Brookhaven National Laboratory **National Synchrotron Light Source II** Work Instruction	Doc No. NSLSII-7ID-WIN-001 Effective Date: 24JAN2018 Review Frequency: 5 yrs Rev. No. 1
Title: Operating the Superconducting Magnet System at the SST Beamline	

Prepared By:	Reviewed By:	Approved By:
1/23/2018	1/23/2018	1/23/2018
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1 WORK SCOPE

This work instruction provides the directions for operating the Superconducting Magnet System (SRI 8.5/0.6T, magnet system) at the SST (7-ID) beamlines.

2 PREREQUISITES

2.1 Magnetic field hazard signs and barriers shall be posted at the 5 Gauss line (see Attachment A)

2.2 Magnet operators shall have completed static magnetic field training (TQ-SMF) and Static Magnetic Field Medical Surveillance (OM-MEDSURV-SMF).

3 PRECAUTIONS/WARNINGS

3.1 The magnet shall be operated by qualified personnel only.

3.2 Never operate the magnet without the magnet supervision system. A quench in the system shall be avoided to prevent damage to the coil packs.

3.3 Do not remove the power leads or turn off the power supply while the magnet is energized.

3.4 The compressor absorber shall be replaced after every 20,000 hours of use.

3.5 Magnetic fields greater than 5 Gauss will be present in the demarcated areas when the magnet is operating.

4 INSTRUCTIONS

4.1 Vacuum

Note: A good vacuum is critical to satisfactory performance of the cryocooler; prior to operation, the cryostat shall be pumped to a minimum of 10^{-3} mbar in accordance with the steps below.

Note: When the cryocooler is operated continuously, vacuum in the cryostat should be refreshed every 2 weeks to ensure efficient cooling.

a. Connect the vacuum pump to the magnet.

Note: In absence of the vacuum gauge, observe the following time guidelines:

- ~30 minutes to evacuate the vacuum hose
- ~5 hours to evacuate the magnet.

b. Close the vacuum valve AND run the vacuum pump for a minimum of 30 minutes to evacuate the hose.

c. Slowly open the vacuum valve, while continuing to run the vacuum pump for a minimum of 5 hours.

d. During operation, monitor the magnet for signs of sweating, which indicates a degradation of the vacuum.

4.2 Cooldown

Note: Leave the vacuum pump in action during cooldown of the magnet. The observed pressure will drop to ~10^{-6} mbar due to the cryopumping of residual gases by the cold mass.

Note: Cooldown time for this magnet is ~55 hours.

a. Verify the following:

- Magnet is under vacuum.
- Compressor cooling water is turned on
- Helium flex lines are securely attached

- Cold head motor cable is connected to both the compressor and cold head motor
- Compressor pressure gauges read between 205 – 215 PSIG at 60Hz.

b. IF any of the criteria above are not met, THEN the compressor shall not be operated until corrective actions are taken.

Note: Refer to the SHI Manual for complete operating instructions, including attachment of the helium flex lines, and recommended maintenance.

c. IF all of the criteria above are met, THEN press the power switch on the front panel of the compressor to turn the system on.

4.3 Energizing the Magnet

Note: When not in use, it is recommended to de-energize the magnet (ensure the Kepco power supply is set to zero). The magnet system supervisor is hard-wired into the Kepco power supply.

Caution: Never unplug the magnet power supply while the magnet is energized.

a. Verify that all temperatures monitored at the magnet system supervisor are below the set-points in Tables 5-1 and 5-2.

Table 5-1: Set Trip Points for the Magnet Monitoring System (Sample Magnet)

Monitored Value	Trip Point	Reset Point
T1 cold head 1st stage	48K	47K
T2 cold head 2nd stage	13K	12K
T3 input – A side	14K	13K
T4 input – B side	15K	14K
T5 back of coil pack	17K	16K
DV = (V2-V1)	35 mV	10 mV

Table 5-2: Set Trip Points for the Magnet Monitoring System (Detector Magnet)

Monitored Value	**Trip Point**	**Reset Point**
T1 cold head 1st stage	37K	36K
T2 thermal buss	38K	37K
T3 interconnect	40K	39K
T4 coil pack 1	40K	39K
T5 coil pack 2	40K	39K
DV = (V2-V1)	20 mV	1 mV

a.1 IF all set temperatures are below their set-points, THEN the Kepco magnet power supply may be activated.

a.2 IF all set temperatures are not below their set-points, THEN check the cryostat vacuum and compressor pressures (refer to the vacuum section above for thre vacuum and Cryomech manual for refilling Helium).

b. Turn on the power supply.

c. Verify that the status screen displays the current and voltage values, current set-points and voltage.

d. Enter the desired magnet current AND press enter to energize (see the Kepco Operator Manual for complete operating instructions).

4.4 System Shut-down

Note: Once the system is shut down, the magnet monitor may be left operating to provide system temperature during warm-up.

Note: If the magnet will only be powered down for a short period of time (< 24 hrs), the cryocooler may be left operating to keep the magnets cold for the next ramp up.

a. Set the magnet current to zero.

b. Verify that the power supply current is at zero.

c. Turn off the Kepco power supply.

d. Turn off the cryocooler.

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REVISION HISTORY

REVISION	SECTION(S)	PAGE #	DATE	List of Reviewers	DESCRIPTION
1	All	All	19JAN2018	R. Lee	First Issue.

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

Attachment A – SST Magnet Survey Report

BROOKHAVEN NATIONAL LABORATORY

DIRECT READING INSTRUMENT SURVEY FORM

Date:	11/29/2017	Surveyor(s):	C. Weilandics

I. AREA INFORMATION

Dept. :	LT	Bldg. :	740	Room:	ID-7
Source:	HTS-110 SRI 8.5/0.6T magnet system				
Engineering Controls:	None				

II. EMPLOYEE INFORMATION

Name :	N/A			N/A	
Dept. :	N/A	Bldg. :	N/A	Job Title :	N/A
Exposure Duration (Hrs) :	N/A	Times Per Day :	N/A	N/A	
Job / Task Performed :	N/A				
PPE Used :	N/A				

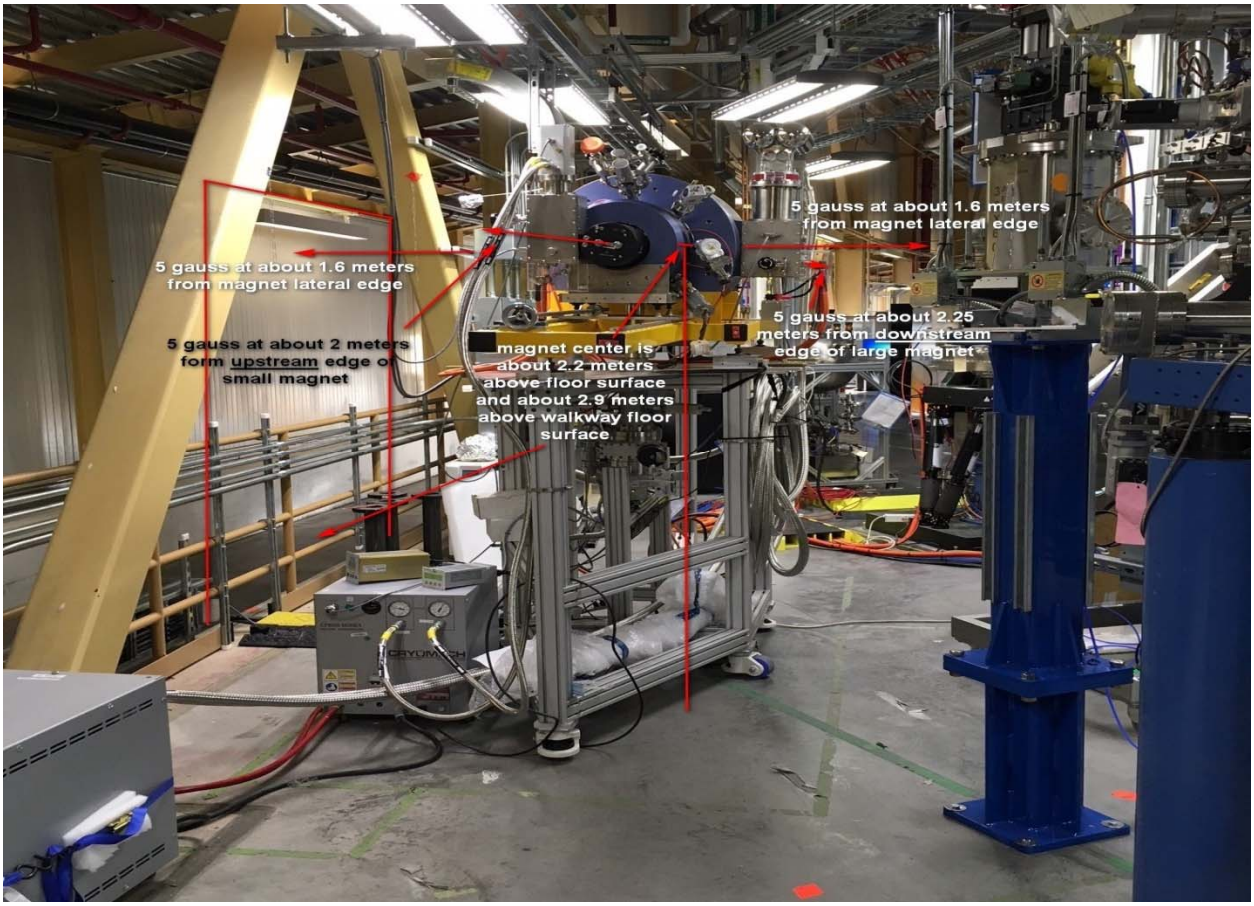
III. SURVEY INSTRUMENT INFORMATION

Instrument:	Metrolab	Cal Date : ☑ Pre-Cal	9/26/2017	Calibrator :	N/A
Model :	THM 7025	☑ Post-Cal		Comment :	cal check
Serial # :	TH-BO 855			Comment :	cal check

IV. SAMPLING INFORMATION AND RESULTS

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

Time	Location	Reading	Comments
	See map below	See map below	Magnet core field = 10 Tesla



V. Conclusion and Recommendation: The magnet actually consists of two magnets; a sample magnet which runs nominally at 8.5 tesla, and a smaller upstream Detector magnet which runs at 0.6 tesla. The five gauss readings taken with the meter were in fairly close agreement with the five gauss contour plot which may be found on sheet 2 of this survey. The maximum readings would be obtained at about the horizontal centerline of the magnet (~69 inches, or about 2.2 meters in height above the experimental floor and about 2.9 meters above the walkway floor surface). On the outboard side of the magnet, the 5 gauss line extends out to the vertical extent of the experimental floor slab. For someone to exceed this level they would have to be in an elevated platform (i.e. man lift) above the walkaway, and leaning in toward the magnet while it is on.

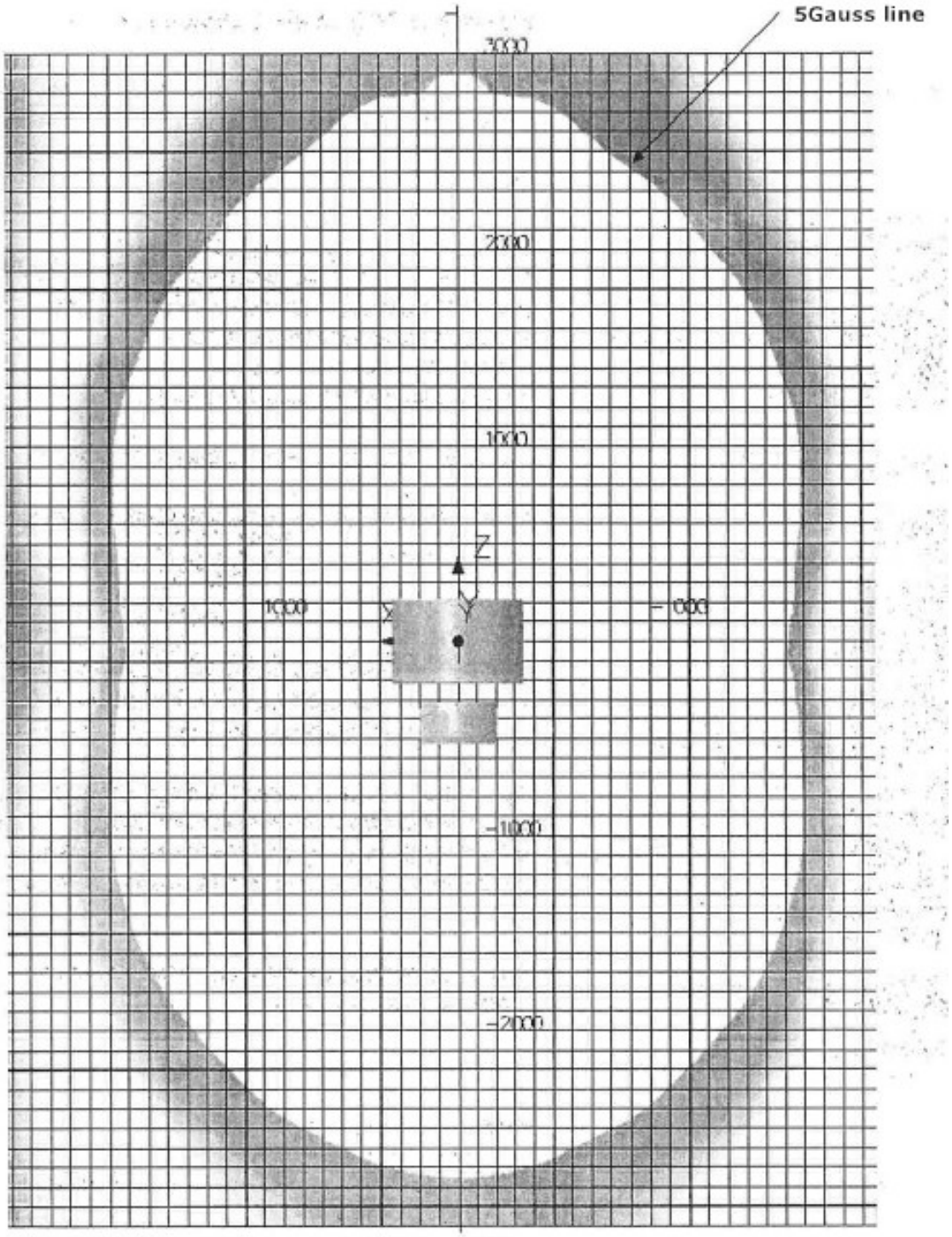


Figure 3: 5Gauss line - x-z plane