

Photon Sciences Directorate, Brookhaven National Laboratory			
Doc No. PS-C-ESH-PRC-002	Author: L. Hill	Effective Date: 27Jun2014 Review Frequency: 3 yrs	Version 4
Title: Unreviewed Safety Issue Determination Procedure			Administrative

Attachment B
USI Screening Checklist

A) USI Screening Purpose: <input checked="" type="checkbox"/> Proposed Activity <input type="checkbox"/> Existing Condition	B) Description of Proposed Activity/Discovered Condition and Sponsor/Condition Owner: Review of Diagnostic R&D Beamline (Cell 22) Shielding Design
C) USI Screening Outcome: <input checked="" type="checkbox"/> No potential USI <input type="checkbox"/> Potential USI	USI Screening Performed by/Date:  Steve Moss / July 14, 2017 The following answers are based on Conclusions of Review by RSC Ray-Tracing Sub-committee as captured in memo dated July 13, 2017 from Dr. Z. Zhong to Sub-committee members, et. al. and establish Cell 22 compliance with NSLS-II Shielding Policy.

Qualified Screener answers the following questions; if:

- Any question is answered yes (i.e., "Y"), check "Potential USI" box in Part C, above.
- If all questions are answered no (i.e., "N"), check "No potential USI" box in Part C, above.

Does the proposed change or discovered condition impact or potentially impact:

1) The personnel protection system (PPS)?

Examples: Access doors, fencing, hutches, accelerator enclosures, software change, hardware modifications that are not, "replacement-in-kind."

Y or N

2) ODH Monitoring System?

Examples: Hutch ODH monitors, filling station ODH monitors.

Y or N

3) Radiation Safety Component?

Examples: Shielding, earthen berms, hutches, concrete walls, beam shutters, scatter shields, burn-through devices, exclusion zones, labyrinths, beam stops, beam masks, collimators, hutch guillotine and beam transport pipes.

Y or N

4) Area radiation monitoring system or components?

Examples: Changing instrument position or use of a new type of instrument used for area radiation monitoring, alarms and controls.

Y or N

5) Radiological source terms identified in the SAD?

Examples: New insertion devices, change to the maximum synchrotron energy or accelerated charge values, accelerator modifications that are not "replacement-in-kind."

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Y or N

6) Critical devices

Examples: Safety shutters, dipole magnets, top-off apertures.

Y or N

7) PS operating organization?

Examples: Control room operators, support staff responsible for PPS, radiation monitoring or shielding configuration management.

Y or N

8) Operational safety limits described in the Authorization Basis Documents?

Examples: Maximum current, beam energy, pulse rate.

Y or N

Forward the completed form to the Authorization Basis Manager



Memo

Date: July 13, 2017
To: Danny Padrazo, Bernard Kosciuk, WeiXing Cheng, David Siddons, and Sushil Sharma
From: Zhong Zhong (chair), Photon Science Radiation Safety Committee
Subject: Review of the ray-tracing design of the 3PW pinhole camera beamline in the frontend of Cell 22.

Dear Danny, Bernie, XeiXing, Pete and Sushil,

The Photon Science Radiation Safety Committee (RSC)'s ray-tracing subcommittee concluded review of the shielding design of the pinhole camera beamline in the frontend of Cell 22 on July 12.

Subjects reviewed include the synchrotron max-fan and Bremsstrahlung drawings and aspects of thermal management that relate to radiation safety.

Written documents

The preliminary drawings were submitted to the RSC this March for preliminary review and feedback. Review requirements were discussed with Andrew Ackerman at that time. The following approved drawings were submitted on July 11, 2017 for final review:

1. Cell 22 front-end assembly drawing, SR-DG_BL-8001, Rev. A by J. Tuozzolo, March 2017.
2. Cell 22-BM, pin-hole camera beamline front-end Bremsstrahlung ray-tracing, SR-DG_BL-8001, Rev. A, sheets 4 and 5 for horizontal and vertical projections, respectively.
3. Cell 22-BM pin-hole camera beamline front-end max. synchrotron ray-tracing, SR-DG_BL-8001, Rev. A, sheets 2 and 3 for horizontal and vertical projections, respectively.

Notes

The following comments are noted for completeness:

1. Cell 22 is being purposed to be a diagnostic pinhole camera, using 3PW as x-ray source. The beamline is all contained inside the shielded wall.
2. Shielding for the primary Bremsstrahlung x-rays is designed using ray-tracing method. A collimator (shadow-shield, at 6.44 m) and beam-stop (at 22.14 m) combination stops the primary Bremsstrahlung in the frontend, upstream of the shielded wall.
3. Since the pinhole camera beamline is located completely in the frontend, inside the shielded wall of the storage ring, procedure for reviewing front-end designs is used for reviewing this beamline.
4. The beamline uses a 3PW as source through the pinhole and Diamond window. The mask uses the standard mask design for NSLS-II 3PM frontends. As an extra precaution, the lead beam-stop is protected by a sheet of aluminum. Thus there is no thermal risk.
5. The beamline has a diamond window in the front-end separating the beamline vacuum from the ring vacuum.
6. The radiation shielding components checklist for the beamline was previously reviewed by the RSC checklist sub-committee members, Mo Benmerrouche and Ray Filler, as part of Pentant 2 checklist.

Conclusions

1. Based on our assessment of the ray-tracing drawings the RSC finds that the cell-22 pin-hole camera beamline shielding design meets the NSLS-II shielding policy. Subject to experimental verification by radiation survey, we believe the installed shielding will provide adequate personnel protection for normal operation and against failures of synchrotron orbit.
2. Based on our review of the max. synchrotron ray-tracing drawings, the RSC believes that the cell-22 pin-hole camera beamline's window, mask, white-beam transport, and white-beam stop are adequately designed to protect against thermal failure of shielding components.
3. Based on our review of the beamline layout, the RSC finds that all Radiation Safety Components meet NSLS-II design requirements.

Radiation Safety Committee

<i>Name</i>	<i>Expertise</i>	<i>Directorate</i>
Andrew Ackerman	Deputy ESH Manager	PS
Dana Beavis	Experimental Nuclear Particle Physics	NPP
Andi Barbour	Beam Line Physicist	PS
Mohamed Benmerrouche	Nuclear and Radiation Physics	PS
Scott Buda	Personnel Protective Systems	PS
Ray Filler	Accelerator Physicist	PS
Wah-Keat Lee	Beam Line Physicist	PS
Boris Podobedov	Accelerator Physics	PS
Chuck Schaefer	Accelerator SME	ESH
Om Singh	Accelerator Controls	PS
Lutz Wiegart	Beam Line Physicist	PS
Zhong Zhong	Beam Line Physicist	PS
Emil Zitvogel	Accelerator Operations	PS

Ashley Shoemaker-Skokov Administrative Support PS

Ray-tracing sub-committee

Andrew Ackerman	Deputy ESH Manager	PS
Mary Carlucci-Dayton	Mechanical Engineer	PS
Wah-Keat Lee	Beam Line Physicist	PS
Chuck Schaefer	Accelerator SME	ESH
Christopher Stelmach	Designer	PS
Lutz Wiegart	Beam Line Physicist	PS
Zhong Zhong	Beam Line Physicist	PS

PPS sub-committee

Dana Beavis	Experimental Nuclear Particle Physics	NPP
Mohamed Benmerrouche	Nuclear and Radiation Physics	PS
Scott Buda	Personnel Protective Systems	PS
Robert Lee	ESH manager	PS
Zhong Zhong	Beam Line Physicist	PS

RSC checklist sub-committee

Andi Barbour	Beam Line Physicist	PS
Mohamed Benmerrouche	Nuclear and Radiation Physics	PS
Ray Filler	Accelerator Physicist	PS

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C) USI Screening Outcome: <input checked="" type="checkbox"/> No potential USI <input type="checkbox"/> Potential USI	USI Screening Performed by/Date:  Steve Moss / July 12, 2017 The following answers are based on results of Review by RSC Ray-Tracing Sub-committee as given by E-mail dated July 10, 2017 from Dr. Z. Zhong to Sub-committee members, and their subsequent responses.

Qualified Screener answers the following questions; if:

- Any question is answered yes (i.e., "Y"), check "Potential USI" box in Part C, above.
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Y or N

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Y or N

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Moss, Steven H

From: Ackerman, Andrew
Sent: Wednesday, July 12, 2017 10:08 AM
To: Moss, Steven H
Subject: FW: Please review cell 22 diagnostic front-end ray-tracing
Attachments: SR-DG-BL-8001.pdf

-----Original Message-----

From: Zhong, Zhong
Sent: Monday, July 10, 2017 2:57 PM
To: Shoemaker-Skokov, Ashley; Wiegart, Lutz; Schaefer, Charles W; Ackerman, Andrew; Carlucci-Dayton, Mary; Lee, Wah-Keat; Stelmach, Christopher
Cc: Cheng, Weixing; Siddons, David; Padrazo, Danny; Padrazo, Danny; Shoemaker-Skokov, Ashley
Subject: Please review cell 22 diagnostic front-end ray-tracing

Dear RSC ray-tracing sub-committee,

Cell 22 is being purposed to be a diagnostic pinhole camera, using 3PW as x-ray source. It is all contained inside the shield wall. Please review the attached front-end ray-tracing for the cell-22 3PM diagnostic port.

I took a look. It is a very simple front-end with all Bremsstrahlung stopped inside the shield wall. Thus there is no radiation risk. Using a 3PW as source through the pinhole and Diamond window, there is no thermal risk.

Please let me know by this Wed. if you have any issues or would like to meet with the team to discuss.

Best regards,

Zhong

