

<u>Title</u>	<u>Name</u>	<u>Approval Date</u>
NPB Portfolio Manager	Andrew Broadbent	10/02/2017
Deputy Director for Construction	Erik Johnson	10/02/2017
ESH Manager	Robert Lee	10/02/2017
Quality Assurance Engineer	Joseph Zipper	10/02/2017

Serial No	Part No	Part Rev	ECN	Rev	ECN	Rev
	PD-SST-MICR-1000	A				

**Deviation & Waiver:** \_\_\_\_\_

OP	Description	Name/Life #	Date	DR
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10 TRAVELER INFORMATION

C. Jaje 06156	4/17/19	
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This traveler shall be used for the installation and testing of end station equipment previously installed and operated at NSLS or another facility, that is now being installed at NSLSII. This traveler goes beyond the typical installation/test traveler that instructs/documents installation qualification. It will also:  
 ✓ 1) confirm that the re-purposing of this equipment was reviewed and approved for its intended use 2) collect upgrade information from subject matter experts (SME) that they deem necessary for the equipment's safe operation at NSLSII, and 3) ✓ confirm that any new upgrades have been implemented.

**COMPLETE OP#20 THRU OP#130 BEFORE INSTALLATION**

20 A. In the space provided at the top of this traveler write in the relevant beamline.

C-JAJE 06156	4/23/19	
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B. In the space below record the name/description of the end station equipment, and its intended use.

NAME/DESCRIPTION: LARIAT-1 Endstation

INTENDED USE: NEXAFS imaging on SST-1



OP	Description	Name/Life #	Date	DR
30	EQUIPMENT RE-PURPOSING REVIEW - This operation shall be signed off by the Lead Beamline Scientist when all concurrences have been obtained.	C. Jaye 06156	4/17/19	

The undersigned have inspected the end station equipment and agree to the following:

- It is fit for the intended purpose
- It will be used in a manner in which it was intended
- There is no additional radiation safety risk
- There are no additional vacuum/pressure vessel risks

Concurrence:

Lead Beamline Scientist: *[Signature]*  
 Program Manager: *[Signature]*  
 Project Manager: *[Signature]*  
 Beamline Engineer: *[Signature]*  
 ESH Manager: *[Signature]*

40 EQUIPMENT UPGRADE INFORMATION - This operation shall be completed by the Electrical Engineering Group Leader

J ESCALLISE 20624	4/17/19	
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Inspect the equipment for electrical safety hazards, and complete the following:

The equipment is safe as is and there are no upgrades required.

The following upgrades are required:

RACK REI  
RACK CLEANUP  
UNIT BONDING

Note: If there is not enough space provided here please write "See attachment" and reference 'OP#40' on the attachment.

*[Handwritten notes and signatures]*  
 OK [Signature] 3/22/19  
 RECOMMEND (REQUIRED)  
 1) VALID TEST OF OVERTEMP SYSTEM OF MAGNET  
 2) ADD ON KIXONS TO EACH COIL PACK AS REDUNDANCY  
 [Signature] 4/17/19  
 [Signature] 4/17/19



OP	Description	Name/Life #	Date	DR
50	EQUIPMENT UPGRADE INFORMATION - This operation shall be completed by a Pressure Safety SME	Gl. G. Flory 2203	20 Nov 2017	

Inspect the equipment for pressure safety hazards, and complete the following:

The equipment is safe as is and there are no upgrades required.

The following upgrades are required:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Note: If there is not enough space provided here please write "See attachment" and reference 'OP#50' on the attachment.

60 EQUIPMENT UPGRADE INFORMATION - This operation shall be completed by a Vacuum Engineer

R. Tondor/18710	11/21/17	
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Inspect the equipment for vacuum equipment performance, and complete the following:

The equipment is acceptable as is and there are no upgrades required.

The following upgrades are required:

ENSURE TURBO ROUGH PUMPS HAVE VPI VALVES INTEGRATED TO PUMPS. ENSURE WORK INSTRUCTIONS COMPLETED FOR SAFE VACUUM VALVE OPERATION

Note: If there is not enough space provided here please write "See attachment" and reference 'OP#60' on the attachment.

COMPLETED

R. Tondor 11/21/17



OP	Description	Name/Life #	Date	DR
70	EQUIPMENT UPGRADE INFORMATION - This operation shall be completed by a Radiation Safety SME	Swartz 25809	11/20/17	

Inspect the equipment for radiation safety hazards, and complete the following:

The equipment is safe as is and there are no upgrades required.

The following upgrades are required:

check the glass thickness at SS  
are sufficient to stop  
secondary electrons

checked and found OK  
C. Zipper  
Swartz 4/16/19

Note: If there is not enough space provided here please write "See attachment" and reference 'OP#70' on the attachment.

80	EQUIPMENT UPGRADE INFORMATION - This operation shall be completed by the Beamline Engineering Group Leader	Sutterfield 17280	20 November 2017	
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Inspect the equipment for mechanical safety hazards, and complete the following:

The equipment is safe as is and there are no upgrades required.

The following upgrades are required:

Ensure mechanical stability of final  
chamber support. → OK as installed Sept. 2018 SUT

Note: If there is not enough space provided here please write "See attachment" and reference 'OP#80' on the attachment.



OP	Description	Name/Life #	Date	DR
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90 EQUIPMENT UPGRADE INFORMATION - This operation shall be completed by ESH Staff

Stiegler 19497	7/17/19	
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Inspect the equipment for safety hazards, and complete the following:

The equipment is safe as is and there are no upgrades required.

The following upgrades are required:

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Note: If there is not enough space provided here please write "See attachment" and reference 'OP#90' on the attachment.

100 EQUIPMENT UPGRADE INFORMATION - This operation shall be completed by an EPS Controls Engineer

M Gaffney 22039	20 Nov 2017	
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Inspect the equipment for EPS upgrades, and complete the following:

The equipment is acceptable as is and there are no upgrades required.

The following upgrades are required:

Please verify Power Supply/magnet  
thermal protection is adequate and  
can be tested periodically

Note: If there is not enough space provided here please write "See attachment" and reference 'OP#100' on the attachment.

*acceptable based on  
beamline verification  
design  
MHG/mj 22039  
10 Apr 2019*



OP	Description	Name/Life #	Date	DR
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110 EQUIPMENT UPGRADE INFORMATION - This operation shall be completed by a Mechanical Utilities Engineer

24021 O'BRIEN	11/20/17	
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Inspect the equipment for mechanical utility upgrades, and complete the following:

The equipment is acceptable as is and there are no upgrades required.

The following upgrades are required:

PRESSURE TEST DOCUMENTATION OF  
MAGNET COOLING CIRCUIT IAW MAWP  
OF HASKRIS PUMP

} PCHW SYSTEM IS USED, NOT HASKRIS  
4/18/19

Note: If there is not enough space provided here please write "See attachment" and reference "OP#110" on the attachment.

C.I. 4/25/19

120 EQUIPMENT UPGRADE INFORMATION - This operation shall be completed by the Survey Group

<del>RAH</del> 20563/06158	4/09/19	
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Inspect the equipment for survey/alignment upgrades, and complete the following:

The equipment is acceptable as is and there are no upgrades required.

RAH  
20563 4/25/19

The following upgrades are required:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Note: If there is not enough space provided here please write "See attachment" and reference "OP#120" on the attachment.



OP	Description	Name/Life #	Date	DR
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130 END STATION DRAWING

A. On the space provided on page 1 for part number record the released drawing number for this end station equipment.

B. Verify that the drawing includes envelope dimensions, location from source, critical interfaces, performance specifications, and upgrade information from the SME's. For clarity purposes the drawing may also include a photo of the equipment but its not required.

C. JAYE 06156	4/17/19	
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**COMPLETE OP#140 THRU OP#250 AFTER INSTALLATION & UPGRADE**

140 Follow the ESH and PPE requirements for the area. Wear safety glasses, safety shoes and gloves for physical installation as applicable

JR 19194	4/23/19	
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150 Verify measuring and test equipment used for this procedure contains a valid calibration label in accordance with NSLS-II Calibration Procedure PS-QAP-0901, where applicable.

JR 19194	4/23/19	
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The technician is responsible for notifying the technical supervisor and/or the cognizant engineer of any discrepancies occurring during the performance of this procedure. All discrepancies shall be identified and reported in accordance with NSLS-II Discrepancy Reporting Procedure PS-QAP-0002.

160 Verify installation of the end station components per its released drawing.

C. JAYE 06156	4/23/19	
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170 Verify windows and viewports (overpressure, Be) are installed and compliant with NSLSII requirements

C. JAYE 06156	4/23/19	
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180 Verify access to the end station and adjacent equipment is acceptable and unimpeded.

C. JAYE 06156	4/23/19	
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OP	Description	Name/Life #	Date	DR
190	MAGNETIC FIELD SAFETY VERIFICATION - This operation shall be completed by BNL Safety and Health Services Division Personnel  A. Measure location of 5 Gauss Line. ✓  B. In the space provided below make recommendations on shielding, barricades, and/or signage.  <i>C. Weidman to provide survey &amp; posting for magnet rack</i>  C. Confirm recommendations have been installed and are acceptable.	<i>C. Weidman 17246</i>	<i>4/25/19</i>	
200	FOR END STATION EQUIPMENT WITH CRYOGENICS  A. Verify cyro lines are securely supported  B. Veriy over pressure relief device is installed.	<i>N/A C. JATE / 06156</i>	<i>4/23/19</i>	
210	VACUUM TESTING  A. Perform vacuum testing as per traveler BL-VA-001.  B. Attach completed BL-VA-001 travelers to this traveler.	<i>C. JATE 06156</i>	<i>4/22/19</i>	



OP	Description	Name/Life #	Date	DR
220	<p>UPGRADE INSTALLATION VERIFICATION - This operation shall be signed off by the Lead Beamline Scientist once all signoffs are obtained from the SME's.</p> <p>SME's shall sign-off below that requested upgrades have been installed and are acceptable. If no upgrades were requested then write "N/A".</p> <p>Electrical Engineering Group Leader: <u>RE</u></p> <p>Pressure Safety SME: <u>MA</u> 4/17/2019</p> <p>Vacuum Engineer: <u>Robert P. ...</u></p> <p>Radiation Safety SME: <u>Alvin Smith</u></p> <p>Beamline Engineering Group Leader: <u>David Helbert</u></p> <p>ESH Staff: <u>Loi Steyer</u></p> <p>EPS Controls Engineer: <u>N/A</u></p> <p>Mechanical Utilities Engineer: <u>NLO</u></p> <p>Survey Group: <u>N/A</u></p>	C-JAYE 06156	4/17/19	
230	<p>SURVEY GROUP</p> <p>A. Survey and align all components per released drawings.</p> <p>B. Attach survey report to this traveler.</p>	ddas 23067	4/17/19	
240	<p>Motion Testing with Motion Control System:</p> <p>A. Verify the motion of all motorized axes of the end station components listed above. Also verify the function of travel limits, over-travel limits, encoders, and home switches where applicable.</p> <p>B. Document results and attach test report.</p>	C-JAYE 06156	4/24/19	
250	Verify All Traveler Operations Complete	C-JAYE 06156	4/25/19	
260	<p>REVISION HISTORY (This step is informational and does not require signoff)</p> <p>Rev - Description - Date C First Release</p>			



Point Group FLNGS AGAIN: FLNG 6 - Cardinal Pts			
Point Name	X (mm)	Y (mm)	Z (mm)
Center	2305.937	249.835	57778.998

Point Group FLNGS AGAIN: FLNG 7 - Cardinal Pts			
Point Name	X (mm)	Y (mm)	Z (mm)
Center	2425.904	295.632	58896.261

Point Group FLNGS AGAIN: FLNG 8 - Cardinal Pts			
Point Name	X (mm)	Y (mm)	Z (mm)
Center	2438.005	316.843	59078.205

Cylinder FLNGS AGAIN: -4.6 DEGREE PIPE			
	X	Y	Z
Begin (mm)	2285.906	89.142	57636.542
End (mm)	2204.797	111.446	56833.775
Proj. Ang. (deg)	Rx from Y -88.4085	Ry from Z -174.2306	Rz from X 164.6248
Radius (mm)	22.254	Diameter (mm)	44.507
Length (mm)	807.162		

Cylinder FLNGS AGAIN: LARIAT CYL IN			
	X	Y	Z
Begin (mm)	2301.696	84.911	57791.043
End (mm)	2306.374	83.878	57842.196
Direction	0.091057	-0.020110	0.995643
Proj. Ang. (deg)	Rx from Y 91.1571	Ry from Z 5.2255	Rz from X -12.4539
Radius (mm)	12.708	Diameter (mm)	25.417
Length (mm)	51.377		

Title	Name	Approval Date
Interface and Beamline Manager	Andrew Broadbent	06/10/2014
ES&H Operations Manager	Lori Stiegler	06/10/2014
CSX Beamline Scientist	Stuart Wilkins	06/10/2014
Quality Assurance Engineer	Joseph Zipper	06/10/2014

Serial No	Part No	Part Rev	ECN	Rev	ECN	Rev
7-ID (SST)	LARIAT 1					
Deviation & Waiver: BETWEEN GV29 & GV30						

OP	Description	Name/Life #	Date	DR
10	Follow the ES&H and Personal Protective Equipment Requirements for the area.	R. Todd / 18710	4/15/19	
15	Verify measuring and test equipment used for this procedure contains a valid calibration label in accordance with NSLS-II Calibration Procedure PS-QAP-0901, where applicable.  The technician is responsible for notifying the technical supervisor and/or the cognizant engineer of any discrepancies occurring during the performance of this procedure. All discrepancies shall be identified and reported in accordance with NSLS-II Discrepancy Reporting Procedure PS-QAP-0002.	R. Todd / 18710	4/15/19	
20	Vacuum Component/Section Information - This step shall be performed by the cognizant beamline engineer/scientist (CE/CS)  A. Record the Beamline name (in the space provided) at the top of each page of this traveler.  B. For a vacuum component, record the part number and description on this sheet in the box for "Part No".  C. For a vacuum section, record the section number on this sheet in the box for "Part No"  D. Record required base pressure for Vacuum Comp/Sec. <u>1x10<sup>-7</sup></u> (Torr)  E. Review this entire traveler and if a step (OP#) does not apply, write in that operation's sign-off box: "NA per OP#20"	C. J. J. / 06186	4/15/19	



System	Axis	Driven with PEWin	Driven with EPICS	Driven with XDAC	Date	Initials
LARIAT1 (Compu6K8-30)	X Stage Sample Manipulator	N/A	N/A	✓	3/5/2019	JK
	Y Stage Sample Manipulator	N/A	N/A	✓	3/5/2019	JK
	Z Stage Sample Manipulator	N/A	N/A	✓	3/5/2019	JK
	Theta Stage Sample Manipulator	N/A	N/A	✓	3/5/2019	JK

Completed by:

*Samy Kuehl*

Date:

4/17/2019

**BROOKHAVEN NATIONAL LABORATORY**  
**DIRECT READING INSTRUMENT SURVEY FORM**

Date: 4/18/2019 Surveyor(s): C. Weilandics

**I. AREA INFORMATION**

Dept. : PS Bldg. : 740 Room: ID-7  
Source: GMW 5403EG-50 electromagnet  
Engineering Controls: None

**II. EMPLOYEE INFORMATION**

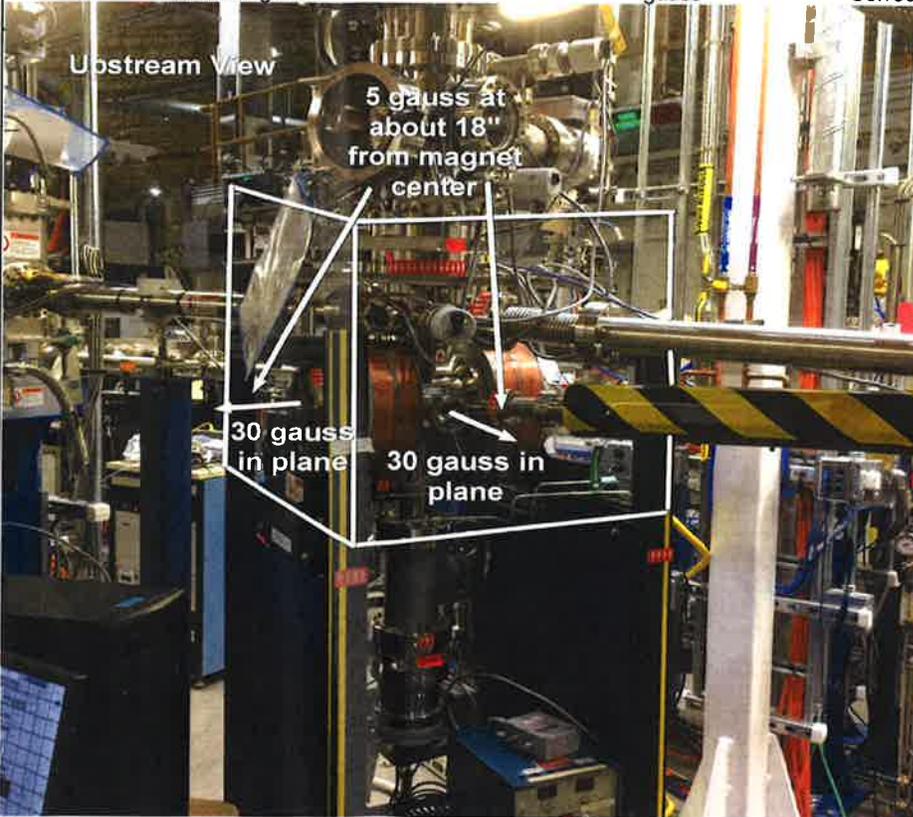
Name : C. Jaye BNL / GUEST # : O6156  
Dept. : PS Bldg. : 743 Job Title : Physicist  
Exposure Duration (Hrs) : N/A Times Per Day : N/A Times Per Year : N/A  
Job / Task Performed : N/A  
PPE Used : N/A

**III. SURVEY INSTRUMENT INFORMATION**

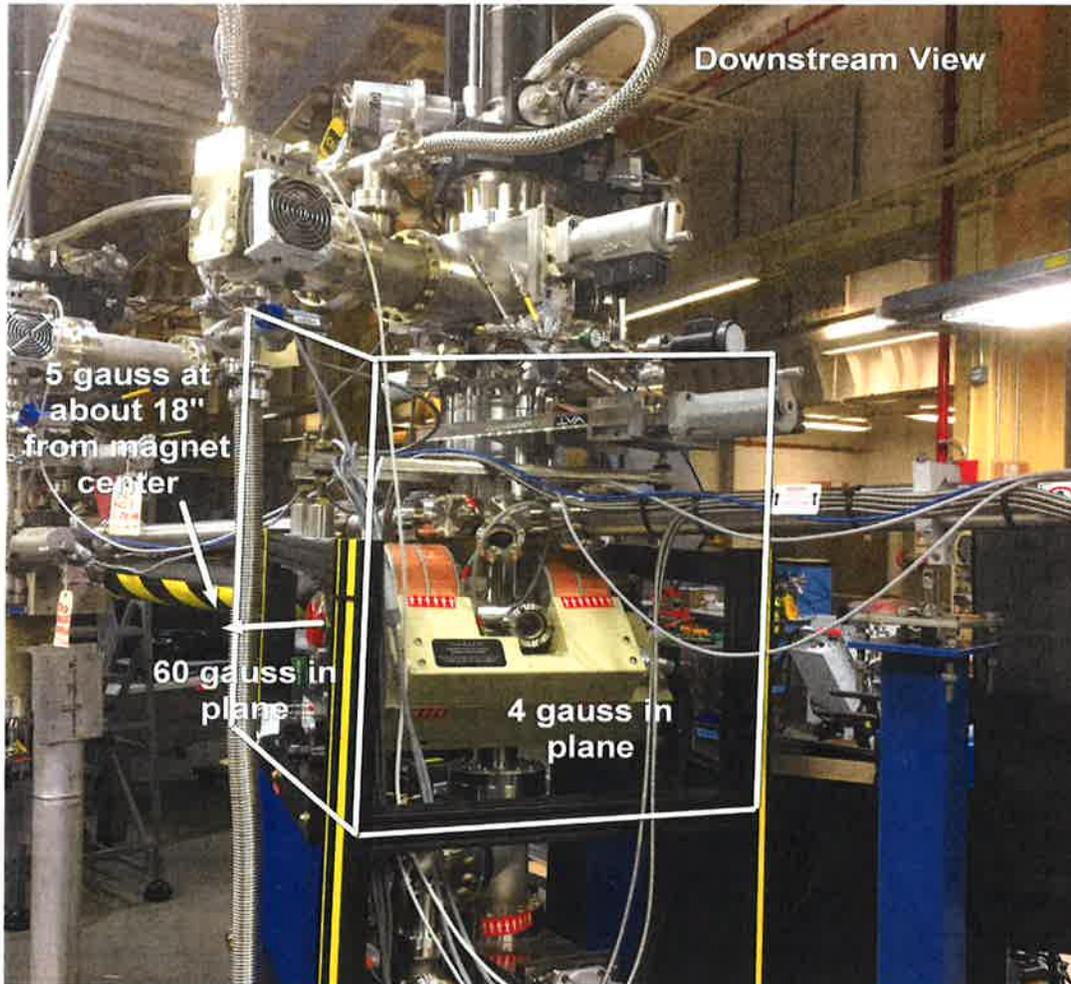
Instrument: Metrolab Cal Date : 2/27/2019 Calibrator : N/A  
Model : THM 7025  Pre-Cal Comment : cal check  
Serial # : TH-BO 331  Post-Cal Comment : cal check

**IV. SAMPLING INFORMATION AND RESULTS**

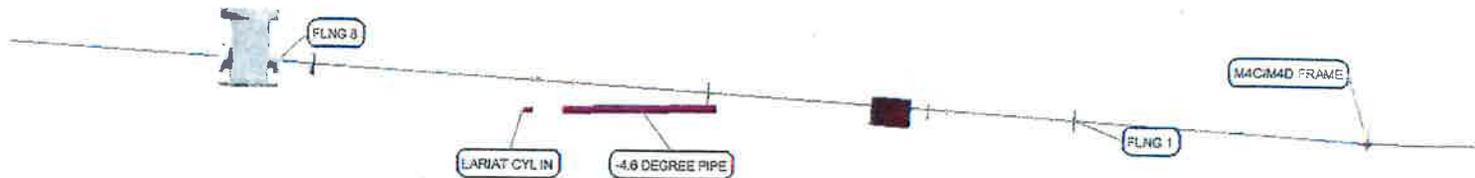
Hazard : Static Magnetic Field Magnet current: 60 A  
Units : gauss Correction Factor : None



**V. Conclusion and Recommendation:** Values are recorded at a current of 60 Amps supplied to the magnet. The in-plane values in the above picture (upstream view) indicate the highest values found within an extended plane of the mounting rack. The five gauss reading is found at about 18 inches from the center of the magnet



**Observations:** Values are recorded at a current of 60 Amps supplied to the magnet. The in-plane values in the above picture (downstream view) indicate the highest values found within an extended plane of the mounting rack. The five gauss reading is found at about 18 inches from the center of the magnet. Note here that the five gauss contour is within the extended plane of the rack.



Point Group FLNGS AGAIN: FLNG 1 - Cardinal Pts			
Point Name	X (mm)	Y (mm)	Z (mm)
Center	2013.856	94.562	55003.785

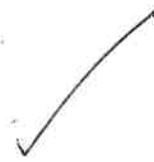
Point Group FLNGS AGAIN: FLNG 2 - Cardinal Pts			
Point Name	X (mm)	Y (mm)	Z (mm)
Center	2083.297	128.892	55667.257

Point Group FLNGS AGAIN: FLNG 3 - Cardinal Pts			
Point Name	X (mm)	Y (mm)	Z (mm)
Center	2092.653	134.499	55764.763

Point Group FLNGS AGAIN: FLNG 4 - Cardinal Pts			
Point Name	X (mm)	Y (mm)	Z (mm)
Center	2208.583	193.301	56876.911

Point Group FLNGS AGAIN: FLNG 5 - Cardinal Pts			
Point Name	X (mm)	Y (mm)	Z (mm)
Center	2282.647	230.464	57582.558

MODEL CENTER	2282.650	230.460	57582.560
DEVIATION	0.003	-0.004	0.002



Point Group FLNGS AGAIN::FLNG 6 - Cardinal Pts			
Point Name	X	Y	Z
	(mm)	(mm)	(mm)
Center	2305.937	249.835	57778.998

Point Group FLNGS AGAIN::FLNG 7 - Cardinal Pts			
Point Name	X	Y	Z
	(mm)	(mm)	(mm)
Center	2425.904	295.632	58896.261

Point Group FLNGS AGAIN::FLNG 8 - Cardinal Pts			
Point Name	X	Y	Z
	(mm)	(mm)	(mm)
Center	2438.005	316.843	59078.205

Cylinder FLNGS AGAIN::-4.6 DEGREE PIPE			
	X	Y	Z
Begin (mm)	2285.906	89.142	57636.542
End (mm)	2204.797	111.446	56833.775
Proj. Ang. (deg)	Rx from Y -88.4085	Ry from Z -174.2306	Rz from X 164.6248
Radius (mm)	22.254	Diameter (mm) 44.507	
Length (mm)	807.162		

Cylinder FLNGS AGAIN::LARIAT CYL IN			
	X	Y	Z
Begin (mm)	2301.696	84.911	57791.043
End (mm)	2306.374	83.878	57842.196
Direction	0.091057	-0.020110	0.995643
Proj. Ang. (deg)	Rx from Y 91.1571	Ry from Z 5.2255	Rz from X -12.4539
Radius (mm)	12.708	Diameter (mm) 25.417	
Length (mm)	51.377		

<u>Title</u>	<u>Name</u>	<u>Approval Date</u>
NPB Portfolio Manager	Andrew Broadbent	10/02/2017
Deputy Director for Construction	Erik Johnson	10/02/2017
ESH Manager	Robert Lee	10/02/2017
Quality Assurance Engineer	Joseph Zipper	10/02/2017

Serial No	Part No	Part Rev	ECN	Rev	ECN	Rev
	PD-SST-MCAL-1000	A				

**Deviation & Waiver:** \_\_\_\_\_

+ PART#S PD-SST-BL-1030  
 PD-SST-MIR-1000

OP	Description	Name/Life #	Date	DR
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10 TRAVELER INFORMATION

C. JATE 06156	4/24/19	
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This traveler shall be used for the installation and testing of end station equipment previously installed and operated at NSLS or another facility, that is now being installed at NSLSII. This traveler goes beyond the typical installation/test traveler that instructs/documents installation qualification. It will also:  
 ✓ 1) confirm that the re-purposing of this equipment was reviewed and approved for its intended use 2) collect upgrade information from subject matter experts (SME) that they deem necessary for the equipment's safe operation at NSLSII, and 3) confirm that any new upgrades have been implemented.

**COMPLETE OP#20 THRU OP#130 BEFORE INSTALLATION**

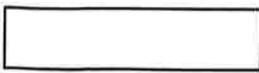
20 A. In the space provided at the top of this traveler write in the relevant beamline.

C. JATE 06156	4/24/19	
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B. In the space below record the name/description of the end station equipment, and its intended use.

NAME/DESCRIPTION: MCAL Endstation (Includes IO up of MSW mirror)

INTENDED USE: Fluorescence Yield NEXTAS  
measurements at 7-10



OP	Description	Name/Life #	Date	DR
30	EQUIPMENT RE-PURPOSING REVIEW - This operation shall be signed off by the Lead Beamline Scientist when all concurrences have been obtained.	C. Sage 06156	4/17/19	

The undersigned have inspected the end station equipment and agree to the following:

- It is fit for the intended purpose
- It will be used in a manner in which it was intended
- There is no additional radiation safety risk
- There are no additional vacuum/pressure vessel risks

Concurrence:

Lead Beamline Scientist: [Signature]

<sup>P. Afshar</sup>  
Program Manager: [Signature]

Project Manager: [Signature]

Beamline Engineer: [Signature]

ESH Manager: [Signature]

40	EQUIPMENT UPGRADE INFORMATION - This operation shall be completed by the Electrical Engineering Group Leader	J Escallier 20629	4/18/19	
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Inspect the equipment for electrical safety hazards, and complete the following:

The equipment is safe as is and there are no upgrades required.

The following upgrades are required:

- BOND ION PUMP [Signature] 9044 4/17/19
- EEI ALL EQUIPMENT
- READ HV / VARIAN CONNECTOR O.K. [Signature]

Note: If there is not enough space provided here please write "See attachment" and reference 'OP#40' on the attachment.



OP	Description	Name/Life #	Date	DR
50	EQUIPMENT UPGRADE INFORMATION - This operation shall be completed by a Pressure Safety SME	M. Goffney 22027	20 NOV 2017	

Inspect the equipment for pressure safety hazards, and complete the following:

The equipment is safe as is and there are no upgrades required.

The following upgrades are required:

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Note: If there is not enough space provided here please write "See attachment" and reference 'OP#50' on the attachment.

60 EQUIPMENT UPGRADE INFORMATION - This operation shall be completed by a Vacuum Engineer

P. T. ... / 18710	11/21/17	
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Inspect the equipment for vacuum equipment performance, and complete the following:

The equipment is acceptable as is and there are no upgrades required.

The following upgrades are required:

ENSURE ROUGH PUMPS HAVE PROPERLY INTEGRATED VPI VALVES. ENSURE WORK INSTRUCTIONS COMPLETE FOR SAFE VACUUM VALVE OPERATION

COMPLETED  
4/12/19 K. T. ...

Note: If there is not enough space provided here please write "See attachment" and reference 'OP#60' on the attachment.



OP	Description	Name/Life #	Date	DR
70	EQUIPMENT UPGRADE INFORMATION - This operation shall be completed by a Radiation Safety SME	Shirley Chitav 25809	11/20/17	

Inspect the equipment for radiation safety hazards, and complete the following:

The equipment is safe as is and there are no upgrades required.

The following upgrades are required:

check glass and SS shielding  
are sufficient to stop the  
scattered radiation.

checked and found OK  
Shirley Chitav  
4/16/19

Note: If there is not enough space provided here please write "See attachment" and reference 'OP#70' on the attachment.

80	EQUIPMENT UPGRADE INFORMATION - This operation shall be completed by the Beamline Engineering Group Leader	S. Huibert 17250	20 November 2017	
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Inspect the equipment for mechanical safety hazards, and complete the following:

The equipment is safe as is and there are no upgrades required.

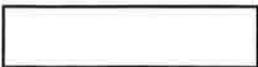
The following upgrades are required:

Check labeling, for example "SS. Shielding"  
is used to label an evaporator mask.

OK as relabeled 10 Sept. 2018 SMT

ENSURE mechanical stability of final mechanical support. → OK as installed  
Sept. 2018  
SMT

Note: If there is not enough space provided here please write "See attachment" and reference 'OP#80' on the attachment.



OP	Description	Name/Life #	Date	DR
90	EQUIPMENT UPGRADE INFORMATION - This operation shall be completed by ESH Staff	Stegler 19497	4/17/19	

Inspect the equipment for safety hazards, and complete the following:

The equipment is safe as is and there are no upgrades required.

The following upgrades are required:

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Note: If there is not enough space provided here please write "See attachment" and reference 'OP#90" on the attachment.

100 EQUIPMENT UPGRADE INFORMATION - This operation shall be completed by an EPS Controls Engineer

<del>N/A</del> C. SAYE / 06/158	4/24/19	
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Inspect the equipment for EPS upgrades, and complete the following:

The equipment is acceptable as is and there are no upgrades required.

The following upgrades are required:

N/A

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Note: If there is not enough space provided here please write "See attachment" and reference 'OP#100" on the attachment.

C.J. 4/24/19  
C. GUERRERO  
25434 4/24/19



OP	Description	Name/Life #	Date	DR
110	EQUIPMENT UPGRADE INFORMATION - This operation shall be completed by a Mechanical Utilities Engineer	O'BRIEN 24021	11/20/17	

Inspect the equipment for mechanical utility upgrades, and complete the following:

The equipment is acceptable as is and there are no upgrades required.

The following upgrades are required:

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Note: If there is not enough space provided here please write "See attachment" and reference 'OP#110" on the attachment.

*LS. 4/25/19*

120	EQUIPMENT UPGRADE INFORMATION - This operation shall be completed by the Survey Group	<del>N/A</del> C. JATE/0658	4/24/19	
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Inspect the equipment for survey/alignment upgrades, and complete the following:

The equipment is acceptable as is and there are no upgrades required.

The following upgrades are required:

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Note: If there is not enough space provided here please write "See attachment" and reference 'OP#120" on the attachment.

RAH  
20563 4/25/19



OP	Description	Name/Life #	Date	DR
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130 END STATION DRAWING

A. On the space provided on page 1 for part number record the released drawing number for this end station equipment.

B. Verify that the drawing includes envelope dimensions, location from source, critical interfaces, performance specifications, and upgrade information from the SME's. For clarity purposes the drawing may also include a photo of the equipment but its not required.

C. JAYE 06156	4/24/19	
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### COMPLETE OP#140 THRU OP#250 AFTER INSTALLATION & UPGRADE

140 Follow the ESH and PPE requirements for the area. Wear safety glasses, safety shoes and gloves for physical installation as applicable

C. JAYE 06156	4/24/19	
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150 Verify measuring and test equipment used for this procedure contains a valid calibration label in accordance with NSLS-II Calibration Procedure PS-QAP-0901, where applicable.

C. JAYE 06156	4/24/19	
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The technician is responsible for notifying the technical supervisor and/or the cognizant engineer of any discrepancies occurring during the performance of this procedure. All discrepancies shall be identified and reported in accordance with NSLS-II Discrepancy Reporting Procedure PS-QAP-0002.

160 Verify installation of the end station components per its released drawing.

C. JAYE 06156	4/24/19	
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170 Verify windows and viewports (overpressure, Be) are installed and compliant with NSLSII requirements

C. JAYE 06156	4/24/19	
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180 Verify access to the end station and adjacent equipment is acceptable and unimpeded.

C. JAYE 06156	4/24/19	
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OP	Description	Name/Life #	Date	DR
190	MAGNETIC FIELD SAFETY VERIFICATION - This operation shall be completed by BNL Safety and Health Services Division Personnel	N/A C-JAYE 06156	4/24/19	
	A. Measure location of 5 Gauss Line.	C. Waldman 17246	4/25/19	
	B. In the space provided below make recommendations on shielding, barricades, and/or signage.			
	_____			
	_____			
	_____			
	C. Confirm recommendations have been installed and are acceptable.			
200	FOR END STATION EQUIPMENT WITH CRYOGENICS	N/A C-JAYE 06156	4/24/19	
	A. Verify cyro lines are securely supported			
	B. Veriy over pressure relief device is installed.			
210	VACUUM TESTING	C-JAYE 06156	4/24/19	
	A. Perform vacuum testing as per traveler BL-VA-001.			
	B. Attach completed BL-VA-001 travelers to this traveler.			



OP	Description	Name/Life #	Date	DR
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220 UPGRADE INSTALLATION VERIFICATION - This operation shall be signed off by the Lead Beamline Scientist once all signoffs are obtained from the SME's.

C. JAYE 06156	4/17/19	
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SME's shall sign-off below that requested upgrades have been installed and are acceptable. If no upgrades were requested then write "N/A".

Electrical Engineering Group Leader: JR  
Pressure Safety SME: MAA 11/2/2019  
Vacuum Engineer: T. Blunt  
Radiation Safety SME: Q. H. H. H. Summit cluster  
Beamline Engineering Group Leader: Steven H. Heltzer  
ESH Staff: Loi Stuy 4/17/19  
EPS Controls Engineer: N/A  
Mechanical Utilities Engineer: N/A  
Survey Group: N/A

230 SURVEY GROUP  
A. Survey and align all components per released drawings.  
B. Attach survey report to this traveler.

ddab 23067	4/17/19	
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240 Motion Testing with Motion Control System:  
A. Verify the motion of all motorized axes of the end station components listed above. Also verify the function of travel limits, over-travel limits, encoders, and home switches where applicable.  
B. Document results and attach test report.

C. JAYE 06156	4/24/19	
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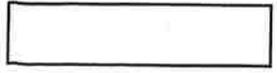
250 Verify All Traveler Operations Complete

C. JAYE 06156	4/24/19	
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260 REVISION HISTORY (This step is informational and does not require signoff)

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Rev - Description - Date  
C First Release



<u>Title</u>	<u>Name</u>	<u>Approval Date</u>
Interface and Beamline Manager	Andrew Broadbent	06/10/2014
ES&H Operations Manager	Lori Stiegler	06/10/2014
CSX Beamline Scientist	Stuart Wilkins	06/10/2014
Quality Assurance Engineer	Joseph Zipper	06/10/2014

Serial No	Part No	Part Rev	ECN	Rev	ECN	Rev
7-ID(SST)	μCAL # ID - UP					
Deviation & Waiver: <u>(BETWEEN GV29 &amp; GV30)</u>						

OP	Description	Name/Life #	Date	DR
10	Follow the ES&H and Personal Protective Equipment Requirements for the area.	R. Todd / 18710	4/15/19	
15	Verify measuring and test equipment used for this procedure contains a valid calibration label in accordance with NSLS-II Calibration Procedure PS-QAP-0901, where applicable.  The technician is responsible for notifying the technical supervisor and/or the cognizant engineer of any discrepancies occurring during the performance of this procedure. All discrepancies shall be identified and reported in accordance with NSLS-II Discrepancy Reporting Procedure PS-QAP-0002.	R. Todd / 18710	4/15/19	
20	Vacuum Component/Section Information - This step shall be performed by the cognizant beamline engineer/scientist (CE/CS)  A. Record the Beamline name (in the space provided) at the top of each page of this traveler.  B. For a vacuum component, record the part number and description on this sheet in the box for "Part No".  C. For a vacuum section, record the section number on this sheet in the box for "Part No"  D. Record required base pressure for Vacuum Comp/Sec. <u>1x10<sup>-7</sup></u> (Torr)	C. Jaye / 06158	4/15/19	
	E. Review this entire traveler and if a step (OP#) does not apply, write in that operation's sign-off box: "NA per OP#20"			



OP	Description	Name/Life #	Date	DR
30	<p>Configuration- This step shall be performed by the CE/CS.</p> <p>A. Is component/section in its final configuration? (circle one)</p> <p style="text-align: center;"><input checked="" type="radio"/> YES <input type="radio"/> NO</p> <p>B. If "NO", provide a brief description of component/vacuum section</p> <p>_____</p>	R. Todd / 18710	4/15/19	
40	<p>Visual Inspection</p> <p>Prior to pumping down, visually inspect that all flanges and vacuum connections to component/sector are tight and secure. Confirm the presence of burst disk (as required by the assembly drawing) and inspect for damage. Confirm all vacuum forces are restrained through the use of bolted stands/supports and appropriate bellows restraints. Any deviations from the assembly drawing shall be noted and the Cognizant Beamline Engineer shall be notified prior to proceeding.</p>	R. Todd / 18710	4/15/19	
50	<p>Leak check</p> <p>Leak check component/vacuum section using calibrated He MSLD. Confirm total leak rate &lt; 2x10<sup>-10</sup> mbar l/sec He.</p>	R. Todd / 18710	4/15/19	
60	<p>RGA scan</p> <p>Acquire RGA data. The CS/CE or Vacuum Engineer (VE) will acquire and interpret RGA and prescribe corrective action if necessary. Initial RGA scan shall include a baseline scan of RGA isolated from vacuum section/component to confirm RGA cleanliness.</p>	NA R. Todd / 18710	4/15/19	
70	<p>Bakeout</p> <p>Confirm that bakeout was performed according to procedure PS-C-XFD-PRC-013 (NSLS-II Beamline Vacuum Bake-Out Procedure) and the manufacturer's requirements with temperature ramp rate(s) soak time(s), soak temperature(s) and maximum temperature(s) all controlled within acceptable limits.</p>	NA R. Todd / 18710	4/15/19	
80	<p>Hot leak check</p> <p>With the component/sector at the soak temperature, perform leak check using calibrated He MSLD. Confirm total leak rate &lt; 2x10<sup>-10</sup> std cc/sec He (mbar l/sec He).</p>	NA R. Todd / 18710	4/15/19	
90	<p>Crossover to ion pumps</p> <p>Confirm with the Cognizant Beamline Engineer prior to switching from turbopump to ion pump(s). Record the date and time the ion pumps are turned on and the turbopump valved out.</p>	R. Todd / 18710	4/15/19	

Date 10/18 Time     

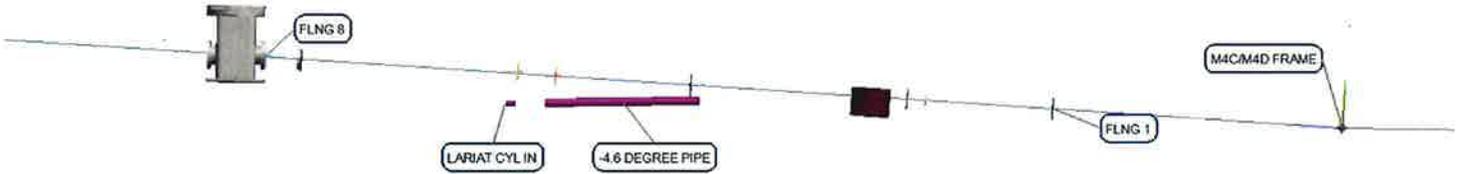


OP	Description	Name/Life #	Date	DR
100	Final RGA scan When the component/section has reached room temperature, acquire RGA data. The CS/CE/VE will acquire and interpret the data to determine conformance to section 4.7.3 of spec LT-ENG-RSI-SR-VA-002 and prescribe corrective action if necessary. Attach RGA scan.	NA R.Todd/18710	4/15/19	
110	Base pressure measurement. Confirm the required base pressure in OP 20 is met. The CE/BE/VE shall make this determination. Record base pressure measurement. <u>9.2 X 10<sup>-9</sup></u> (Torr)	R.Todd/18710	4/15/19	
120	Forward this traveler and all attachments to QA for archiving.	R.Todd/18710	4/15/19	
130	REVISION HISTORY (This step is informational and does not require signoff)			

Rev - Description - Date

B INITIAL RELEASE





Point Group FLNGS AGAIN: FLNG 1 - Cardinal Pts			
Point Name	X (mm)	Y (mm)	Z (mm)
Center	2013.856	94.562	55003.785

Point Group FLNGS AGAIN: FLNG 2 - Cardinal Pts			
Point Name	X (mm)	Y (mm)	Z (mm)
Center	2083.297	128.892	55667.257

Point Group FLNGS AGAIN: FLNG 3 - Cardinal Pts			
Point Name	X (mm)	Y (mm)	Z (mm)
Center	2092.653	134.499	55764.763

Point Group FLNGS AGAIN: FLNG 4 - Cardinal Pts			
Point Name	X (mm)	Y (mm)	Z (mm)
Center	2208.583	193.301	56876.911

Point Group FLNGS AGAIN: FLNG 5 - Cardinal Pts			
Point Name	X (mm)	Y (mm)	Z (mm)
Center	2282.647	230.464	57582.558

Point Group FLNGS AGAIN: FLNG 6 - Cardinal Pts			
Point Name	X (mm)	Y (mm)	Z (mm)
Center:	2305.937	249.835	57778.998

Point Group FLNGS AGAIN: FLNG 7 - Cardinal Pts			
Point Name	X (mm)	Y (mm)	Z (mm)
Center:	2425.904	295.632	58896.261

Point Group FLNGS AGAIN: FLNG 8 - Cardinal Pts			
Point Name	X (mm)	Y (mm)	Z (mm)
Center:	2438.005	316.843	59078.205

Cylinder FLNGS AGAIN: -4.6 DEGREE PIPE			
	X	Y	Z
Begin (mm)	2285.906	89.142	57636.542
End (mm)	2204.797	111.446	56833.775
Proj. Ang. (deg)	Rx from Y -88.4085	Ry from Z -174.2306	Rz from X 164.6248
Radius (mm)	22.254	Diameter (mm)	44.507
Length (mm)	807.162		

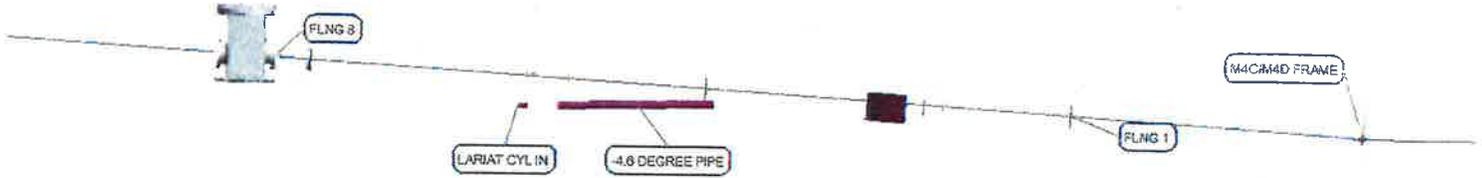
Cylinder FLNGS AGAIN: LARIAT CYL IN			
	X	Y	Z
Begin (mm)	2301.696	84.911	57791.043
End (mm)	2306.374	83.878	57842.196
Direction	0.091057	-0.020110	0.995643
Proj. Ang. (deg)	Rx from Y 91.1571	Ry from Z 5.2255	Rz from X -12.4539
Radius (mm)	12.708	Diameter (mm)	25.417
Length (mm)	51.377		

System	Axis	Driven with PEWin	Driven with EPICS	Driven with XDAC	Date	Initials
MICROCAL & IO_UP (Compu6K8-30)	X Stage Sample Manipulator	N/A	N/A	✓	4/17/2019	JK
	Y Stage Sample Manipulator	N/A	N/A	✓	4/17/2019	JK
	Z Stage Sample Manipulator	N/A	N/A	✓	4/17/2019	JK
	Theta Stage Sample Manipulator	N/A	N/A	✓	4/17/2019	JK
MICROCAL & IO_UP (MM3000)	IO_UP Upper Slit	N/A	N/A	✓	4/17/2019	JK
	IO_UP Lower Slit	N/A	N/A	✓	4/17/2019	JK
	IO_UP Calib Mesh	N/A	N/A	✓	4/17/2019	JK

Completed by:

Date:

*John Fahl*  
4/17/2019



Point Group			
FLNGS AGAIN: FLNG 1 - Cardinal Pts			
Point Name	X	Y	Z
	(mm)	(mm)	(mm)
Center	2013.856	94.562	55003.785

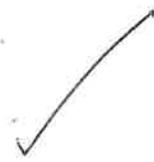
Point Group			
FLNGS AGAIN: FLNG 2 - Cardinal Pts			
Point Name	X	Y	Z
	(mm)	(mm)	(mm)
Center	2083.297	128.892	55667.257

Point Group			
FLNGS AGAIN: FLNG 3 - Cardinal Pts			
Point Name	X	Y	Z
	(mm)	(mm)	(mm)
Center	2092.653	134.499	55764.763

Point Group			
FLNGS AGAIN: FLNG 4 - Cardinal Pts			
Point Name	X	Y	Z
	(mm)	(mm)	(mm)
Center	2208.583	193.301	56876.911

Point Group			
FLNGS AGAIN: FLNG 5 - Cardinal Pts			
Point Name	X	Y	Z
	(mm)	(mm)	(mm)
Center	2282.647	230.464	57582.558

MODEL CENTER	2282.650	230.460	57582.560
DEVIATION	0.003	-0.004	0.002



Point Group FLNGS AGAIN::FLNG 6 - Cardinal Pts			
Point Name	X	Y	Z
	(mm)	(mm)	(mm)
Center	2305.937	249.835	57778.998

Point Group FLNGS AGAIN::FLNG 7 - Cardinal Pts			
Point Name	X	Y	Z
	(mm)	(mm)	(mm)
Center	2425.904	295.632	58896.261

Point Group FLNGS AGAIN::FLNG 8 - Cardinal Pts			
Point Name	X	Y	Z
	(mm)	(mm)	(mm)
Center	2438.005	316.843	59078.205

Cylinder FLNGS AGAIN::-4.6 DEGREE PIPE			
	X	Y	Z
Begin (mm)	2285.906	89.142	57636.542
End (mm)	2204.797	111.446	56833.775
Proj. Ang. (deg)	Rx from Y -88.4085	Ry from Z -174.2306	Rz from X 164.6248
Radius (mm)	22.254	Diameter (mm) 44.507	
Length (mm)	807.162		

Cylinder FLNGS AGAIN::LARIAT CYL IN			
	X	Y	Z
Begin (mm)	2301.696	84.911	57791.043
End (mm)	2306.374	83.878	57842.196
Direction	0.091057	-0.020110	0.995643
Proj. Ang. (deg)	Rx from Y 91.1571	Ry from Z 5.2255	Rz from X -12.4539
Radius (mm)	12.708	Diameter (mm) 25.417	
Length (mm)	51.377		

## RADIATION SAFETY COMPONENTS ALIGNMENT

<u>Title</u>	<u>Name</u>	<u>Approval Date</u>
Beamline Engineering Group Leader	Steven Hulbert	03/02/2018
ES&H Operations Manager	Lori Stiegler	03/01/2018
Quality Assurance Engineer	Joseph Zipper	03/01/2018

Serial No	Part No	Part Rev	ECN	Rev	ECN	Rev
	PD-SST-BL-LAY-1070	A				

Deviation & Waiver: \_\_\_\_\_

OP	Description	Name/Life #	Date	DR
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- 10 Review the following for ES&H requirements:
- PS-JRA-0001 Electrical and Electronic Shop Work;
  - PS-JRA-0006 Accelerator or Beam Line Components, Mechanical Assembly;
  - PS-JRA-0014 Hand Tool Use.

<i>ABin</i> 19194	4/17/19	
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- 20 Verify measuring and test equipment used for this procedure contains a valid calibration label in accordance with NLS-II Calibration Procedure PS-QAP-0901, where applicable.

<i>J Adams</i> 23067	4/17/19	
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The technician is responsible for notifying the technical supervisor and/or the cognizant engineer of any discrepancies occurring during the performance of this procedure. All discrepancies shall be identified and reported in accordance with NLS-II Discrepancy Reporting Procedure PS-QAP-0002.

30 BEAMLINE COMPONENT INFORMATION

A. In the space provided on page 1 of this traveler, write the part number and serial number of the item that this traveler is being used for.

<i>C. Jare</i> 06156	4/17/19	
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B. Indicate if the item has aperture(s). Yes or  No

- ✓ C. Confirm the item is properly labeled.



OP	Description	Name/Life #	Date	DR
40	SURVEY GROUP	<i>[Signature]</i> 23067	4/17/19	

- A. Perform a bench survey per the following:
- Determine the center line of the item body defined by the centers of the flanges.
  - Measure each fiducial (tooling ball center) x.y.z coordinates with respect to the item centerline.
  - Measure the size of the item with respect to the item center line.

- B. If the item has aperture(s) per op#30, perform the additional following steps;
- Measure the size inlet and outlet aperture(s)
  - Determine the aperture(s) center location with respect to the item centerline.
  - Determine the location of the aperture(s) with respect to the part containing the aperture.
  - Measure the aperture(s) channel length, channel inclination and taper surface angle.
  - Determine the fiducial locations with respect to the aperture center(s).

C. Attach survey report to this traveler.

Note:

The Survey report shall contain the following:

- Survey Data FileName
- Survey Data File Location
- Survey equipment used

50 COGNIZANT BEAMLIN ENGINEER/SCIENTIST

<i>[Signature]</i> 06156	4/17/19	
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- A. Indicate the model/drawing number, which include fiducial information to be used to survey / align the item into the corresponding beamline location.

Model / Drawing number:

PD-SST-BL-LAY-1070

- B. Indicate the "positioning" tolerances (with measurement units) that the item fiducials shall be aligned to.

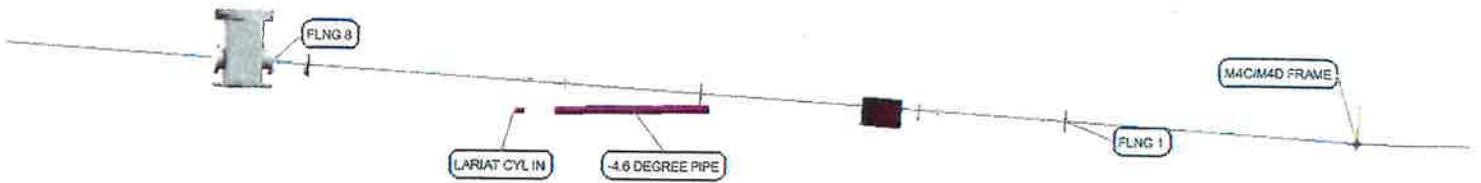
X: +/- 10mm Y: +/- 10mm Z: +/- 30mm



OP	Description	Name/Life #	Date	DR
60	<p>SURVEY GROUP</p> <p>A. Align the item (using OP#40 bench survey data) to the 3D model, within required tolerance (per OP#50)</p> <p>B. Attach survey report to this traveler.</p> <p>Note: The Survey report shall contain the following: -Installed location of Bench Survey center line in beamline coordinates (beamline origin = source point) -Measured fiducial locations (as installed) versus required positions (using corrected bench survey measurements) in accelerator/beamline coordinates -Aperture center in beamline coordinates -Survey Data FileName -Survey Data File Location -Survey equipment used</p>	<p><i>J. Dalab</i> 23067</p>	<p>4/17/19</p>	
65	<p>SURVEY RESULTS ANALYSIS - This operation shall be completed by the Beamline Engineer</p> <p>Review final survey results and confirm they are satisfactory. (i.e. tolerance requirements met)</p>	<p><i>M. O'Hara</i> 17-APR-2019</p>		
70	<p>Verify All Traveler Operations Complete</p>	<p>C. DATE 06/5/6</p>	<p>4/24/19</p>	
80	<p>REVISION HISTORY (This step is informational and does not require signoff)</p> <p>Rev - Description - Date A First Release 7/23/2014 B Steve Hulbert replaced Mary Carlucci-Dayton as author and approver OP#65 Added</p>			







Point Group			
FLNGS AGAIN: FLNG 1 - Cardinal Pts			
Point Name	X	Y	Z
	(mm)	(mm)	(mm)
Center	2013.856	94.562	55003.785

Point Group			
FLNGS AGAIN: FLNG 2 - Cardinal Pts			
Point Name	X	Y	Z
	(mm)	(mm)	(mm)
Center	2083.297	128.892	55667.257

Point Group			
FLNGS AGAIN: FLNG 3 - Cardinal Pts			
Point Name	X	Y	Z
	(mm)	(mm)	(mm)
Center	2092.653	134.499	55764.763

Point Group			
FLNGS AGAIN: FLNG 4 - Cardinal Pts			
Point Name	X	Y	Z
	(mm)	(mm)	(mm)
Center	2208.583	193.301	56876.911

Point Group			
FLNGS AGAIN: FLNG 5 - Cardinal Pts			
Point Name	X	Y	Z
	(mm)	(mm)	(mm)
Center	2282.647	230.464	57582.558

MODEL CENTER	2282.650	230.460	57582.560
DEVIATION	0.003	-0.004	0.002





Point Group FLNGS AGAIN: FLNG 6 - Cardinal Pts			
Point Name	X (mm)	Y (mm)	Z (mm)
Center:	2305.937	249.835	57778.998

Point Group FLNGS AGAIN: FLNG 7 - Cardinal Pts			
Point Name	X (mm)	Y (mm)	Z (mm)
Center	2425.904	295.632	58896.261

Point Group FLNGS AGAIN: FLNG 8 - Cardinal Pts			
Point Name	X (mm)	Y (mm)	Z (mm)
Center	2438.005	316.843	59078.205

Cylinder FLNGS AGAIN: -4.6 DEGREE PIPE			
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Begin (mm)	2285.906	89.142	57636.542
End (mm)	2204.797	111.446	56833.775
Proj. Ang. (deg)	Rx from Y -88.4085	Ry from Z -174.2306	Rz from X 164.6248
Radius (mm)	22.254	Diameter (mm) 44.507	
Length (mm)	807.162		

Cylinder FLNGS AGAIN: LARIAT CYL IN			
	X	Y	Z
Begin (mm)	2301.696	84.911	57791.043
End (mm)	2306.374	83.878	57842.196
Direction	0.091057	-0.020110	0.995643
Proj. Ang. (deg)	Rx from Y 91.1571	Ry from Z 5.2255	Rz from X -12.4539
Radius (mm)	12.708	Diameter (mm) 25.417	
Length (mm)	51.377		

