

INSTRUMENT READINESS REVIEW

FOR

BNL NATIONAL SYNCHROTRON LIGHT SOURCE II

PROJECT BEAMLINE, FRONT ENDS, AND INSERTION DEVICES

LINES OF INQUIRY (LOIs)



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1. INTRODUCTION

The lines of inquiry (LOIs) included in this document were developed to support the Instrument Readiness Reviews (IRRs) for beamline commissioning and operations. The scope of this review includes the Front ends and Insertion Devices associated with these beamlines. They are organized according to the readiness criteria included in the Instrument Readiness Plan (IRP) for these reviews and are intended to be applicable to only those aspects of the readiness criteria that apply to the beamlines, front ends, and insertion devices, rather than a re-evaluation of the Photon Sciences “base program” which has been reviewed by previous Accelerator Readiness Review teams.

2. PILLAR I DOCUMENTS & PROCEDURES

AUTHORIZATION DOCUMENTS/USI PROCESS

Safety Assessment Document Lines of Inquiry (LOI)
Interview selected management /staff involved in SAD development
Determine adequacy of safety analysis performed to support SAD
Determine if SAD / ASE meets DOE O 420.2C requirements
Determine if SAD provides adequate technical basis for ASE
Determine if ASE addresses required controls and operating limits
Determine adequacy of SAD / ASE to support beamline commissioning and operations
Interview Authorization Basis Manager
Determine if USI process as implemented for beamlines meets DOE O 420.2C requirements
Determine if USI process is adequately linked to Configuration Management program as implemented for beamlines
Determine adequacy of USI process to support beamline commissioning and operations

QUALITY ASSURANCE

Quality Assurance Lines of Inquiry (LOI)
Interview QA Manager and select beamline staff
Determine adequacy and completion of beamline travelers
Determine if previous findings related to beamlines (from internal personnel and external teams) have been adequately addressed and closed.
Determine adequacy of QA Program to support beamline commissioning and operations

CONDUCT OF OPERATIONS PROGRAM

ConOps Lines of Inquiry (LOI)
Review ConOps program and procedures
Interview PS Conduct of Operations Manager
Determine if ConOps is adequately implemented for beamlines
Determine if Implementing procedures and documents cited in ConOps are issued in accordance with PS and BNL requirements
Determine adequacy of ConOps associated procedures to support beamline commissioning and operations

RADIATION SURVEY PLANS

Radiation Survey Plan Lines of Inquiry (LOI)
Review Beamline Radiation Safety Commissioning Plan
Verify beamline specific radiation survey plan is approved.
Review selected operating procedures controlling approval for startup, beam enabling, beam authorization, and safety significant controls

PROCEDURES

Procedures Lines of Inquiry (LOI)
Review PS procedure program documentation
Interview selected beamline management/staff on their role in the PS procedure program
Review selected operating procedures controlling approval for startup, commissioning, beam enable, and safety significant controls
Review procedures required for beamline commissioning and operation
Interview PS staff on emergency response procedures
Determine adequacy of procedure program to support Beamline Commissioning and Operations and to maintain the function of 'credited controls'

3. PILLAR II HARDWARE (SPECIFIC FOR EACH BEAMLIN, FRONT END, AND INSERTION DEVICE)

RADIATION SAFETY COMPONENTS (NOT FOR INSERTION DEVICES)

Radiation Safety Component Lines of Inquiry (LOI)
Interview Lead Beamline Scientist
Determine if beamline specifications have been defined for 500 mA operation
Determine if design reviews have been completed and all follow up actions closed?
Review the completed Travelers
Verify that all utility connections completed and tested
Verify that ray traces have been reviewed by RSC
Verify that configuration management requirements met
Determine if PPS components been tested and verified by the cognizant engineer and independently certified by ES&H staff

OPTICS (STEER AND FOCUS) (ONLY BEAMLINES)

Optics Lines of Inquiry (LOI)
Determine if the optics have been designed in accordance with PS requirements
Ensure that the design reviews have been completed and all follow up actions closed
Review the completed Travelers for components
Verify that all utility connections have been completed and tested
Verify that configuration management requirements have been met
Determine if EPS requirements and interfaces have been designed, installed and tested in accordance with PS requirements.

OTHER BEAMLIN COMPONENTS (ONLY BEAMLINES)

Other Beamline Components Lines of Inquiry (LOI)
Determine if components been designed in accordance with PS requirements?
Verify that the design reviews have been completed and all follow up actions closed
Review the completed Travelers for installation
Verify that configuration management requirements have been met
Determine if all utility connections have been completed and tested
Verify that EPS requirements and interfaces have been designed, installed and tested
Determine if components have been designed in accordance with PS requirements

END STATION (ONLY BEAMLINES)

End Station Lines of Inquiry (LOI)
Determine if the end station equipment has been designed in accordance with PS requirements
Verify that the design reviews have been completed and all follow up actions closed
Review the completed Travelers for installation
Verify that configuration management requirements have been met
Verify that all utility connections have been completed and tested
Determine if EPS requirements and interfaces have been designed, installed, and tested?

SHIELDING (ONLY BEAMLINES)

Shielding Lines of Inquiry (LOI)
Interview ES&H Manager and Lead Beamline Scientists
Determine if shielding guidelines and ALARA goals were established and followed in the design and installation of shielding
Verify that ray traces were reviewed by the RSC
Review the completed Travelers for installation
Determine if the "as-built" shielding meets the SAD and ASE requirements/assumptions.
Verify that configuration management requirements are being met
Determine the adequacy of the radiation survey plan

HUTCHES AND BEAMLINE LAYOUT (ONLY BEAMLINES)

Hutches and Physical Plant Readiness Lines of Inquiry (LOI)
Interview the cognizant scientists and engineers
Determine if shielding guidelines and ALARA goals were established for hutches?
Determine if the "as-built" shielding meets the SAD and ASE requirements/assumptions.
Determine if design reviews have been completed and all follow up actions closed
Review the completed Travelers
Verify that the industrial hazards of the hutch have been analyzed and are well understood
Verify that the hazards of working in or on the hutch have been mitigated on the basis of a laboratory industrial safety program
Determine if there are operational checks required before the hutch is placed in service

UTILITIES (WATER, AIR, GN₂, ELECTRICAL POWER)

Utilities Lines of Inquiry (LOI)
Interview the cognizant engineer for Utilities
Determine if utilities were designed in accordance with PS requirements?
Review drawings for installed utilities
Review the completed Travelers
Verify that appropriate safety devices have been installed

PERSONAL PROTECTION SYSTEM (PPS) (NOT FOR INSERTION DEVICES)

PPS Lines of Inquiry (LOI)
Interview the ES&H Manager and cognizant engineer for PPS
Determine if the PPS system was designed in accordance with PS specifications
Verify that design reviews have been completed and all follow up actions closed
Verify that drawings are completed and configuration management requirements are met
Verify that Credited Passive, Active and Administrative Controls in the ASE are installed and operational
Verify that an independent functional certification of the PPS has been completed

EQUIPMENT PROTECTION SYSTEM (EPS)

EPS Lines of Inquiry (LOI)
Interview the cognizant engineers for EPS
Determine if the EPS has been designed in accordance with PS requirements
Verify that interfaces have been specified and completed
Review Travelers
Verify that cybersecurity risks have been mitigated in the design of control systems

VACUUM

Vacuum Lines of Inquiry (LOI)
Interview the cognizant engineer for Vacuum systems
Determine if vacuum systems have been designed in accordance with PS requirements
Verify that the design reviews have been completed and all follow up actions closed
Review the completed Traveler for vacuum
Determine if vacuum is acceptable in all components

OXYGEN SENSORS (ONLY BEAMLINES)

Oxygen Sensors Lines of Inquiry (LOI)
Interview the cognizant engineer for ODH calculations
Determine if an adequate ODH evaluation has been done for each applicable hutch
Verify that oxygen monitoring systems are designed in accordance with PS requirements
Determine if configuration management requirements have been met?
Verify that the oxygen monitoring system has been installed and certified?
Review the ODH alarm response procedure
Determine if Beamline personnel and Operators are familiar with ODH alarm response actions

AREA RADIATION MONITORING SYSTEM (ARMS) (ONLY BEAMLINES)

ARMs Lines of Inquiry (LOI)
Determine if an adequate number of ARMs are all available, calibrated, and functionally certified as part of the PPS?
Review the process for determining ARM placement
Verify how configuration control is implemented
Review the process for determining Alarm and Interlock set points
Verify PSD has a formalized process for controlling/changing these set points
Determine if the set points and alarm actions are consistent with the description provided in the SAD
Verify that ARM Travelers have been completed and ARMs are installed and secured
Verify that the ARMs are powered and integrated with PPS

CONTROLS

Controls Lines of Inquiry (LOI)
Interview the Controls Engineer
Determine if the Controls system has been designed in accordance with PS requirements
Verify that interfaces have been specified and completed
Review Travelers
Verify that cybersecurity risks have been mitigated in the design of control systems

FRONT END (FRONT END ONLY)

Front Ends Lines of Inquiry (LOI)
Interview the Front Ends Engineer
Determine if the Front Ends have been designed in accordance with PS requirements
Verify that interfaces have been specified and completed
Review Travelers
Verify that component safety functions have been tested and components are under configuration control.

INSERTION DEVICES (INSERTION DEVICES ONLY)

Insertion Devices Lines of Inquiry (LOI)
Interview the Insertion Devices Engineer
Determine if the Insertion Devices have been designed in accordance with PS requirements
Verify that interfaces have been specified and completed
Review Travelers
Verify that component safety functions have been tested and components are under configuration control.

4. PILLAR III PERSONNEL

AUTHORIZED BEAMLINE STAFF

Authorized Beamline Staff Lines of Inquiry (LOI)
Review PSD training program documentation and procedures for beamlines
Interview Training Manager and Photon Division Director
Determine adequacy of training program to support Beamline commissioning and operations
Verify safety-related training records for PS personnel are current
Verify Job Training Assessments (JTAs) have been completed for PS Beamline personnel and are adequate to enable personnel to carry out their roles and responsibilities.

LEAD BEAMLINE STAFF

Lead Beamline Staff Lines of Inquiry (LOI)
Verify that Lead Beamline Staff have been identified and trained in appropriate beamline startup, and operational procedures.
Verify that safety-related training for Lead Beamline Staff is adequate and current.

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