08-BM-B, and the area around the transport pipe upstream & downstream of the PSH.



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

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

*Additional information/comments:*

Angle of M1 \_\_\_\_\_ Angle of M2 \_\_\_\_\_

Angle of MONO \_\_\_\_\_ Angle of PFM \_\_\_\_\_

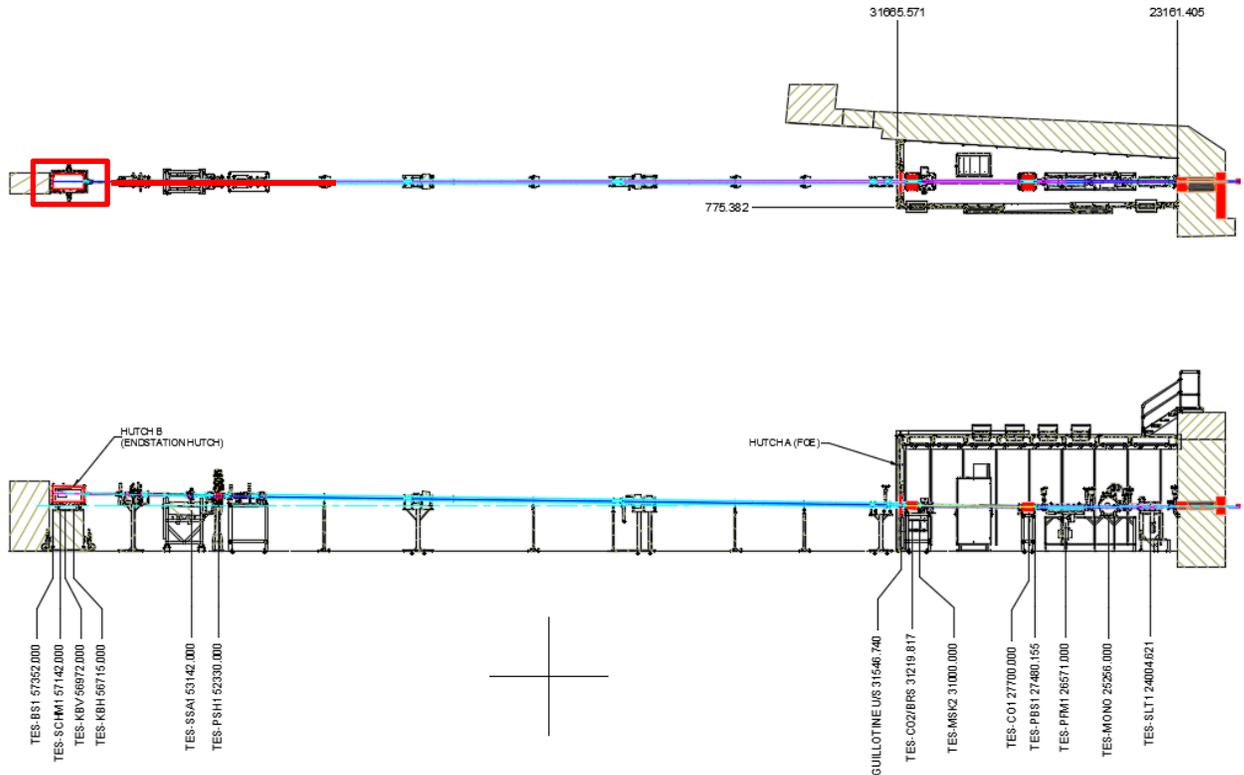
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6. **Monochromatic beam survey: FE slits fully open, FE shutters open, PSH open, mirrors M1, M2 and MONO in nominal positions, PFM in nominal position, KB Mirrors out of the beam, beam on mono beam stop.** Survey all walls and roof of 08-BM-B, and the area around the transport pipe downstream of the PSH.



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

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

**Additional information/comments:**

**Angle of M1** \_\_\_\_\_ **Angle of M2** \_\_\_\_\_

**Angle of MONO** \_\_\_\_\_ **Angle of PFM** \_\_\_\_\_

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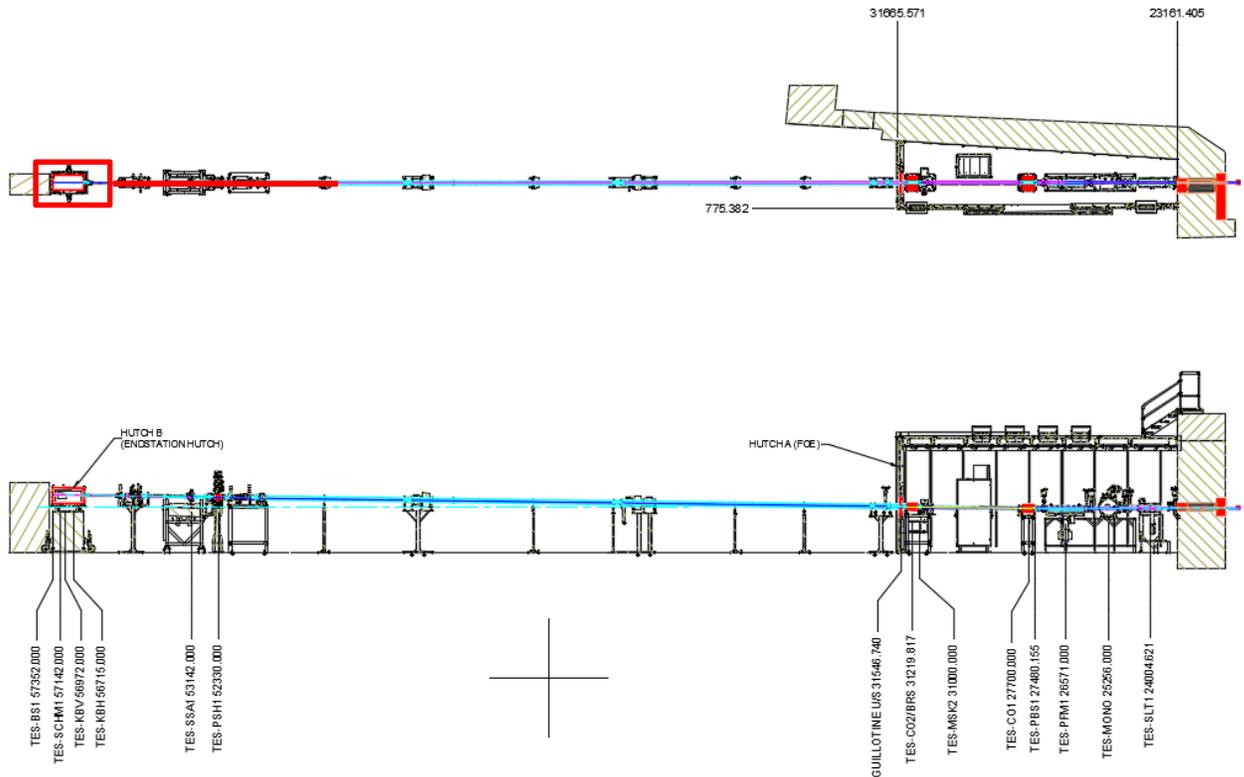
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7. **Monochromatic beam survey: FE slits fully open, FE shutters open, PSH open, mirrors M1, M2 and MONO in nominal positions, PFM in nominal position, KB Mirrors into the beam.** Survey all walls and roof of 08-BM-B, and the area around the transport pipe downstream of the PSH.



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

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

**Additional information/comments:**

**Angle of M1** \_\_\_\_\_ **Angle of M2** \_\_\_\_\_

**Angle of MONO** \_\_\_\_\_ **Angle of PFM** \_\_\_\_\_

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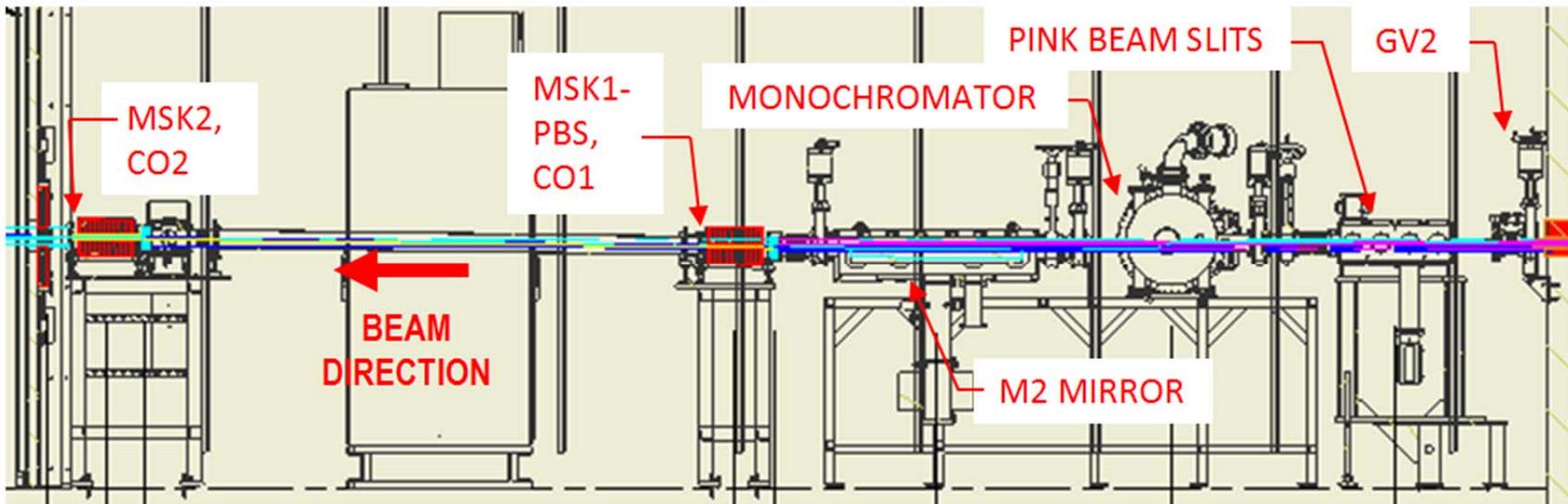
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## Attachment B

### Elevation View inside TES FOE (Enclosure 8-BM-A)

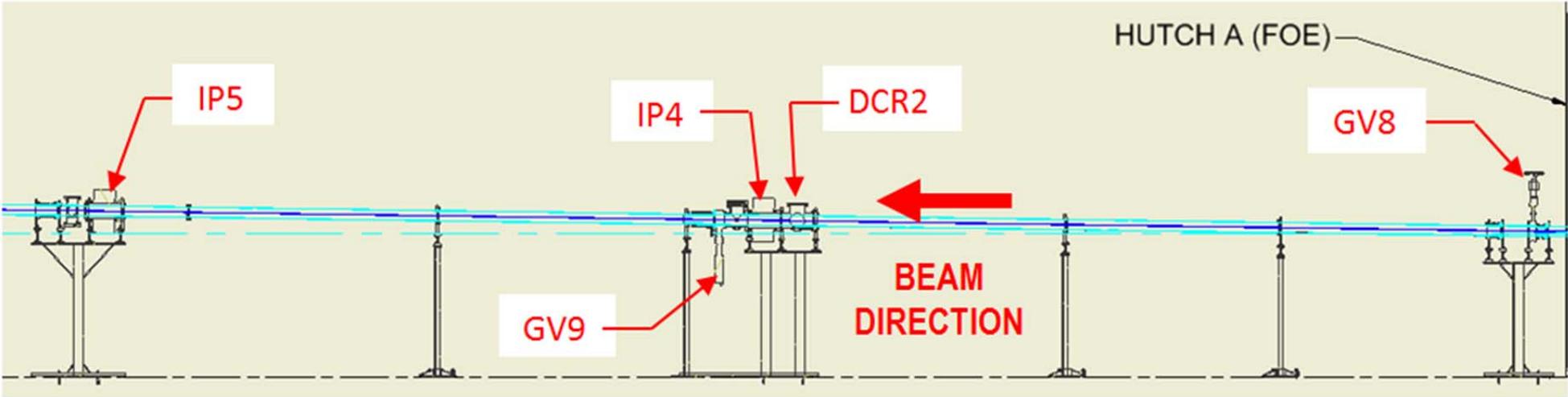


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**Attachment C**

**Elevation View, Upstream Half of TES Beam Transport Line (FOE to BLW10)**



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### Attachment D

#### Elevation View, Downstream Half of TES Beam Transport Line (Downstream of BLW10)

