



**Protection Program Internal Assessment Program Summary for the
CY 2002-2004 Triennium
Fermilab Radiation Protection Group
February 15, 2005**

Executive Summary:

During the course of these audits there were no major radiological issues found. Each division/section has continued to maintain a highly effective radiological protection program. It is recognized that most of the personnel involved in radiation protection activities throughout Fermilab are dedicated professionals who put in the extra effort to ensure that people are safe, the environment is unharmed, and the Fermilab high energy physics program supported. It is evident that the recent improvements to the radiation dosimetry program are well-received and are achieving the objective of supplying all radiation workers with appropriate dosimetry services. Also, many tasks involving radiation exposures are benefiting from detailed pre-job planning to keep doses as low as reasonably achievable (ALARA). Such efforts will be even more important in the future as proton intensities are increased. During the shutdown of autumn, 2004, the assistance provided by two members of the ES&H Section's Radiation Physics Team to Accelerator Division in activities of this type was mutually beneficial.

A continuing concern at Fermilab is the handling, labeling, posting, and transportation of low level radioactive material. During this triennium, several such events occurred, generally involving items of very low levels of radioactivity. It is acknowledged that the concerned division/section always promptly addresses the specific issue. However, continued vigilance on this topic remains essential. During several audits included in this assessment, it was clear that the longstanding role the designated liaison assignments between the ES&H Section Radiation Physics Team and the divisions and sections is a useful one well worth continuing. However, in several instances its effectiveness could be improved if the liaison role were more routinely exercised by divisions and sections.

The scope of the next Radiation Protection audit sequence will be adjusted to accommodate radiological protection issues that arise during the next triennium. If the Radiation Protection Plan (RPP) undergoes revision during this period of time that should be covered as a Table Top review of the Radiation Protection Program.

Introduction

10 CFR 835, "Occupational Radiation Protection", applicable to all DOE facilities conducting radiological work, includes the following requirement at §835.102:

- Internal audits of the radiation protection program, including examination of program content and implementation, shall be conducted through a process that ensures that all functional elements are reviewed no less frequently than every 36 months. Functional areas are derived from "Management and Administration of Radiation Protection Programs Guide DOE G 441.1-1A" dated October 20, 2003. These functional elements are listed in detail in Table 2.
- This requirement is reflected in Article 122 of the Fermilab Radiological Control Manual (FRCM) and in Fermilab's Radiation Protection Program (RPP). This internal audit program is an ongoing process carried out by means of formal reviews conducted in accordance with the general requirements specified by Fermilab Environment, Safety, and Health Manual (FESHM) Chapter 1040. This report summarizes the audit activities conducted during the past 36-month period.

As a part of this triennial assessment, a review of the past triennial assessments for the period 1999-2001 was completed. In January 2004, the ES&H Section Radiation Protection (RP) staff conducted a tabletop assessment of many of the functional elements of Fermilab's Radiation Protection Program. In addition, the ES&H Section RP staff conducted audits of division and section radiological protection programs. Accelerator Division, Computing Division, Facilities Engineering Section, Particle Physics Division and Technical Division were audited.

1. Review of Past Triennial Internal Assessments of Fermilab's Radiological Protection Program under 10 CFR 835

A review of the most recent triennial audit of Fermilab's Radiation Protection Program was conducted for the period 1999-2001. During CY 2001, the ES&H Section Radiation Protection staff conducted a comprehensive audit of this program. Specific topical areas addressed in this audit were management and administrative requirements, external exposure control, records and reports to individuals, entry control programs, posting and labeling, training, radioactive contamination and source control. Table 1 describes the 2001 Fermilab Radiation Protection Program Triennial Audit. The table indicates the ESHTRK identification number, provides a brief description, associated findings closure dates. All corrective actions identified during the 1999-2001 triennium were completed in a timely manner.

Table 1
2001 Radiation Protection Program Compliance Audit

23837	ES	FERMILAB	2001 RADIATION PROTECTION PROGRAM TRIENNIAL AUDIT	03/01/2001	10/15/2001
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Review ID 23837
Review Title 2001 RADIATION PROTECTION PROGRAM TRIENNIAL AUDIT
Agented By ES
 ENVIRONMENT, SAFETY & HEALTH SECTION
Performed On FERMILAB
 FERMI NATIONAL ACCELERATOR LABORATORY
Start Date 03/01/2001
End Date 10/15/2001
Description This audit consists of a sampling of all division/sections and represents a snap shot in time. The items that are noted as noteworthy practices, recommendations and findings may be intrinsic to ongoing operations within divisions/sections. A portion of the audit consisted of interviews with Division/Section Heads, Division/Section Radiation Safety Officers (RSOs) and other available personnel from division/section ES&H departments. The interviewees were asked to comment on the current radiation protection program activities within their division/section and also their perception of how their division/section interacts and communicates with other divisions/sections at the Laboratory.

Finding ID	Date Found	Found In	RPM	Finding Title	Status
70094	08/23/2001	AD		IMPROPER POSTING OF OUTDOOR STORAGE OF RADIOACTIVE MATERIALS	CLOSED 01/17/2002
70111	10/11/2001	AD		RADIOLOGICAL TRAINING REQUIREMENTS	CLOSED 01/16/2002
70112	10/11/2001	AD		MATERIAL MOVE SURVEY TRAINING REQUIREMENTS	CLOSED 01/17/2002
70113	09/30/2001	AD		INCOMPLETE EXPOSURE INVESTIGATIONS	CLOSED 01/17/2002
70114	05/01/2001	BS		IMPROPERLY POSTED AREA CONTAINING RADIOACTIVE MATERIAL	CLOSED 01/11/2002
70115	10/11/2001	BS		RADIOLOGICAL TRAINING REQUIREMENTS	CLOSED 01/11/2002
70116	10/11/2001	BS		MATERIAL MOVE SURVEY TRAINING REQUIREMENTS	CLOSED 01/11/2002
70117	10/11/2001	CD		RADIOLOGICAL TRAINING REQUIREMENTS	CLOSED 01/17/2002
70118	10/11/2001	ES		RADIOLOGICAL TRAINING REQUIREMENTS	CLOSED 06/18/2002
70121	08/30/2001	PD		IMPROPER POSTING OF AREAS	CLOSED

				CONTROLLED FOR RADIOLOGICAL PURPOSES	02/04/2002
70122	08/30/2001	PD		UNLABELED RADIOACTIVE MATERIAL	CLOSED 02/04/2002
70123	10/11/2001	PD		RADIOLOGICAL TRAINING REQUIREMENTS	CLOSED 05/15/2003
70124	10/11/2001	PD		MATERIAL MOVE SURVEY TRAINING REQUIREMENTS	CLOSED 01/15/2003
70125	09/30/2001	PD		INCOMPLETE EXPOSURE INVESTIGATIONS	CLOSED 09/03/2003
70126	10/11/2001	TD		RADIOLOGICAL TRAINING REQUIREMENTS	CLOSED 01/04/2002
70127	10/11/2001	TD		MATERIAL MOVE SURVEY TRAINING REQUIREMENTS	CLOSED 01/04/2002
70128	09/30/2001	TD		INCOMPLETE EXPOSURE INVESTIGATIONS	CLOSED 01/04/2002

For more details, including recommendations and noteworthy practices contained in this audit, consult the original audit report as maintained in the ESHTRK database at the following web link:
http://www.esh.fnl.gov/pls/default/eshtrk_common.audit_details?rid=23837.

2. 2002-2004 Triennial Audit of Radiological Protection Program Under 10 CFR 835

The functional elements detailed in Table 2 below were assessed by means of a tabletop assessment, external assessments conducted by the Occupational Safety and Health Administration (OSHA), the Nuclear Regulatory Commission (NRC) and DOE Lab Accreditation Program (DOELAP), tripartite assessments, a dosimetry program internal assessment, and audits of division and section radiological protection programs. The Tabletop Assessment of 10 CFR 835 Functional Elements was conducted by D. Cossairt, V. Cupps, K. Graden, S. McGimpsey, and K. Vaziri of the ES&H Section Radiation Physics Team. Fermilab's Radiological Protection Program (RPP) document was used as the basis document for this review. The functional elements evaluated in the tabletop included organization and administration, ALARA program, internal dosimetry program, radiological controls, sealed sources, emergency exposure situations, and records.

Table 2
10 CFR Triennial Assessment Plan for 2002-2004

Functional Element	Proposed Methodology	Nature of Documentation	Scheduled Date	Date of Completion
1. Organization and Administration , 10 CFR 835, Subpart B, Section 4.1 of this Guide	Tabletop, RPS, NRC Assessment	Memorandum	January 2004	(NRC, 11/2003) Tabletop: 1/22/2004

2. ALARA Program , 10 CFR 835.101(c), Subpart K,DOE G 441.1-2, OCCUPATIONAL,ALARA PROGRAM GUIDE (DOE,1999d)	Tabletop, RPS + Audits of Divisions/Sections	Memorandum + ESHTRK Reports	January 2004	Tabletop: 1/22/2004 5/31/2004 8/3/2004 7/1/2004 11/29/2004 12/17/2004
3. External Dosimetry Program ,10 CFR 835.401 (a), 402(a),(b),DOE G 441.1-4, EXTERNAL DOSIMETRY PROGRAM GUIDE,(DOE 1999e)	DOELAP Onsite 2002 (ESHTRK 24175) DOELAP Onsite 2003 (ESHTRK 26137) Dosimetry Program Audit (ESHTRK 24555)	ESHTRK Reports	Already Completed	6/12/2003 6/20/2003 12/10/2003
4. Internal Dosimetry Program ,10 CFR 835.401(a), 402(c),(d),DOE G 441.1-3, INTERNAL DOSIMETRY PROGRAM GUIDE,(DOE 1999f)	Tabletop, RPS Audits of Divisions/Sections (AD, TD, ES)	Memorandum + ESHTRK Reports	January 2004	Tabletop: 1/22/2004 7/1/2004 12/17/2004
5. Area Monitoring and Control				
a. Area Radiation Monitoring ,10 CFR 835.401(a),DOE G 441.1-4, EXTERNAL DOSIMETRY PROGRAM GUIDE	Tabletop, RPS + Audits of Divisions/Sections (ES, FE, AD, PPD, TD, CD)	Memorandum + ESHTRK Reports	February 2004	5/31/2004 8/3/2004 7/1/2004 11/29/2004 12/17/2004
b. Airborne Radioactivity Monitoring ,10 CFR 835.209, 401(a), 403,DOE G 441.1-3, INTERNAL,DOSIMETRY PROGRAM GUIDE DOE G 441.1-8, AIR MONITORING,GUIDE (DOE 1999g)	Tabletop, RPS + Audits of Divisions/Sections (AD)	Memorandum + ESHTRK Reports	February 2004	7/1/2004
c. Contamination Monitoring and Control ,10 CFR 835.401(a), Subpart L,DOE G 441.1-9, RADIOACTIVE,CONTAMINATION CONTROL, GUIDE (DOE 1999h),	Tabletop RPS + Audits of Divisions/Sections (ES, AD, TD, PPD)	Memorandum + ESHTRK Reports	February 2004	7/1/2004 11/29/2002 12/17/2004
d. Instrument Calibration and Maintenance ,10 CFR 835.401(b),DOE G 441.1-7, PORTABLE MONITORING INSTRUMENT,CALIBRATION GUIDE (DOE 1999i)	Tabletop, RPS + Instrumentation Team	Memorandum	August 2004	Tabletop 1/22/04

6. Radiological Controls				
a. Radiological Work Planning ,10 CFR 835.501(d), 1001(b), 1003,DOE-STD-1098-99 RADIOLOGICAL CONTROL	Audits of Divisions & Sections (ES, FE, TD, PPD, AD)	ESHTRK Reports	See Below	5/31/2004 7/1/2004 11/29/2004 12/17/2004
b. Entry and Exit Controls ,10 CFR 835, Subpart F, DOE-STD-1098-99, RADIOLOGICAL CONTROL,DOE G 441.1-5, RADIATION-GENERATING DEVICES GUIDE,(DOE 1999j),	Audits of Divisions & Sections (ES, FE, TD, PPD, AD)	ESHTRK Reports	See Below	5/31/2004 7/1/2004 11/29/2004 12/17/2004
c. Radiological Work Controls ,10 CFR 835, Subpart F, 1003,DOE-STD-1098-99, RADIOLOGICAL CONTROL,DOE G 441.1-5, RADIATION-GENERATING DEVICES GUIDE,	Audits of Divisions & Sections (ES, FE, TD, PPD, AD)	ESHTRK Reports	See Below	5/31/2004 7/1/2004 11/29/2004 12/17/2004
d. Posting and Labeling ,10 CFR 835, Subpart G,DOE G 441.1-10, POSTING AND LABELING FOR RADIOLOGICAL,CONTROL GUIDE (DOE 1998j)	Audits of Divisions & Sections (ES, FE, TD, PPD, AD)	ESHTRK Reports	See Below	5/31/2004 7/1/2004 11/29/2004 12/17/2004
e. Release of Materials and Equipment ,10 CFR 835.1101,DOE G 441.1-9, RADIOACTIVE CONTAMINATION CONTROL,GUIDE,	Audits of Divisions & Sections (ES, FE, TD, PPD, AD)	ESHTRK Reports	See Below	5/31/2004 7/1/2004 11/29/2004 12/17/2004
e. Sealed Radioactive Source , Accountability and Control,10 CFR 835, Subpart M,DOE G 441.1-13, SEALED RADIOACTIVE SOURCE ACCOUNTABILITY AND CONTROL GUIDE (DOE 1999i)	Tabletop, RPS	Memorandum	January 2004	Tabletop: 1/22/2004

7. Emergency Exposure Situations , 10 CFR 835.1301, 1302, DOE O 151.1A, COMPREHENSIVE EMERGENCY MANAGEMENT SYSTEM (DOE 2000)	Tabletop, RPS	Memorandum	January 2004	Tabletop: 1/22/2004
8. Nuclear Accident Dosimetry , 10 CFR 835.1304 DOE G 441.1-4, EXTERNAL, DOSIMETRY PROGRAM GUIDE	Not Applicable per RPP	Not Applicable per RPP	NA	NA
9. Records , 10 CFR 835, Subpart H, DOE G 441.1-11, OCCUPATIONAL RADIATION PROTECTION, RECORD-KEEPING AND REPORTING GUIDE (DOE 1999m)	Tabletop, RPS + DOELAP Assessments, Dosimetry Program Assessments	Memorandum + ESHTRK Reports	January 2004	Tabletop: 1/22/2004
10. Reports to Individuals , 10 CFR 835, Subpart I, DOE G 441.1-11, OCCUPATIONAL RADIATION PROTECTION RECORD-KEEPING AND REPORTING GUIDE, DOE O 232.1A, OCCURRENCE REPORTING AND PROCESSING, OF OPERATIONS INFORMATION (DOE 1997f)	DOELAP Onsite 2002 (ESHTRK 24175) DOELAP Onsite 2003 (ESHTRK 26137) Dosimetry Program Audit (ESHTRK 24555)	ESHTRK Reports	Already Completed	6/12/2003 6/20/2003 12/10/2003
11. Radiation Safety Training , 10 CFR 835, Subpart J, DOE G 441.1-12, RADIATION SAFETY TRAINING GUIDE	Tabletop, RPS + Audits of Divisions/Sections	Memorandum + ESHTRK Reports	February 2004	5/31/2004 8/3/2004 7/1/2004 11/29/2004 12/17/2004
12. Limits for the Embryo/Fetus , 10 CFR 835, Subpart C, DOE G 441.1-6, EVALUATION AND CONTROL OF RADIATION DOSE TO THE EMBRYO/FETUS GUIDE (DOE 1999n)	Tabletop, RPS	Memorandum	January 2004	Tabletop: 1/22/2004

Audits of Divisions & Sections	Leader/Assistant	Nature of Documentation	Scheduled Date	Date of Completion
Facilities Engineering Services Section	Cossairt/McGimpsey, Cupps	ESHTRK Report - ID No. 26576	March 2004	5/31/2004
Computing Division	Cupps/Vaziri, McGimpsey	ESHTRK Report - ID No. 26876	April 2004	8/3/2004
Accelerator Division	Graden, McGimpsey, Vaziri	ESHTRK Report - ID No. 26712	May 2004	7/1/2004

Particle Physics Division	Cossairt/Cupps, Vaziri, Graden	ESHTRK Report -ID No. 26978	November 2004	11/29/2004
Technical Division	Vaziri/Cupps, McGimpsey, Cossairt	ESHTRK Report -ID No. 27028	December 2004	12/17/2004

During the current triennium, several specific topical areas of Fermilab's Radiation Protection Program were addressed by means of self-assessments, external audits and tripartite assessments. Because these audits addressed specific components of Fermilab's Radiation Protection Program, they are considered to be part of the list of assessments conducted during the current triennium. Descriptions of these assessments are given below.

3. Summary of Radiological Protection Program Self-Assessments for Triennium 2001-2004

In August of 2003, the ES&H Section Radiation Physics Team conducted a self-assessment of Fermilab's Radionuclide Analysis Facility (RAF). Table 3 provides a brief description of the Radionuclide Analysis Facility assessment.

**Table 3
Radiation Protection Program Internal Self-Assessments**

Title	Lead Assessor(s)	Date of Completion	ESHTRK ID No.
RADIONUCLIDE ANALYSIS FACILITY SELF-ASSESSMENT	K. Vaziri and V. Cupps	8/1/2003	Not applicable

4. Summary of Assessments Conducted by External Agencies for Triennium 2002-2004

In February of 2002 and December of 2003, the DOE Lab Accreditation Program (DOELAP) conducted assessments of Fermilab's Radiation Dosimetry Program. During March of 2004, the Occupational Safety and Health Administration (OSHA) conducted an onsite review that included specific aspects of Fermilab's Radiological Protection Program. In November of 2003, The Nuclear Regulatory Commission (NRC) conducted a comprehensive regulatory compliance assessment. A brief description of these external reviews, as maintained in ESHTRK database, is listed in Table 4.

**Table 4
Summary of Radiation Protection Audits Conducted By External Agencies**

ID	Start Date	End Date	Agented By	Performed On	Review Title
24215	02/13/2002	02/14/2002	DOE	ES	DOELAP ONSITE ASSESSMENT - FEBRUARY 13 & 14, 2002

For more details, the original audit report as maintained the ESHTRK database, should be consulted at the following web link: http://www-esh.fnal.gov/pls/default/eshtrk_rpt.report10_step2?rid=24215.

ID	Start Date	End Date	Agented By	Performed On	Review Title
26137	12/09/2003	12/10/2003	DOE	ES	DOELAP ON-SITE ASSESSMENT - DECEMBER 9TH & 10TH 2003

For more details, the original audit report as maintained the ESHTRK database, should be consulted at the following web link:

http://www-esh.fnal.gov/pls/default/eshtrk_rpt.report10_step2?rid=26137.

Review ID	Agented By	Performed On	Review Title	Start Date	End Date
26508	FERMILAB	FERMILAB	OSHA REVIEW	03/01/2004	03/10/2004

Review ID 26508

Review Title OSHA Review

Agented By FERMILAB
FERMI NATIONAL ACCELERATOR LABORATORY

Performed On FERMILAB
FERMI NATIONAL ACCELERATOR LABORATORY

Start Date 03/01/2004

End Date 03/10/2004

Description [Report on the OSHA Audit of Fermilab](#)

For more details, the original audit report as maintained the ESHTRK database, should be consulted at the following web link:

http://www-esh.fnal.gov/pls/default/eshtrk_common.audit_details?rid=26508.

Title	Participants	Date of Completion	ESHTRK ID No.
NUCLEAR REGULATORY COMMISSION COMPLIANCE ASSESSMENT OF FERMILAB	Fred Brown, NRC, Team Leader Sharon Steele, NRC, Deputy Team Leader Robert Gattone, NRC, Lead Reviewer James Dwyer, NRC, Acceleratory Safety Assessment Don Cossairt, Fermilab, Associate Head for Radiation Protection Dennis Parzyck, DOE-FAO Point of Contact Vernon Cupps, Fermilab, RP staff Kathy Graden, Fermilab, RP staff Susan McGimpsey, Fermilab, RP staff Kamran Vaziri, Fermilab, RP staff	11/21/2003	Not applicable

5. Tripartite Radiation Protection Assessments Including the DOE Fermi Area Office (DOE-FAO) Conducted during 2002-2004

During this triennium, audits of topics relevant to the Radiation Protection Program were conducted jointly as tripartite assessments (see FESHM 1040) with DOE-FAO in accordance with the principles of Integrated Safety Management, the Fermilab Work Smart Set of Standards (FESHM 1020). Other assessments were conducted independently by DOE-FAO as part of DOE's Operational Awareness Program. Specifically, five tripartite assessments were conducted during this triennium. In September of 2002, a tripartite assessment of Radiological Controls of Stand-Alone Radiation Generating Devices was

conducted in what was then the Beams Division. In addition, a tripartite assessment of Beams Division Air and Water Radiological Monitoring Program was completed. An Integrated Safety Management within ES&H Section Groups tripartite assessment took place during the months of March, April and May of 2003. An Assessment of the Railhead Storage Area in Business Services Section was conducted in June of 2003. The most recent tripartite assessment that took place May through June of 2004 covered the topic of Chemical/Radiological Waste Management. These assessments provide a great deal of useful information on program performance. A synopsis of these reviews as maintained in ESHTRK database is provided in Table 5.

**Table 5
Summary of Tripartite Assessments Having Participation by DOE-FAO**

Review ID	Agented By	Performed On	Review Title	Start Date	End Date
24615	ES	AD	TRIPARTITE ASSESSMENT OF RADIOLOGICAL CONTROLS OF STAND-ALONE RADIATION-GENERATING DEVICES IN THE BEAMS DIVISION	09/05/2002	09/17/2002

Review ID 24615

Review Title TRIPARTITE ASSESSMENT OF RADIOLOGICAL CONTROLS OF STAND-ALONE RADIATION-GENERATING DEVICES IN THE BEAMS DIVISION

Agented By ES
ENVIRONMENT, SAFETY & HEALTH SECTION

Performed On AD
ACCELERATOR DIVISION

Start Date 09/05/2002

End Date 09/17/2002

Description The purpose of this tripartite assessment is to evaluate the compliance posture of the Laboratory with respect to the operations of equipment capable of producing ionizing radiation in a stand-alone condition independent of the operation of the main Fermilab accelerator complex. For purposes of this review, the Fermilab accelerator complex is defined as the Cockcroft-Walton, Linac, Booster, Main Injector, Antiproton Source, Tevatron, and the associated beam transfer lines and target stations.

The goal of this review is to assess compliance with 10 CFR 835, conformance with requirements of the Fermilab Radiological Control Manual (FRCM), and implementation of good management practice directed toward keeping radiation exposures as low as reasonably achievable (ALARA) for the various devices of this type. Sealed sources and medical diagnostic equipment are not within the scope of this assessment.

Finding ID	Date Found	Found In	RPM	Finding Title	Status
71007	09/16/2002	ES		FERMILAB'S RADIOLOGICAL CONTROL MANUAL	CLOSED 12/06/2002

				(FRCM) ARTICLE 362 DOES NOT ADEQUATELY ADDRESS NON-MEDICAL USE OF RADIATION-GENERATING DEVICES.	
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For more details, the original audit report as maintained the ESHTRK database, should be consulted at the following web link: http://www-esh.fnal.gov/pls/default/eshtrk_common.audit_details?rid=24615.

Review ID	Agented By	Performed On	Review Title	Start Date	End Date
25562	ES	AD	TRIPARTITE ASSESSMENT OF THE BEAMS DIVISION AIR AND WATER RADIOLOGICAL MONITORING PROGRAM	04/17/2003	06/13/2003

Review ID 25562
Review Title TRIPARTITE ASSESSMENT OF THE BEAMS DIVISION AIR AND WATER RADIOLOGICAL MONITORING PROGRAM
Agented By ES
 ENVIRONMENT, SAFETY & HEALTH SECTION
Performed On AD
 ACCELERATOR DIVISION
Start Date 04/17/2003
End Date 06/13/2003
Description The purpose of this audit was to examine the current Beams Division methodology for monitoring air and water for radionuclides generated as a result of accelerator operations. Specifically, radionuclides potentially found in sumps, retention pits and other closed loop systems. This goal of this audit was to verify that procedures are in place and being followed to successfully maintain compliance with the Federal Regulations to keep the concentrations of radionuclides well below regulatory limits.

Finding ID	Date Found	Found In	RPM	Finding Title	Status
72061	05/16/2003	AD		NPDES PERMIT GUIDANCE	CLOSED 07/29/2003

For more details, the original audit report as maintained the ESHTRK database, should be consulted at the following web link: http://www-esh.fnal.gov/pls/default/eshtrk_common.audit_details?rid=25562.

25518	ES	ES	INTEGRATED SAFETY MANAGEMENT WITHIN ESH SECTION GROUPS	03/20/2003	05/28/2003
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Review ID 25518
Review Title INTEGRATED SAFETY MANAGEMENT WITHIN ESH SECTION GROUPS
Agented By ES
 ENVIRONMENT, SAFETY & HEALTH SECTION
Performed On ES
 ENVIRONMENT, SAFETY & HEALTH SECTION

Start Date 03/20/2003

End Date 05/28/2003

Description To look into how the Integrated Safety Management (ISM) concept is practiced in the ESH Section and how the various principles and core functions are embedded into the work processes and procedures.

Of all groups within the ES&H Section only five groups were selected to be assessed. Selection was based on the type of activities in which these groups are engaged. These groups are:

§ The Environmental Group (Hazard Control Technology Team and Waste Management)- Site 40/55

§ The Radiation Physics Calibration Facility (RPCF)

§ The Security Department

§ The Fire Department

§ The Radionuclide Analysis Facility (Site 39)

Finding ID	Date Found	Found In	RPM	Finding Title	Status
71988	05/28/2003	ES		THERE ARE NO FINDINGS REGARDING IMPLEMENTATION OF ISM WITHIN THE ESH SECTION BASED ON INTERVIEWS WITH DEPARTMENT HEADS AND EMPLOYEES.	CLOSED 06/10/2003

For more details, the original audit report as maintained the ESHTRK database, should be consulted at the following web link: http://www-esh.fnal.gov/pls/default/eshtrk_common.audit_details?rid=25518.

Review ID	Agented By	Performed On	Review Title	Start Date	End Date
25817	ES	BS	TRIPARTITE ASSESSMENT OF THE RAILHEAD STORAGE AREA	06/03/2003	06/19/2003

Review ID 25817

Review Title TRIPARTITE ASSESSMENT OF THE RAILHEAD STORAGE AREA

Agented By ES ENVIRONMENT, SAFETY & HEALTH SECTION

Performed On BS BUSINESS SERVICES SECTION

Start Date 06/03/2003

End Date 06/19/2003

Description During the past several years, a great deal of effort has gone into reorganizing the storage of radioactive materials at the Railhead. While work activities of this type could be classified as "ongoing" in nature due to the need to conserve hardstand space and to reap the benefits of scrap metal sales, two factors have increased their importance during the past three years.

First, the moratorium on the recycling of metals originating from radioactive materials and radiological areas imposed by the Department of Energy in July 2000 has resulted in the need to accommodate in storage a considerable volume of metals that are not radioactive and would otherwise have been recycled. Second, during CY 2001, the maximum dose equivalent found at the site boundary was determined to be 7.6 mrem, a higher level than reported in previous years. This assessment has several goals:

1. To document the efforts that have taken place to date.
2. To collect relevant characterization data that may be available.
3. To identify potential deficiencies and any opportunities for improvement.
4. To evaluate future needs.

Finding ID	Date Found	Found In	RPM	Finding Title	Status
72326	06/19/2003	BS		MARKING OF "GROUP 2" ITEMS	CLOSED 10/17/2003
72327	06/19/2003	BS		BSS WRITTEN PROCEDURES FOR CONTROL OF RADIOACTIVE MATERIALS IN THE RAILHEAD	CLOSED 10/17/2003
72328	06/19/2003	ES		ESHS-HCTT WRITTEN PROCEDURES FOR CONTROL OF RADIOACTIVE MATERIALS IN THE RAILHEAD	CLOSED 10/21/2003

For more details, the original audit report as maintained the ESHTK database, should be consulted at the following web link: http://www.esh.fnal.gov/pls/default/eshtrk_common.audit_details?rid=25817.

Review ID	Agented By	Performed On	Review Title	Start Date	End Date
26809	ES	AD	CHEMICAL/RADIOLOGICAL WASTE MANAGEMENT	05/13/2004	07/20/2004

Review ID 26809

Review Title CHEMICAL/RADIOLOGICAL WASTE MANAGEMENT

Agented By ES
ENVIRONMENT, SAFETY & HEALTH SECTION

Performed On AD
ACCELERATOR DIVISION

Start Date 05/13/2004

End Date 07/20/2004

Description In May through July 2004, a tripartite self-assessment audit was conducted of the Accelerator

Division's Chemical and Radiological Waste Management Program. The review focused on the process portions of the division's program, namely documentation, training and satellite accumulation areas.

The Tripartite self-assessment team had representatives from the Environment, Safety and Health Section (ESHS), Accelerator Division (AD), and Department of Energy (DOE) Fermilab Area Office (FAO). Dave Baird of the ESHS served as the team's lead. [Note: Polychlorinated Biphenyls (PCBs) and Asbestos waste streams were not reviewed as part of this tripartite.]

Finding ID	Date Found	Found In	RPM	Finding Title	Status
75041	06/22/2004	AD		YELLOW 55-GALLON RADIOACTIVE WASTE DRUM FILLED WITH SAND	CLOSED 09/15/2004
75042	07/13/2004	AD		TRAINING REQUIREMENTS	CLOSED 12/14/2004

For more details, the original audit report as maintained the ESHTRK database, should be consulted at the following web link: http://www-esh.fnal.gov/pls/default/eshtrk_common.audit_details?rid=26809.

6. Triennial Assessments Under 10 CFR 835 of Division and Section Radiological Protection Programs for Triennium 2002-2004

Triennial assessments were conducted along organizational lines for those divisions and sections involved in radiological work. This audit consists of a sampling of all division/sections and represents a snap shot in time. The items that are noted as noteworthy practices, recommendations and findings may be intrinsic to ongoing operations within divisions/sections.

As previously shown, Table 2 describes the many functional elements that were reviewed as a part of these assessments. Some of the functional elements contained specific points of emphasis that were reviewed during this triennium. These specific topics include written procedures, implementation of ALARA, facility design and modification provisions found in §835.1002, status of exposure investigations, use of area monitoring badges (as applicable), RCT field work and logbooks, radiological work permits, post-job reviews, entry control, detection of gradual buildup of radioactive material, and effectiveness of engineering and process controls in containing radioactive material and reducing radiation exposure. Airborne radioactivity, contamination controls, and protective clothing controls were reviewed for applicable divisions. Training records were reviewed for all divisions and sections and escort training was discussed as well. Receipts of packages containing radioactive material were reviewed within the ES&H Section.

The following sections provide the results of division and section radiological program assessments as they are contained in the ESHTRK database.

a. Accelerator Division

Review ID	Agented By	Performed On	Review Title	Start Date	End Date
26712	ES/RP	AD	10 CFR 835 TRIENNIAL ASSESSMENT – REVIEW OF DIVISIONS AND SECTIONS, ACCELERATOR DIVISION	05/13/2004	07/01/2004

Review ID 26712

Review Title 10 CFR 835 TRIENNIAL ASSESSMENT – REVIEW OF DIVISIONS AND SECTIONS, Accelerator Division

Agented By ES/RP
ESH, RADIATION PROTECTION

Performed On AD
ACCELERATOR DIVISION

Start Date 05/13/2004

End Date 07/01/2004

Description This audit is conducted in accordance with the Fermilab Tripartite Self-Assessment Plan and the triennial review requirements set forth in 10 CFR 835. This self-assessment serves as verification of the Accelerator Division (AD) radiation protection program as it pertains to the requirements contained in Fermilab’s Radiological Control Manual (FRCM).
Lead > Kathy Graden 8304N ES&H Radiation Protection Group
Participant > Vernon Cupps 8258N ES&H Radiation Protection Group
Participant > Susan McGimpsey 12359N ES&H Radiation Protection Group
Participant > Kamran Vaziri 10046N ES&H Radiation Protection Group

The subject audit of Accelerator Division was conducted in May and June of 2004. This review consisted of a meeting with the AD Radiological Control Organization, walk-throughs and a snoop survey of AD areas, review of documents and procedures, informal conversations, email messages and feedback from AD Department Heads and other AD personnel. The general conclusion from the assessment is that most of the basic requirements of Fermilab’s Radiation Protection Program are being met. It should be recognized that the Accelerator Division is, by far, the dominant division/section at Fermilab in terms of radiological work in all respects.

Documents and Records Reviewed

- Weekly, Monthly, Quarterly, Bi-Annual and Annual Routine Monitoring Program
- Beams Division ES&H Procedure, BDSP-99-0003, Radiation and Detection
- Beams Division ES&H Procedure, BDSP -10-0202, Control and Release of Radioactive Materials From Radiological Areas to Controlled Areas
- Beams Division ES&H Procedure, BDSP -99-0011, Special Hazards
- Beams Division ES&H Procedure, BDSP -10-0003, Measures to Assure Shielding and Groundwater Protection During Civil Construction in the Vicinity of Accelerator Enclosures
- Beams Division ES&H Procedure, BDDP -SH-1003, Beams Division Routine Monitoring Program
- Beams Division ES&H Procedure, BDDP -SH-1004, Operation of the Vault Exhaust Sampling System

- Beams Division ES&H Procedure, BDDP -SH-1001, Operation of the AMS-3 Air Monitor
- Accelerator Division Radiological Work Permits
- Exposure Investigations Assigned to Accelerator Division
- Accelerator Division Dose Records
- Accelerator Division Radiological Worker Training Tickler Report
- Accelerator Division Radiological General Employee Radiological Training Tickler Report
- ALARA Hot Job Estimates and Post Job Reviews and other selected ALARA documentation
- Radiological Control Technician Qualification Training Records
- Accelerator Division Area Monitoring Dose Records

All findings and recommendations from the 2001 triennial self-assessment of this program have been closed. Four noteworthy practices, twelve recommendations and three findings have been identified as a result of this assessment.

Noteworthy Practices

1. Accelerator Division consistently posts radiological warning signs above doors rather than on doors so that postings are clearly visible whether the door is open or closed.
2. AD has successfully implemented procedures to assure that all division personnel have current GERT training or promptly receive radiological worker training if the latter is so-identified in the ITNA process. As of 5/26/04, 100 % of individuals within Accelerator Division are current in General Employee Radiation Training (GERT).
3. Feedback from various AD Department Heads and AD personnel regarding the AD ES&H Radiation Safety Group was favorable. Responses to questions were generally positive. Responders did not provide any suggestions for improvement that should be noted as part of this assessment.
4. The AD should be commended for the recently enhanced efforts to integrate ALARA planning with shutdown task management. This effort reflects AD management support.

Recommendations

1. Accelerator Division ES&H procedures should continue to be reviewed and revised as necessary to reflect current practices and also to reflect the division's name change.
2. There is no formal mechanism to assure that ALARA is being implemented for new projects and modifications to existing projects. Commendably, AD personnel are contacted through email to stay "plugged in" to new projects, but a formal mechanism, with documentation and perhaps linked to other AD planning activities, should be developed to assure that ALARA is being considered and implemented. It is recognized that this problem is broader than the Accelerator Division and its resolution requires labwide attention, likely spearheaded by the ES&H Section.
3. One of the uses of the area monitor badge program conducted within AD is to verify that GERT trained AD personnel have not received more than 100 millirem in a year. AD should document this result in a technical basis document or other format that will secure long-term retention.
4. AD should continue to submit ALARA hot job reports in a timely manner. In addition,

appropriate informal ALARA correspondence should be forwarded promptly to the ES&H Section ALARA Coordinator, perhaps after some “distillation.”

5. AD should continue to submit ALARA Opportunities for Improvement in a timely manner.
6. Bins that contain protective clothing throughout AD are not well designed. It appears that used protective clothing is returned to the clean clothing container. There are no containers to dispose of contaminated or non-contaminated protective clothing. Efforts should be completed to resolve this issue. (This problem was also identified during the OSHA External Regulations Assessment.)
7. The Instruction page of the AD Controlled Access RWP binder should be reviewed and updated as necessary. The last revision was in 1999.
8. Several AD General Radiological Work Permits (RWPs), exemplified by RWP AD-514, presently include “tours” under “Description of Work”. This was intended to cover walkthroughs by visiting dignitaries, escorted by trained personnel, not tours by untrained personnel. A clarification is needed.
9. RWPs should be reviewed for inconsistencies that exist regarding exclusion of work in areas greater than 20 mR/hr at 1’. As an example, RWP AD-514 excludes work in these areas but under the “Special Requirements” section, it appears to contradict itself in that it gives instruction to obtain a Contamination Survey if 20 mR/hr at 1’ is exceeded.
10. AD should consider improved monitoring of the field work performed by the AD RCTs to more accurately reflect the amount time and type of work being performed by AD RCTs. This could assist in the determination of staffing needs and promote better matching of resources to tasks.
11. Buildings that are classified as limited occupancy should be locked to limit access by unauthorized persons if practicable. For example, MI-12 Service Building has been assessed to have dose rates of less than 5 mrem/hour and has been found to be unlocked on several occasions. It is recognized that the Fermilab Security Department has had reduced resources with which to perform building lockups since September 2001.
12. The efforts being made to improve control of areas where radioactive materials are stored should be expanded. The control of access to the M-Test Worm and the shielding block storage building by members of the AD ES&H Department provides an example of how to proceed elsewhere.

Finding ID	Date Found	Found In	RPM	Finding Title	Status
74993	05/17/2004	AD		Improper Posting of Areas Controlled for Radiological Purposes	CLOSED 08/12/2004
74994	05/24/2004	AD/PBAR		Improper Radiological Controls Identified on Radiological Work Permits	CLOSED 08/12/2004
74995	05/13/2004	AD		Improper Control and Labeling of Radioactive Materials	CLOSED 08/12/2004

b. Computing Division

Review ID	Agented By	Performed On	Review Title	Start Date	End Date
26876	ES/RP	CD	10 CFR 835 TRIENNIAL ASSESSMENT – REVIEW OF DIVISIONS AND SECTIONS - COMPUTING DIVISION	07/13/2004	08/03/2004

Review ID 26876

Review Title 10 CFR 835 TRIENNIAL ASSESSMENT – REVIEW OF DIVISIONS AND SECTIONS- COMPUTING DIVISION

Agented By ES/RP
ESH, RADIATION PROTECTION

Performed On CD
COMPUTING DIVISION

Start Date 07/13/2004

End Date 08/03/2004

Description This audit is conducted in accordance with the Fermilab Tripartite Self-Assessment Plan and the triennial review requirements set forth in 10 CFR 835. This self -assessment serves as verification of the Computing Division (CD) radiation protection program as it pertains to the requirements contained in Fermilab’s Radiological Control Manual (FRCM).

The assessment was conducted by:

Lead > Vernon Cupps 8258N ES&H Radiation Protection Group Radiation Physicist
Participant > Sue McGimpsey 12359N ES&H Radiation Protection Group Radiation Physicist
Participant > Kamran Vaziri 10046N ES&H Radiation Protection Group Radiation Physicist
Participant > Amy Pavnica 10683N Computing Division SSO

The subject audit of Computing Division was conducted in July and August of 2004. This review consisted of a meeting with the CD Radiation Safety Officer (RSO), walk -through of CD areas, review of documents and procedures, informal conversations and email messages. The general conclusion from the assessment is that most of the basic requirements of Fermilab’s Radiation Protection Program are being met.

Documents and Records Reviewed

- Audit of Occupational Radiation Safety Program of the Computing Division, 1998, ESHTRK Audit # 18604.
- 2001 Radiation Protection Program Triennial Audit, ESHTRK Audit # 23837.
- ESHTRK Training Completed Report for Computing Division in Material Move Survey as of 7/21/04.
- September 13, 2001 memo documenting appraisal of the Interlock system for the Computing Division’s X-ray unit.
- Standard Operating Procedure for the Computing Division’s (CDs) X-ray Unit written by Glenbrook Technologies and adapted for CDs use.
- Fermilab Radiological Work Permit No. CD-01.
- List of Radiation Worker trained personnel within Computing Division received from Amy Pavnica of Computing Division on 7/28/04.
- Certificate of Calibration from Glenbrook Technologies, Inc. dated 9/23/03.
- BPM Amplifier Boards-Class 1 Procedure written by Tim Kasza on 12/19/2002.
- Computing Division Radiological Worker Training Tickler Report

- Computing Division Radiological General Employee Radiological Training Tickler Report.
- Memo to file from Sue McGimpsey regarding a CD X-ray Machine Interlock Inspection dated 7/26/2004.
- Memo to file from Sue McGimpsey regarding operating procedure for the Glenbrook Technologies Jewel Box 90c Real Time X-Ray Inspection System dated 7/26/2004.
- E-mail from Amy Pavlica to Vernon Cupps listing all BPM workers dated 8/03/2004.
- ESHTRK Expired Training Report as of 7/21/2004 .
- Demonstration of the safety interlock system for the Glenbrook Technologies Jewel Box 90c Real Time X-Ray Inspection System by Jim Franzen on 7/29/2004.

All findings and recommendations from the 2001 triennial self -assessment of this program were closed. Two noteworthy practices, one recommendation and one finding have been identified as a result of this assessment.

Noteworthy Practices

1. Computing Division requires a properly completed Material Move Request (MMR) for all radioactive material that enters the Feynman Computing Center (FCC).
2. Computing Division has demonstrated a proactive approach to the safety of their new X-Ray system for inspecting circuit boards. They actively sought out help from the ESH Section in establishing that the interlock system met all the requirements of the FRCM.

Recommendations

1. Surveys and wipes should be taken on a periodic basis in all areas where radioactive materials are used or stored.

Finding ID	Date Found	Found In	RPM	Finding Title	Status
75089	08/03/2004	CD		Radiological Training Requirements	OPEN

c. Facilities Engineering Services Section

ID	Category	Title	ES Findings Closed / Total	Led By	Performed On	Owner	Start	End
26576	Scheduled	10 CFR 835 TRIENNIAL ASSESSMENT – FACILITIES ENGINEERING SERVICES SECTION	None All	ES/RP	FE	ES	04/01/04	05/31/04

Review ID 26576
Review Title 10 CFR 835 Triennial Assessment – Facilities Engineering Services Section
Agented By ES/RP

ESH, RADIATION PROTECTION

Performed On FE
FACILITIES ENGINEERING SERVICES SECTION

Start Date 04/01/2004

End Date 05/31/2004

Description Audit Team: D. Cossairt (lead), Vernon Cupps, Susan McGimpsey, and Kamran Vaziri

The subject audit of FESS was conducted in April of 2004. A chief component of this review consisted of a meeting with the FESS Radiation Safety Officer, Elaine Marshall, on April 28, 2004. On April 29, 2004 a tour of the two areas containing radiological activities for which FESS has landlord responsibility; the Central Utilities Building (CUB) and the Operations and Maintenance (O&M) Building at Site 38. The scope of radiological activities for which FESS is responsible is limited, but FESS personnel do work for all other divisions and sections in the spaces for which the other organizations have "landlord" responsibilities. The general conclusion from the assessment is that radiological issues in FESS are well controlled and the requirements of Fermilab's Radiation Protection Program are being met. No findings resulted from this review but several recommendations are made which should improve program performance. Several of these apply to FESS while others apply to the ES&H Section.

During the meeting on April 28, the following notations were made:

- FESS workers requiring GERT or Radiological Worker training, according to their ITNAs, are kept up to date routinely.
- Water samples of the regeneration process at CUB are reviewed retrospectively (that is, after discharge) against the criteria of the relevant IEPA permit initially established about 10 years ago. These criteria are presently based on the Derived Concentration Guides (DCGs) of DOE Order 5400.5 for sewer discharges. The primary defense of the permit is based upon limitations on levels of external radiation exhibited by the DI bottles that undergo regeneration. The RSO reviews the sampling results and looks for upward trends as an indicator of a potential problem. Present concentrations in the regeneration effluent are typically a few pCi/ml of tritium, compared with the relevant DCG of 10,000 pCi/ml. This approach was thought to be acceptable by the review team. However, since the permit conditions and on-the-job training provide the only relevant guidance, a succession issue may exist. This topic may be more important in the future as beam intensities are increased with the potential for increased LCW radionuclide concentrations. (See Recommendation No. 1.)
- Dosimetry badges are collected promptly and exposure investigations are completed in a very timely manner. (See Noteworthy Practice No. 1.) The labwide badge collection schedule was discussed. Presently the collection goes between the 6th and the 10th of the relevant month. From the FESS perspective, this schedule does not present a problem except for the collection in early January which seems to be problematic labwide due to people returning from holiday vacations. In view of this observation both by FESS and by other divisions and sections some adjustment to the January collection schedule is being considered by the Dosimetry Program Manager. (See Recommendation No. 2.)
- ALARA aspects of FESS work are reviewed. One example is the control of doses incurred in the replacement of the solid state controllers of the MiniBooNE sump system that failed due to radiation damage. It was pointed out that FESS had recommended that such radiation-sensitive controllers not be installed in this area, but that judgment was overridden by the groups responsible for MiniBooNE installation. Another is the

investigation of the placement of equipment containing refrigerants in areas where activation is possible (environmental ALARA). (See Recommendation No. 3.) The numbers of smoke detectors awaiting disposal have been reduced from quantities found in previous years.

- FESS activities are reviewed for compliance with the ongoing DOE recycling moratorium. This was done, for example, with respect to the removal of the zinc from the 15 ft. Bubble Chamber at the time of writing of the purchase requisition.

- FESS has no Contamination Areas. CUB is the only FESS area that could perhaps qualify. Regular monitoring of wipes and periodic surveys supports the posting of CUB as a Controlled Area/Radioactive Material Area.

- FESS personnel observe the RWP's of other organizations and apply PPE as specified therein. Recently, FESS personnel have experienced problems associated with both the availability of PPE and provisions for its disposal after use that were also noted by the OSHA external regulation review team. (See Recommendation No. 4.)

- Proper training of visitor escorts of visitors to CUB is controlled through the ProxCard system. All who possess keys to FESS's Site 38 location have current Radiological Worker training.

- Due to privacy concerns, quarterly dosimetry badge results are not posted for FESS employees. While this practice is, per se, acceptable, the information on how to obtain one's dosimetry results should be made readily available to employees. (See Recommendation No. 5.)

- An important issue discussed during the meeting related to communication between Divisions and Sections. It was conveyed to us that critical information regarding radiation dose in the AD areas where FESS personnel are requested to work was not always readily available. There is also some apprehension of FESS personnel related to radiological work that possibly are exacerbated by these communications problems. For example, some FESS workers encountered an area where an alarm was going off. Upon contacting the Main Control Room (MCR), they were told that the MCR knew of the alarm and were instructed to not worry about and proceed to enter. This has to be handled with care for all personnel, especially for individuals who do not do radiological work routinely. It was also noted that due to the lack of dose rate information, more time may be required to complete exposure investigations.

During the tour of the CUB on April 29, the following notations were made:

- This area is posted as a Controlled Area and Radioactive Materials Area. This area is considered a Construction Area, hence hard hats, long pants, long sleeves, steel toed shoes, safety glasses and hearing protection is now required.

- This facility only has a few radiological concerns as described by the RSO. The levels in the 95 LCW Booster are high enough to have measurable dose rates on the mezzanine of CUB where the piping traverses. The levels in the 95 LCW MI and PBar systems are not high enough to detect measurable dose rates. However, the presence of these pipes throughout the building along with the prompt radiation are the rationale behind posting the entire building as a Controlled Area and imposing controls when these systems are compromised. The polishing bottles are the locations of highest dose rates in the building due to the collection of the particulate matter in the system. The regeneration effluent, sludge and bottles awaiting generation pose minimal hazards.

· For the polishing bottles for the 95 LCW Booster system, 1-2 mrem/hr at a foot seems to be the typical reading since the upgrades to the Booster system. The RSO stated that she roped off those bottles and posted an additional 'Radioactive Material' sign. when the dose rates reached these levels. The polishing bottles for the 95 LCW Pbar system are along the lines of 0.5 mrem/hr at 1 foot.

· The highest reading that can be attributed to the prompt radiation is 0.04 mrem/hr with a background of 0.01 mrem/hr as measured with a Fredron. The levels are due to radionuclides produced in the Booster LCW system and thus fluctuate with variations in Booster beam losses. (Booster beam losses, the source of these radionuclides, are currently receiving much attention in the Accelerator Division.)

· In addition a survey log is kept of the DI bottles and located in a central cabinet. This cabinet also housed survey instrumentation.

· The RSO indicated that surveys are done of this area on a quarterly basis. Wipes are also taken and sent to the RAF for analysis. The RSO also indicated that no significant levels of radioactivity were ever found that would require additional controls to be in place. There are personnel that spend up to eight hours a day in the control room and they have not received a measurable dose. All are radiological worker trained. During the tour of the O&M Building at Site 38 on April 29, the following notations were made:

· A small technician shop is located within the O&M building. No radioactive material is brought to this location. A frisker is kept on hand to verify that the materials being handled are not radioactive. The RSO stated that all personnel are Radiological Worker-trained. It was observed that the pocket dosimeter log is being maintained.

· Located in the back of Site 38 is a small radioactive storage facility (LLR cage). This contains equipment or material that has been found to be radioactive or have originated from a radiological area. This area currently contains heaters, check valves, de-humidifiers, light bulbs, emergency lighting, sweeping compound and some miscellaneous equipment. Used air filters were the major items being stored.

· Items are stored here until one of the following occurs: the radiation levels decay down to where items can be disposed of as non-radioactive waste or recycled (non metals), or they are delivered to the HCTT to be disposed of as radioactive waste.

· This area is key accessed. People with access to a key are radiological worker trained and training was verified for the people whose ID number appeared on the inventory log of this area. This inventory log is kept at the gate entrance to this area.

· In back of this area is another location for material storage. This did not contain radioactive materials. It was noted that storage bins for Group 1 materials for recycling were so labeled and were being utilized. (See Noteworthy Practice No. 2.)

Noteworthy Practices:

1. The collection of dosimetry badges in a timely manner and the prompt completion of exposure investigations in FESS is exemplary.

2. The localized management of recycled metals in view of the DOE metals recycling moratorium is a useful innovation probably suitable for use elsewhere at Fermilab.

Recommendations:

1. The FESS RSO should develop a short written procedure for reviewing CUB water samples for radionuclide concentrations against the established release criteria in order to provide more clear guidance to others who might have to substitute in or assume this role. (FESS responsibility)
2. Review the collection schedule for dosimetry badges especially for the January collection with respect to personnel availability due to vacations. (ES&H responsibility)
3. The placement of equipment containing refrigerants in areas where radioactivation is possible should be reviewed in subsequent audits in this series. (ES&H responsibility)
4. Provisions for PPE and for its proper disposal after use should be reviewed in other divisions and sections in subsequent audits in this series. (ES&H responsibility)
5. FESS has chosen not to publicly post quarterly dosimetry badge results. In lieu of such posting, it is recommended that the information as to how to obtain one's own results be made readily available to FESS employees. (FESS responsibility)

d. Particle Physics Division

Review ID	Agented By	Performed On	Review Title	Start Date	End Date
26978	ES/RP	PD	10 CFR 835 TRIENNIAL ASSESSMENT - PARTICLE PHYSICS DIVISION	10/29/2004	11/29/2004

Review ID 26978

Review Title 10 CFR 835 Triennial Assessment - Particle Physics Division

Agented By ES/RP
ESH, RADIATION PROTECTION

Performed On PD
PARTICLE PHYSICS DIVISION OFFICE

Start Date 10/29/2004

End Date 11/29/2004

Description Audit Team: Don Cossairt (lead), Vernon Cupps, Kamran Vaziri, and Kathy Graden

The subject audit of PPD was conducted in November of 2004. This review began with a meeting with the PPD Radiation Safety Officer, Wayne Schmitt and PPD Senior Safety Officer Martha Heflin on November 2, 2004 where the radiation safety component of PPD's environment, safety, and health program was extensively discussed. On November 4, 2004 a follow-up meeting including Wayne and Jose DeLao, PPD's Radiological Control Technician (RCT), was conducted. At this time snoop survey records were reviewed and a tour was taken of several areas for which PPD is responsible where radiological issues, summarized in parentheses, are currently present; the Meson Detector Building (clearing the MP and ME target station areas for the superconducting module test facility (SMTF)), the M-Center (E907) and M-East "Worms" (storage of radioactive materials and depleted uranium modules), and a portion of Lab 6 (upcoming work with tritiated water). On November 5, 2004, Kamran Vaziri, Vernon Cupps, and Don Cossairt toured the Meson Assembly Building and adjacent outdoor storage yard, the Lab A-D complex, the New Muon Laboratory, and the

perimeter of the KTeV building.

The overall conclusion from the assessment is that radiological issues in PPD are generally well-controlled and the basic requirements of Fermilab's Radiation Protection Program are being met. However, while the scope of radiological activities for which PPD is responsible is somewhat limited, it is evolving, perhaps in the direction of increased complexity, in support of new Laboratory initiatives such as SMTF, BTeV, Proton Driver R&D, and an adiabatically expanding 120 GeV fixed target physics research program. This contrasts significantly with the recent past in which the major functions of PPD involved the support of the two Tevatron collider experiments (CDF and D0), the building of MINOS near detector modules, and the refurbishment of structures at the downstream end of the Tevatron fixed target areas, activities where novel radiological hazards were only rarely, if ever, encountered, along with areas where sealed sources are used with considerable surveillance by ES&H Section personnel. Future success is likely to depend upon continued and improved communication and coordination with other Laboratory organizations such as AD, TD, and FESS. In addition it is our view that the increased level of involvement of the PPD ES&H and Building Management Department and especially the PPD RSO into the planning stages of all PPD activities at the earliest possible time should be encouraged. This is especially desirable for those activities that will involve multiple Fermilab organizations. Several of our recommendations and findings are specifically directed toward such issues.

A closeout attended by J. Strait, W. Schmitt, M. Heflin, T. Miller, K. Graden, K. Vaziri, and D. Cossairt was held on November 29, 2004.

During the meetings, discussions, and tours, the following observations were made:

- The Particle Physics Division Operating Manual, available online, was reviewed.
- Dosimetry badges are collected promptly and exposure investigations are now being completed in a very timely manner, the results of a major effort in catching up from a backlog predating Wayne Schmitt's assumption of RSO duties. The quarterly e-mailings to badge-wearers to announce upcoming badge changes were noted as being effective and helpful to the collection process.
- A big new task for which PPD has ES&H oversight is the cleanout of portions of the Meson Detector Building and "Worms", in particular the MP and ME areas in preparation for SMTF and for Proton Driver R&D. A weekly planning meeting has been established for this work involving TD, AD, and PPD personnel. J. DeLao is doing near-continuous oversight of the hands-on work. Also, coordination with AD Radiation Safety (Mike Gerardi) is helping to keep PPD personnel, otherwise unfamiliar with historic 800 GeV fixed target operations in the area, apprised of potential radiological hazards that might be found as the target piles continue to be dismantled, and connected with SY120 accelerator operations in the vicinity. This task is divided into "phases" and it is likely that each phase will bring new issues to the forefront.
- While surveillance of areas where sealed sources are used is not specifically done as a separate routine task, it is included in the written snoop survey program and PPD personnel are kept informed of sealed source locations.
- ALARA efforts consist of carrying out the snoop survey program, maintaining control of low level activated items, coordinating with the sealed source program whenever sources of activity sufficiently high to produce "Radiation Areas" are deployed.
- It was noted that analytical samples are correctly documented at the time of submittal to the Radionuclide Analysis Facility (RAF).
- Training is tracked using TRAIN. While the present records (as of the date of this discussion) shows a 95% compliance rate of PPD for Radiological Worker Training, it was stated that this "artificial deficiency" is due to the inclusion of "Guest Scientists" in the pool of PPD "employees" without regard to the fact that they may be "inactive" for months at a time. It was stated that training is believed to be complete for all personnel who are actually

present and doing radiological work due to “enforcement” by gatekeepers at the experiments and by the Main Control Room for access of PPD personnel into AD areas.

- “Escorts” into radiological areas within experiments are supervised by the experiments themselves in accordance with a written PPD policy PPD_ADMIN_005 that was reviewed by this assessment team.
- Reviews of planned construction activities are conducted by the SSO and the RSO for those activities for which PPD is responsible for ES&H.
- Experiments are reviewed by means of the operational readiness clearance (ORC) process as they proceed toward fully operational status. This process is specified in policy PPD_ESH_006.
- Memoranda of understanding (MOU’s) for planned experiments are not generally reviewed by the ES&H and Building Management Department at this time. Some, but not all, had traditionally been passed down for review by the previous Division Head at his discretion.
- There are no general radiological work permits (RWPs) in force. Occasionally, a job-specific RWP is used for selected projects. It is common for radiological hazards to be addressed in the Hazard Analyses required by FESHM 2060. Examples for the Superconducting RF Module Test Facility (SMTF) Project –Phase I and for the clearance of items from the ME worm were reviewed by this team.
- The connection of the RSO and the SSO with the MINOS experiment was discussed.
- A well-formulated schedule for the conduct of snoops is maintained. While the snoops are done when they conveniently fit into other activities such as surveillance for hazardous materials, the overall schedule is adhered in such a way as to assure coverage of all designated areas at least twice a year, or more frequently (e.g., quarterly) as needed for certain locations. Photographs are extensively used to document conditions.
- For work requiring RCT coverage, the RSO backs up the RCT as needed. When the RSO is absent, backup is provided by the SSO.
- In general, areas visited were clean, orderly, and, in general, appropriately posted. This was true for the MAB interior, the New Muon Lab interior, and for Labs A-D. Areas where radioactive sources are used were appropriately designated. In particular, the MAB yard was well-fenced and orderly. Also, the KTeV building was appropriately posted.

Noteworthy Practices:

1. Improvements in the percentages of dosimetry badges collected and the elimination of the longstanding backlog in the completion of exposure investigations in PPD are exemplary.
2. The cleanup of the outdoor storage areas for radioactive materials as discussed at the June 5, 2002 Radiation Safety Subcommittee meeting was noteworthy and served as a benchmark for other Divisions and Sections Laboratory-wide.
3. Most of the procedures in the Particle Physics Operating Manual are well written and this document is readily available on the home page of the Division.

Recommendations:

1. The PPD ES&H Department should become more involved with MINOS-related issues now that the Director, by memorandum, has assigned “territorial” responsibilities between AD and PPD for NuMI-MINOS. In particular, as NuMI begins operation, the ES&H environmental sampling program should be reviewed to insure that information concerning radionuclide concentrations in the MINOS sumps or discharges is disseminated to appropriate personnel in a timely manner (PPD responsible).
2. The process requiring PPD ES&H review and concurrence on proposals, experiment memoranda of understanding (MOU), and projects should be formalized to assure completeness and timeliness. While ES&H review is embedded into the ORC process,

participation in the MOU process would afford the opportunity for efficient, helpful input at a much earlier stage in the life of experiments (PPD responsible).

3. At MAB, the postings at the northeast corner of the storage yard are missing the "Controlled Area" sign adjacent to the existing "Radioactive Material Area" sign (PPD responsible).

4. Procedure PPD_ESH_006 needs to be updated to correctly identify the Accelerator (a.k.a. "Beams") Division. Also, contrary to the first paragraph, the Fixed Target experiments are not covered by one SAD (PPD responsible).

5. Procedure PPD_ESH_007, as posted on the internet, appears to be missing its last page (PPD responsible).

6. The inclusion of personnel in the "Guest Scientist" category as PPD employees is rendering the evaluation of the status of completion of training in the TRAIN database to be inaccurate. This undesirable result is due to fact that a significant fraction of these people are commonly absent from the Laboratory for long periods and hence "inactive". A solution to this problem, recognized as perhaps too cumbersome, would be to revise the individual training needs assessments (ITNAs) for these people when they become inactive. While it is clearly desirable to maintain these people "enrolled" at the Laboratory in some manner, perhaps the ID and TRAIN databases can be modified to create a straightforward method of identifying "inactive" individuals (ES&H responsible).

7. K. Graden, as Fermilab source physicist, should describe the functioning of the sealed source program to J. Strait at a timely opportunity, likely when someone next requests a source capable of creating a radiation area within PPD (ES&H responsible).

8. Perhaps appropriate to the scope of radiological work there, PPD is "one deep" as far as RSO and RCT coverage are concerned. Backup functions might be improved if the PPD RSO and the ES&H Section Radiation Protection Group liaison established regular discussions concerning on going PPD projects and tasks (PPD and ES&H responsible).

9. Survey forms do not routinely document background levels for instruments utilized in PPD to detect and measure contamination levels. The best management practice is to document these levels to substantiate the validity of the survey performed (PPD responsible).

10. The FRCM does not currently specify the recording of some of elements of survey documentation commonly done at Fermilab as best practice. A improvement should be considered, specifically to Articles 551 and 751 (ES&H responsible).

11. Several general safety items were found that should be addressed (PPD responsible). These are:

a. The fan guard is missing on the air conditioning unit in the Lab 6 darkroom.

b. Contrary to provisions of the applicable Hazard Analysis, a Fermilab employee working in the MP target station area was observed as not wearing a hard hat while working near an object suspended by the 20 ton crane only slightly above head height. (At the time this was observed, upon instruction from the PPD RSO, the hat was donned.)

c. The PPD ES&H staff (namely, the RSO and the RCT) are aware of the possibility for lead contamination near the northwest exit of Enclosure MC6, an operational 120 GeV beamline. While provisions for PPE are present now, it is suggested that this situation be clarified and any lead contamination cleaned up, if possible, prior to resumption of 120 GeV operations

when the “traffic” in the area increases accordingly.

Finding ID	Date Found	Found In	RPM	Finding Title	Status
75161	11/29/2004	PD		Hazards Analysis Improvement	CLOSED 11/30/2004

e. Technical Division

Review ID	Agented By	Performed On	Review Title	Start Date	End Date
27028	ES/RP	TD	10 CFR 835 TRIENNIAL ASSESSMENT – TECHNICAL DIVISION	11/18/2004	12/17/2004

Review ID 27028

Review Title 10 CFR 835 Triennial Assessment – Technical Division

Agented By ES/RP
ESH, RADIATION PROTECTION

Performed On TD
TECHNICAL DIVISION

Start Date 11/18/2004

End Date 12/17/2004

Description Audit Team: Kamran Vaziri (lead), Vernon Cupps, Don Cossairt, and Sue McGimpsey

The subject audit of TD was conducted in December of 2004. This review began with a meeting with the TD Radiation Safety Officer, Mike Herr and TD Senior Safety Officer Rich Ruthe on December 7, 2004 where the radiation safety component of TD’s environment, safety, and health program was extensively discussed. Following the meeting a tour was taken of the Scanning Electron Microscope (SEM) facility at IB3. On December 9, 2004, the audit team toured Industrial Buildings 1 and 2, Labs 1 and 4 and the MP -9 building kicker test facility.

The overall conclusion from the assessment is that radiological issues in TD are well controlled and the basic requirements of Fermilab’s Radiation Protection Program are being met. However, with the start of new R&D to support the proton driver proposal and Superconducting Module Test Facility (SMTF), the scope of radiological activities for which TD is responsible is evolving. Future success is likely to depend upon continued and improved communication and coordination with other Laboratory organizations such as AD, PPD, FESS and ES&H.

A closeout meeting was held with R. Sood, R. Ruthe, M. Herr, K. Vaziri, V. Cupps, and S. McGimpsey on December 17, 2004. At this meeting the observations, recommendations and findings were discussed.

The following Technical Division documents and procedures, were reviewed:

- TS-3010, TS-3011, TD-4010, TD-6010, TD-6020, TD-6030, TD-6040, TD-6060, TD-7010, TD-7020, TD-7030, TD-7040, TD-7040A, TD-7110, TD-7120, TD-7130.

- Radiological Work Permit TD-07-09/04 for Lab 4.

- Training records for all TD employees.

During the meetings, discussions, and tours, the following observations were made:

1. IB3 has been recently deposted and removed from the list of Facilities Containing Radioactive Material.
2. The RSO stated that the quarterly e-mailings to badge-wearers to announce upcoming badge changes were very effective and helpful to the collection process. It has reduced the number of exposure investigations significantly.
3. Dosimetry badges are collected promptly. There are only two outstanding exposure investigations.
4. RSO trains TD Radiation Monitors and Machine Shop Surveyors.
5. RSO trains TD staff on the procedure for receiving radioactive material. As a recent example, a metallic panel from NTF that was not correctly labeled was sent back to AD.
6. ALARA efforts consist of routine surveys to keep track of radioactive material and monitor for radioactive contamination.
7. Another part of the ALARA effort is a requirement for notification of the RSO before any machining work on radioactive material.
8. Work on Class II or higher material are handled by RWP.
9. TD requires that radioactive items to be delivered when they are ready to be worked on. TD does not store radioactive material.
10. It was noted that analytical samples are correctly documented at the time of submittal to the Radionuclide Analysis Facility (RAF).
11. Kurt Kasules keeps track of the training of TD staff using TRAIN. This information is regularly shared with the TD RSO. Audit team's survey of the radiological training records of TD personnel on 12/6/04 showed one person had expired Rad. Worker Training and two with expired GERT.
12. Training for the TD personnel involved in the shut down was planned ahead of time to ensure that the required trainings do not expire during the shutdown work.
13. The SEM is in a locked room. Only trained and authorized personnel are allowed to use it.
14. The team found a roughing station in IB2 which had radioactive Class I labels. The labels were not properly filled out. The MMR form (# M 116177) attached to this item did not show that this item was surveyed for radioactivity before being moved to TD.
15. The magnet-debonding oven has been used to debond radioactive magnets during the last three years. The RSO is notified before any such use.
16. For work requiring RSO coverage, the SSO backs up the RSO as needed. For example during the Accelerator shutdown when the RSO was on loan to AD, the SSO took on the RSO's responsibilities.
17. In general, areas visited were clean, orderly, and, in general, appropriately posted. Areas where radioactive material was present were appropriately designated.

Noteworthy Practices:

1. The RSO uses expertise provided by the ES&H Hazard Control Technology Team and the ES&H Instrumentation team for additional training of the TD Radiation Monitors.
2. Most of the TD ES&H procedures are well written and are readily available on the TD Web-page. At locations such as machine shops where PCs are not readily available, TD has added "safety Kiosks", which other organizations in the laboratory are trying to duplicate.
3. TD consistently posts radiological warning signs next to doors rather than on doors so that postings are clearly visible whether the door is open or closed.
4. TD has been making a conscious effort in reducing the number of the buildings containing radioactive material.

Recommendations:

1. The TD ES&H Department should follow up on the roughing station that was received with incorrect MMR (Observation #14, TD responsible).
2. The outstanding exposure investigations should be completed in a timely manner (TD responsible).
3. Several of TD ES&H procedures need to be updated to reflect the DOE moratorium on recycling of the metals, ES&H Section current form numbers, ES&H Section Hazard Control Technology Team and Accelerator Division name changes. As a heads up for the January '05 change of waste disposal site, it is suggested referral to the state of Washington be replaced with a generic one to alleviate the requirement for revision every time the contractor is changed. (TD responsible).
4. Perhaps appropriate to the scope of radiological work there, TD is "one deep" as far as RSO coverage are concerned. Backup functions might be improved if the TD RSO and the ES&H Section Radiation Protection Group liaison established regular discussions concerning ongoing TD projects and tasks.

Finding ID	Date Found	Found In	RPM	Finding Title	Status
75191	12/17/2004	ES/RP		X-Ray Instrumentation	OPEN