ORC Guidelines

The full set of information that constitutes official guidelines is in the Fermilab ES&H Manual (FESHM). The ORC inspection is based largely on the Hazard ID Checklist.

- Flammable (Gases or Liquids)
  - On your Hazard ID Checklist specify the total amount of each type of gas to be used, the flow rate, and the capacity of the device in which the gas will be used.
  - FESHM Chapter 6020.3 Outlines the requirements and necessary documentation for use of Flammable Gases.
  - Any flammable materials and/or systems need to be labeled.
- Gases
  - Example: Wire Chambers, GEMs, and other Gas Detectors
  - **Every type** of gas that will be used needs to be indicated so that safety personnel can determine if permitting is required.
  - On your Hazard ID Checklist specify the total amount of each type of gas to be used, the flow rate, and the capacity of the device in which the gas will be used.
  - Greater than 0.1 pounds/hr of flow of gas emissions will require an air permit
  - Green House Gases, air pollutants, or scrap, waste, etc. may trigger the need for an IEPA permit. *The need for an IEPA permit may delay installation for three months*.
  - Environmental Safety ORC Review Tips
- Hazardous Chemicals
  - Any experiment using flammable, corrosive, reactive, or toxic materials will need to post the chemical's Safety Data Sheet at the experiment location.
  - Safety Data Sheets in the Fermilab database can be found here.
- Radioactive Sources
  - Are they being used as a calibration (temporary use) or do you need them in the enclosure while beam is being run (permanent installation)?
  - A list of sources can be found here.
  - Sources can be requested from the ESH&Q Source Manager
  - Anyone using sources will need Source Training (as well as RadWorker)
- Target Materials
  - Certain materials require additional training for handling
  - Targets may require additional safety reviews/inspections/approval
  - Any material put in the beam will need to be surveyed by a Rad Control Tech (RCT) upon removal from the beam enclosure
- Nuclear Materials
  - No nuclear material shall be shipped to Fermilab without notification and prior approval of the Fermilab Nuclear
    Materials Representative.
    - NM Representative: Kathy Graden
    - Alternate: Susan McGimpsey
  - The table attached to the Hazard ID Checklist defines nuclear materials in accordance with DOE O 474.2, Change 2, Nuclear Material Control and Accountability dated 11/19/2012.
- Lasers
  - Use of a Class 3b or Class 4 laser at Fermilab must be approved by the Laser Safety Officer prior to operation
  - Anyone working with the Laser will have to take the Laser Safety Training Class and have a laser eye exam done. This can be arranged through the Fermilab Medical Office (x3232) medical_office@fnal.gov
  - Ensure that proper enclosures, interlocks, and Personal Protective Equipment are in place.
  - **Necessary Documentation**:
    - Registration form
    - Written Standard Operating Procedures
  - Fill out the above forms and send to the Laser Safety Officer (LSO), upon approval the LSO will issue laser registration labels
  - Place laser registration labels on the laser after receipt from LSO
  - The laser will have a final review of the setup done by the LSO as part of the ORC Inspection.

    - *NOTE: The process of registering and properly configuring a Class 3b or Class 4 laser for use can take a significant amount of time and resources. Please consult with the LSO as soon as you identify a need for such a laser*.
- Ultra Violet (UV) Radiation Sources
    - Use of any UV radiation source operating within 180-400 nm requires notification to ESH&Q.
    - Contact Division Safety Officer (DSO) for warning labels, enclosure requirements, and PPE determinations.
    - See FESHM 4280 for further information.
- Electrical Equipment
    - Electrical Safety ORC Review Tips
    - Electrical Design Standards for Electronics to be used in Experiments at Fermilab
    - **Necessary Documentation**:
        - Simplified (block) electrical diagram of entire installation, including commercial components, with special emphasis on power handling issues. These must be of sufficient detail that reviewers can verify the experimenters have observed good systems engineering practices and have used proper fusing, wire sizes, insulation, termination, etc.
        - Line diagrams of custom manufactured circuitry or modifications of commercial components of similar detail.
- Mechanical Structures
    - Small test apparatuses are often placed on moveable tables. In this case, ensure the table is grounded and its motion stops are in place. Exercise the motion table to ensure cable slack and motion interlock stops are correctly positioned.
    - Lifting fixtures and fabricated structural elements must have an engineering note.
- Vacuum Vessels
    - Apparatuses containing vacuum vessels will need to be inspected by the ORC Committee. Vacuum vessels must comply with FESHM 5033 or FESHM 5033.1.
- Pressure Vessels and Pressure Piping
    - Apparatuses containing pressure vessels and piping will need to be inspected by the ORC Committee. Pressure vessels and piping must comply with FESHM 5031 or FESHM 5031.1.
- Cryogenics
    - Apparatuses containing cryogenics will need to be inspected by the Cryogenic Review Committee who will issue an engineering note upon approval. This note will be referenced by the ORC chairperson as part of the ORC Inspection
- Other Hazardous/Toxic Materials
    - Reviewers will want to know if safer alternatives were considered, and a reasoning as to why they were not chosen.
    - FESHM 4110, FESHM 4180 through 4200, FESHM 8030, FESHM 8031
- Fire and Life Safety
    - As a general practice, the use of combustibles within buildings should be limited. If there are questions regarding the combustibility of building materials (cables, foam board, plastics, etc.), please obtain a sample of the material and contact the Division Safety Officer (DSO). There is a system in place to test these materials.
    - Fire-Life Safety Guidelines
- Radiation Safety
    - The ESH&Q Radiation Physics Engineering Group will inspect the area to look for any issues that may result in adverse radiological consequences, each time an experiment sets up to take beam.
    - Rad Safety Checklist for FTBF ORC Reviews
- Other Safety Considerations: Besides all of the above things, Safety Inspectors will be looking out for the following:
    - Trip Hazards (Be sure cords are secure, taped down, or covered properly.)
    - Falling Hazards (Be sure equipment is mounted in a secure way and cannot fall.)
    - Strain Relief (Be sure your cables are not reaching too far, even if the table moves.)

ORC Approval Process

The walk through is conducted with the experimental representative, but depending on the situation it may be helpful to have other experimenters present so that minor issues that arise can be addressed immediately without delaying the process.

After the walk through (and after any appropriate remediations are in place), there will be a sequence of sign-offs. The committee members will give their email approval to the Chairman, who will arrange for a signed 'Operational Readiness Clearance' document. The requestor will then obtain signatures from all required parties.

If requesting beam, once all signatures are obtained deliver a signed copy to the Accelerator Division Operations Department Head, who will then authorize the MCR Crew Chief to deliver beam when requested by the experiment. The crew chief will also see to any steps necessary for operating the beamline.

Renewing your ORC

Regarding experiments that have not run for more than 30 days, PPD_ESH_006 reads:

Projects that require beam and have been previously approved but have been idle for greater than 30 days must contact the ES&H Review Chair to determine whether another review is needed; if the experiment does not require beam, a 60 day period is used. The experiment will verify, in writing, the end date of the previous run and that ***the experiment has not changed****. The ES&H Review Coordinator will then inform all ORC signatories of the approval to run or any recommendations determined necessary to resume the experiment.*

In any case, a renewal ORC will be generated.