Work scope details:

Title: Bl-15 Remove Roof Panel Lower Equipment

Work Scope Summary: - The task involves the removal of the roof block from Bl-15, lowering of equipment, and subsequent reinstallation of the roof block.

Key Work Scope Components: - Removal of Bl-15 roof block - Lowering of equipment - Installation of roof block

Relevant previous events and lessons learned:

Event Title	Event Summary	Lessons Learned	Reference link

100 kg steel pin falls during roof block removal	On January 2, 2020, Lawrence Berkeley National Laboratory riggers and two mechanical technicians were removing a roof shielding block to allow access to the Storage Ring (SR). This required the removal of 100-kilogram steel pins that are used to secure the roof blocks to the side walls. A crane is used to lift the pins out of the roof blocks and lay them in an available space on top of an adjacent roof block where it is then properly secured against movement. For this task, there was not sufficient space on the adjacent roof block to lay the pin down horizontally. A space under an object that was resting on top of cribbing material was identified as the best location to store the pin, but this required manually lowering the pin from the vertical to the horizontal position and maneuvering pin into the space. A lead had not been designated for this work, and a plan to manage this situation had not been discussed during the pre-job meeting. The pin was lowered with the crane onto the roof block in a vertical position, and worker 1 removed the rigging harness. Worker 1 attempted to physically lower the pin to fit it into the available space next to the cribbing, but lost control of the pin, which rolled and fell 9 feet to the SR floor. There were no injuries. A safety watch was established and positioned to prevent access under the exposed area during the lift operation. No damage occurred to any major equipment or components. An investigation is underway.	Ensure adequate job planning and designate a lead for tasks involving heavy equipment. Discuss and plan for potential issues during pre-job meetings.	Link
Roofing installer fatality	A 33-year-old roofing installer died after falling 16 feet from a suspended runway positioned between a utility truck bed and the roof of a housing unit in Missouri. The accident happened while carrying plywood during roof-related operations.	Implement comprehensive fall protection measures and ensure proper training for workers on elevated surfaces.	Link

Construction worker paralysed	A construction worker was left paralysed after falling four metres through an unguarded hole in a roof while working on the installation of a vent at Marlborough Park, Swindon. The accident was due to insufficient safety planning and removal of protective scaffolding.	Maintain safety barriers and scaffolding until all work is completed. Conduct thorough safety planning and risk assessments.	Link
Collapse of roof trusses	Collapse of three long-span steel roof trusses and several steel bar joists during the construction of an indoor swimming and diving pool at Natatorio de San Juan, Puerto Rico, resulted in two deaths and two injuries.	Conduct detailed structural assessments and ensure compliance with engineering standards during construction.	Link

Missing Hazards:

Hazard	Missing or Inadequate Mitigation in Current Work Control Document	Recommended Mitigation for Revision	Reference link	SBMS Link
Falling objects during roof block removal	Not addressed	Implement controls for securing objects during roof block removal, such as netting or barriers	Link	Link
Inadequate fall protection during roof work	Not addressed	Ensure compliance with OSHA standards for fall protection systems during roof work	Link	Link
Insufficient safety barriers and scaffolding	Not addressed	Install toe boards and ensure proper scaffolding setup and inspection	Link	Link
Structural failure during roof block installation	Not addressed	Conduct thorough inspections of roof structures and ensure compliance with building codes	Link	Link
Time pressures and high workload	Not addressed	Implement workload management strategies and ensure adequate breaks and resources	Link	Link

Distractive environment	Not addressed	Minimize distractions through environmental controls and awareness training	Link	Link
Lack of designated task leader	Not addressed	Assign a task leader for coordination and oversight of safety protocols	Link	Link
Inadequate job planning	Not addressed	Develop comprehensive job planning procedures, including hazard assessments	Link	Link
Inadequate pre-lift inspections	Not addressed	Implement detailed pre-lift inspection protocols and meetings	Link	Link
Inadequate emergency response planning	Not addressed	Develop and train on comprehensive emergency response plans	Link	Link

Failure mode analysis:

Current control	Failure mode of the control	Effect of Failure	Cause of Failure	Recommended action
Written permits for the work activity	Permit not obtained or expired	Unauthorized work leading to safety hazards	Lack of awareness or oversight	Ensure all permits are current and verified before work begins
Precautions, step warnings, Hold Points	Steps not followed or ignored	Increased risk of accidents or equipment damage	Inadequate training or communication	Conduct thorough pre-job briefings and enforce adherence to procedures
Personal Protective Equipment (PPE)	PPE not worn or inadequate	Increased risk of injury to personnel	Complacency or lack of availability	Regular PPE checks and mandatory compliance checks
Work instructions	Instructions not followed or misunderstood	Incorrect execution of tasks leading to equipment damage	Poor communication or unclear instructions	Simplify and clarify instructions; conduct training sessions
ORNL subject area requirements	Non-compliance with specific requirements	Legal and safety violations	Lack of knowledge or oversight	Regular audits and training on compliance requirements

Discuss group/individual responsibilities	Miscommunication or unclear roles	Task execution errors and safety risks	Poor communication or lack of defined roles	Clearly define roles and responsibilities in pre-job meetings
Follow work instructions & safety procedures	Deviations from procedures	Safety incidents or task failures	Overconfidence or time pressure	Reinforce the importance of following procedures through training
Availability/location of materials, tools	Tools/materials not available or misplaced	Delays or incorrect task execution	Poor planning or inventory management	Implement a robust inventory and tool management system
Response if work cannot be performed as planned	Inadequate response to unforeseen issues	Escalation of safety risks or project delays	Lack of contingency planning	Develop and communicate contingency plans for common issues
Pre-Lift Checklist	Checklist not completed or ignored	Increased risk of lift failure or accidents	Complacency or time pressure	Enforce checklist completion and verification before lifts
Designated Signal Person	Signal person not designated or absent	Miscommunication during lifts leading to accidents	Oversight or lack of personnel	Assign and verify signal person roles before operations
Equipment Inspected prior to lift	Equipment not inspected	Equipment failure during lift	Negligence or time constraints	Mandatory inspections with documented verification
Load path and landing area clear	Obstructions in load path	Accidents or equipment damage	Poor planning or oversight	Conduct thorough area inspections and clearances before operations
Emergency Response	Inadequate emergency procedures	Increased severity of incidents	Lack of training or unclear procedures	Regular emergency drills and clear communication of procedures