

NuMI Project Guidance for ES Reviews: Triggers & Scope

Hazard	Threshold for consideration	Review Guidance
Mechanical Hazards	Weight exceeds 3 tons and is supported above the floor	Mechanical Structures and Systems - The design of mechanical structures and systems shall be evaluated to verify:
	Exceeds 10 tons in total weight	1. Calculations have been prepared and are based on good engineering practice.
	Moves at a speed greater than 5 ft/sec	2. Calculations reference and follow applicable standards and codes including but not limited to ASME Section VIII, ANSI, AWS, AISC 9 th Edition ASD, CGA, NFPA as appropriate.
	Costs more than \$100k to replace	3. Calculations address each element of the design in sufficient detail to ensure the complete structure or system meets applicable design standards and that the completed structure or system minimizes occupational safety hazards. The reviews should emphasize the overall design process rather than simply checking what has been provided to minimize oversights as part of the design process.
	Includes pressure/vacuum vessels	4. Assembly procedures for elements are prepared as deemed necessary by the NuMI ES&H/QA Review Committee and/or NuMI ES&H Coordinator in order to minimize occupational safety hazards during installation or assembly and to minimize delays during installation
Flammable Gas	Presence of flammable gases	Flammable gas systems shall be reviewed for compliance with FESHM 6020.3.
Electrical	Any Primary Beam Magnet Power Supply Having Output Capability Greater Than 50 Amps	Review to be conducted and documented by Beams EE Support Department in accord with Departmental Procedure BDDP-EE-1002. Such a review typically involves generation of a Safety Analysis Report, safety walkthrus before commissioning and/or operation, and determination as to necessity of and development of written LOTO procedures.
	Kicker Power Supply System	Review to be conducted and documented by Beams EE Support Department in accord with Departmental Procedure BDDP-EE-1002. This review involves generation of a Safety Analysis Report, a safety walkthru before commissioning and/or operation, and development of the associated written LOTO procedure.
	Horn Power Supply System	Review to be conducted and documented by Beams EE Support Department in accord with Departmental Procedure BDDP-EE-1002. This review involves generation of a Safety Analysis Report, a safety walkthru before commissioning and/or operation, and development of the associated written LOTO procedure.

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	Hadron and Muon Monitors & MINOS Near Detector Experimental Apparatus	Review to be conducted in accord with established Particle Physics Division procedures for review of experiments before operation. Special precautions may be required in accord with particularly high density/value of associated electronics. Special consideration shall be given to non-commercial, low-voltage, high-current distribution systems and associated requirements of FESHM Chapter 5046.
Fire Hazards	Large inventory of combustible items	Responsibility for the fire protection program are addressed in FESHM 6010. The responsibility of the NuMI ES&H/QA Review Committee is to verify compliance with FESHM 6040.1 and 6040.2 for items included as part of the project. The intent of this review is to verify compliance during the design phase to avoid remedial action and resulting additional costs or installation delays.
Oxygen Deficiency Hazards	Presence of oxygen displacing gases	Systems that may result in oxygen deficiency hazards shall be reviewed for compliance with FESHM 5064.
Magnetic Hazards	Presence of magnetic fields	Systems that have static magnetic fields shall be reviewed for compliance with FESHM 5062.2
Cryogenic Hazards	Presence of cryogenic liquids	Systems that may result in oxygen deficiency hazards shall be reviewed for compliance with FESHM 5032.
Laser Hazards	List any lasers that will be used	Systems, which utilize lasers, shall be reviewed for compliance with FESHM 5062.1.
Radiation Hazards	Activated components exceeding 1 R/hr at 1 foot	The responsibility of the NuMI ES&H/QA Review Committee is to verify that the ES&H Section addresses radiation safety. Radiation safety reviews shall satisfy the Fermilab Radiological Control Manual.
	List radioactive sources	
Toxic Materials	Inventory of toxic or hazardous materials	This review shall verify that elements are designed and built to minimize occupational exposure to toxic materials.
Occupational Industrial Hazards	Presence of occupational industrial hazards	The responsibility of the NuMI ES&H/QA Review Committee is to verify that the Division's ES&H Department addresses occupational industrial hazards.

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Any/All	Use of computers in systems that protect people, property or the environment	Computers and Programmable Logic Controllers (PLC's). The lab requires that detectors or apparatus that rely solely on dedicated computers or PLC's for safety, environment, or property protection functions must comply with Directors Policy # 21 (see http://www.fnal.gov/directorate/Policy_Manual.html#No_21).