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IMPLEMENTATION OF WORK PLANNING AND CONTROL AT THE APS



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AGENDA

- Background
- Work Planning and Control Process and Implementation
- Main Features
- Examples
- Schedule
- Laboratory Requirement on Reporting High Risk Work
- Q&A

BACKGROUND

- User Operations were paused on July 25, 2017 as a result of two electrical incidents in the Photon Sciences (PSC) Directorate
- The investigations revealed significant weaknesses in the implementation of integrated safety management (ISM) for work in PSC
- Following the restart of user operations on July 28, PSC Associate Lab Director/APS Director required that all non-office work in PSC must be covered by a procedure, technical note, ESAF or work tool
- For work that is not already described in above categories, a Work Control Document (WCD) must get generated
 - WCD in many cases broadly encompasses task-specific activities with a well-defined scope.
- Before work commences, the WCD has to be reviewed and approved, work authorized, all workers must have requisite training and a pre-job briefing has to be completed.

APS WORK PLANNING AND CONTROL - BACKGROUND

- Procedure based on multiple other sources of information, from DOE handbooks to DOE lab and lightsource procedures.
- Procedure codifies what has been already been occurring since major Lab events in 2017 and APS stand-down / work pause:
 - Reinvigorating WP&C through use of Work Control Documents (WCDs)
 - Application of pre-job briefs at point of work, before work commences
- Read and sign training targeting non-office work only individuals in Photon Sciences.

APS WORK PLANNING AND CONTROL - GENERAL

- Revised APS work planning and control process incorporates basic Integrated Safety Management (ISM) principles to provide a consistent and integrated approach to performing all types of work at the APS, with easy to follow reference tables.
- All APS work classified into 3 categories:
 - **Experimental work**
 - **Contractor/construction work**
 - **Facility technical tasks (aka “other work”)**
- Procedure also contains essential elements:
 - Suspend and stop work authority,
 - Clear identification of approval versus authorization,
 - Work Planning & Control (WP&C) roles and responsibilities by work function.

PROCEDURE		Page 1 of 13
Advanced Photon Source	ICMS Content ID:	APS_1432773
	DNS #:	APS-PPR-ADM-000-A022-000012
	Revision #:	3
	Issue Date:	3/20/18
	Review Period:	2 years
	Supersedes:	Rev. 2, 1/2/18
	Last Reviewed:	3/20/18
Work Planning and Control at the APS		
Changes made in this revision:		
<ul style="list-style-type: none">• Significant revision from prior version (Rev. 2)		
Prepared by:		
AES Technical Support Services		
Reviewed/Approved by:		
Safety Manager, PSC		
AES Division Director		
XSD Division Director		
ASD Division Director		
Deputy ALD for Operations		

APS WORK PLANNING AND CONTROL IMPLEMENTATION

■ Experimental work:

- ESAF remains as focal, controlling mechanism for experiments and lab work

Experimental Work, see [APS Experiment Safety Reviews](#) for additional information

1. Define Scope	2. Identify Hazards	3. Identify Controls	4. Approve	5. Authorize	6. Perform Work within Controls	7. Closeout	8. Feedback
The experiment Spokesperson completes the description sections of the experiment on an ESAF	Experiment Spokesperson identifies the hazard classes sections on an ESAF and submits the ESAF	Upon ESAF submittal, Hazard Control Plan (HCP) is automatically generated	Safety: 1) Beamline or APS Group designated approver and 2) APS Experiment Safety Review Board	Experiment Authorization (EA): 1) APS Floor Coordinator (FC) generates an EA form 2) FC confirms controls in place with experiment On-site Spokesperson (OSP) 3) OSP signs-off EA form 4) FC posts EA at work area	Experiment executed by persons identified on ESAF Beamline staff, Floor Coordinators, and APS ESH personnel provide oversight	FC removes EA and updates run log	End of Run form

■ Contractor/construction work:

- APS Work Planning Checklist along with Contractor Job Safety Analysis (JSA) and Work Entry Clearance, overseen by IS Group (APS Site Operations)

Construction, see [Contractor and Construction Services](#) for additional information

1. Define Scope	2. Identify Hazards	3. Identify Controls	4. Approve	5. Authorize	6. Perform Work within Controls	7. Closeout	8. Feedback
Requestor submits requirements to APS Site Operations Group (ASO). ASO completes a Work Project Checklist (WPC)	ASO lists hazards on a Job Safety Analysis (JSA)	For each JSA hazard, the ASO identifies the mitigating controls on the JSA	Sign-offs required per the Work Project Checklist are obtained.	ASO and AES Division Director (or designee)	Per contracts and applicable JSA ASO provides oversight	ASO update facility records	Feedback to ASO

APS WORK PLANNING AND CONTROL IMPLEMENTATION

■ Facility technical tasks:

- Approved WCD is focal, controlling mechanism; either Standard Operating Procedure (SOP)-based or task-based WCDs.
- Rigor classification from creation of WCD
- Pre-job brief requirement, then work authorization

Facility Technical Tasks, see [Work Request](#) guide and Argonne's [WP&C software application](#) for additional information

1. Define Scope	2. Identify Hazards	3. Identify Controls	4. Approve	5. Authorize	6. Perform Work within Controls	7. Closeout	8. Feedback
<p>Scope is captured clearly in the Scope Summary field of either a:</p> <ul style="list-style-type: none"> • Standard Operating Procedure (SOP)-based Work Control Document (WCD) in the Argonne WP&C software application • Task-based WCD in the Argonne WP&C software application 	<p>Requestor or cognizant individual identifies hazards and mitigating controls in the Argonne WP&C software application.</p>	<p>A hazard analysis with identification of controls is required for generation of a WCD.</p> <p>This hazard analysis outputs a level of rigor (Low, Medium, High) based on the ratings assigned to hazard consequence and complexity of the task</p> <p>Routine, common and frequently performed Low Rigor tasks can be part of a group summary WCD and hazard analysis (one that lists common Group tasks in one document)</p>	<p>Low Rigor WCD: Group Leader approval</p> <p>Medium Rigor WCD: Group Leader approval</p> <p>High Rigor WCD: Division Management (DD, ADD, or DDD)</p>	<p>Low Rigor: Supervisor through Work Request system, Pre-Job Brief software application, Toolbox Review or Plan of the Day/Week meeting.</p> <p>There may be instances where a Pre-Job Brief should be conducted for Low Rigor work. See Appendix B for criteria.</p> <p>Medium Rigor: Group Leader through documented Pre-Job Brief software application</p> <p>High Rigor: Division Director through documented Pre-Job Brief software application.</p> <p>Work should be authorized only for systems with approved designs.</p>	<p>Overseen by Supervisor(s)</p>	<p>Update facility records (e.g., file as-built drawings, update maintenance logs, and file closed permits – including CCWPs for work on shielding)</p>	<p>Feedback to procedure author, Supervisor, and/or Group Leader.</p> <p>Low Rigor: Post-Job Brief completed in Pre-Job Brief software application if Pre-Job Brief was documented.</p> <p>Medium and High Rigor: Post-Job Brief completed in Pre-Job Brief software application.</p>

IMPACT

- Most of the work is covered by two processes that have been developed and implemented for many years:
 - Experimental Work – ESAF
 - Contractor/Construction work
- For the third category of Facility Technical Tasks:
 - Implementing training and reporting:
 - Work Planning and Control
 - Work Control Documents
 - Pre-job brief requirement and work authorization
 - Rigor classification

FACILITY TECHNICAL TASKS – NEW ANL WP&C APP

- Approved Work Control Document (WCD) is focal, controlling mechanism and has 2 options:
 - Standard Operating Procedure (SOP)-based or
 - Task-based WCDs.
- Rigor classification from creation of WCD
- Pre-job brief requirement, then work authorization

AVAILABLE APPROVED GENERIC TASK-BASED WCD

- Beamline Common Work (Low and Moderate Rigor)
 - Work activities associated with the experiments and instrumentation used on the Advance Photon Source beam lines, and the associated support, control and common areas within the APS.
 - Does not include any work that is covered under an approved ESAF or radiation protection/personnel protection systems.
- Installation of Beamline Components (Low Rigor)
 - Work associated with the installation of beamline components
 - Does not include any operations that require a permit, electrical installation, or blind penetrations
- Machine Tool Operation (Low Rigor)
 - Operation of APS Machine Tools within APS facilities
 - Does not include the machining of hazardous materials.

BEAMLINE COMMON WORK

- Task 1 - Beam Line, Experimental Hutches, and Common Areas
 - The scope covers activities and instrumentation within beam lines, experimental hutches and associated control and common areas.
 - Includes beam line instrumentation used to transport x-ray beams from the APS shield wall to the experimental enclosures.
 - Typical beam line activities include:
 - vacuum work
 - alignment & mechanical adjustments
 - electronic interfacing on equipment such as slits, mirrors, monochromators, beam position monitors, cryo-cooled optics....
 - associated motion control, robotic, laser, mechanical and electrical systems

BEAMLINE COMMON WORK (CONT'D)

■ Task 2 - Dry Lab Activities

- For mechanical and electrical (non-energized) work on components and equipment to support experimental activities.
- Typical work includes assembly, repair, and testing of beam line equipment.
- This includes activities such as:
 - mechanical work with hand tools and/or small power tools
 - fabricating and testing signal and motor cables
 - configuration and repair of beam line equipment such as vacuum pumps, motors, actuators, amplifiers, compressors, and sample stages
 - soldering of electrical connections
 - testing of software communication with beamline equipment
 - unpacking and assembly of beamline components

BEAMLINE COMMON WORK (CONT'D)

▪ Task 3 - Wet Lab Activities

- Activities in chemical laboratory space including sample preparation and testing of beamline components
- This includes activities such as:
 - cleaning samples using common solvents such as acetone, ethanol or methanol
 - mounting of samples using various common adhesives
 - grinding of metallic powders using a mortar and pestle
 - loading sample cells or mounts
 - heating of samples and/or adhesive mixtures using a hot plate or kiln
 - testing new beam line equipment such as sample cooling refrigeration units
 - unpacking and assembly of beam line components and user-provided instrumentation

WORK OUTSIDE OF GENERIC TASK-BASED WCD

- Creation of a Work Control Document in the ANL Work Planning and Control System
 - WPC assist in define the controls required based on pre-defined hazard trees
 - much like ESAF
- Pre-Job Briefing
- High Risk Reporting, if applicable

EXAMPLE NOT COVERED BY GENERIC WCD

■ Ion Chamber Battery Replacement



Worker Package

Title	TEST- Ion Chamber Battery Replacement - TEST		
Document No.	57094.0	Status	SME Review as of 05/16/2018
Complexity Determination	Simple	Consequence Determination	Major
Planned Start Date	08/01/2018	Planned End Date	08/01/2020
Scope Summary	Replace the 300V battery on an Ion Chamber		
Type	Task-based Hazard Analyses	Rigor Level	High
Approving Division	PSC	Approving Department	Not Applicable
NEPA Number	ASO-CX-265 - In-door bench-scale research projects and conventional laboratory operations generic CX	Person in Charge	Rossi, Paul

Task Summary

Task #	Task
1	Ion Chamber Battery Replacment

Attachments

File Name	Date	Attached By
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Permits Summary

Code	
ANL-211 Energized Electrical Work Permit	http://www.tis.anl.gov/db/forms/template/DDD/ANL-211_20061214_PDF6.pdf

Title	TEST- Ion Chamber Battery Replacement - TEST		
Document No.	57094.0	Status	SME Review as of 05/16/2018
Task 1 Ion Chamber Battery Replacment			
Task Description	Remove the battery pack from service by disconnecting the BNC connector Open the battery enclosure Remove and recycle the old battery Replace the battery and re-install the enclosure		
Planned Start Date	08/01/2018	Planned End Date	08/01/2020
Scope Limits	Battery terminals must be taped when removed for recycling.		
Task Attachments	File Name	Date	Attacher
Lessons Learned	2017-ANL-020 - Less than Adequate Oversight Resulted in a Student Receiving a Shock		
Response to Unplanned Events	Stop work immediately and contact the supervisor. In case of emergency dial 911.		
Worker Proficiencies	Not Applicable		
Work Instructions	Remove the battery pack from service by disconnecting the BNC connector Open the battery enclosure Remove and recycle the old battery Replace the battery Re-install the enclosure Connect the battery pack to the Ion Chamber		

Title	TEST- Ion Chamber Battery Replacement - TEST		
Document No.	57094.0	Status	SME Review as of 05/16/2018

Task 1 Ion Chamber Battery Replacment		
Hazard Detail	Controls	Training
/Physical safety hazards/ Electrical hazards/Category 2 - DC/Where voltage is > 100 and ≤ 400 volts/And current is > 40 mA and ≤ 500 A Mode 3 - Energized Work Task Hazard Relationship Ion Chamber Battery Replacement	safety watch see Energized Electrical Work Permit Permits ANL-211 Energized Electrical Work Permit http://www.tis.anl.gov/db/forms/template/DDD/ANL-211_20061214_PDF6.pdf	ESH114 Lockout/ Tagout Training ESH376 Electrical Safety Training for QEW1 ESH376C 2015 Updates to 70E R&D Course
/Physical safety hazards/ Electrical hazards/Category 4 - Batteries (Note: for batteries/ battery banks > 100 volts, also refer to DC (Category 2) which may require additional controls) Where power is ≥ 100 and < 1000 watts (all Modes) Task Hazard Relationship Replace Ion Chamber Battery	no jewelry	ESH384 Battery Safety for R&D

Title	TEST- Ion Chamber Battery Replacement - TEST		
Document No.	57094.0	Status	SME Review as of 05/16/2018

Task 1 Ion Chamber Battery Replacement		
Hazard Detail	Controls	Training
/Physical safety hazards/Hand tool hazards/Non-powered hand tool GENERIC (use for all hand tools - select this in addition to those below, if appropriate) Task Hazard Relationship Ion Chamber Battery Replacement	do not carry hand tools in pockets - carry in hands, tool pouches, bags, or boxes do not place tools where they can cut, fall on, or trip someone do not use "cheater bars" to increase leverage, torque, or extend handle of tool follow LMS-PROC-153 inspect tools before each use - never use broken or damaged tools only use tools you have been trained to use verify handles are tight and free of grease or oil safety glasses with sideshields (ANSI Z87.1) shoes that cover the entire foot sturdy work gloves when handling rough or sharp material	
/Physical safety hazards/Hand tool hazards/Non-powered hand tool Screwdriver Task Hazard Relationship Ion Chamber Battery Replacement	verify handle firmly attached; screwdriver tip not chipped or rounded	

Locations			
Building	Room	Location	Task
400		APS Experimental Areas	Task # 1

Title	TEST- Ion Chamber Battery Replacement - TEST		
Document No.	57094.0	Status	Approved as of 05/17/2018

Reviews and Approval			
Type	Reviewer	Reviewer Comments	Completed
Draft	Rossi, Paul (#57494)(630) 252-4192		05/16/2018
Review Team Lead Signoff	Rossi, Paul (#57494)(630) 252-4192		05/16/2018
SME Review: Electrical hazards	Doktorczyk, George J. (#216167) (630) 252-9496		05/17/2018
ESH Coordinator Review	Rossi, Paul (#57494)(630) 252-4192		05/17/2018
Divisional Approval	Rossi, Paul (#57494)(630) 252-4192		05/17/2018

PRE/POST-JOB BRIEFING

- Required to be performed prior to the start of work, renew annually
- Utilize the APS Pre-job Briefing Form

APS Pre-job Briefing Form

Division: XSD
Group: MM
Pre Job Brief Title: Thomson Rail Stage Baseplate Modification and Assembly
Job Location: 6ID
APS Work Request Ticket
Number:
Job Description: Use mill to drill 5 mm diameter holes located in existing Thomson rail base plate per design.
Review of
procedures/guidance: Global WPC for APS beamlines 19202.4. LMS-PROC-153
Hazard level: Low
Is a CCWP required?: No (Check only if a Configuration Control Work Permit is required)
Hazards or potential hazards: Potential hand/eye injury
Ways to mitigate hazards: Wear PPE: Safety glasses, and gloves.
Authorizer: MCDOWELL, MICHAEL W.
Understanding your role: Yes
Does the assignee
understand Stop Work
Authority? Yes ⓘ
Assignee: Douglas Robinson
Date: Mon Feb 26 2018 16:12:46 GMT-0600 (Central Daylight Time)

- Post Job when completed to provide Feedback and Improvement

RECENT LABORATORY MANDATE TO CAPTURE HIGH RISK WORK

- DOE heightened scrutiny of ANL safety
- Purpose is to keep all apprised of high risk, high rigor, unique or one-off work activities planned, methods to mitigate risk, and status of ongoing activities.
- Required for WCD rigor of High
- In PSC, high risk work has to be approved by the division director, for CATs this approver is George Srajer

REPORTING HIGH HAZARD WORK

- Mandated Laboratory reporting tool is a Vector Application
- Starts June 4
- Allows for Dashboard and Calendar functions

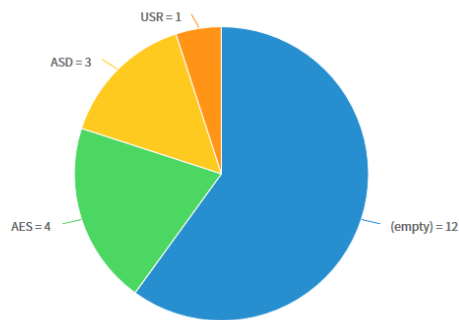
High Hazard Work Directorate Dashboard

Current Selection:

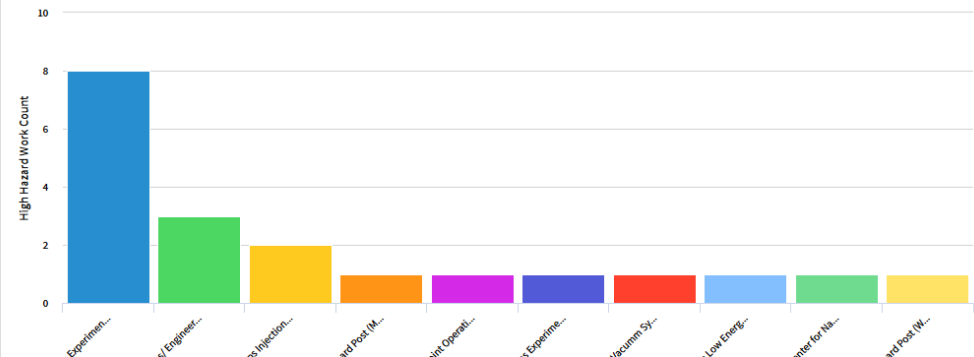
CLS EGS IS OTD **PSC** PSE

Number	Title	State	Recurrence	Executing Directorate	Executing Division	Person In Charge	Planned Start Date
HHW0001188	Conditioning of accelerating structure in linac	Identified	Non-Recurring	PSC	ASD	David Bromberek	2018-03-12
HHW0001189	Linac Extension Area - building a sidewalk, landscaping	Identified	Non-Recurring	PSC	ASD	Philip Rash	2018-03-23
HHW0001167	Septum Thermal Testing	Identified	Non-Recurring	PSC	AES	John Zientek III	2018-03-26
HHW0001193	Sector 13 rad sample experiment	Identified	Non-Recurring	PSC		Wendy VanWingeren	2018-04-03
HHW0001191	10-BM rad sample experiment	Execution	Non-Recurring	PSC		Wendy VanWingeren	2018-04-03
HHW0001192	Sector 20 rad sample experiment	Identified	Non-Recurring	PSC		Wendy VanWingeren	2018-04-03
HHW0001198	Sector 7 combustor experiment	Identified	Non-Recurring	PSC		Bruce Glagola	2018-04-03
HHW0001196	Sector 16 rad sample experiment	Identified	Non-Recurring	PSC		Wendy VanWingeren	2018-04-05

High Hazard Work by Division



High Hazard Work by Building



IMPLEMENTATION SCHEDULE

- Complete WCD for all SOP's listed in Sector Safety Plan
- Implementation target date: August 1, 2018

SUMMARY

- Implementation of Working Planning and Control for CATs should be straightforward
- Many activities beyond ESAFs and Construction have been already captured
- PSC is committed to working with CAT to smoothly, and, hopefully painlessly implement the WP&C process

An aerial photograph of the Argonne National Laboratory campus, featuring various buildings, parking lots, and a large circular structure, all overlaid with a semi-transparent blue filter.

QUESTIONS?

ADDITIONAL SLIDES

WORK PLANNING AND CONTROL – RISK ASSESSMENT AND GUIDE TO DISCUSSIONS

RISK SCREENING CRITERIA

Chemical/Laboratory

- Work with toxic gases such as metal hydrides or corrosives
- Handling of pyrophoric materials with particle size small enough to support spontaneous combustion
- Working with highly corrosive or toxic chemicals/acids
- Use of primary explosive material and/or use of low energy electro-explosive devices
- Entry into environments with potential imminent danger to life or health, including work that may activate chemical deluge systems
- Operating, aligning, or servicing openly accessible or exposed Class 3B or Class 4 laser beams
- Work in very high radiation areas

Field Work

- Working at heights requiring a fall protection plan
- Hoisting and rigging work that requires a critical lift plan
- Confined space entry
- Excavation of wall, floor, or ceiling penetration where you cannot identify all potential hidden hazards
- Excavation with power equipment to a depth of eight inches or more that might contact underground utilities or when an employee must enter an excavation five feet or more in depth

Risk Management

Management Awareness of Risks

Equipping Staff, including Front Line Supervisors, to Understand and Manage Risks

Electrical/Pressure

- Energized electrical work > 50 V
- Work on equipment or processes involving multiple types of hazardous energy sources requiring LOTO
- Work with high pressure systems
- Work within < 10 ft of an overhead power line > 50 kV, including equipment movement underneath
- Work with or around high voltage equipment (>480 volts)

Security and Sensitive Information

- Work with classified documents
- Work with ITAR or other sensitive, but non-classified information
- Handling of Personally Identifiable Information (PII)

OVERLAY CONSIDERATIONS

Work Schedule

- First time work
- Work that has not been performed for an extended period of time
- Work scheduled on weekends or on overtime
- Working under highly aggressive schedule pressures

Personnel

- Work involving coordination between multiple work groups
- Subcontractor work on hazardous equipment or systems
- Work done by staff, post-docs, users, and students that are new to the lab

Supervision

- Work overseen by a new supervisor
- Work done in areas where there is not bandwidth for significant management oversight

Risk Management

Management Awareness of Risks

Equipping Staff, including Front Line Supervisors, to Understand and Manage Risks

Group or Individual Dynamics

- Work done by groups or individuals experiencing unusually high levels of stress
- Work done by groups that are having unusual management/employee interaction issues (e.g. harassment complaints, grievances)
- Work done by an employee or group that have shown past risky behaviors or tendencies to cut corners

Work Environment

- Work in high heat or low cold environments
- Work in off-site or remote field locations
- Work with equipment that has come to the Lab outside of normal procurement avenues (e.g. as excess or on loan from another lab or university)

DEFINITIONS

- Risk - the chance or probability that a person will be harmed or experience an adverse health effect if exposed to a hazard. It may also apply to situations with property or equipment loss, or harmful effects on the environment.
- 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 (without regard to the likelihood or credibility of accident scenarios or consequence mitigation).
- Rigor - The formality of work control, including documentation and execution, based on the complexity of the work and the related safety consequences.

LABORATORY REQUIREMENT ON REPORTING HIGH RISK WORK (NON-ESAF)

- Weekly ALD review of high risk / high hazard planned work
 - Screening criteria used as shown in addition to other criteria (WCD rigor of Medium or High, SME review invoked, etc.)
 - Purpose is to keep all apprised of high risk, high rigor, unique or one-off work activities planned, methods to mitigate risk, and status of ongoing activities.
- Currently utilizing home-grown electronic **APS Moderate and High Risk Work Register**
- In PSC, high risk work has to be approved by the division director, for CATs by George Srajer