Conduct of Operations Manual

APS Operations

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This document implements and maintains controls related to the Safety Assessment Document (SAD) for the Advanced Photon Source and/or the APS Accelerator Safety Envelope (ASE).

Any changes made to this document should ensure these controls are maintained; see “APS Accelerator Safety Configuration Management Plan” (APS_1693025).

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Acronyms

For a more complete listing see: APS Acronyms.

Commonly used acronyms:

ACIS	Access Control Interlock System (accelerator system safety interlocks)
AES	APS Engineering Support Division
ALARA	As Low As Reasonably Achievable
ALD	Associate Laboratory Director (APS Director)
APS	Advance Photon Source
APS-U	APS Upgrade Project
ARR	Accelerator Readiness Review
ASD	Accelerator Systems Division
ASE	Accelerator Safety Envelope
ASO	Accelerator Safety Order (Safety of Accelerator Facilities, DOE O 420.2D)
CAT	Collaborative Access Team
CDB	Component Database
CDT	Collaborative Development Team
CFR	Code of Federal Regulations
CRD	Contractor Requirements Document
DALD	Deputy Associate Laboratory Director
DMS	Document Management System
DNS	Document Numbering System
EFOG	Experiment Floor Operations Group (Floor Coordinators)
EHCP	Experiment Hazard Control Plan
EPS	Equipment Protection System
ESAF	Experiment Safety Assessment Form

FC	Floor Coordinator
FEEPS	Front End Equipment Protection System
HP	Health Physics
ICMS	Integrated Content Management System (APS central electronic document/records repository)
IRR	Installation Readiness Review
ISM	Integrated Safety Management
JHQ	Job Hazard Questionnaire
LMS	Lab Management System (Argonne Lab-Wide policies and procedures)
MBA	Multi-Bend Achromat (APS-U's high brightness storage ring lattice)
MCR	Main Control Room
MPS	Machine Protection System (equipment protection for accelerator systems)
PDRC	PSC Design Review Committee
PRSC	PSC Radiation Safety Committee
PSC	Photon Science (APS plus APS-U)
PSS	Personnel Safety System (beamline safety interlocks)
RSS	Radiation Safety System
SAD	Safety Assessment Document
TMS	Training Management System
WCD	Work Control Document
XSD	X-Ray Science Division

APS Operations

Introduction

Purpose
The mission of the Advanced Photon Source (APS) is to deliver world-class science and technology by operating an outstanding synchrotron radiation research facility accessible to a broad spectrum of researchers.

Scope
This manual provides:

- An overview of the organization of the APS and
- Descriptions of APS-wide operational procedures, policies, and standards.

It is a reference for anyone trying to understand the overall operational structure of the APS. For those that want additional information, links are provided to the implementing processes and reference documents.

The processes described here are the local APS implementation of DOE and Argonne requirements and standards.

Not in the scope of this manual:

- Beamline and accelerator R&D
- Projects (e.g., the APS Upgrade Project)
- User Administrative Programs (e.g., User registration and badging)

This document describes the conduct of APS facility operations, it does not describe the conduct of the project management unique to the APS-Upgrade project.

Maintenance of the Manual
This manual is prepared and maintained under the direction of PSC Deputy ALD for Operations (DALD) and is maintained in the APS electronic records system, the Integrated Content Management System (ICMS). ICMS provides a persistent URL that links to the latest revision of a document (APS_2283552). This manual is reviewed on an annual basis and as warranted by operational or organizational changes. Review and ICMS approval workflow is managed by the APS Policy and Procedure Administrator. Feedback can be submitted through an on-line comment form or directed to the DALD for Operations.

Hierarchy of Requirements and Practices:

Authority	Requirement Documents	
Federal and DOE Regulations, and mandatory consensus standards	DOE Orders and associated guidance Code of Federal Regulations (e.g., as 10 CFR 835, DOE Occupational Radiation Protection Program; 10 CFR 851, DOE Safety and Health Program; DOE O 420.2D, Safety of Accelerators; NFPA 101, Life Safety Code)	
↓		
Argonne	Prime Contract Lab Management System (LMS)	
↓		
APS	APS-wide policies, processes, and standards Safety Assessment Document Accelerator Safety Envelope	← This document
↓		
Division/Group	Division and Group specific policies and procedures Work task procedures & Work Control Documents (WCDs)	

The APS has two tiers of Conduct of Operations Manuals. This top tier manual describes APS-wide processes and the MCR and Experiment Floor Operations Group Conduct of Operations Manuals describe the specific implementations at the group level. The three manuals use the DOE O422.1 based framework and a common APS template.

Section 1 - PSC Standards

1.1 DOE and ANL Standards

UChicago Argonne, LLC, operates Argonne National Laboratory under contract - the Prime Contract - with the Department of Energy (DOE). The contract requires that the Lab's work be performed in accordance with listed Contractor Requirements Documents (CRDs). Most of these DOE requirements are in the form of DOE Orders (e.g., DOE Order 420.2D, Safety of Accelerators) and by reference include federal regulations (notably federal regulations such as 10 CFR 835, DOE Occupational Radiation Protection Program and 10 CFR 851, DOE Safety and Health Program).

The Argonne Laboratory Management System (LMS) consists of the site-wide processes through which Argonne carries out its mission in conformance with the CRDs (i.e., how the Lab accomplishes the performance requirements identified in the Prime Contract).

1.2 PSC Standards

The local APS policies, procedures, and standards that implement the DOE and Argonne standards include:

- Safety Assessment Document (SAD)
- Accelerator Safety Envelope (ASE)
- APS Policies and Procedures
- Engineering Standards - provide design basis.

PSC records are kept in the APS Integrated Content Management System (ICMS), an on-line electronic records system. When you see a reference to APS_xxxxxx, xxxxxx represent the content ID, a number that is the unique ICMS identifier to the document. For example, the content ID for this document is APS_2283552.

Section 2 - Organization

2.1 Organization and Administration

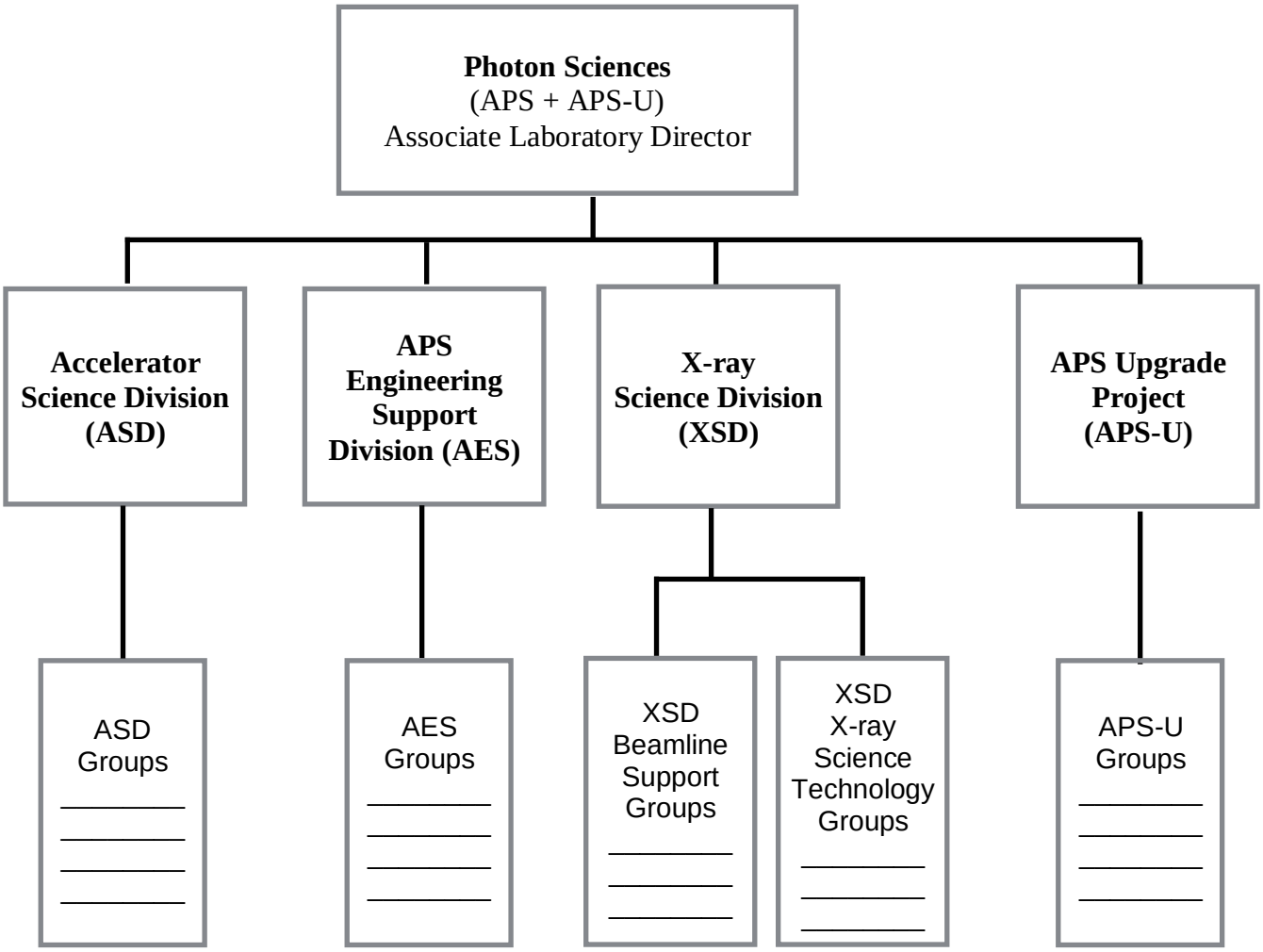
The Photon Sciences Directorate (PSC) is one of the programmatic directorates of Argonne and includes the APS and, for the duration of the project, the APS-Upgrade Project.

Argonne
Argonne centralized services provide business and facility services common to programmatic organizations (i.e., HR, plant facilities maintenance, ESH support and oversight, desk-top IT support, procurement, shipping and receiving, financial services, Health Physics services, etc.).

Argonne Organization Chart

2.1.1 APS Organization

The PSC is headed by an Associate Laboratory Director (ALD), who also serves as the APS Director. The APS is organized into an ALD Office, three Divisions, and APS-U.



Detailed chart with personnel assignments: [APS Organization Chart.]

The ALD Office is home to:

- Deputy ALD for Operations
- Deputy ALD for X-ray Science
- Business Manager (matrixed from Argonne Financial Management and Procurement Services organization)
- Communications Manager (matrixed from Argonne Communications and Public Affairs organization)
- ESH /QA manager (matrixed from the Argonne Health, Safety and Environment (WSE) Division)
- HR Manager (matrixed from the Argonne HR organization)

Reporting to the ALD Office:

- User Administration and Support Group (the "User Office" reporting to the Deputy ALD-X-ray Science)
- HR service section (Argonne HR personnel embedded in PSC)
- Finance and Budget Service section
- PSC Communication and Information Services section
- Portfolio Management Office (Argonne Project Management Office embedded in PSC)
- Technical Support Services Group

Note: the APS-U Director reports directly to Argonne Laboratory Director.

The three Argonne divisions within the Photon Sciences Directorate perform the following roles:

APS Engineering Support Division (AES)
AES groups provide engineering services across the APS organization including shared responsibilities for APS buildings and infrastructure with the Argonne Facility Division / Argonne Infrastructure Services Directorate. AES Groups (7):

- Design and Drafting
- Experimental Facilities Operations
- Information Solutions
- Information Technology
- Mechanical Engineering and Design
- Mechanical Operations and Maintenance
- Safety Interlocks

Accelerator Systems Division (ASD)
ASD is responsible for operation and maintenance of the systems unique to the accelerator facility and accelerator R&D. ASD Groups (8):

- Accelerator Operations & Physics
- Controls
- Diagnostics
- Main Control Room
- Magnetic Devices
- Power Systems
- Radio Frequency Systems
- Special Projects

ASD is responsible for operations of the two APS-managed diagnostics beamlines, existing 35-BM and in-development 38-AM.

X-ray Science Division (XSD)
XSD groups are responsible for operation, maintenance, and improvements of the APS-managed beamlines (36 of 53 APS beamlines) and support APS x-ray science R&D. XSD Groups:

- Beamline Operations Section Groups (14):
  - Chemical and Materials Science

  - Dynamics and Structure
  - eBERlight
  - Imaging
  - Inelastic X-ray and Nuclear Resonant Scattering
  - Magnetic Materials
  - Materials Physics and Engineering
  - Microscopy
  - Spectroscopy
  - Structural Science
  - Surface Scattering and Microdiffraction
  - Time-Resolved Research
  - High-Pressure CAT (NNSA funded)
  - GM/CA Structural Biology Facility (NIH funded)
  - Structural Biology Center (DOE-BER funded)
  - High Pressure CAT
- X-ray Science Technology Section Groups (7):
  - Optics
  - Detectors
  - Beamline Instrumentation
  - Beamline Controls and Data Acquisition
  - Scientific Software Engineering & Data Management
  - Computational Science and Artificial Intelligence
  - Nanopositioning Support Lab

The APS Upgrade Project is not a formal Argonne division, but it has been formed to carry out the APS-U Project. Many personnel working for APS-U are matrixed from the three APS divisions.

2.1.2 Organization Mission and Goals

Links to mission statements, detailed organization charts, and group web pages:

- APS/PSC
  - APS Mission & Goals
  - APS Organization Chart
  - PSC Leadership Team

- APS Engineering Support Division (AES)
  - AES Mission and Goals
  - AES Organization Chart
  - Groups

- Accelerator Systems Division (ASD)
  - ASD Mission Statement & Goals
  - ASD Organization Chart

    - Groups

- X-ray Science Division (XSD)
    - XSD Mission Statement & Goals
    - XSD Organization Chart
    - Groups

- APS-U (provided for reference)
    - APS-U Mission: The Advanced Photon Source (APS), a U.S. Department of Energy Office of Science user facility at Argonne National Laboratory, has been one of the most powerful X-ray light sources in the world for 25 years. The mission of the APS Upgrade Project is to carry out a massive upgrade to the facility that will significantly enhance its capabilities, replacing the original APS magnet lattice with state-of-the-art technology, creating nine new feature beamlines and enhancing multiple other existing beamlines. The upgraded APS will deliver X-ray beams up to 500 times brighter than those currently generated and will provide the national and international scientific community with a world-leading facility for broad and diverse research. The APS Upgrade project will enable innovations and discoveries that will improve our daily lives and will keep the United States at the forefront of global hard X-ray science.
    - Organization Chart

2.1.3 PSC Roles and Responsibilities

The Associate Laboratory Director (ALD) Office

ALD - The PSC ALD Office coordinates and oversees all aspects of the APS facility; sets and implements the Strategic Plan for the facility; measures its performance to ensure that the facility is optimally producing science; and point of contact with DOE. The PSC Directorate plays a role in the Argonne management structure and participates in the overall management of the Laboratory. Groups providing safety, QA, HR, finance, and communications services for all of the APS report to the ALD office.

ALD advisory groups include:

- Scientific Advisory Committee
- Partner User Council (PUC) – representatives of Collaborative Access Teams, Collaborative Development Teams, and principal investigators of partner user proposals.
- APS Users' Executive Committee (APS UEC) – elected representatives of the APS User community
- Computing Advisory Committee (CAC) – representatives appointed by the APS
- Machine Advisory Committee (MAC) – representatives appointed by the APS ALD

The ALD is supported by the Deputy ALD for Operations and the Deputy ALD for X-ray Science.

The User Administration and Support Group (the User Office) reports to the Deputy ALD for X-ray Science. The User Office responsibilities include registering APS users; facilitating User site access; facilitating experiment proposal reviews and beam time allocation; and facilitating user meetings and CAT reviews.

Groups with Conduct of Operations Manuals

The Main Control Room (MCR) is responsible for the safe and reliable operations of APS accelerator systems, ensuring optimal machine performance, high availability, and excellent service to users. The MCR is staffed for round-the-clock coverage during accelerator operations. With a broad understanding of accelerator, safety, and facility systems, the MCR staff provides direction and scheduling for accelerator operations, repairs, maintenance, and enhancements. The MCR staff also supports development, maintenance, and application of software for accurate, timely operation of APS accelerator systems.

- See Conduct of Operations Manual, APS Main Control Room (APS_1180311) for details.

The Experimental Facilities Operations Group (EFOG) is responsible for monitoring the safe operations of the user beamlines. EFOG Floor Coordinators (FCs) provide safety support and oversight on the experiment floor, oversight of user beamline readiness, maintenance of components under configuration control, operations, and safety. At least one Floor Coordinator is on duty (present or on-call) at all times during User Operations periods.

- See Conduct of Operations Manual, APS User Experimental User Facilities Group (EFOG) (APS_2213451) for details.

See Section 2.1.1 APS Organization above for details on roles and responsibilities.

2.1.4 Safety Management

As described in the Argonne Integrated Safety Management System / Worker Safety and Health (ISMS) Program Description, "[L]ine management is responsible for the safe and efficient conduct of work for the protection of the public, the workers, and the environment. Senior managers are responsible for providing leadership and integrated safety management across Laboratory organizations. Mid-level managers and supervisors are responsible for coordinating the work of their organizations and for the execution of work in a consistent, reliable, safe, and efficient manner. All workers are responsible for carrying out their assigned duties."

Organizational guiding principles of ISM include requirements for the establishment of clear roles and responsibilities and that competence for each position be commensurate with responsibilities. Refer to the ISMS Program Description for additional information.

2.1.5 Committees

2.1.5.1 Cross-Divisional Committees

The PSC Directorate has established the following cross-Divisional Standing Committees:

General / Administrative

- Operations Directorate (Ops Directorate)
  Ops Directorate is chaired by the Deputy ALD for Operations and includes the Division Directors, APS operations personnel, APS-U personnel, and APS user representative. The Operations Directorate coordinates operating decisions that affect the facility as a whole and establishes both long- and short-term schedules, including scheduled maintenance and facility improvement periods.

- PSC Committee for Hires and Promotions (CHP)
  CHP advises the ALD helping to ensure equitability of R&D hires and promotions. Members come from across disciplines and across the organization. See The Guideline for the Photon Sciences (PSC) Committee for Hires and Promotions (CHP) (APS_1706400) for a description of committee processes and standards.

- ICMS Workgroup
  The Integrated Content Management System (ICMS) is the APS electronic document system. In the group, information system developers and ICMS users work to enhance ICMS.

Safety

- PSC Design Review Committee (PDRC)
  Performance, safety, and operational objective reviews are an integral part of the APS Design Review process. See the APS Design Review policy and procedure (APS_000031) for a description of the committee processes and standards.

- Commissioning Readiness Review Team (CRRT)
  - Advises the commissioning authorizer on the safe commissioning of new or modified installations.
  - Verifies that approved designs were implemented in installations.
  - Ensures that the hardware, personnel, and documentation are in place to ensure safe reliable operations.

- PSC Radiation Safety Committee (PRSC)
  The PRSC advises PSC management, the PDRC, APS technical personnel, and users on radiation safety and shielding matters. The Committee reviews the design of radiation

shielding systems that are used for personnel protection and reviews functional and design changes to APS safety interlock systems, PSS and ACIS.

- Experiment Safety Review Board (ESRB)
  The ESRB reviews each experiment that is submitted to the APS via the APS Experiment Safety Assessment Form System (ESAF). The ESRB advises the PSC Management on the safe implementation of experiments performed by APS users on the experiment hall floor

- Radioactive Sample Safety Review Committee (RSSRC)
  An advisory group on handling radioactive sample safety matters at the APS

- Laser Safety Advisory Committee (LSC)
  An advisory group on laser safety matters at the APS

2.1.5.2 External Advisory Committees

- Scientific Advisory Committee (SAC)
  The SAC is a key advisory group reporting to the ALD. The Group meets a minimum of once per year to (1) evaluate the scientific output and use of the facility, (2) provide policy advice, and (3) participate in strategic planning.
- Computing Advisory Committee (CAC) – The full Committee meets a minimum of once per year to provide advice, expertise, and guidance on the topic of computing at the APS to ensure computational methodologies and technologies are leveraged and integrated into the research and operations activities at the APS.
- Machine Advisory Committee (MAC) – The Committee meets at least once per year to (1) provide advice on the commissioning and operation of the APS-U accelerator, and (2) advise on the technical design and R&D activities of the accelerator systems and insertion devices.

2.1.5.3 User Committees

- Advanced Photon Source Users Executive Committee (APS UEC)
  The APS UEC serves as an advocacy group for the user community, advises the ALD on matters affecting the user community, and assures good communication between the APS user community and APS management.

- Partner Users Council (PUC)
  The Partner Users Council is an ALD advisory board that represents the interests of facility partners, including Collaborative Access Teams, Collaborative Development Teams, and principal investigators of partner user proposals

- Life Sciences Council (LSC)
  A subgroup of the Partner User Council representing CATs conducting biological studies.

- General User Proposal Review Panels (PRPs)
  For each new beamline experiment proposal, a PRP appropriate to the area of research, develops a consensus proposal rating and recommends the amount of beam time to allocate to the experiment.

- Beam Time Allocation Committees (BACs)
  Assigns beamtime for proposals.

- InterCAT Technical Workgroup (TWG)
  TWG meets regularly to share beamline-related technical developments with the user community and the APS.

2.1.6 Interrelated Processes

Interrelated Processes are those processes or activities that can affect operations but are under the control of persons other than the affected operators, such as shared support systems or special testing. (DOE O422.1)

Argonne Organization	Service Area	Services	Interface
Laboratory Operations			
Business & Information Services (BIS)	IT, non-technical (e.g., desktops) [APS provides the IT services for accelerator and beamline systems]	Information technology, networking, software, information and cyber security, email, and service licenses.	Central Lab Service - on-line ticketed requests (Vector)
Environment Safety & Health (ESH)	Deployed Safety Service Program	Safety, occupational health, and safety	Embedded Division ESH Coordinators and Directorate Safety/QA Manager
	Radiological Protection Program	Health Physics, dosimetry, and radiation physics	Argonne Radiation Safety Officer and Health Physicists
	Medical Wellness (HEW) & Emergency Services	Health & Employee Wellness	Medical Department and 911
	Quality, Work Planning, and Analysis	Assessment Program, Issue Management, CAS, Lessons learned, QA, Work Planning and Control, etc.	Embedded Division ESH Coordinators and Directorate Safety/QA Manager

Argonne Organization	Service Area	Services	Interface
Financial Management & Procurement Services (FMPS)	Deployed Finance & Procurement	Accounting, budget, finance, payroll, accounts payable (Financial Service Manual, MS-MNL-24) and procurement (Acquiring Goods and Services, LMS-MNL-23)	Embedded Division financial personnel and Financial Business Manager
Human Resource Services (HRS)	HR	HR	Embedded Division and Directorate Representatives
Infrastructure Services (IS) Directorate / Facilities (FAC) Division / Fire Protection (FP)	Maintaining plant facilities - MOU defines IS/APS responsibilities* and fire protection	Develop and maintain non-technical facilities, including delivery of utilities to APS and fire department	APS Site Operations Group located at the APS and for fire protection 911 (ANL)/1 (630) 252-1911 (cell)
Nuclear, Waste, and Site Services Management (NWS)	Waste management	Waste management	Central Lab Services
Project Management Organization (PMO)	Project management	Project Support services	Central Lab Services and embedded consultants
Security and Travel Services (STS)	Security Program and Travel	Travel and security issues	Central Lab Services and 911
Office of The Director (OTD)			
Communications & Public Affairs (CPA)	Public relations	Media and community relations and event services	Embedded Communications
Legal Department (LEG)	Legal service		Central Lab Services

*Plant Facility Services

Argonne's Infrastructure Services Directorate (IS) is responsible for providing and maintaining the building and utility infrastructure that house and support the APS. IS maintains a dedicated engineering group to support APS electrical and mechanical facilities - APS maintains responsibility for technical (accelerator and experimental) systems.

FCs are the designated APS points of contact for IS for IS-managed work that may impact beamline operations. FCs will coordinate IS work with beamline personnel.

The IS/APS Site Operations Group Leader is the designated IS point of contact; is matrixed to the PSC/AES Division; and is physically located in APS facilities.

A memorandum of understanding (MOU) has been jointly prepared by PSC and IS that defines the responsibilities for infrastructure to be provided to the APS by IS:

Memorandum of Understanding Between The Photon Sciences Directorate (PSC) and The Infrastructure Services (IS) Directorate For the Advanced Photon Source (APS) Complex (APS_2191853).

2.2 Material and Personnel Resources to Accomplish Operations

Funding for materials and personnel for APS operations is principally provided through the DOE Office of Basic Energy Sciences. Operating funds are requested annually through DOE Field Work Proposals (FWP). The process for submitting a FWP is describe in detail in the Argonne, Financial Services Manual (LMS-MNL-24, Section 3.6).

The annual DOE Office of Science program budget cycle starts every year when DOE Headquarters calls for a budget in February or March and ends with FWP submissions in June. Timeline for the Office of Science Budget Call:

- February/March – Argonne receives a budget call with instructions for preparing a FWP from DOE Headquarters for the current fiscal year plus two years; for example, the budget call in February 2023 will be for FY2024+2 or FY2026.
- March/April – The Argonne Budget Office issues a call to the Laboratory departments and divisions (with guidance, changes to submissions, escalation percentages, and due dates) for FY XXXX program budget submissions.
- April/May/June – Divisions prepare proposals and applicable FWPs. The plans are loaded into the Argonne eBUD system (a web-based integrated budgeting tool) and applicable FWPs
- June – The Budget Office reviews proposals and applicable FWPs and submits them electronically to DOE-Argonne Site Office and to DOE-Headquarters.

The APS also receives funding for other specific activities (e.g., externally funded, facility-operated beamline support; Laboratory Directed R&D; Work for Others; proprietary charges; projects such as the APS Upgrade; and technical, optics and detector development).

Argonne procurement processes are detailed in Procurement: Acquiring Goods and Services (LMS-MNL-23).

2.3 Accountability for the Safe Performance of Work

Argonne Accountability Policy
Argonne Laboratory-Wide Policy LMS-POL-1: Argonne recognizes that to complete the important mission of the Laboratory requires that every employee, subcontractor, and visitor be protected from injury and illness. The health and safety of Argonne's workers and protection of the public health and safety are paramount in all that Argonne does and to its success. Argonne uses the annual Department of Energy Office of Science (DOE – SC) performance evaluation and measurement plan as the means to establish occupation health and safety objectives for the year.

Individual accountability
Authority to Pause or Stop Work: Per Argonne Work Planning and Control Manual (LMS-MNL-10) everyone - all Argonne employees, visitors, facility users, and subcontractors- is empowered and obligated to stop any activity that they deem to pose an immediate danger to themselves, other employees, visitors, users, or subcontractors, the public, or the environment. This "stop/pause work authority" is described in more detail in Section 3.3.4.

Each year, as part of worker's performance appraisal, supervisors must provide a safety competency rating as part of a core capability rating.

2.4 Assessments Programs

The Laboratory's assessment program is described in the Argonne's Assessments Manual (LMS-MNL-14). Assessments confirm that Argonne programs, activities, processes, and operations meet or exceed expectations, contractual requirements, and applicable federal, state, and local regulations. Groups use assessments to identify and resolve issues that contribute to their success or failure in fulfilling mission, goals, requirements, or expectations.

Argonne uses four types of assessments, each has its own purpose, focus, and components:

- **Management assessments** - identify and correct problems that hinder the organization from achieving its objectives.
- **Self-assessments** - include walk-throughs, inspections, operational monitoring, readiness reviews, and other assessments and are performed by those most familiar with the work being assessed.
- **Independent assessments** conducted by staff who are independent of line management in the assessed group.
- **External assessments** conducted by organizations outside of Argonne including regulators, third-party certification groups, and sponsors.

The APS has a number of standing assessments that are described in APS policies and procedures; the MCR Conduct of Operations Manual (APS_1180311); and Conduct of

Operations Manual APS User Experimental Facilities Operations Group (EFOG) (APS_2213451). Other assessments are completed on an as-needed basis.

2.5 Management Training, Qualification, and Succession

It is Argonne policy to provide "all employee, subcontractors, and visitors with the relevant information, operational controls, and effective training on [occupational health and safety] requirements to enable them to conduct their activities safely." Mandatory training is designed to give individuals the information and skills they need to comply with laws, regulations, U.S. Department of Energy (DOE) directives, and other requirements invoked by the Prime Contract. Argonne procedure LMS-PROC-16: delineates responsibilities for identifying who must be trained; developing and delivering training; and documenting its delivery. General process:

- Argonne ESH & Quality training group develops, delivers, and documents Lab-wide mandatory training.
- Local, specialized training such as MCR Operator qualifications or Floor Coordinator training is developed and delivered by APS personnel.
- New employees at Argonne, with the assistance of their supervisor and an ESH Coordinator, complete an on-line Job Hazard Questionnaire (JHQ) identifying workplace hazards and responsibilities.
- Based on the JHQ, a training profile is generated in the ESH-managed, on-line Training Management System (TMS). TMS:
    - Allows employees access to training requirements and information
    - Allows management to identify employee training needs based on hazards encountered in the workplace
    - Provides individual control of data entry for Job and Hazard Questionnaire (JHQ) responses
    - Generates statistical reports on training completion and requirements
    - Enrolls employees in training courses
    - Monitors individual and corporate compliance with training requirements
    - Notifies individuals and management by e-mail when employees are out of compliance
- JHQs are reviewed and approved by the worker, the supervisor, and an ESH Coordinator on a periodic basis and as job or training requirements change.
- A manager's training requirements take into consideration the potential hazards of their direct reports.

The APS has implemented rigorous in-house programs for on-shift training for MCR Operator and Floor Coordinator training and testing that are detailed in:

- Conduct of Operations Manual, APS Main Control Room (APS_1180311)
- Conduct of Operations Manual, APS User Experimental User Facilities Group (EFOG) (APS_2213451) and FC Training Modules

As a part of on-going talent assessments, with support from Human Resources, succession planning is addressed for managers and other key personnel.

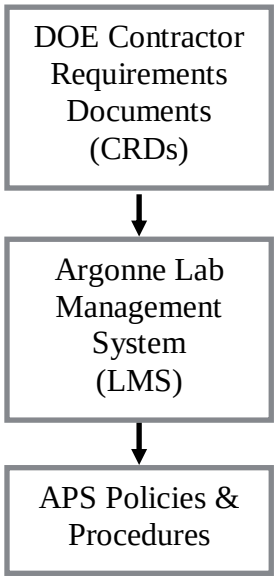
Section 3 - Policies & Procedures

This section covers:

1. Hierarchy of policies and procedures
2. APS-wide, policies and procedures
3. Configuration Management

3.1 Hierarchy of Policies and Procedures

Argonne operates under contract, the Prime Contract, with the DOE. The contract is performance based, meaning that it identifies what the Lab is expected to deliver but not specifically how the Lab is expected to accomplish the work. DOE requirements are included by reference in a list of Contractor Requirements Documents (CRDs) (Prime Contract Appendix I, List B). Most of the CRDs are in the form of DOE Orders.



The Argonne Laboratory Management System (LMS) consists of the site-wide processes through which Argonne carries out its R&D mission in conformance with the CRDs (i.e., how the Lab accomplishes the performance identified in the Prime Contract).

In turn, the APS has policies and procedures that are the implementation of the DOE and Argonne requirements. The APS manages ~600 facility procedures.

3.2 Managing APS Facility Procedures

Each group at the APS is required to maintain documented procedures to ensure a safe work environment and reliable and efficient operations. This applies to APS mission/safety critical

procedures, namely those that are required to ensure a safe work environment and reliable, efficient operations at the APS.

APS managed policies and procedures are available on-line through ICMS. For convenience, a number of web pages provide links to procedures in a particular topical area (e.g., APS Document Central and for accelerator technical procedures, a matrix of machine and subsystems can be used to pull up lists of links to the appropriate procedures).

APS managers ensure procedures are kept current; available to workers who currently use them; and maintained in ICMS. Required minimum approvals are identified in the policy and ICMS workflow is used for review and approvals.

New procedures are submitted to an APS-designated Procedure Administrator (PA) (PPAdmin@aps.anl.gov). The PA works with the author and facilitates the formatting, workflow, periodic reviews, and addressing feedback (feedback link). The template used for APS procedures is available through ICMS (APS_1191216).

Once approved, a procedure is released in ICMS and a persistent URL provides the link to the latest revision. (Of course, personnel should verify that all printed copies are current before using them).

Copies of procedures that need to be accessed outside a firewall can be pushed to a public facing web page (e.g., User policies and procedures).

Instructions for execution-time modifications to a policy/procedure can be found in the following document: Field Modification of APS Policy/Procedure (APS_1408152).

For additional information refer to: Managing APS Facility Procedures (APS_1001409).

3.3 APS Policies and Procedures

3.3.1 Managing APS Documents

To ensure important APS documents are retained and are retrievable, the APS has established requirements for documents that are required to:

- Maintain a safe work environment
- Maintain reliable and efficient operations, and
- Record the business activities of the APS

The Integrated Content Management System (ICMS) is the APS common electronics records repository:

- A persistent URL is assigned to each document in ICMS for the latest version of the document
- ICMS workflows are available for approving procedures. Once approved, they are released and available on-line inside an APS firewall.
- The records of APS safety committees are kept in ICMS. For additional information, refer to Safety Committee Records in ICMS (APS_1259350)

Administrative documents are generally kept in ICMS or can be regenerated from the APS business database (e.g., forms generated through Oracle applications).

The APS Document Management System (DMS) is a tool that allows searches and file organizations across multiple document repositories and a DNS number is a cross-repository unique identifier.

Engineering document repositories include:

- AutoDesk Vault - for AutoDesk AutoCAD, provides workflow tools and filenames map onto DNS fields. Released documents from Vault are transferred to ICMS.
- Windchill (PDMLink) - for Creo 3D models, providing workflow tools and filenames map onto DNS fields. Released documents from Windchill are transferred to ICMS.
- ICMS - automatically provides a viewable format for many types of source documents.

For additional information, refer to: Managing APS Documents Policy.

3.3.2 Design Reviews

APS design reviews assess the adequacy of a design in meeting performance, safety and operational objectives. The APS standing design review procedure (APS Design Reviews, APS_000031):

- Defines the process to evaluate system and component designs, to determine their adequacy in meeting performance, safety and operational objectives. It applies to the designs of new or modified components and systems.

- Describes the standing design review committee, The PSC Design Review Committee (PDRC), with flexible, as-needed committee membership. The PDRC reports to the DALD-Operations.
- Provides a grading rubric to determine the appropriate scope and level of formality and approval for a design. Grading is based on the potential consequence of a failure in the implementation of a design and considers the potential financial, operational, and environment, safety, & health consequences of a failure. The grading determines required reviews, documentation, and approvers.
- Provides for progressive reviews for complex designs (e.g., conceptual, preliminary, and final).
- Flags potential Unreviewed Safety Issues (see next section for additional information).

Design review recommendations are formally tracked to closed utilizing the APS Action Items Tracking System, the APS-U Recommendations Database, and/or through the Commissioning Readiness Review process.

Records of APS design reviews are kept in ICMS.

For additional information, refer to: APS Design Reviews (APS_000031).

3.3.3 Unreviewed Safety Issue

An Unreviewed Safety Issue (USI) is an activity or discovered condition with accelerator specific hazards that have yet to be evaluated to determine if the activity or discovered condition introduces accelerator specific hazards that are not adequately addressed by the current SAD and approved ASE.

A USI process – the process or methodology used to evaluate/review USIs to determine if the activity or discovered condition is adequately addressed by the current SAD and approved ASE - is required by DOE as part of an accelerator safety program: “A USI process supports

configuration management efforts that helps ensure the facility and supporting safety documentation are maintained current and periodically updated."

To determine if there is a USI, the APS Unreviewed Safety Issue Determination policy (APS_1185831) follows the Argonne Facility-Specific Implementation of Unreviewed Safety Issue (USI) Procedure (LMS-PROC-383) with the APS USI-related assignments:

- Facility Manager – The accelerator system machine manager or Group Leader for beamline and associated facilities notifies the PSC-Safety Manager of a potential USI, requests a determination, and reviews the USI determination
- USID preparer – The PSC-Safety Manager, or designee, prepares APS USI determinations.

3.3.4 Work Planning and Control

APS work planning and control (WPC) is an important element in the implementation of Integrated Safety Management (ISM), meeting the worker safety and health requirements for hands-on work. APS WPC processes:

- Ensure a safe work environment, protecting workers, and the public
- Ensure work hazards are analyzed and are mitigated or eliminated
- Identify clear roles and responsibilities of those involved in the planning and execution of the work
- Identify the impact of the work on the facility and the work force
- Support highly reliable operations
- Optimize the use of effort and other resources to support the mission of the APS
- Provides consistent framework to develop new or improve existing work practices

The APS Work Planning and Control Policy (APS_1432773) establishes the local APS requirements for work, tailored to three types of work:

1. Experimental work - Applies to all experimental work, by users or APS personnel, in all APS facilities and is described below in section 3.3.5.
2. Construction and contractor services - The APS has established specialized WPC processes tailored to Contractor and Construction Services (APS_1410423). Contract work must be conducted in accordance with Argonne procedure LMS-PROC-123, Contractor Safety.
3. Facility Technical Task - All other work is considered as facility technical task. Work in this category is planned to use the Argonne Aware software application to generate a Work Control Document (WCD). The overall Lab WPC process is described in the Work Planning and Control Manual (LMS-MNL-10).

The APS WPC policy establishes APS approval and authorization requirements for each of these categories of work.

For additional information, refer to: APS Work Planning and Control Policy (APS_1432773).

Stop Work

At Argonne, everyone has the authority and obligation to stop any activity that they deem to pose an immediate danger to themselves, others, or the environment. Per Argonne Work Planning and Control Manual (LMS-MNL-10),APS APS Work Planning and Control Policy (APS_1432773) policies, and APS policies, after the potentially unsafe situation is secured, individuals who exercise stop-work authority also are obligated to immediately report their action to the appropriate Division Director or more senior line management and work may only be restarted after Division management ensures appropriate hazard control measures are in place.

If a stop work issued by MCR personnel, it shall be noted in the MCR shift log.

Suspend or Pause Work

Argonne employees, visitors, facility users, and subcontractors are also empowered to temporarily pause their own work to immediately correct a deficiency or unsafe condition that does not pose an immediate danger to themselves, other employees, the public, or the environment. As a good practice described in DOE Handbook HDBK-1211-2014, the "concerned employee should initiate a Pause Work when a condition of concern or an unexpected condition is perceived to exist. For example, a step in the procedure cannot be worked as written or another task being performed in the adjacent area presents a conflict. In many such instances, the performing employee or the responsible manager may be able to correct the condition of concern with minimal effort and time. In simple cases, the situation could be resolved via face-to-face communications such that the concerned employee is satisfied with the solution or explanation. However, if the condition represents an imminent risk of death, serious physical harm, or other serious hazard to workers, a concerned employee should promptly initiate a formal Stop Work action."

Suspended work may be restarted without supervisor authorization.

For further information see the Argonne environment Work Planning and Control Manual (LMS-MNL-10), APS Work Planning and Control Policy (APS_1432773), and DOE Handbook HDBK-1211-2014.

3.3.5 Beamline Experiment Safety Reviews

Prior to conducting an experiment on a beamline, all experiments must be reviewed and approved. The process is started with the experimenter submitting an on-line Experiment Safety Assessment Form (ESAF).

An Experiment Cannot Begin Without:

1. Completion and submission of the Experiment Safety Assessment Form (ESAF) by the experimenters (submission of the ESAF generates the Experiment Hazard Control Plan (EHCP) based on the information provided on the ESAF)
2. Review and approval of the ESAF by both the APS Experiment Safety Review Board/ESH Coordinator AND Experiment Operations Management
3. Completion and endorsement of the Authorization Checklist by the APS Floor Coordinator
4. Completion of the Experiment Authorization (EA) Form (all required endorsements must be present on the EA Form)
5. Posting the EHCP at the experiment station or work area (i.e., laboratory entrance) and posting the endorsed EA Form in the beamline end cabinet or work area (i.e., laboratory entrance)

For additional information, refer to: Experiment Safety Reviews (APS_1187922).

3.3.6 Contractor and Construction Services

The Contractor and Construction Services policy establishes the APS requirements for:

- Contractors working on-site at the APS - including work planning and control requirements
- Construction - To ensure compliance with Argonne-required building codes/standards, labor requirements, and construction safety requirements, and for coordination with other plant activities, Argonne's Facilities Division, APS Site Operations Group will be the point of contact for construction at the APS and work will be managed according to Argonne's Manual of Construction. Only Argonne can contract for on-site construction work
- Users and Third-Party Contractors - conventional construction must be contracted through Argonne (CATS/non-Argonne Users cannot contract through their home institutions for construction work at the APS) and meet work planning and control requirements

For addition information, refer to: Contractor and Construction Service (APS_1410423).

3.3.7 Other APS-Wide Policies and Procedures

ESH and QA

- Escorted Entry to Accelerator System Controlled Areas during ACIS Authorized Open Access Mode
- PSC National Environmental Policy Act (NEPA) Reviews
- Reimbursement for Emergency On-Site Lodging
- Control of APS Measuring and Test Equipment

Administrative and R&D Policies and Procedures

- APS Publication Policy and Procedure
- Web Publication Policy
- Visits to the APS by Members of the Media
- APS Protocol for Reporting Construction Vibration Issues for Beamlines
- Changing Allowed Values in the APS Beamlines Directory Database
- PSC Educational Assistance Policy

Users

- User Access Framework

Engineering Policies and Procedures

- Releasing APS Purchased Parts
- Design and Drafting Drawing Standards

3.4 Configuration Management

The basic objectives of CM are the same for all facilities and activities: establish consistency among design requirements, physical configuration, and documentation (including analysis, drawings, and procedures) for the facility or activity and to maintain this consistency throughout the life of the facility or activity, particularly as changes are being made.

Configuration management, based on the DOE Standard, configuration Management (DOE-STD-1073) framework, includes five elements:

- Design requirements
- Work Control
- Change Control
- Document Control
- Assessments

3.4.1 APS Configuration Management

APS processes implementing Configuration Management

	Conduct of Ops Manual references	APS Implementation References
Design Control	See section 3.3.2	• APS Safety Assessment Document (SAD) (APS_1188832) • Accelerator Safety Envelope (ASE) (APS_2278796) • APS Engineering Standards • APS Design Reviews (APS_000031)
Work Control	See section 3.3.4	• APS Work Planning and Control Policy (APS_1432773) • Managing APS Facility Procedures (APS_1001409) • APS Policies and Procedures web page

Change Control	See sections 3.3.3 and 3.4.2	• USIs
		  ○ APS Unreviewed Safety Issue Determination (APS_1185831)
		  ○ Argonne Facility-Specific Implementation of Unreviewed Safety Issue (USI) Procedure (LMS-PROC-383)
		  ○ Change Control for Radiation Safety Systems (APS_1685081)

Document control	See section 3.3.1	• Managing APS Documents Policy (APS_1273342)
Assessments	See section 2.4	• Argonne's Assessments Manual (LMS-MNL-14) • MCR Conduct of Operations Manual (APS_1180311) • Conduct of Operations Manual APS User Experimental Facilities Operations Group (EFOG) (APS_2213451)

3.4.2 Configuration Management of Radiation Safety Systems

Due to the special risks associated with radiation safety, the APS has a rigorous program of configuration management of radiation safety systems.

Design Basis and Review
Designs of radiation safety systems at the APS are reviewed to ensure they meet the DOE regulation Occupational Radiation Protection (10 CFR 835) including ALARA. The APS Design Review process is described above in section 3.3.2.

RSS Configuration Documentation

- Records of design reviews, submitted designs and reports of the review, are captured in ICMS.

- Design reviews inventory radiation safety systems
  - Beamline and front-end shielding inventories - a Component Reference Table is reviewed and approved for all beamlines and front-ends and lists all credited radiation safety shielding on a beam line
- Experimental Floor Operations Group Floor Coordinators with Health Physics maintain inventories of RSS through the following databases:
  - Beamline Component Database
  - Machine Component Database
- Component-specific documents for Radiation Safety Systems are being added to the Component Database Portal

Configuration control and verification of radiation safety systems
RSS Components are tagged prior to commissioning. For the accelerator, Critical Component System Managers create and attach configuration control tags to RSS Components. On the Beamlines and Front-Ends, either the Critical Component System Manager or FCs create and attach configuration control tags to RSS Components.

The FC web page provides guidance on RSS classifications, instructions for making RSS tags, and the template for RSS tags.

FCs are responsible for the management of beamline administrative controls placed on the operating envelope of beamlines. The administrative controls are typically identified during the design review process.

- Procedure for Administrative Restriction Forms on APS Beamlines (APS_1273829)

Prior to start-up of the accelerator following a machine maintenance period, Health Physics with Critical Component System Managers conduct a walk-through to verify that credited shielding is in place and properly tagged. Prior to the startup of a new or modified beamline or front-end, or at restart at the beginning of each user run, Floor Coordinators do a walk-down verification that beamline or front-end credited shielding is in place and tagged.

Authorization to operate

- Beamline authorization - After the integrity of the beam line shielding has been confirmed by the APS commissioning readiness review team, a beamline may be authorized for operations with control turned over to beamline personnel. Accelerator authorization for operations follows the Accelerator Readiness Review process.

RSS change control
During all RSS work an approved Configuration Control Work Permit (CCWP) must be posted

- Floor Coordinators and Main Control Room Operators administer permits for RSS change control:

- Change Control for Radiation Safety Systems (APS_1685081)
- Configuration Control Work Permit (APS_1192930)
- The FC Reference pages contains specific CCWP sub-processes (e.g., specific CCWP procedures to be followed for opening and closing labyrinths (APS_1205731) and mini-enclosures (APS_1217519))

- All technical personnel at the APS are trained on the proper use of CCWPs

Section 4 - Conduct of Operations

4.1 Conduct of Ops Manuals at the APS

Conduct of Operations Program: The formal documentation, practices, and actions implementing disciplined and structured operations that support mission success and ensure worker, public, and environmental protection. The program goal is to minimize the likelihood and consequences of human fallibility or technical and organizational system failures. (DOE O 422.1)

There are two groups at the APS whose practices have been detailed in conduct of operations manuals:

- Conduct of Operations Manual, APS Main Control Room (APS_1180311)
- Conduct of Operations Manual, APS User Experimental User Facilities Group (EFOG) (APS_2213451)

The MCR and EFOG Conduct of Ops manuals are organized by the topical structure described in the DOE Conduct of Operations (DOE O422.1), Attachment 2 (the specific Attachment 2 requirements are indicated in the parentheses):

- Organization and Administration (a)
- Shift Routines and Operating Practices (b)
- Control Area Activities (c)
- Communications (d)
- On-shift Training (e)
- Investigation of Abnormal Events, Conditions, and Trends (f)
- Notifications (g)
- Control of Equipment and System Status (h)
- Lockouts and Tagouts (i)
- Independent Verification (j)
- Logkeeping (k)
- Turnover and Assumption of Responsibilities. (l)
- Control of Interrelated Processes (m)

- Required Reading (n)
- Timely Instructions/Orders (o)
- Operating/Technical Procedures (p)
- Operator/Floor Coordinator Aids (q)
- Component Labeling (r)

4.2 APS-Wide Conduct of Ops Topics

This document also looks at conduct of operations topics identified in DOE O422.1 and that are implemented across the APS (the specific DOE O422.1 Attachment 2 requirements are indicated in the parentheses):

- Communications (d) – see Section 4.2.1
- Investigation of Abnormal Events, Conditions, and Trends. (f) – see Section 4.2.2
- Notifications (g) – see Section 4.2.3
- Control of Equipment and System Status. (h) – see Section 4.2.4
- Lockout and Tagouts (i) – see Section 4.2.5
- Control of Interrelated Processes (m) - see section 2.1.3.
- Technical Procedures (p) - see Sections III and 4.2.6
- Component Labeling (r) – see Section 4.2.7

These topics are also covered in MCR and EFOG Conduct of Ops Manuals.

4.2.1 Communications

Communications Systems for Emergency Operations

Communication systems have been implemented to ensure that all facility occupants are warned of hazards and threats and are promptly alerted to facility emergencies. When personnel are working in areas where the public address system or emergency signals cannot be heard, alternative methods for alerting these persons shall be utilized.

911
The principal mechanism to be used by individuals to report an emergency incident is to dial 911 using an ANL telephone or to call (630) 252-1911 from a cellular phone. For Microsoft Teams softphone dial 911, calls are routed to the on-site Argonne Emergency Center. All employees and resident visitors are trained to call 911 in any emergency.

If in doubt if you should call 911, call 911.

The Fire Department can be contacted in a non-emergency by dialing 911, as described above, and informing the Fire Alarm Office that your call is for a non-emergency.

Laboratory-Wide Alert System
Argonne maintains a site-wide notification system to provide time-urgent warnings (e.g., fire alarms, tornado warnings, and emergency alerts). The Argonne Office of Emergency Management (OEM) provides oversight of the capabilities of the Laboratory's public address system and the outdoor warning system. The Infrastructure Services (IS) organization is responsible for maintaining these systems. Periodically, but at least annually, OEM arranges for testing of the site's general notification and warning systems. Uses of the systems are detailed in the Argonne Comprehensive Emergency Management Plan (CEMP) and related Office of Emergency Management (OEM) procedures. References:

- Emergency Management Planning (OEM): LMS-POL-4.
- Operating and maintaining the Argonne Notification and Warning Systems policy: LMS-POL-29.

All Argonne employees and resident visitors are trained to recognize the emergency audio-signals used by ANL (e.g., fire, tornado, and hazardous materials releases) and those used by APS to announce emergency situations, as well as the proper actions to be taken. Training is administered and managed using the Laboratory's Training Management System (TMS).

The Argonne Director of Communications and Public Affairs Division (CPA) oversees non-emergency use of these systems.

Site-wide e-mail notices include Argonne Newsroom general Campus Updates, sent for non-emergency announcements, and OEM Argonne Alert System notices.

APS Communications Systems for Normal Operations

The APS maintains local public address that is integrated into the Argonne site system. The Building Manager coordinates operational and maintenance requirements for the building's notification and warning systems and capabilities. The Building Manager also serves as a point of contact for activities that may affect building notifications and warning system operations. The APS Facility Managers may direct actions to confirm the availability of a functional notification and warning system.

The APS public address system use is controlled to maintain its effectiveness and prevent it becoming too commonplace.

APS General Announcements emails are sent for APS site-wide non-emergency notifications.

Call-In Technical Support

APS Groups providing technical support services maintain on-line call-in lists for off-hours support services (ASD Accelerator Operations and Physics (MCR) call-in lists).

4.2.2 Investigations of Abnormal Events, Conditions, and Trends

All significant aspects of an abnormal event are to be investigated and resolved.

If the event indicates a potentially significant increase in the consequence or probability from the hazards analyzed in the Safety Assessment Document (SAD), the USI processes described in section 3.3.3 shall be followed (APS_1185831).

An occurrence is an event or condition that adversely affects, or may adversely affect, Laboratory personnel, the public, property, or the environment and is determined to be reportable as defined in LMS-PROC-157, Incident Notification. In addition, "near miss" situations shall be reported for review if it is suspected that such a review might uncover circumstances that could lead to a recurrence with potentially serious consequences.

Events requiring investigation are defined in Argonne's LMS-MNL-5, Performance Improvement Manual.

As is appropriate to their assigned duties, all personnel have the responsibility to remain attentive to operational conditions or events indicative of hazards to:

- The safety or well-being of persons working at or visiting the APS
- The general environment
- The APS facility and associated equipment
- The reliable operation of the facility

Individuals who find themselves engaged in an unsafe activity or observe unsafe working conditions are empowered and obligated to stop any activity that they deem to have placed them or others in immediate danger (see next section for additional information).

4.2.3 Notifications

Individuals that observe conditions or events that can adversely impact APS operations, ESH, or security should report them.

Stop Work
Per Argonne Work Planning and Control Manual (LMS-MNL-10): At Argonne everyone has the authority and obligation to stop any activity that they deem to pose an immediate danger to themselves, other, or the environment. After the potentially unsafe situation is secured, individuals who exercise stop-work authority also are obligated to immediately report their action to the appropriate Division Director or more senior line management.

911 - any emergency incidents on site

- When an emergency incident occurs, safely stabilize the situation to the extent possible (e.g., pause or stop work) and take one of the following actions call:

  - 911 from an Argonne land line
    or
  - (630) 252-1911 from a cell phone on site
- Notify your manager as soon as possible that you placed the 911 call.
- Any 911 calls related to MCR-related activities shall be noted in the shift log

Accidents and Injuries

- When an injury or accident occurs, once the situation is secured, notify your supervisor and an ESH Coordinator as soon as practical.
- The supervisor will conduct an investigation and the ESH Coordinator and the ALD ESH Program Manager will be responsible for follow-on notifications, if any, to Argonne and/or DOE.

4.2.4 Control of Equipment and System Status

Equipment and System Status Changes

APS has implemented practices for controlling facility equipment installations and subsequent changes to ensure APS facilities operate with known, proper configurations. Generally, the hands-on work on facility technical systems (e.g., accelerator system, front end, ACIS, PSS, MPS, and FEEPS) is done by the technical groups in ASD and AES. The MCR provides technical support and oversight for accelerator systems and ACIS. Floor Coordinators provide technical support and oversight for Beamline and Front End systems and PSS.

The MCR for Accelerator Systems and Floor Coordinators for Beamline and Front-End Systems, have key configuration management responsibilities including work and start-up/restart authorization; tracking and communicating the status of work; and change control administration.

Work Request System

The primary tool for scheduling, defining the scope of work, and tracking status related to the APS accelerators, front-ends, and beamlines is the Work Request System (WRS). See Introduction and Use of the APS Work Request System (APS_1302758) for details on the Work Request System.

To execute a work request:

1) A system/responsible engineer submits a work request for defined scope of work and proposed schedule. The request is to include, as appropriate, Work Control Documents, Job Safety Analysis, and identifying facility procedures.
2) The work request is approved on technical merit and operational impact (e.g., potential conflicts with other work).
   a) Approval does not set the priority or authorize the start of the tasks.
   b) Safety implications are considered (e.g., working on energized systems)
   c) Authorized approver is typically a CO or Floor Coordinator but can be an MCR crew chief during emergent conditions.

3) The work is scheduled.
   a) Before starting **accelerator** system work, the work must be authorized by an MCR Crew Chief. Upon authorization, the status of a work request is updated to "in progress": Crew Chief tracks and updates work request status - status is available on-line. Prior to starting **front-end or beamline** work, the work must be authorized by a Floor Coordinator.
   b) **Accelerator** work is coordinated within the Machine Studies schedules by the Accelerator Operations and Physics Group and the MCR. Studies times may be requested for work such as emergency repair of an accelerator component or system, and the Storage Ring Access Emergency Repairs Policy APS_1187358 must be followed. For maintenance/shutdown scheduling see: APS Maintenance Shutdown Planning Procedure (APS_2188852) for details. **Front-end** work is also coordinated with the Machine Studies or Maintenance schedules, but by the Floor Coordinators and AES systems engineers and technicians. **Beamline** work is coordinated with the Floor Coordinators, AES system engineers and technicians, and beamline staff considering scheduled user time.
4) Work must be done per approved plans.
5) At completion of the work, the system engineer certifies work complete including ensuring physical configuration consistent with approved design; documents are updated as appropriate
6) After the work is completed, the responsible engineer closes out the work request.

It is the responsibility of the System/Responsible Engineers to submit a Work Requests; obtain MCR Crew Chief or Floor Coordinator authorization to begin work; see that the work takes place as defined in the Work Request; and notify the MCR Crew Chief or Floor Coordinator when the work is completed.

Following maintenance or modification, the System/Responsible Engineer ensures equipment is tested for all functions that may have been affected to demonstrate that the equipment is capable of performing its intended function. For repairs, testing shall verify that maintenance work corrected the original problem, and no new problems were introduced. The System/Responsible Engineer reports to the MCR or Floor Coordinator on the readiness of the system.

Following work on any system interlocked or controlled by one of the safety interlock systems, Access Control Interlock System (ACIS) or the Personnel Safety System (PSS) that has work done on its interlock subsystems, the repaired system shall be functionally tested and validated according to the appropriate ACIS or PSS procedures.

For addition information refer to: Introduction and Use of the APS Work Request System (APS_1302758). The MCR Conduct of Operations Manual has additional information about work request approvals and authorizations for work on accelerator systems.

Approved Designs
To ensure a proper configuration, it is the responsibility of the system/responsible engineer to ensure that if the work includes new designs or changes to an approved configuration of a system

or components, the hardware cannot be installed until the designs of the system or component has been approved per the APS policy/procedure.

For additional information refer to: Section 3.3.2 and APS Design Review (APS_000031)

Radiation Safety Systems (RSS)
If the work includes work on radiation safety shielding, a Configuration Control Work Permit is required prior to the start of work on the RSS per:

- Change Control for Radiation Safety Systems (APS_1685081)
- Configuration Control Work Permits (CCWP) (APS_1192930)

CCWPs for accelerator work are administered by MCR personnel and for beamline and front ends are administered by Floor Coordinators.

Unreviewed Safety Issue
As described in section 3.3.3, if an activity or discovered condition with accelerator specific hazards that have yet to be evaluated to determine if the activity or discovered condition introduces accelerator specific hazards that are not adequately addressed by the current SAD and approved ASE, to determine if a Unreviewed Safety Issues exists, the USI processes described in section 3.3.3 shall be followed (APS_1185831).

Shutdown Planning
In routine operations, the APS operates on an annual schedule that typically has three user operations runs of 11-12 weeks separated by 3 total, 6-week longevity maintenance periods for accelerator system installations, repairs, and accelerator studies/training. The schedule is set by the Operations Directorate. During the run, one or two days a week are typically scheduled for machine studies and intervention studies. During runs, emergency repairs may be required to return accelerator systems to normal operation. In addition, there may be work on systems that aren't involved in or impacting machine operations.

The APS Operations Directorate sets the schedule and posts it online (APS Long-Range Operations Schedule).

For additional information refer to: Introduction and Use of the APS Work Request System (APS_1302758) and the planning process detailed in APS Maintenance Shutdown Planning (APS_2188852).

Accelerator systems controls are described in more detail in the MCR Conduct of Operations Manual.

Document Control
An essential element of configuration management is ensuring that documents are consistent with the as-installed configuration of equipment. Facility records, maintained in an approved records depository, typically ICMS, should be updated as appropriate.

For additional information refer to: Section 3.3.1 and Managing APS Documents Policy (APS_1273342)

4.2.5 LOTO

Lockout and Tagout (LOTO) is a practice to establish positive control over hazardous energy sources to protect personnel from injury and to protect equipment from damage while work is performed.

Workers must use LOTO when working on or near equipment that could cause injury to people if the equipment unexpectedly energizes, starts up, or releases stored energy. Hazardous energy is any form of energy that can cause personal injury including electrical, mechanical, pressure or vacuum, hydraulic and pneumatic. No matter what the source, mitigation of hazards by isolating hazardous energy and using LOTO is part of Integrated Safety Management.

There is a flow-down of LOTO requirements from national codes and standards to Argonne Lab-wide requirements, which are implemented in APS procedures.

Mandatory general safety National Codes and Standards

- 10 CFR 851, Worker Safety and Health Program (which establishes the following referenced codes and standards)
- Title 29 CFR 1910, Occupational Safety and Health Standards
- Title 29 CFR 1926, Safety and Health Regulations for Construction

National codes and standards specific to electrical safety:

- NFPA 70, National Electrical Code (NEC)
- NFPA 70E, Standard for Electrical Safety in the Workplace

Argonne Hazardous Energy Program

To prevent injury to personnel or damage to property that may result from hazardous energy and to implement the national codes and standards, the Laboratory has established a hazardous energy program. The program is described in:

- Hazardous Energy Program Manual (LMS-MNL-4)

This Manual sets minimum standards that must be met by local APS processes.

To control the ubiquitous laboratory electrical hazards and thereby protect personnel, Argonne has established: 1) a Qualified Electrical Worker Program, 2) minimum requirements for identifying and controlling electrical hazards, and 3) Laboratory-wide site-specific electrical safe work practices that meet regulatory requirements and match the types of hazards found on site. Argonne requirements are detailed in:

- Electrical Safety Work Controls, Chapter 6 of the Argonne Electrical Safety Manual

4.2.6 Technical Procedures

APS Facility Procedures

It is the policy of the APS that each group at the APS shall maintain documented procedures to ensure a safe work environment and reliable and efficient operations. For additional information see Section 3.2 above and:

- Managing APS Facility Procedures (APS_1001409)

To help ensure that procedures remain current, facility procedures are subject to periodic reviews.

In addition to search tools available in ICMS, an on-line matrixed directory of many machine/system APS Technical Procedures is available. Selecting a machine and technical area from the matrix yields a list of applicable procedures.

Work Control Documents

Work planning and control of facility technical tasks is described in the APS policy:

- Work Planning and Control (APS_1432773)

Facility task work may be planned using the Argonne AWARE application to generate a work control document (WCD). A WCD defines the hazards and mitigations of a scope of work. See section 3.3.4 for additional details.

Emergencies

Procedures are prepared for anticipated facility conditions. Personnel may take whatever corrective actions are necessary during emergencies to place the equipment in a safe condition, and to protect equipment, personnel, and public safety without first initiating a procedure change. Employees shall be capable of performing the immediate action steps of emergency procedures without reference to the procedure. The emergency procedure shall be reviewed after the actions are performed, verifying that all required actions have been taken.

4.2.7 Component Labelling

Component Database

The Component Database (CDB) is an electronic data management tool designed to document, organize, track, and manage components over their life cycle. The CDB holds information about a component's design, inventory information of each component type, and where components will be used. The CDB interfaces with other systems where component information is stored, such as PDMLink, ICMS, DMS, PARIS, eTraveler, etc. The CDB is used to organize this data about a component and provides access via links to these other systems to minimize storage of redundant information.

Each component procured or fabricated for the APS-U will be uniquely identified with a QR ID code. A sticker with the QR ID code will be adhered to the component in a visible location (if possible).

An entry in the Component Instance table will relate the component instance to a particular component; thereby allowing all relevant information about this component instance to be referenced using the QR ID.

See:
The Component Database User Guide

RSS Components
All radiation safety systems (RSS) at the APS are labelled to alert personnel of the special configuration controls that apply to these critical safety systems. The FC web page provides guidance on RSS classifications, instructions for making RSS tags, and the template for RSS tags.

Appendices

Appendix 1 - Glossary

Definitions adapted from the following sources:

- DOE O422.1, Conduct of Operations
- DOE O420.2D, Safety of Accelerator Facilities
- DOE G420.2-1A, Accelerator Facility Safety Implementation Guide for DOE O 420.2C, Safety of Accelerator Facilities
- DOE STD-1073-2016, Configuration Management
- DOE O426, Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities
- DOE O232.2A, Occurrence Reporting and Processing of Operations Information
- APS Change Control for Radiation Safety Systems (APS_168501)

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Accelerator: a device employing electrostatic or electromagnetic fields to impart kinetic energy to molecular, atomic, or sub-atomic particles and capable of creating a radiological area. (DOE O 420.2D)

Accelerator Enclosure: Any one of the areas that contains accelerator components through which accelerated particles pass.

Accelerator Facility: Accelerator and associated roads within site boundaries, plant and equipment utilizing, or supporting the production of, accelerated particle beams and the radioactive material created by those beams to which access is controlled to protect the safety and health of workers, the public or the environment. The term facilities includes injectors, targets, beam dumps, detectors, experimental halls, non-contiguous support and analysis facilities, experimental enclosures and experimental apparatus utilizing the accelerator, etc., regardless of where that apparatus may have been designed, fabricated, or constructed, including all systems, components and activities that are addressed in the Safety Analysis. (DOE O 420.2D)

Accelerator Operations: Activities of an accelerator and any associated accelerator facilities that are bounded by the Safety Assessment Document. Accelerator operations (and post operations) include the production, dispensing, analysis, movement, processing, handling and other uses, and storage of radioactive material within the accelerator facility. (DOE O 420.2D)

Accelerator Readiness Review (ARR): an ARR is a structured method for verifying that hardware, personnel, and procedures associated with commissioning or routine operations are ready to permit the activity to be undertaken safely. (DOE O 420.2D)

Accelerator Safety Envelope (ASE): a set of verifiable physical and administrative credited controls that define the bounding conditions for safe operation and address the accelerator facility hazards and risks. (DOE O 420.2D)

Accident: An undesired event that results in injury, illness, damage to equipment, or insult to the environment.

Administrative Controls: Work procedures such as written safety policies, rules, supervision, schedules, and training with the goal of reducing the duration, frequency, and severity of exposure to workplace hazards. (DOE G 450.4-1C)

Approve: means to confirm that a proposed activity has acceptable safety and health implications. (Adapted from DOE G420.2-1A)

At-the-Controls Area: A designated area where special access and controls are necessary. Examples are the space in front and to the immediate sides of a control panel, control station, computer terminal, etc., or the area where facility, workstation, or experiment controls (e.g., switches, knobs, buttons) are located. (DOE-STD-1042-93, Ch 1)

Authorize: Means to give a right to undertake an activity. (Adapted from DOE G420.2-1A)

Authorized Access: Access to an accelerator enclosure by an authorized person without MCR intervention.

Certification: The process by which facility management provides written endorsement of the satisfactory achievement of qualification of a person for a position. (DOE O422.1 / DOE O 426.2)

Collaborative Access Team (CAT): An externally funded (i.e., the majority of funding does not come from the APS Operations funding) Partner User group, organized to develop and operate beamlines in a designated sector or sectors.

Collaborative Development Team (CDT): A Partner User group, organized for the development of a beamline that will be ultimately operated by the APS.

Concern: Matter of interest that may involve an event or condition with an adverse impact on safety, health, quality assurance, or the environment.

Commissioning: A phase of an accelerator facility operation that is typically used to conduct initial beam testing and/or verify design specifications. Commissioning periods may be tailored to the needs of each facility and there may be great variations in their duration, breadth, and formality, but in all cases, the activities will be bounded by an ASE. (adapted from DOE O 420.2D)

Configuration Control Work Permit (CCWP): A permit required for work on radiation safety systems (RSS).

Conduct of Operations Program: The formal documentation, practices, and actions implementing disciplined and structured operations that support mission success and ensure worker, public, and environmental protection. The program goal is to minimize the likelihood and consequences of human fallibility or technical and organizational system failures. (DOE O422.1)

Configuration: The combination of the physical, functional, and operational characteristics of the structures, systems, and components (SSCs), credited controls, or parts of the existing facility or activity. (DOE STD-1073-2016)

Configuration Control Work Permit (CCWP): A document that identifies: the scope of RSS work; authorizations; validations; stop points; approvals for RSS entry into, or return to, service; and, when posted, alerts personnel that RSS work is authorized and in progress. (APS_1685081)

Configuration Management (CM): A disciplined process that involves both management and technical direction to establish and document the design requirements and the physical configuration of the facility or activity and to ensure that they remain consistent with each other and the documentation. (DOE STD-1073-2016)

Control Area: The physical area (e.g., room, booth, desk) where the facility or portions of the facility operations are monitored and controlled. (DOE-STD-1042-93, Ch 1).

Credited controls: controls determined through safety analysis to be essential for safe operation directly related to the protection of personnel or the environment. (DOE O 420.2D)

Design Basis: Design basis consists of the design inputs, the design analysis and calculations, and the design outputs. It includes topical areas such as seismic qualification, fire protection, and safe shutdown. The design basis explains why a design requirement has been specified in a particular manner or as a particular value. (DOE-STD-1073-2016)

Design Documents: Design documents define either the design requirements or the design basis of the facility or activity. Design documents include design specifications, design change packages, design drawings, design analysis, setpoint calculations, summary design documents, correspondence with DOE or other regulator that provides design commitments, and other documents that define the facility or activity design. (DOE-STD-1073-2016)

Design Information: The combination of design requirements and design basis information associated with the design process, consisting of design inputs, design analysis and calculations, and design outputs. (DOE-STD-1073-2016)

Design Inputs: Those specific criteria, limits, performance requirements, bases, or other initial requirements (i.e., specific operational requirements, design bases, and commitments), as well as general restrictions and limits to the engineering design process that ensure consistency and quality of design (i.e., quality assurance or QA requirements, applicable codes and standards, regulatory requirements, and required design methodologies) upon which the detailed final design is based. (DOE-STD-1073-2016)

Design Outputs: Documentation such as drawings, design change packages, specifications, load lists, valve lists, design reports, and setpoint lists. They are the composite result of the engineering organization's consideration of the design inputs and the design analysis and calculations. The design outputs specify the requirements of the design basis, e.g., the necessary functions, capabilities, capacities, physical sizes and dimensions, limits and setpoints. They include the operational requirements, as well as procurement requirements, QA requirements, construction/installation specifications and instructions, post-installation testing, post-maintenance testing, and periodic surveillance/testing requirements. (DOE-STD-1073-2016)

Enclosure: An accelerator area that is locked and interlocked to prevent personnel access while the beam is on. (DOE G420.2-1A)

Experimenters: All persons directly involved in experimental efforts at the accelerator facility using the accelerator or its beams, including visiting scientists, students, and others who may not be employees. (DOE G420.2-1A)

Facility Representative: An individual assigned responsibility by the Field Element Manager (or designee) for monitoring the safe and efficient performance of the site/facility and its operations. This individual is the primary point of contact with the contractor for operational and safety oversight and is responsible to the site's/facility's DOE Line Manager. (DOE-STD-1063-2017)

Floor Coordinators (FC): Individuals responsible for monitoring the safe operations of the user beamlines and at least one Floor Coordinator is on duty (present or on-call) at all times during User Operations periods. The FCs provide the first level of oversight for user compliance with APS policies, procedures, and safety and operational guidelines.

Hazard: A source of danger (i.e., material, energy source, or operation) with the potential to cause illness, injury, or death to personnel or damage to a facility or to the environment. (DOE G420.2-1A)

Incident: An event resulting in personal injury/illness, spill or release to the environment, loss or spill of radiological material, radiation exposure or contamination, chemical or physical agent exposure that may have potential health effects, fire or explosion, near miss, regulatory noncompliance, property damage, vehicle mishap, loss of assets, or an event or condition that adversely affects or may adversely affect DOE or contractor personnel, the public, property, the environment, or DOE mission.

Independent Verification: The act of checking, by a separate qualified person, that a given operation or component position conforms to established criteria. (DOE 422.1 / DOE-STD-1036-93 CH-1)

Interlock: A device, such as a door-position switch, or a method, such as key trapping, that prevents harm to an individual from an accelerator. (DOE G420.2-1A)

Interrelated Processes: Those processes or activities that can affect operations but are under the control of others, such as shared support systems or special testing. (DOE O422.1)

Lockout: The application of a lock and a tag identification on an energy-isolating device in accordance with an established procedure.

Machine Intervention: Time scheduled during user operations for accelerator-related activity. The primary use of this time is accelerator studies, or as needed for repair or maintenance.

Machine Manager: An individual designated as having responsibility for the performance of one of the APS accelerators: linac, PAR, booster, storage ring, and the linac extension (LEA). Machine Managers define and maintain performance parameters and must be involved in any design changes that affect performance parameters.

Narrative Logs: Logs in which APS personnel enter information that describes the events of their shifts and pass on information to subsequent shifts and other APS personnel.

Near Miss: A situation where an incident was avoided by only a single barrier or when all of the conditions necessary to cause an incident existed (i.e., when all barriers were compromised).

Occurrence: An event or condition that adversely affects or may adversely affect DOE or contractor personnel, the public, property, the environment, or DOE mission. (DOE O232.2A)

Operating Envelope: A set of physical and administrative conditions that define the bounding conditions to ensure that operations are held well within the safety envelope. Operating envelopes are set by machine managers with concurrence from the Argonne Radiation Safety Officer.

Operator Aids: Approved, posted information used to assist personnel in performing a task. Examples are copies of procedures (portion or pages thereof), system drawings, information tags, curves, graphs, or prints. (DOE O422.1 / DOE-STD-1043-93 (CH-1)

Operations: The general term to encompass the work activities accomplished by the facility or project. (DOE O422.1)

Operating Envelope: A set of physical and administrative conditions that define operational bounding conditions well within the safety envelope.

Physical Configuration: The actual physical location, arrangement, and material condition of structures, systems, and components or credited controls within a facility or for an activity. (DOE-STD-1073-2016)

Qualification: Education, experience, training, examination, and any special requirements necessary to perform assigned responsibilities for a given position. (DOE O422.1 / DOE O 426.2)

Radiation Safety Systems (RSS): Systems that prevent exposure of personnel to unacceptable levels of ionizing radiation. (APS_1685081)

Resident Beamline Personnel: Non-Argonne beamline personnel who are onsite at the APS collectively for three of the twelve months in a calendar year.

Risk: A quantitative or qualitative expression of possible harm, which considers both the probability that a hazard will cause harm and the amount of harm. (DOE G420.2-1A)

Safety Analysis: a documented process to systematically identify the hazards of a given operation; including a description and analyses of the adequacy of measures taken to eliminate, control, or mitigate the hazards and risks of normal operation; and identification and analyses of potential accidents and their associated risks. (DOE O 420.2D)

Safety Assessment Document (SAD): a document containing the results of a safety analysis for an accelerator facility pertinent to understanding the risks of operating the accelerator facility. (DOE O 420.2D)

Sector: A subunit of the APS facility consisting of the Experiment Hall space allocated to an insertion device beamline and the preceding bending magnet beamline, as well as that portion of the storage ring that includes these two radiation sources.

Shift: 1) The normal period of work for an individual or group (e.g., 8:00am to 5:00 pm. (DOE O422.1 and DOE STD 1041-93, Ch 1). 2) Eight-hour periods used for scheduling beamtime and accelerator operations.

System/Responsible Engineer: Member of a Technical Group that is designated by position description or assignment as responsible for improving and ensuring the proper maintenance and repair of a specific technical system within the APS. They may be responsible for an entire system, such as storage ring rf or synchrotron vacuum, or for a subsystem thereof, such as storage ring rf modulators or synchrotron vacuum pumps.

Technical Groups: The groups responsible for the maintenance, repair, and improvement of all APS equipment and are organized along lines of technical expertise.

Unreviewed Safety Issue (USI): An activity or discovered condition with accelerator specific hazards that have yet to be evaluated to determine if the activity or discovered condition introduces accelerator specific hazards that are not adequately addressed by the current SAD and approved ASE. (DOE O 420.2D)

User: An individual authorized to conduct research operations at an APS beamline. A user may be an employee of the APS, of an Argonne division outside of the APS, or from another institution.

- **General users** receive authorization to conduct research at the APS through the proposal-based APS General User system.
- **Partner Users** are members of groups that have responsibilities in the development of beamline facilities, instrumentation, or techniques and/or beamline facilities operations. Partner user groups include Collaborative Access Teams (CATs), Collaborative Development Teams (CDTs), a group with approve APS Partner User Proposal (PUP). Per agreement with the APS and subject to DOE requirements, in exchange for their facility contributions, Partner User Groups may be allocated beamtime.
- **Resident users** are non-APS users who spend a significant part of the year at the APS and are in general responsible for the operations of non-APS beamlines, instruments, or experiments. A General User or Partner user may or may not be a resident user.

Waiver or Deviation: Documented authorization to depart from specified requirements. (DOE-STD-1073-2016)

Walkdown: A visual inspection of facility or activity structures, systems, and components to identify the as-found physical configuration and any discrepancies with currently approved facility or activity documentation. (DOE-STD-1073-2016)

Work Control Document: A document that defines the hazards and mitigations of a scope of work. (DOE G 433.1-1A, Chg. 1)

Work Request: An online APS form, available through the Work Request System, that is used to initiate work on accelerator systems, front ends, and APS support groups on beamlines. The system tracks approvals, authorizations, progress, and final check-outs. (Introduction and Use of the APS Work Request System Guide)

Appendix 2 - DOE Standards and Requirements

1) The Argonne/DOE Prime Contract

CLAUSE H.19 - APPLICATION OF DOE CONTRACTOR REQUIREMENTS DOCUMENTS:
(a) Performance. The Contractor [Argonne] will perform the work of this Contract in accordance with each of the Contractor Requirements Documents (CRDs) appended to [the] contract as "Appendix I, List B".
(b) Laws and Regulations Excepted. The process described in this clause shall not affect the application of otherwise applicable laws and regulations of the United States, including regulations of the Department of Energy.

2) Office of Environment, Health, Safety & Security Occupational Radiation Protection Program (10 CFR 835) establishes radiation protection standards, limits, and program requirements for protecting individuals from ionizing radiation resulting from the conduct of DOE activities. The requirements given in 10 CFR 835 are matters of law, punishable by civil and criminal penalties. Elements include assessing external and internal doses, workplace monitoring, radiological equipment, and radiation dose reporting. Doses are required to be ALARA (as low as reasonably achievable) and must not exceed the limits given in 10 CFR 835.

3) Safety of Accelerator Facilities DOE O 420.2D

4) Accelerator Facility Operations Guidance DOE G 420.2-1A

5) DOE Standard, Configuration Management DOE-STD-1073-2016

Appendix 3 - DOE Conduct of Ops Standard

Conduct of Ops specific requirements excerpted from DOE O 422.1, Attachment 2.

a. Organization and Administration. (DOE-STD-1032-92 (CH-1), Guide to Good Practices for Operations Organization and Administration. The operator must establish policies, programs, and procedures that define an effective operations organization, including the following elements:
   (1) organizational roles, responsibilities, authority, and accountability
   (2) adequate material and personnel resources to accomplish operations
   (3) monitoring and self-assessment of operations (See DOE O 226.1, Implementation of Department of Energy Oversight Policy, current version.
   (4) management and worker accountability for the safe performance of work
   (5) management training, qualification, succession, and, when appropriate, certification
   (6) methods for the analysis of hazards and implementation of hazard controls in the work planning and execution process; and
   (7) methods for approving, posting, maintaining, and controlling access to electronic operations documents (procedures, drawings, schedules, maintenance actions, etc.) if electronic documents are used

b. Shift Routines and Operating Practices. (DOE-STD-1041-93 (CH-1), Guide to Good Practices for Shift Routines and Operating Practices). The operator must establish and implement operations practices to ensure that shift operators are alert, informed of conditions, and operate equipment properly, addressing the following elements:
   (1) prompt notification to operating personnel and supervisors of changes in the facility status, abnormalities, or difficulties encountered in performing assigned tasks
   (2) adherence by operating personnel and other workers to established safety requirements
   (3) awareness by operating personnel of the status of equipment through inspection, conducting checks, and tours of equipment and work areas
   (4) procedures for completing round sheets or inspection logs, responding to abnormal conditions, and periodic supervisory reviews of round sheets or inspection logs
   (5) procedures for protecting operators from personnel hazards, e.g., chemical, radiological, laser, noise, electromagnetic, toxic, or nano-scale materials
   (6) prompt response to instrument indications, including the use of multiple indications to obtain parameters
   (7) procedures for resetting protective devices
   (8) authorization to operate facility equipment
   (9) designating shift operating bases and providing equipment for them; and
   (10) professional and disciplined operator performance of duties.

c. Control Area Activities. (DOE-STD-1042-93 (CH-1), Guide to Good Practices for Control Area Activities) The operator must establish and implement operations practices that promote orderly, business-like control area operations and address the following elements:
   (1) control-area access
   (2) formality and discipline in the control and at-the-controls areas
   (3) surveillance of control panels and timely response to determine and correct the cause of abnormalities/out-of-specification conditions
   (4) limitation of the number of concurrent evolutions and duties, and
   (5) authorization to operate control area equipment.

d. Communications. (DOE-STD-1031-92 (CH-1), Guide to Good Practices for Communications) The operator must establish and implement operations practices that ensure accurate, unambiguous communications among operations personnel and address the following elements:
   (1) provision of communications systems for emergency and normal operations
   (2) administrative control of communications equipment, including authorization to use the public address system and allowable locations and purposes for radio use
   (3) methods for control areas to contact operators and supervisors
   (4) use of abbreviations and acronyms; and
   (5) use of oral instructions and communications, including use of repeat-backs and sender/receiver identifications.

e. On-shift Training. (DOE-STD-1040-93 (CH-1), Guide to Good Practices for Control of On-Shift Training) The operator must establish and implement operations practices that control on-shift training of facility operators, prevent inadvertent or incorrect trainee manipulation of equipment, and address the following elements:
   (1) on-shift training program
   (2) authorization and documentation of training activities
   (3) supervision and control of personnel under instruction by qualified personnel; and
   (4) facility conditions and controls for conducting training during operational activities, including suspension of training during unanticipated or abnormal events.

f. Investigation of Abnormal Events, Conditions, and Trends. [DOE-STD-1045-93 (CH-1), Guide to Good Practices for Notifications and Investigation of Abnormal Events]. The operator must establish and implement operations practices for investigating events to determine their impact and prevent recurrence, addressing the following elements:
   (1) specific events requiring investigation, and criteria for identifying other events or conditions to be investigated
   (2) designation of investigators and their training and qualification
   (3) investigation process and techniques
   (4) causal analysis and corrective action determination
   (5) event investigation reporting, training, and trending; and

(6) response to known or suspected sabotage. Operators should integrate related requirements in DOE O 232.2, Occurrence Reporting and Processing of Operations Information, current version, and DOE O 225.1, Accident Investigations, current version.

g. Notifications. (DOE-STD-1045-93 (CH-1), Guide to Good Practices for Notifications and Investigation of Abnormal Events) The operator must establish and implement operations practices to ensure appropriate event notification for timely response, addressing the following elements.
   (1) procedures for internal, DOE, and external notifications, including events, persons to be notified, persons responsible to make notifications, contact information, and recordkeeping; and
   (2) communications equipment for notifications. Operators should integrate related requirements found in DOE O 232.2, Occurrence Reporting and Processing of Operations Information, current version; DOE O 151.1, Comprehensive Emergency Management System, current version; DOE O 470.4, Safeguards and Security Program, current version; and DOE O 205.1, Department of Energy Cyber Security Program, current version, and applicable regulatory notification requirements.

h. Control of Equipment and System Status. (DOE-STD-1039-93 (CH-1), Guide to Good Practices for Control of Equipment and System Status) The operator must establish and implement operations practices for initial equipment lineups and subsequent changes to ensure facilities operate with known, proper configuration as designed, addressing the following elements:
   (1) authorization for, and awareness of, equipment and system status changes
   (2) initial system alignment, and maintaining control of equipment and system status through startup, operation, and shutdown, and documentation status
   (3) use and approval of lockouts and tagouts for administrative control of equipment status (see also paragraph 2.i)
   (4) operational limits compliance and documentation
   (5) management of equipment deficiencies, maintenance activities, post-maintenance testing, and return to service
   (6) awareness and documentation of control panel and local alarm issues
   (7) control of temporary equipment modifications and temporary systems; and
   (8) configuration control and distribution of engineering documents.

i. Lockout and Tagouts. (DOE-STD-1030-96, Guide to Good Practices for Lockouts and Tagouts)
   (1) The operator must establish and implement operations practices that address the following elements for the installation and removal of lockout/tagouts for the protection of personnel:
      (a) procedures, roles and responsibilities associated with the development, documentation, review, installation, and removal of a lockout/tagout;

(b) compliance with Occupational Safety and Health Administration Rules, 29 CFR Part 1910 and/or 29 CFR Part 1926, requirements for the protection of workers using Lockout/Tagout;
(c) compliance with National Fire Protection Association Standard 70E electrical safety requirements using lockout/tagout;
(d) description and control of the tags, locks, lockboxes, chains, and other components utilized for the lockout/tagout program; and
(e) training and qualification in lockout/tagout and special considerations for DOE facilities, e.g., operational limitations, or seismic issues from the mass of locks or chains.

(2) The operator must establish and implement operations practices that address the following elements for the installation and removal of caution tags for equipment protection or operational control:
(a) roles and responsibilities associated with the development, documentation, review, installation, and removal of caution tags to convey operational information or equipment alignments for protection of equipment
(b) description and control of the tags; and
(c) measures to prevent relying on caution tags for personnel protection.

j. Independent Verification. (DOE-STD-1036-93 (CH-1), Guide to Good Practices for Independent Verification) The operator must establish and implement operations practices to verify that critical equipment configuration is in accordance with controlling documents, addressing the following elements:
(1) structures, systems, components, operations, and programs requiring independent verification
(2) situations requiring independent verification
(3) methods for performing and documenting independent verification
(4) situations, if any, allowing concurrent dual verification; and
(5) methods for performing concurrent dual verification, if used.

k. Logkeeping. (DOE-STD-1035-93 (CH-1), Guide to Good Practices for Logkeeping) The operator must establish and implement operations practices to ensure thorough, accurate, and timely recording of equipment information for performance analysis and trend detection, addressing the following elements:
(1) narrative logs at all key positions, as defined by management, for the recording of pertinent information
(2) prompt and accurate recording of information
(3) type, scope, and format for log entries
(4) method for recording late entries and correcting erroneous entries without obscuring the original entry
(5) periodic supervisory reviews for accuracy, adequacy, and trends; and
(6) document retention requirements.

l. Turnover and Assumption of Responsibilities. (DOE-STD-1038-93 (CH-1), Guide to Good Practices for Operations Turnover) The operator must establish and implement operations practices for thorough, accurate transfer of information and responsibilities at shift or operator relief to ensure continued safe operation, addressing the following elements:

(1) definitions for all key positions requiring a formal turnover process;
(2) turnover of equipment/facility status, duties, and responsibilities that results in the safe and effective transfer of equipment status and in-progress or planned activities from one shift or workgroup to the next; and
(3) process for reliefs during a shift.

m. Control of Interrelated Processes. (DOE-STD-1037-93 (CH-1), Guide to Good Practices for Operations Aspects of Unique Processes) The operator must establish and implement operations practices to ensure that interrelated processes do not adversely affect facility safety or operations, addressing the following elements:

(1) defined responsibilities with respect to the control of interrelated processes (processes or activities that can affect operations, but are under the control of persons other than the affected operators, such as shared support systems or special testing);
(2) operator training and qualification to understand interrelated processes, to interpret instrument readings, and provide timely corrective action for process-related problems; and
(3) establish lines of communication between operating personnel, process support personnel, and other interrelated process operators for coordination of activities

n. Required Reading. (DOE-STD-1033-92 (CH-1), Guide to Good Practices for Operations and Administration Updates Through Required Reading) The operator must establish and implement operations practices for an effective required reading program to keep operators updated on equipment or document changes, lessons learned, or other important information, addressing the following elements:

(1) identification of material to be distributed via required reading
(2) identification of which personnel are required to read specific required reading items; and
(3) distribution of required reading to appropriate personnel and documentation of their timely completion.

o. Timely Instructions/Orders. (DOE-STD-1034-93 (CH-1), Guide to Good Practices for Timely Orders to Operators) The operator must establish and implement operations practices for timely written direction and guidance from management to operators, addressing the following elements:

(1) appropriate circumstances for the use of timely instructions/orders
(2) designated levels of review and approval prior to issuance
(3) configuration control of timely instructions/orders; and

(4) distribution of timely instructions/orders to appropriate personnel and documentation of their receipt and understanding.

p. Technical Procedures. (Procedure Professionals Association Standards PPA AP-907-001, Procedure Process Description, Rev 2, Jan 2016, and PPA AP-907-005, Procedure Writer's Manual, Rev 2, Feb 2016) The operator must establish and implement operations practices for developing and maintaining accurate, understandable written technical procedures that ensure safe and effective facility and equipment operation, addressing the following elements:
   (1) expectations for the use of procedures to perform operations
   (2) a process for procedure development
   (3) procedure content, including consistent format and use of terms (e.g., prerequisites, warnings, cautions, notes, hold points, etc.), detail sufficient for accomplishing the operation, technically accurate procedures capable of performance as written, and procedure conformance with the facility design and manufacturer documentation
   (4) a process for procedure changes (pen and ink or page changes) and revisions (complete reissues)
   (5) a process for training personnel on new, revised, or changed procedures
   (6) a process for approval of new, revised, or changed procedures
   (7) initial-issue and periodic review and testing of procedures
   (8) availability and use of the latest revisions of procedures; and9(9) specified and defined procedure use requirements, i.e., reader-worker method, reference use only, use-each-time, and emergency response.

q. Operator Aids. (DOE-STD-1043-93 (CH-1), Guide to Good Practices for Operator Aid Postings) The operator must establish and implement operations practices to provide accurate, current, and approved operator aids, addressing the following elements:
   (1) technical evaluation and management approval of operator aids
   (2) operator aids serve as conveniences, not operational requirements
   (3) operator aids do not obscure equipment
   (4) administrative control of installed operational aids; and
   (5) periodic review for adequacy and correctness.

r. Component Labeling. (DOE-STD-1044-93 (CH-1), Guide to Good Practices for Equipment and Piping Labeling) The operator must establish and implement operations practices for clear, accurate equipment labeling, addressing the following elements:
   (1) components that require a label
   (2) label information that uniquely identifies components and is consistent with regulations, standards, and facility documents
   (3) durable and securely attached labels that do not interfere with controls or equipment; and

(4) administrative control of labels, including a process for promptly identifying and replacing lost or damaged labels, preventing unauthorized or incorrect labels, and control of temporary labels.

Appendix 4 - Revision History

Date	Revision*	Changes section)	Who made the changes
7/13/23	Rev β.0	Initial release	TOSS Davey
7/27/23	Rev β.1	Reviewed by Laura Boon – edits for corrections, content, and style. Deleted ARR crosswalk	Davey and Boon
7/31/23	Rev 0.0	Route to Boon and Quintana for review/approval	Davey
10/17/23	Rev 0.1	Update URLs for APS safety committees with persistent ICMS URLs and pushed to web site.	Davey
11/16/23	Rev 0.2	Repaired URLs	Davey
1/26/24	Rev 0.3	Per Management Assessment: 1) Add ADD reviewers and DD and Safety Manager approvers (cover page). 2) Following Hierarchy of requirements and practices added description of relationship between Conduct of Ops Manuals (Introduction, p 8).3) Noted service groups maintain on-line call-in lists/ AOG link added (4.2.1).	Davey
"	"	1) Updated USI section (3.3.3, 4.2.4, and App. 1) with current DOE O420.2 D definitions. 2) Moved to WP&C section and expanded descriptions of stop and pause work. Pause work description taken from DOE HDBK-1211-2014 (3.3.4, 2.3 and 4.2.3). 3) Removed dated ICMS Working Group link (2.1.5). 4) Replaced User's Executive Committee with APSUO. 5) Corrected minor formatting problems and updated hyperlinks.	Davey
2/13/24	"	Added missing link on page 15 and modified multiple links font style for link uniformity	Davey
3/18/24		Updates:1) RSS references to "Radiation Safety Systems" 2) changes to Argonne and APS organizations; 3) Fire Department contact 911 for both emergencies and non-emergencies.	Davey, Edelen, and Rossi
4/22/25	Rev. 1.0	Author changed from Technical Operations Specialist to User Technical Interface. Updated Content ID/hyperlink to MOU in 2.1.6. Removed DEIA and XSD advisory council references. Added ASD Diagnostics Beamline operation. Updated APSUO titles to APS UEC. Updated ALD, ASD, and XSD organization group names. Updated links to HEW and SAS programs. Updated configuration management and RSS work section to include accelerator operations. Updated MCR and EFOG Conduct of Operations topical structure bullets. Updated Control of Equipment and Equipment Status, Work Request Section,	Pedergnana

		to include floor operations activities. Updated Section 4.2 with the SR Access for Emergency Repairs policy and ICMS reference.	

For revision of Rev x.y,

- Increasing y indicates limited changes such as edits for clarifications, style, correcting typos, or updating URLs.
- Increasing x and resetting y to 0 indicates changes of substance in the ways the APS conducts operations.

This is a living document and subject to revision.