Fermilab
FY2002 Self-assessment
Process Assessment Report
For
Division/Section____Particle Physics Divison____

Date September 30, 2002

Division/Section performing assessment

Particle Physics Division (PPD)

Name of organization that owns assessed process

Every individual in the Particle Physics Division

Organization Strategy

Results of the assessment process are used to evaluate the effectiveness of existing programs and identify areas in need of improvement. It is also used to determine priorities for actions that will improve the Particle Physics Division ability to meet the performance measures negotiated between Fermilab and the DOE.

Names of Personnel on Assessment team

	Name	Fermi ID#	Organization	Title
Lead >	Martha Heflin	8971N	PPD	PPD SSO
Participant >	Mary Logue	11773N	ES&H Section	Associate Head, Health & Safety
Participant >	Dennie Parzyck	09935V	DOE-FAO	DOE Facility Representative
Participant >	T.J. Sarlina	4129N	PPD	PPD ES&H Dept Head
Participant >	Timothy Miller	4058N	ES&H Section	ES&H Section

Brief description of process to be assessed

The purpose if this assessment was to determine how well PPD has implemented Integrated Safety Management (ISM), including internal procedure PPD_OPER_004 and FESHM Chapter 2060.

1. Are metrics associated with this process? If so, what are they?

   No contractual metric existed for this assessment. Therefore, an internal metric was developed. Each of the seven principles of the Integrated Safety Management Program were identified as an indicator. Credit was given for each indicator successfully implemented. The seven principles of the Intergrated Safety Management Program used as the metric in this assessment are:

   1.) Line Management Responsible for Safety
   2.) Clear Roles and Responsibilities
   3.) Competence Commensurate with Responsibilities
   4.) Balanced Priorities
   5.) Identification of Safety Standards and Requirements
   6.) Hazard Controls Tailored to Work
   7.) Operations Authorization

   Using the method described above, the following scale and associated ranking was developed.

Outstanding	-7 indicators successfully implemented
Excellent	-5-6 indicators successfully implemented
Good	-3-4 indicators successfully implemented
Marginal	-1-2 indicators successfully implemented

2. What are the names of the procedures associated with this process?

   PPD's Integrated Safety Management implementation document, PPD_OPER_004 and FESHM chapter 2060.

3. Are these procedures being followed? Are they current?

   Yes, the procedure and FESHM chapter are being followed. The FESHM chapter is current. PPD_OPER_004 was last revised in 1999. That procedure should be updated.

4. Describe the methodology used to assess this process.

   A series of meetings and discussions were held in order to properly review the documents and records. The materials were assembled and organized according to the categories listed in Attachment 1, the seven principles of an ISM System. Each of the program elements was reviewed and categorized as to where it fit into the systematic plan for ISM implementation and how it contributed to the overall program.

5. Results of the assessment:

   a. There were no findings regarding the implementation of ISM in the Particle Physics Division based on the records and documentation reviewed. The conclusion was that all of the seven ISM principles were at work based on the documentation provided. Assessment Team members were in agreement that John Cooper should

be recognized for his strong leadership and personal commitment to ES&H. His commitment played a key role in implementing a successful ISM program in PPD.

The reviewers examined HAs for large-scale hazardous operations that have been conducted over the past year. This included the Neon Railcar move, the D-Zero cryostat move and the MiniBooNE tank filling. These documents were well thought-out, detailed, and easy to understand. It is apparent that these were useful in getting these jobs done safely and efficiently.

b. The following were notable practices identified:

(1) Case Close Out meetings are held for injury and illness cases as outlined in PPD_ESH_013, Case Management Procedure. These meetings involve the injured employee, their direct supervisor, the group leader, the department head, a PPD ES&H department representative, and the division head.

(2) The PPD operations manual is well organized, clearly written, clearly spells out responsibilities, and provides useful guidance to division personnel in plain language. Of particular note were the following procedures:

- PPD_ADMIN_022 identifies the requirement to reassign ESHTRK responsibilities prior to termination or transfer. This keeps ESHTRK items from falling through the cracks.

- PPD_OPER_004 is the guidance document to implement ISM. This is a strong indicator that ISM has importance and is implemented throughout the entire organization. It has very detailed instructions for developing and using Hazard Assessments (HA's). OPER_004 is one of the best examples around of tailoring controls to the hazards.

- PPD_ESH_013 provides a detailed overview of roles and responsibilities in an easy-to-read flowchart.

(3) Routine meetings with PPD Head, PPD SSO, and Dept Heads. These meetings are an opportunity to convey training status, ITNA status, and information regarding recent injuries in the Division. It is also an opportunity for the Department Heads to request support or information from the SSO for upcoming projects.

(4) An Operational Readiness Clearance (ORC) Process (PPD_ESH_006) is followed prior to new pieces of equipment or new experimental apparatus becoming operational. The Division Head forms a review panel and assigns a Chairperson. The Panel reviews all aspects of the equipment's operation and either suggests modifications before clearance can be recommended or directly recommends to the Division Head that operational clearance be granted. The Division Head approves or delays operation of the equipment based on the recommendation(s) of the review panel.

(5) Safety Merit Program for worker safety suggestions is set aside as part of the normal merit funds for PPD. The thought behind the program is that rewarding

workers for ideas that contribute to the safety of PPD activities should be held on par with other commendable work practices. This is an excellent example of balancing priorities and establishing expectations.

(6) In May 2002, John Cooper spoke to the CDF and D-Zero managers about his expectations regarding safety during the June shutdown. He specifically talked about our LWCR. He firmly stated that safety was the priority during this shutdown and it was okay if the groups were not able to complete all of their work. He went on to say that it was his expectation that the department heads would convey this message to the group leaders and the group leaders would convey this message, via a toolbox talk, with their crews before and throughout the shutdown.
John talked briefly about the recent injuries we have had in both the CDF and D-Zero collision halls. He reiterated that safety had the priority over schedule. This is an excellent example of balancing priorities and establishing expectations.

(7) PPD sets aside an annual budget of approximately $100,000 to cover unforeseen ES&H expenditures. In the past year, much of this money was used to upgrade fire protection in Village structures where HPR inspections had pointed out existing deficiencies.

c. There were no major deficiencies identified.

d. The process is working very effectively. The conclusion was that all of the seven ISM principles were at work based on the documentation provided.

e. This is the first time PPD has assessed this process.

f. PPD has successfully implemented each of the seven principles of ISM. PPD has met all seven indicators.

g. An Outstanding rating was achieved.

Identified opportunities for improvement

(1) Update PPD_OPER_004 to reflect the changes dictated by operational use of the procedure over the last 3 years.

(2) Train all of the supervisors on revised PPD_OPER_004. Several new managers have been appointed since the last training session.

(3) Review the existing Self-Assessment Program to determine if any improvements are necessary. Very few OSHA-type violations are found by the inspectors now due to increased worker awareness and accountability. Suggested changes included redefining the duties of the inspectors to document positive aspects about the work areas, to focus more on specific issues across the Division, or to adopt a more DuPont style approach and evaluate work activities in progress during the inspection tours.

(4) The ES&H Section should modify the HPR format to eliminate lined-out text that was revised long ago. With successive reviews of facilities, all text has been maintained in the HPR reports. Deleted text remains in lined-out form. The report has become difficult to read.

(5) Give Dept. Managers a tour of TRAIN and some of the sections that might be of benefit to them (tickler, expired training report, course completion report).

(6) Develop and disseminate some of the recent positive lessons learned (PW-8, mineral oil transfer).

Schedule for implementation of improvements

OFI #1 and #2 will be implemented in the next twelve months. OFI #3-6 will be implemented within the next six months.

Status of improvements from previous assessment

This was the first assessment of the ISM program.

Attachments (supporting data, worksheets, reports, etc.)

ATTACHMENT 1

PPD – Implementation of Integrated Safety Management

LMR	CR&R	CCw/R	BP	ISS	THC	OA
Training Tickler Report DuPont Training Report PPD Operating Manual OPER_ 003 OPER_ 004 ESH_013	Training Tickler Report PPD Oper. Manual ESH_ 002 OPER_ 001 OPER_ 003 OPER_ 004 ESH_ 013 Task Manager List PPD Hazard Reviewers Crane & FL Evaluators	Training Tickler Report Task Manger list T&M Electrical Crdntrs. PPD Hazard Reviewers Crane & FL Evaluators PPD Operating Manual ESH_ 002 ESH_ 006 ADMIN_ 004	Division Head Safety Talks (overheads) Safety Merit Raises Self Assessment Program Inspection reports Safety theme in annual picnic ESHTRK report	Non construction hazard analyses ESHTRK report IH Asments. HPR Asments.	Non-construction hazard analyses PPD Operating Manual ESH_004 ESH_005 ESH_013 ORC Clearance Reviews CDF Internal Safety Comm. Safety Merit Raises Workstation Reviews D0 Haz Awareness Training CDF Haz Awareness Training	ORC Reviews PPD Operating Manual ESH_006 OPER_ 001

LMR – Line Management Responsibility
CR&R – Clear Roles and Responsibilities
CCw/R – Competencies Commensurate with Responsibility
BP – Balanced Priorities
ISS – Identify Safety Standards
THC – Tailor Hazard Controls
OA – Operations Authorization

The following documents are examples from Attachment 1. They are some of the same documents reviewed by the audit team. They are examples of how PPD has implemented the seven principles of Integrated Safety Management.

PPD Internal Procedure – PPD_OPER_004

PPD Implementation
of
Integrated Safety Management (ISM)
and
Fermilab ES&H Manual (FESHM) Chapter 2060

Contents:

PPD Implementation
of
Integrated Safety Management (ISM)
and
Fermilab ES&H Manual (FESHM) Chapter 2060

I. Introduction

This document describes the PPD Implementation of ISM and FESHM 2060.

Within PPD our focus is work planning. A hazard analysis and mitigation of the hazards is a natural part of this planning. Approval of the work and notification of supervisors about work plans is the standard procedure, and review of completed work to improve future work should be a part of our standard practice. Throughout the rest of this document, the term "**Work Plan/Hazard Analysis**" will be used to summarize this process.

This implementation is not intended to challenge the competence of trained and experienced

people. We are working towards safety performance at a new level where more eyes on the hazards and mitigation of the hazards are needed to find and avoid the more exotic problems. We also need to be alert for accident situations stemming from several ordinary hazards working in concert. "More eyes" includes writing Work Plan/Hazard Analysis, having the written plan reviewed by experts in some cases, having every individual on a work team read and sign the written plan, and having the approved written plan distributed to the next level in line management.

This implementation is intended to follow FESHM 2060. Instead of references to FESHM chapters or to CFR (Code of Federal Regulations), this PPD document attempts to collect the full set of FESHM 2060 guidance and other special PPD concerns in terms of simple phrases for easy everyday reference.

II. Object

This document provides guidance on the following:

- **When is a written Work Plan/Hazard Analysis required and who writes it?**
- **When must a written Work Plan/Hazard Analysis be reviewed and who reviews it?**
- **When should line management be notified about Work Plans/Hazard Analyses?**

Generally, we all fall into two categories:

➢ **Developers of Work Plans/Hazard Analyses, including:**

- Individual workers,
  recognizing that we all act in this capacity each day.
- Supervisors, Group Leaders, Task Managers for T&M work, and Detector Sub-project Managers.
  - Usually a team of individuals and supervisors will collaborate to write a Work Plan/Hazard Analysis.
  - Supervisors have a special responsibility to ensure that Work Plans/Hazard Analyses are written when required by this document.

➢ **Reviewers of Work Plans/ Hazard Analyses, including:**

- Task Managers for Fixed Price work, Service Contract Managers
- PPD Approvers (defined in Section IV below)
- PPD Department Heads
- PPD Project Managers
- PPD ES&H Review Committees
- PPD Division Head or designee

III. Responsibilities of Individuals

♦ "Line Management Responsibility for Safety" includes everyone in the division. We are all part of the "line". It is expected that individuals will follow the ISM core functions for **every** task. These functions are:

- Define the work
- Analyze the hazards associated with the task(s)
- Take action to mitigate those hazards
- Perform the work within the hazard controls
- Provide feedback to allow improvements

In your daily work, you should use these five core functions as your work guide.

♦ **PPD requires a written Work Plan/Hazard Analysis if:**

- **Your task involves two or more of the hazards in Table 1.**

  Note: your judgment is required. For example, PPD does not expect a full written hazard analysis if you are working on a ladder 6 feet above the floor and there is an electrical outlet nearby (this is not an electrical hazard). PPD does expect a full written hazard analysis if you are modifying a pressurized system from a ladder position 6 feet above the floor. If there are two hazards due to faulty equipment, e.g. a frayed electrical cord, PPD expects you to fix the hazard before beginning the task. Do not write a hazard analysis. Contact your supervisor for help if you have questions.
- **Your task involves one of the PPD High Level hazards in Table 1.**

  Note: your judgment is required. PPD expects you to be on alert for all hazards. PPD does not expect you to consider every potential hazard as a "high hazard". Contact your supervisor for help if you have questions.

♦ You should work with your supervisor to develop a written Work Plans/Hazard Analysis when required. Usually a team of individuals and a supervisor will collaborate to write the document.

♦ You should read and sign the Work Plan/Hazard Analysis before performing the task.

Table 1. List of Hazards and thresholds indicating "high-level" hazards faced by individuals in PPD.

Hazard (If your task has TWO hazards, write a Work Plan/Hazard Analysis)	**PPD "High-Level" Hazards** (If your task has ONE high-level hazard, write a Work Plan/Hazard Analysis)

or in a Radiation Area is a hazard. However, work in a Controlled Area by people already specifically trained for the radiation hazards in that area is NOT a hazard. Known radioactive objects at Fermilab are labeled with a "Class" sticker -- work on such objects is a hazard. Work with radioactive sources is a hazard.	Work with contaminated objects. Work with radioactive liquids. Work with depleted Uranium. Moving sources between buildings.
Electrical Work Hazards are electrocution and injuries associated with arc blast (burns, hearing loss, flying debris).	Work activities near or on exposed electrical conductors, circuits, or equipment that are or may be energized and where there is a significant potential for arcing, flash burns, electrical burns, or arc blast. Any work on an AC electrical power distribution system.
Electronics Work A hazard if a worker is likely to be exposed to voltages, currents, or stored electrical energy of sufficient magnitude and duration to startle or injure if shocking, arcing, sparking, or heating should occur. Workers must have Basic Electrical Safety training.	Work activities near or on exposed electrical conductors, circuits, or equipment that are or may be energized and where there is a significant potential for arcing, flash burns, electrical burns, or arc blast. Any work with non-commercial electronics or with electronics modified at Fermilab has a greater hazard potential, particularly in the prototype stage.
Confined Space Work Work in a space that: 1. Is large enough and so configured that you can bodily enter and perform assigned work; and 2. Has limited or restricted means for entry or exit; and **3.** Is not designed for continuous occupancy.	Entry into a "Permit Required Confined Space" -- these are labeled and indicate a potential hazardous atmosphere or other safety hazard in the confined space.
Fall Hazard Work from a ladder at 6 feet or more above the floor. Work from a scissors lift. Work on low slope roofs (less than 4" rise in 12" horizontal). For clarification, work from previously approved scaffolding is NOT a hazard.	Work from a ladder if 3 of 4 limbs cannot maintain contact with the ladder. Work from a ladder set on uneven or slippery ground. Work from an articulating lift device (e.g. a "cherry picker" or other such single arm device). Work at 6 feet above floor without guardrails. Work on high slope roofs. Any new use of scaffolding, including erection of the scaffolding.
Mechanical Hazards Potential for release of stored energy	Work with a mechanical system that has the potential to release stored energy

through falling, rotating, or other unplanned movement. Note that standard moves of objects with Crane, Hoists, and Forklifts are covered below.	in excess of 60,000 foot-pounds. Examples are: 30 tons at 1 foot off the floor, 3 tons at 10 feet off the floor. Any unusual arrangement of heavy objects, even if below 60,000 ft-lb. energy. Other mechanical stored energy hazards (e.g. springs) require calculation.
Moving Mechanical Hazards Potential for injury from computer controlled moving objects.	Work in an area where an employee can be caught between objects. Work near unguarded rotating shafts.
Hazards in "first time use" of new equipment Potential hazard with any first time use of mechanical or electrical Equipment if a <u>significant</u> injury could occur.	First time production work with new equipment designed or modified at Fermilab if a <u>significant</u> injury potential exists. Examples: start of production with a large new mechanical machine is a high hazard, but starting use of a small low-power printed circuit board is not.
Crane, Hoist & Forklift Usage Material handling with this equipment can have a significant potential for injury if done improperly. Below-the-hook lifting devices must be approved fixtures. Employees must be trained and qualified to operate the device.	If exceptional care is required due to size, shape, or close installation tolerance of a particular load. For clarification, it is not usually a high hazard to perform a "standard lift", e.g. a lift within the crane weight limit of a standard shield block using the lift eye or to lift other loads with an approved lifting fixture.
Hydraulic System Hazards These systems can run at several thousand pounds per square inch, so small leaks can be a hazard without eye protection.	Any work where a sudden uncontrolled release (failure) of pressure could result in injury (e.g. people working around a heavy object supported hydraulically could get "caught between"). Work with modified hydraulic systems.
Excavation and Digging Any digging or soil boring with motorized equipment. Any digging (even by hand) where utilities or unsanitary conditions may be encountered. Any digging where on-lookers are present and could be injured.	Digging deeper than 4 feet. Digging into a radiation shield berm. Any excavation that could become a confined space -- for example within or under a building.
Flammable Gas Hazard Flammable gas areas are classified by fire risk and must be reviewed to determine the risk class (unreviewed areas are Class 2). Work in a Risk Class 0 area (risk of small local flash fire) is a hazard.	Work in a Flammable Gas Risk Class 1Area (risk of local fire) or in a Risk Class 2 Area (risk of a general fire).

Table 1 continues.

Hazard	PPD "High-Level" Hazards
Cryogenic Hazards Working with solids, liquids, or gases	Working with more than 200 liters of cryogenic
Oxygen Deficiency Hazard (ODH) Working in areas that can have large	Working in an area classified as ODH-2 or
Chemicals Use of materials that are flammable,	Work with solvents, reactive or corrosive chemicals in large amounts or in
Hazardous Substances Chemical Carcinogens, Lead, Asbestos,	Direct handling of Lead, Asbestos, Beryllium (even when passivated), and
Work with Regulated Pollutants Work that will generate a WASTE product	Any work that will generate more than 5 gallons of regulated waste.

	Work that will generate a mixed (radioactive + regulated) waste.
Machining and Grinding Moving machinery operated without appropriate guards. Work with the employee in an unusual or awkward position (e.g. overhead grinding is an eye hazard). Sparks from these operations must be controlled.	Machining or grinding hazardous materials such as lead, magnesium, beryllium Removal of structural welds on large weldments (fall hazard may result).
Repetitive Task Hazards Work at an inappropriately designed computer setup. Assembly work with repetitive tasks.	Four consecutive hours of repetitive assembly work. Jobs that may aggravate a pre-existing medical condition. Assembly jobs that have caused previous repetitive injuries.
Noise Hazards Eight hours of work in an environment where you must raise your voice (but not shout) to be heard.	Two hours of work per day in an environment where it is necessary to shout in order to be heard. Work that exceeds a posted noise hazard limitation. (Typically 8 hrs @ 85 dbA).
Other Work Environment Hazards Respiratory hazards from dust, animal waste, … Work in areas of excessive heat or cold. Work from awkward positions.	Continuous work in temperatures above 86 degrees F or below -25 degrees F must be evaluated.
Magnetic Field Hazards Iron objects in a magnetic field can move. Cardiac pacemakers, metallic implants, and other medical devices can function improperly in magnetic fields as low as 2.5 gauss.	Work near any area with a fringe field of more than 1 kilogauss in air over an accessible region more than 1 foot long in all directions. Any time averaged exposure of people to 300 gauss or more. Any situation were ferrous objects can be subject to magnetic forces causing sudden unexpected movement.
Lasers Laser systems can present electrical, chemical, and eye or skin hazards from intense visible light. Lasers are classified on a scale of 1 (safe) to 4 (dangerous).	Work with a Class 3b or higher laser (training is required).
Work with Pressure / Vacuum Systems Potential for rupture or implosion. Modification of a pressure system is a hazard. Unusual or rare operation of a pressure or vacuum system is a hazard.	Work on systems with a pressure greater than 150 psi. Work with a vacuum chamber larger than 35 cubic feet and larger than 12 inches in diameter. Work with thin vacuum windows greater than 12 inches in diameter.
Welding, flame cutting, brazing, open flame work	Any flame cutting on an existing structure.

Hazards are fire, eye injury, thermal and ultra violet burns, noise, ventilation, toxic fumes. Welding work in an area where passers-by can see the arc.	
Work in spaces controlled by other Divisions Potential for unknown hazards.	Always considered a high hazard until analyzed. This includes all Collision Halls.

IV. Responsibilities of Supervisors and Group Leaders

♦ The term "Supervisor" or "Group Leader" within PPD includes Detector Project Managers at all WBS levels and Task Managers of T&M activities. As a supervisor of other employees, you have a special responsibility for safety of those employees. **When you assign work to employees, you are responsible for ensuring that Work Plans/Hazard Analyses are written as required by this document.**

♦ **You are required** to have a written Work Plan/Job Hazard Analysis for tasks done by your employees if their work passes any of the following thresholds:

- **The task involves two or more of the hazards in Table 1.**
- **The task involves one hazard at the "high level" defined in Table 1.**
- **The task involves at least one hazard from Table 1 with a work crew where individual responsibilities of each crew member should be clearly spelled out.**
- **The task is outside of the normal duties and responsibilities for your group and involves one or more hazards from Table 1.**
  (e.g., your group is called to a new area to "help out", or your group is assigned a new permanent and continuing task)
- **The task involves complex activities of more than one day duration and at least one hazard from Table 1.**
  (You should consider having daily toolbox meetings to review the complexities each day. But this is not required if a simple task is just being repeated every day.)
- **If in your judgment the task is complicated and would be done more safely using a written Work Plan/Hazard analysis, then write one!**

♦ **For tasks that recur often**, it is permissible to write a generic Work Plan /Hazard Analysis good for one calendar year. All such generic plans expire on December 31 every year and must be reviewed, amended as needed, and re-approved following the instructions below.

♦ **You are required to have Work Plans/Hazard Analyses reviewed if the work passes any of the thresholds in Table 2.**
Table 2 indicates who should do the review, a designated PPD Approver, a PPD Department Head, a PPD ES&H Review Committee, or the Division Head. If an obvious reviewer cannot be identified, contact the Division Office.

♦ **If the work is below the thresholds in Table 2, no further approval is required.**

♦ Once you have a written plan, **you have the following additional responsibilities:**

- **Discuss the work plan with all involved employees, and get each employee to**

sign the Work Plan/Hazard Analysis as a record that the job was understood. Post a copy near the work area if possible.

- **Keep the Work Plan/Hazard Analysis for your employees on file for one year.**

- **Provide a copy of the Work Plan/Hazard Analysis up the line in the PPD Line Management as detailed in the PPD Organization chart.**

  See Table 2 for additional guidance. Supervisors provide copies to Group Leaders, and Group Leaders provide copies to Department Heads. If you have both a department head (e.g. Support Services) and a project leader (e.g. CMS Project), provide a copy to both.

Table 2. Hazard vs. Review Matrix.

Hazard	Designated PPD Approver threshold *(Who*	Department Head	ES&H Review for use as part of an	PPD ES&H Department	Division Head
Radiation	Work in a High Radiation Area, or on Class 2-5 objects,	Notify	Any sources or rad.	Notify Notify before	Notify -------
Electrical Work	Work on AC electrical power distribution system requires	Notify			Notify Must approve all
Electronics Work	If "significant potential" for arcing, flash burns, electrical	Notify	Systems with non-commercial or modified		
Confined Space Work				If known hazards require a Confined	Notify
Fall Hazard	Any new scaffolding erection. *(PPD Scaffold Competent Person)*	Notify		Notify	

Fall Hazard	Any new scaffolding erection. *(PPD Scaffold Competent Person)*	Notify		Notify	
Mechanical Hazards	Work with a mechanical system that has the potential to release stored energy in excess of 60,000 foot-pounds. *(PPD Engineering Approver)*	Notify	over 3 tons supported above floor over 10 tons		Always notify. Must approve if potential energy release is above 500,000 ft-lbs.
Moving Mechanical Hazards	Work with unguarded rotating machinery. *(PPD Engineering Approver)*	Notify	Moves faster than 5 feet per second	Notify	
Hazards in "first time use" of new equipment	Machines designed or modified for use at Fermilab require an approved procedure before production use. *(PPD Engineering Approver)*	Notify			Notify
Crane, Hoist & Forklift Usage	Below-the-hook lifting devices require review. *(PPD Engineering Approver)*			Notify	Approves unusual use (e.g. outside rated load limit)
Hydraulic System Hazards	Fermilab designed or modified systems require review. *(PPD Engineering Approver)*	Notify			
Excavation and Digging	Excavation permit for any earth removal. *(Task Manager or Construction Coordinator)*	--------- ---------		Notify Permit for any Berm alteration.	-------- Notify
Flammable		Approves	Any use of		Approves

Gas Hazard		work in Flammable Gas Class 1 or 2 areas.	flammable gas or mixtures	Notify	all Flammable Gas installations
Cryogenic Hazards	Any work with more than 200 liters of cryogenic material. *(PPD Engineering Approver)*		Any system with inventory exceeding 200 liters		Approves operation of any system with inventory exceeding 200 liters
Oxygen Deficiency Hazard	Work in ODH-1 areas. *(Immediate Supervisors)*	Approves work in any area classified as ODH-2 or higher	Any use of oxygen displacing gases	Notify for ODH-2 work.	

Table 2 continues.

Hazard	**Designated PPD Approver threshold** *(Who Approves)*	**Department Head**	**ES&H Review for use as part of an Experiment**	**PPD ES&H Department**	**Division Head**
Chemicals	Work with solvents, reactive or corrosive chemicals in large amounts or in a poorly ventilated area. *(Immediate Supervisors)*	Notify		Any work with poisonous, highly reactive, explosive, or carcinogenic chemicals. Any work with new chemicals synthesized at Fermilab.	Notify
Hazardous Substances		Approves direct handling written procedure in advance	Any toxic / hazardous materials planned or used	Approves all abatement work.	Notify for Direct Handling & Abatement.

		of work			
Regulated Pollutants	Any work that will generate greater than 5 gallons of hazardous waste. Any work where a significant spill is possible and likely to get into the environment. *(PPD Environmental Protection Officer)*	Notify		Notify	
Machining and Grinding				Approves any work with hazardous materials.	Notify for work with hazardous materials.
Repetitive Task Hazards	All repetitive assembly work taking more than 4 hours per day. *(Immediate Supervisor)*	Notify		Notify	
Noise Hazards				Approves if more than 8 hrs work in an area above 85 dbA.	Notify
Work Environment Hazards	Continuous work in temperatures above 86 degrees F or below -25 degrees F. *(Immediate Supervisor)*	Notify			
Magnetic Field Hazards	Fringe fields over 1 kilogauss in air extending over 1 cubic foot. Potential mechanical movements due to magnetic fields. *(PPD Engineering Approver)*	Notify		Any time average exposure of people to 300 or more Gauss	

Lasers	Any work with a Class 3b or higher laser. *(Laser Safety Officer in ES&H)*	Notify	Any use of any class	Notify	Notify
Work with Pressure / Vacuum Systems	All pressure vessels and vacuum vessels require an engineering review. *(PPD Engineering Approver)*	Notify	Review of all vessels	Notify	Following test, approves operation of all pressurized systems > 200 SCFH and all vacuum systems > 35 cubic feet
Welding, flame cutting, brazing, open flame work	All work requires a Burn Permit. *(Fermilab Fire Department for permit, PPD Senior Safety Officer for work plan approval)*				
Work in space controlled by another division		Notify			Approves all such work.

Responsibilities of PPD Reviewers

- PPD Reviewers of Work Plans/Hazard Analyses include "PPD Approvers" (defined below), PPD Department Heads, Project Managers, ES&H Review Committees, and the Division Head. "PPD Approvers" are appointed by the Division Head and include:
  - Electrical Coordinators,
  - Scaffolding Competent Person,
  - Task Managers,
  - Construction Coordinators,
  - Mechanical Engineering Approvers,
  - Electronics Engineering Approvers,
  - Radiation Safety Officer,
  - Environmental Protection Officer,
  - Senior Safety Officer

  The list appears in http://www-ppd.fnal.gov/esh&bmg_www/Reviewers.htm

- You are required to review some Work Plans/Hazard Analyses submitted to you by Supervisors and Group Leaders if they are above the thresholds outlined in Table 2 above.

Normally you will approve Work Plans from within your own department. If you are the author of the Work Plan/Hazard Analysis needing review, get someone else to do the review.

- Reviewers are charged with evaluation of the submitted plan within the following guidelines:

  - **Is additional engineering needed to ensure a safe operation?** (do the appropriate engineering calculations or seek additional engineering advice if you are uncertain)
  - **Are FESHM Safety Standards and Fermilab requirements being adhered to?**
  - **Is a multi-hazard analysis complete?**
  - **Have any additional hazards been missed?**
  - **Is the Work Plan understandable?**
  - **Are the roles and responsibilities of the work party clearly defined?**
  - **Who is in charge on the scene and what happens if that person leaves the area?**
  - **Are the people doing the work appropriately skilled and trained for the work?**
  - **Should toolbox meetings be included for complex work continuing over many days?**
  - **Are controls clearly spelled out to mitigate the identified hazards?**
  - **Is the hazard control appropriate for the work being performed?**
  - **Is LOTO mentioned in the plan if it is needed?**
  - **Has proper notification been given to other divisions for work occurring in their space?**

- If you approve such a Work Plan/Hazard Analysis, you are required to:
  - **Keep a copy on file for one year.**
  - **Give the original signed plan back to the author.**
  - **Provide a copy of the approved Work Plan/Hazard Analysis to your Department Head or Project Leader.** If you have both a department head (e.g. Support Services) and a project leader (CMS Project), provide a copy to both.

- **You may conclude that the Work Plan/Hazard Analysis is below threshold and does not require approval.** If so, note this fact on the plan and return it to the requestor. Keep a copy or your note in your files.

V. Responsibilities of PPD ES&H Committees

As detailed in PPD_ESH_006, "ES&H Reviews for Experiments", all experiments within PPD shall be subjected to a safety analysis and review by an ES&H Review Panel appointed by the Division Head. Coordinators for the currently active ES&H Review Panels are listed in the current PPD organization chart.

These Review Panels are the core of the process by which an experiment obtains an Operational Readiness Clearance (ORC) to run the detector or a partial ORC (pORC) to run a part of a detector. The PPD Senior Safety Officer and the Division Head approve all ORCs and pORCs.

Since much of the work in PPD is on such detectors, the division often uses pORCs as a method of approving and permitting the unattended operation of any apparatus within the jurisdiction of the division. With the adoption of this ISM procedure, pORCs will still continue as a method for Division Head approval when required.

The guidelines for these Review Panels are similar to the guidelines in Table 2. The differences stem from an "experiment" view vs. a "hazards associated with a task" view. The guidelines from PPD_ESH_006 are reproduced here for easy cross- reference and are summarized in Table 2.

The following are items that shall require an ES&H review. This is not a complete list. Reviews shall be required whenever the Division Head, Project Engineer, system designer or other knowledgeable person so determines. **Note:** All systems must meet all Fermilab safety standards.

Mechanical Hazards: Devices which meet any of the following criteria:
- Weighs over 3 tons and is supported above the floor
- Exceeds 10 tons in total weight
- Moves at a speed greater than 5 ft/sec
- Costs more than $100,000 to replace
- Includes pressure/vacuum vessels

Flammable Gas Systems: Any use of flammable gas and flammable gas mixtures.

Electrical Hazards: Electrical systems which meet any of the following criteria:
- Uses non-commercial or modified commercial equipment.
- Uses non-PREP or modified PREP equipment.
- Any non-commercial low voltage high current or high voltage distribution systems.
- Any equipment with large capacitor banks.

Fire Hazards: Any large combustible items such as large quantities of plastic scintillator, large numbers of cables requiring cable trays

Oxygen Deficiency Hazards: Use of any oxygen displacing gases such as chamber gas systems, helium bag systems, dry nitrogen, cryogenic magnets or targets

Cryogenic Hazards: Cryogenic systems for magnets, hydrogen targets, calorimeters, or any cryogenic system with inventory exceeding 200 liters.

Laser Hazards: Lasers of any class.

Radiation Hazards: Radioactive sources/materials which will be used. Specify if embedded in detectors.

Toxic Materials: Toxic/hazardous materials planned or used, if the amount exceeds few gallon/pound quantities. Examples include: lithium, beryllium, mercury, lead, uranium, cyanide, etc.

VI. Forms to use for PPD Work Plans/Hazard Analyses

♦ PPD written Work Plans / Hazard Analysis will contain the following information:

- **Job name and location**
- **Job start and end date**

- **A description of the work**

- **A list of hazards associated with the work**
- **Details on planned mitigation of each hazard**

- **The name of the task manager or task supervisor**
- **A list of individuals in the work party with each person's role clearly defined**

- **The name of the Work Plan/Hazard Analysis author**
- **A place for approval by a reviewer if applicable**
- **A place for individuals in the work party to sign that they have read and understood the plan**

- **Details on notification to other divisions if applicable**

A sample form is attached in Appendix A.

The FESHM 2060 form can be used if the above information is added to the form.

♦ Other laboratory or PPD forms can serve the same purpose **as long as a Work Plan is included.** If the lab form does not include a Work Plan, a cover letter can be attached. The list of other common forms is shown below.

- Electrical Work Permit
- Pressure Vessel Testing permit
- Radiation Work Permit
- Confined Space Entry Permit
- Written Lockout/Tagout Procedure Form
- Fire Detection/Protection System Disablement Request (>48 hours)
- Welding and Burning Permit
- Toxic Material Handling Permit
- Work Permit and Notification Form (FESHM 2020)
- FESHM 2060 Hazard Analysis form
- Other PPD written Procedures.

Line Management Responsibility – PPD_OPER_003

PPD_OPER_003
ELECTRICAL WORK PERMITS

INTRODUCTION
Work on AC power distribution systems at Fermilab is controlled by Electrical Work Permits. This includes work performed by employees, T&M subcontractors, and Fixed Price subcontractors. The AC work control document presently in existence is described and included in the Fermilab ES&H Manual, Chapter 5042. PPD uses an electronic version of this form to authorize and control AC power distribution work in the division. The PPD form incorporates other Laboratory requirements to conduct and document a hazard analysis for work of this nature.

RESPONSIBILITIES
Supervisors, Project Managers and Task Managers shall ensure that the procedures in Chapters 2060 and 5042 of the Fermilab ES&H Manual are followed.

PPD Electrical Coordinators (designated by the Division Head and listed in the PPD Task Manager List) will approve Electrical Work Permits (EWP's). To ensure adequate and independent review, Electrical Co-coordinators may not approve EWP's for which they are the Task Manager.

The Task Manager shall transmit a copy of each signed work permit to the PPD Head immediately after it has been signed. The originator of the Electrical Work Permit form shall notify the appropriate building manager of the impending work.

The PPD Head will approve all permits involving work on energized electrical systems (see PPD_ADMIN_001).

DESCRIPTION
The originator of the Electrical Work Permit shall evaluate the work to be done and provide a description of the work, a list of hazards associated with the specific job, and details of how each hazard will be addressed and mitigated. Specific information with regard to Lock-out/Tag-out requirements shall be included on the EWP. The EWP will also function as the Hazard Analysis where the only hazard is of an electrical nature.

The Task Manager should sign as the Preparer and have the Electrical Work Permit approved by an authorized PPD Electrical Coordinator. Any permits involving work on energized electrical systems must be authorized by a designated PPD Electrical Coordinator AND the Particle Physics Division Head.

NOTE: Where Lock-out/Tag-out is required, both the person performing the electrical work AND the Task Manager will be required to independently verify that the electrical equipment is de-energized prior to beginning the work.

Clear Roles and Responsibilities – PPD_ESH_013

PPD_ESH_013
CASE MANAGEMENT PROCEDURE

INTRODUCTION

This procedure describes the Particle Physics Division Case Management System. This system is used to track an illness, injury, or accident from the time it is reported to the time it is closed out. This system involves all levels of the PPD organization and includes trending and recommendations for improvement.

DEFINITIONS

CAIRS - **C**omputerized **A**ccident/**I**ncident **R**eporting **S**heet

Form 5 - A form generated by the Medical Department to track an employee's occupational or non-occupational medical restrictions.

SSO - Senior Safety Officer

Incident Involvement Form - A form filled out by the employee when he or she first reports to the Medical Office. This is the first record of the incident/accident and the events that led up to it from the employee's point of view. It will be a tool used later when the CAIRS form is completed.

Injury Cost Index - Developed by DOE, this index is used as a cost indicator for occupational injuries and illnesses. Cost is given in cents per hour.

Injury Cost Index in $¢/_{hr} = 100\ (^{Cost}/_{Hrs})$

Where Cost = $1{,}000{,}000F + 500{,}000T + 2{,}000N + 1{,}000D_L + 400D_R$ ($)

Hrs	=	Number of person-hours worked
F	=	Number of fatalities
T	=	Number of permanent transfers or termination
N	=	Number of recordable cases
D_L	=	Number of lost work days
D_R	=	Number of restricted duty days

Lost Workday Case Rate - The lost workday case rate provides information about the frequency of "more serious" occupational injuries/illnesses. The rate is based on the number of injuries, illnesses, or lost workdays related to a common exposure base of 100 full-time workers.

Lost Workday Case Rate = 200,000 (NL / Hrs)

Where:

NL = Number of cases with days away from work and/or days of restricted activity.

Hrs = Number of person-hours worked

RESPONSIBILITIES

The Fermilab Medical Department will:

- Evaluate a person's injury or illness and provide appropriate care.
- Inform PPD of the injury and any lost or restricted time that may apply (via electronic mail).
- Provide the Incident Involvement Form to the employee for completion.
- Generate the Form 5 which will track the employee's restrictions until he or she returns to work at full duty, is transferred or terminated.
- Retain all completed Form-5's in the employee's file.
- Maintain injury/illness database (for worker's compensation information.)

The Security Department will:

- File the appropriate report (vehicle accident, property damage, etc.). The Division or Section involved receives a copy of the report and uses the information to determine if the incident meets DOE reporting guidelines. Vehicle accidents and property damage incidents must be reported if the dollar loss exceeds $1,000 and $5,000 respectively.

The SSO or designee will:

- Review a Form-5. If medical restrictions have been placed on the employee, sign the Form-5 if he/she concurs with the supervisor's assessment of whether the restrictions are job limiting. The SSO will forward the Form-5 to the Medical Department.
- Participate in or lead the investigation and provide technical assistance to supervisors as needed.
- Enter investigation report into CAIRS database. Ensure the report is complete.
- Develop written lessons learned reports to share with Division Head and other divisions/sections.
- Complete trending analysis of accidents/incidents and provide feedback to the Division Head.
- Monitor cases with continuing lost or restricted time to ensure restrictions are accommodated. Update CAIRS database as necessary to reflect accurate days lost or restricted, or other new information.
- Enter preventative measures that are not immediately completed into the ESHTRK database.
- Attend a closeout meeting where the employee and his supervisor, along with a member of the PPD ES&H group go over the accident and recommended preventative measures.

The Supervisor will:

- Direct injured employees to the Medical Department.
- Participate in and/or lead the investigation.
- Review the Form-5. If restrictions have been identified, determine if such

restrictions will affect the employee's ability to perform assigned duties. Complete and sign the Form-5.
- Forward the Form-5 to the division/section SSO for signature.
- Identify and ensure corrective actions are implemented.
- Share lessons learned with other members of their group.
- Attend a closeout meeting where the employee and his supervisor, along with a member of the PPD ES&H group go over the accident and recommended preventative measures.

The Department Head may:
- Attend a closeout meeting where the employee and his supervisor, along with a member of the PPD ES&H group go over the accident and recommended preventative measures.
- Provide budget or time for corrective actions to be implemented.

The Division Head/Office may:
- Attend a closeout meeting as described above.
- Take whatever action they deem necessary as case trends, recommendations, or other information becomes available to them.

DESCRIPTION

Fermilab has an occupational injury performance measure; the injury cost index, in its contract with DOE. The injury cost index was developed by DOE and is intended to be an indicator of the total costs associated with occupational injuries and illnesses. This cost index is one of four ES&H performance measures included in the contract between URA and DOE. A second performance measure is the lost workday case rate (LWCR). This lost workday case rate provides information about the frequency of "more serious" occupational injuries/illnesses, i.e., those that result in time away from work or restriction of work activities. However, it does not consider how many days are involved; a case need only result in at least one day away from work or one day of restricted duty. This lack of dependence on severity is the major weakness of the lost workday case rate. For example, a fatality case counts the same as a case involving a single day of restricted activity. The lost workday case rate is a traditional loss control index that is used by employers, regulators, and safety professionals throughout the world. Due to this broad use, it can readily be used to compare the occupational safety and health performance of a wide variety of employers. Unlike the injury cost index, DOE has determined that the lost workday case rate should include data from onsite subcontractors as well as from Fermilab employees. However, experimenters and tourists are excluded. In the fourth quarter of FY01, Fermilab achieved an injury cost index of 8.3 and a lost workday case rate of 1.2. Both of these measures obtained a rating of "*Excellent*".

Reducing the cost index and the lost workday case rate are Laboratory goals. Towards that end, Particle Physics Division has developed this flow chart as one tool we can use to assure we have an effective case management system. Using our system that incorporates other Laboratory tools, such as the Injury Illness Prevention Subcommittee meetings, the Medical Office, and the CAIRS database, we can determine effective ways of preventing occupational injuries and illnesses in not only Particle Physics Division, but other Divisions as well. PPD ES&H will use the information provided by the Fermilab Medical Office to track non-recordable injuries and "flag" potential problems, as we deem appropriate. The CAIRS and Medical databases can be used to provide case summaries to Department Heads and to the Division Office so that they will have the

information necessary to be effectively involved.

Competencies Commensurate w/Responsibility – Crane and Forklift Evaluators

On the Job Trainers for Crane and Forklift Qualification

Name	Mail Station	Ext.	E-Mail
Chyllo, John	355	6484	CHYLLO
Erickson, Dave	305	3366	ERICKSON
Kent, John	355	8466	JWKENT
Miller, Del	357	2152, 2817	DFM
Moorhouse, Bill	355	4905	BILLMOOR
Olson, Craig	318	8613	COLSON

Balanced Priorities – Safety Merit Raises

2002 Merit Award Winners for Safety Suggestions

Karen Kephart: Made a suggestion that has improved the industrial ergonomic design for several technicians who do intricate work under a microscope. In the past, using the traditional magnifying glass could mean spending hours hunched over the work. Karen researched and purchased three devices with intermediate magnification and a flat bed work area. This device not only provides a better depth of field than a standard scope, but it positively adjusts the worker's posture and reduces the risk of an ergonomic injury.

Leonard Nelson: Made a suggestion that has improved visibility in the CDF office-building parking lot. Leonard suggested that the first four spaces nearest the entrance to the lot be designated for compact cars only. He noticed when larger vehicles parked in those spaces; a blind spot was created between the lot and the access road. The signs have been erected and the line of sight between the parking lot and the access road is now unobstructed. This will reduce the likelihood of an accident.

Ed Dijak: Made a suggestion that has improved visibility in the lot behind and to the side of 31/33 Blackhawk. Ed suggested that a mirror be placed so that vehicles coming around from the Alignment parking garage can see vehicles on the North side of the building. Ed purchased and mounted the mirror eliminating the blind corner in the lot. This will reduce the likelihood of an accident.

Jesse Guerra: Created a fixture to help with the lifting of the Minos near detector modules. Jesse saw the potential for someone to injure their back as they lifted the modules from the crate onto the rack. There were more than 250 modules to unpack, so Jesse designed and created a fixture that eliminated the need to do any manual lifting. In addition, this fixture reduces the likelihood of injury to the hands and fingers of the employees handling the modules.

Jerry Judd: Recognized a potentially unsafe situation and took steps to rectify it. Jerry noticed a fair amount of old beam vacuum hardware placed in the metal dumpster at Lab B. He noted that the material included a thin metallic beam window in an aluminum flange and thought there might

be a remote chance that it could be beryllium. Jerry took the initiative to be sure this material was investigated before being picked up for recycling. The beam window was checked and found to be Titanium.

Walt Jaskierny: Recognized a potentially unsafe situation and took steps to rectify it.
Walter noticed material lying in the roadway. He realized that it must have fallen off a truck. Walter was concerned that it may have been a hazardous material and that we could possibly be spreading it all over the site. The material had a very high size to weight ratio and some white oxidization. Walter took the initiative to investigate exactly what the material was. After he did some investigating on his own, he contacted PPD/ES&H. They determined that it was not lead causing the oxidation and that it was actually material that came loose from shielding blocks.

Identify Safety Standards – Non-construction Hazard Analysis – Example #1

PROJECT NAME: D-Zero Test Cryostat LEAD PERSON Del F. Miller, Jr.

TASK: **Move Cryostat from NWA to DAB**

DATE October 22, 2001

Procedure	Hazards	SAFE PLAN
1.) Roll cryostat out of building where as lifting lugs clear the building.	• The weight of cryostat (100 tons) • Rolling on Hillmans • Pulling with a hydraulic cylinder • Moving over storm drain	• The lead technician is trained in the use of Hillmans rollers, including proper placement (attachment #1). • Use Hillmans rollers with a load rating greater than 25 tons each. • Provide anchor points outside of the building for hydraulic cylinder attachments rated at

3.) Mobile crane lifts the cryostat and places it on the truck.	• The weight of cryostat (100 tons) • Location for mobile crane • Tipping the crane • Dropping the cryostat	• Use approved lifting fixture (attachment #2). • Use slings rated for the load. • Study the crane location and cryostat location to determent size and position of mobile crane (attachment #3). • Only qualified operators and skilled workers will perform the operation.	
4.) Move cryostat from NWA to DAB.	• Cryostat falling off the truck • Vehicle accident with another vehicle • Loss of control of the truck • Potential exposure to uranium • Potential uranium contamination	• Secure the cryostat to truck trailer that has a load rating to move 100 Tons or greater and has a low center of gravity (attachment #4). • Close route to other vehicular traffic • Request a Security escort. • Select route that will provide wide turns to minimize the potential for tipping. • Use a driver that is trained and licensed to handle this size of truck. • Request that either the Radiation Safety Officer or the Radiation Safety Technician escort the cryostat to provide immediate help in the event of a radiological emergency.	
5.) Move the crane from NWA to DAB	• Crane hitting overhead wires • Dropping the counterweights, boom, and other subassemblies of the crane during disassembly.	• Select route that minimizes exposure to overhead wires. • Use a driver is trained and licensed to drive the crane. • Request a Security escort. • Use workers with appropriate skills to disassemble the crane. • Keep area clear of personnel not involved in the disassembly of crane.	
6.) Setting the mobile crane up for safe operation.	• Dropping the counterweights, boom, & their subassemblies during assembly.	• Use workers with appropriate skills to set up the crane. • Keep area clear of personnel not involved in the assembly of the crane.	

7.) The mobile crane lifts the cryostat from the truck and places it on the storage pad.	• Backing truck into location for pick • The weight of the cryostat (100 tons) • Location of mobile crane • Tipping the crane • Dropping the cryostat • Backing truck into location for pick	• Driver is trained and licensed to handle this size of truck and has the skills to maneuver it properly and safely. • Use approved lifting fixture (attachment #2) • Use slings rated for load • Study the crane location and cryostat location to determent size and proper position of mobile crane (attachment #3). • Only qualified operators and skilled workers will perform the operation.

Identify Safety Standards – Non-construction Hazard Analysis – Example #2

PROJECT NAME: Neon storage car LEAD PERSON Delmar F. Miller, Jr.

TASK: Move Neon storage car DATE: October 22, 2001
From **Bubble Chamber Storage**
Yard to Rail Head

Procedure	Hazards	SAFE PLAN
1.) Setting the crane up for safe operation.	Dropping the counterweights, and other subassemblies during assembly	• Use workers with appropriate skills to set up the crane. • Keep area clear of personnel not involved in the assembly of the crane.
2.) Mobile crane lifts the Neon storage car and places it on the truck.	• The weight of storage car (100 tons) • Location for mobile crane • Tipping the crane • Dropping storage car	• Place additional mats at correct locations over soft ground (2"x10'x10' steel). • Use slings rated for the load (attachment #2). • Study the crane location and Neon storage car location to determent size and position of mobile crane (attachment #3). • Only qualified operators will perform the operation.
3.) Move the Neon storage car from Bubble chamber storage yard to Railhead.	• Neon storage car falling off the truck • Vehicle accident with another vehicle • Loss of control of the truck	• Secure the Neon storage car to truck trailer that has a load rating to move 100 Tons or greater and has a low center of gravity (attachment #4). • Close route to other vehicular traffic • Request a Security escort. • Select route that will provide wide turns to minimize the potential for tipping. • Use a driver that is trained and licensed to handle this size of truck

5.) Move the crane from Bubble chamber storage yard to Railhead.	• Crane hitting overhead wires • Dropping the counterweights, and other subassemblies of the crane during disassembly.	• Select route that minimizes exposure to overhead wires. • Use a driver is trained and licensed to drive the crane. • Request a Security escort. • Use workers with appropriate skills to disassemble the crane. • Keep area clear of personnel not involved in the disassembly of crane
6.) Setting the mobile crane up for safe operation.	• Dropping the counterweights during assembly.	• Use workers with appropriate skills to set up the crane. • Keep area clear of personnel not involved in the assembly of the crane.
7.) The mobile crane lifts the Neon storage car from the truck and places at new storage site.	• Backing truck into location for pick • The weight of the Neon storage car (100 tons) • Location of mobile crane • Tipping the crane • Dropping car • Pulling truck into •	• Driver is trained and licensed to handle this size of truck and has the skills to maneuver it properly and safely. • Use slings rated for load • Study the crane location and Neon storage car location to determent size and proper position of mobile crane (attachment #3). • Only qualified operators and skilled workers will perform the operation.
8.) Remove the crane from Fermilab site Railhead.	Dropping counter-weights, & other subassemblies of the crane during disassembly	• Use workers with appropriate skills to set up the crane. • Keep area clear of personnel not involved in the assembly of the crane.

Tailor Hazard Controls – PPD_ESH_004

PPD_ESH_004
SAFE HANDLING OF LEAD

INTRODUCTION

Lead is a toxic material that can adversely affect every system of the human body, especially the renal, nervous, blood forming, and reproductive systems. This guideline describes general methods that shall be used when handling lead to reduce or eliminate employee exposure and prevent environmental damage

APPLICABLE STANDARDS

OSHA 29 CFR 1910.1025
OSHA 29 CFR 1926.62
FESHM 5052.3.

DEFINITIONS

The term "handling" is used to describe movement, machining or assembly operations. Examples include hand stacking of lead bricks or assembly of lead components.

PROCEDURE

1. Materials that may contain lead must be tested or assumed to contain lead before any activity is undertaken which could disturb the material.

2. A Hazard Analysis (HA) for tasks involving direct handling of lead shall be completed per PPD-OPER-004. The HA should be written in consultation with the PPD ES&H Group.

   A. Contact the PPD ES&H Group as soon as possible. Pre-planning is necessary in order to keep personnel exposure and area contamination levels to a minimum.

   B. The HA should cover items listed in FESHM Chapter 5052.3. Points to remember include:

      - PPD ES&H should determine lead contamination levels prior to and after the job.

      - Workers must be current in either “Lead Worker” or “Lead Handling” training. “Lead Worker” training is required if there is a potential of exposure to airborne lead above the OSHA Action Level. “Lead Handling” is required if employee exposure is NOT expected to exceed the Action Level. “Lead Worker” training is required annually.

      - The Fermilab Medical Department must be notified of workers potentially exposed

to lead above the OSHA Action Level (0.03 mg/M3). Blood tests must be offered prior to the lead work. Follow-up blood tests shall be offered after the lead work is completed. For those who routinely perform lead work (approx 30 days/year) follow-up blood tests will be offered every 6 months, unless lead exposure warrants more frequent analysis.

- If respirators must be used, the users must be current on their medical clearance, respirator training and fit testing.

- The task manager should coordinate with the Building Manager and nearby personnel prior to beginning the work.

- The lead may be radioactive, contact the PPD ES&H Group for a survey.

C. The standard methods to clean surfaces use a HEPA vacuum (obtainable from the ES&H Group), maslin wipes, or 5% trisodium phosphate solution. Cleaning solutions contaminated with lead must be collected and tested to determine proper disposal method. Lead contaminated solids shall be processed as hazardous waste.

D. Contact PPD ES&H prior to removal of significant quantities of paint to determine if the paint contains lead. Job-specific removal procedures may be required based on the percentage of lead in the paint.

3. Storage

A. Lead shall be stored in designated and labeled areas. Whenever possible, lead should be stored in the lead storage areas under the control of the PPD ES&H Group.

B. Lead shall be stored in covered containers.

Operations Authorization – PPD_ESH_006

PPD_ESH_006
ES&H REVIEW OF EXPERIMENTS

INTRODUCTION

Experiments in the Particle Physics Division (PPD) require ES&H review to help ensure that all appropriate standards and requirements are met. These reviews, because of specificity or complexity, are outside of the normal purview of the established Laboratory Safety Committee (LSC) Subcommittees. Consequently, ES&H Review Panels for experiments have been established. This document defines the procedures for these panels. Operation of experiments depends on satsifactory reviews and is controlled for specific parts of an apparatus by partial Operational Readiness Clearance. Final operational authority is granted by an Operational Readiness Clearance signed by both the head of the PPD and the head of the Beams Division.

CDF and DZero have specific Safety Assessment Documents (SAD). Fixed-target experiments

are covered by a single SAD. Based on the criteria in the FQAP, there is no requirement for Conduct of Operations

RESPONSIBILITIES

The **Particle Physics Division Head** or designee, develops the charge to the panel; establishes the level of review needed; and names panel members in consultation with Division/Section Heads, Department Heads, and LSC Subcommittee Chairs, as appropriate.

The **ES&H Review Panel** is normally charged to complete a timely and accurate safety review and provide a written report describing its conclusions to one or more of the following: the Division Head, the Project Engineer, the Chairperson of the appropriate LSC subcommittee, and the experiment spokesperson.

The **ES&H Review Coordinators** are members of PPD and are appointed to work with individual experiments. They are assigned by the PPD Head. To accomplish their assignments, the ES&H Review Coordinators are expected to work with the PPD Head, the experiment spokesperson, the Project Engineer, and the liaison physicist as appropriate. Their primary responsibility is to assist and guide the experimenters to the completion of the Operational Readiness Clearance (ORC). This includes working with the experimenters to determine the elements of the experiment that require special review, and to set-up the appropriate review committees to accomplish this review. The Preliminary Safety Review Checklist, available from the PPD ES&H Department, may be used for this purpose. ES&H Review Coordinators are also to assist with the preparation of Preliminary SAD's or SAD's if they are required. Co-ordinators for active PPD Review Panels are listed on the PPD Organization Chart.

ES&H REVIEW CRITERIA FOR EXPERIMENTS

1. All experiments having significant (complex or hazardous) systems or operations shall be subjected to a safety analysis and review by a ES&H Review Panel.
    a. The analysis and review will look at all aspects of the system which could present a hazard to personnel or equipment.
    b. The analysis shall demonstrate that the system is designed and constructed in accordance with applicable codes and standards.
    c. The relevant analysis and review shall be completed before initial operation of any part of the system.
2. The panel will be available for the life of the experiment to review new additions to the experiment. All new proposals, including significant modifications to existing equipment, must be reviewed and approved for operation through the ORC process.

GUIDELINES FOR ESTABLISHING A SAFETY REVIEW

The following items require an ES&H review. This is not a complete list. Reviews shall be required whenever the Division Head, Project Engineer, system designer or other knowledgeable person so determines. **Note**: All systems must meet all Fermilab safety standards.

Computers or Programmable Logic Controller (PLC) Use: Detector or apparatus control systems that rely solely on dedicated computers or PLC's for safety, environment, or property protection functions must comply with Director's Policy #22.

Cryogenic Hazards: Cryogenic systems for magnets, hydrogen targets, calorimeters, or any cryogenic system with inventory exceeding 200 liters.

Electrical Hazards: Electrical systems which meet any of the following criteria:

- Uses non-commercial or modified commercial equipment.
- Uses non-PREP or modified PREP equipment.
- Any non-commercial low voltage high current or high voltage distribution systems.
- Any equipment with large capacitor banks.

Fire Hazards: Any large combustible items such as large quantities of plastic scintillator, large numbers of cables requiring cable trays

Flammable Gas Systems: Any use of flammable gas and flammable gas mixtures.

Laser Hazards: Lasers of class III or higher.

Mechanical Hazards: Devices which meet any of the following criteria:

- Weighs over 3 tons and is supported above the floor
- Exceeds 10 tons in total weight
- Moves at a speed greater than 5 ft/sec
- Costs more than $100,000 to replace
- Includes pressure/vacuum vessels

Oxygen Deficiency Hazards: Use of any oxygen displacing gases such as chamber gas systems, helium bag systems, dry nitrogen, cryogenic magnets, or targets

Radiation Hazards: Radioactive sources/materials which will be used. Specify if embedded in detectors.

Toxic Materials and Environmental Hazards: Toxic/hazardous materials planned or used, if the amount exceeds few gallon/pound quantities. Examples include: lithium, beryllium, mercury, lead, uranium, cyanide, PCB's, freons, oils.

OPERATIONAL APPROVALS

Prior to operating equipment or performing work on experimental apparatus in PPD spaces, the assigned ES&H Review Panel will review and inspect the equipment. All partial Operational Readiness Clearance forms must be completed and approved by the Review Committee Co-ordinator, the PPD Senior Safety Officer, and finally, the PPD Head. Other signatures may be required depending on the scope and location of the work. Examples of additional signatures are the Fixed Target Run Co-ordinator for Fixed Target experiments, the Beams Division (BD) Operations Department Head for experiments that require Main Control Room support, other Division/Section Heads when work is being performed in their areas or affect their workers, and other D/S Senior Safety Officers when work is being performed in their areas or affect their workers.

The experiment spokesperson is required to assure the PPD Head in writing that the hazards in the experiment have been identified to all its participants and that all participants have received appropriate training and instruction. This is required before the ORC will be signed.

The Beams Division Head and the Particle Physics Division Head are both required to sign the Operational Readiness Clearance form before an experiment is allowed to receive beam. This is a positive means to ensure that both divisions are aware of operating conditions and parameters for each experiment and have agreed that the appropriate procedures, safety equipment, and run conditions are in place and functional before the start of the experiment.