R-030-204.1

3288

DOCUMENTATION SUPPORTING FERNALD ENVIRONMENTAL MANAGEMENT PROJECT ASBESTOS ABATEMENT REMOVAL ACTION REMOVAL ACTION NO. 26 ASBESTOS PROGRAM PROCEDURES

05-19-92

DOE-FN/EPA
500
REPORT

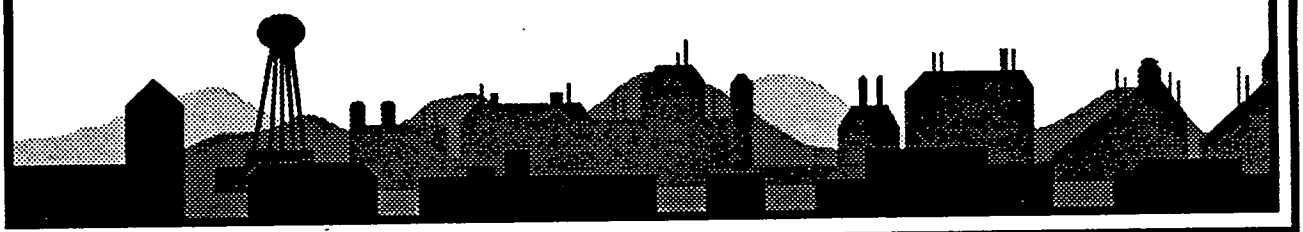
[redacted]

3288

DOCUMENTATION SUPPORTING FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

ASBESTOS ABATEMENT REMOVAL ACTION REMOVAL ACTION NO. 26

ASBESTOS PROGRAM PROCEDURES



MAY 19, 1992

ASBESTOS ABATEMENT REMOVAL ACTION

INDEX

3288

I. REMOVAL ACTION WORK PLAN AND ASBESTOS PROGRAM OVERVIEW

- Introduction
- Background
- Program Description
- Integration with OU3 RI/FS
- Figure 1, Asbestos Control Policy
- Figure 2, Logic Flow Chart for Asbestos Program
- Figure 3, FEMP Document Hierarchy
- Table I, Summary Description of General and Implementing Procedures
- List of Acronyms

II. GENERAL SUPPORTING DOCUMENTATION

- IN-FMPC-6007, Site Documentation System
- SSOP-0023, Deviation and Corrective Action Reporting
- RM-FMPC-0002, Centralized Training Program Manual*
- FMPC-2139, FMPC Quality Assurance Plan*
- FMPC Site Health and Safety Plan*
- PO-1003, Asbestos Control Policy
- CH-2005, Asbestos Management Committee Charter
- FMPC-2152, FMPC Respiratory Protection Manual
- FMPC-0519, Management of Hazardous Waste
- FMPC 2084, FEMP Radiation Control Manual
- FMPC-505, Radiation Control

INDEX

3288

III. IMPLEMENTING PROCEDURES

Step 1 Identification of ACM

- PL-FMPC-3002, Asbestos Management Plan
- Asbestos Survey & Assessment for the FEMP*

Step 2 Characterize ACM

- IH-03, Control of Work Involving Asbestos
- PL-FMPC-3002, Asbestos Management Plan
- Asbestos Survey & Assessment for the FEMP*

Step 3 Determine appropriate abatement

- SOP-FMPC-0518, Completion of NEPA Documentation
- PL-FMPC-3002, Asbestos Management Plan
- OU3 RI/FS Work Plan Addendum*
- Asbestos Survey & Assessment for the FEMP*

Step 4a Agency notification and documentation

- RCG-90-100, Notification Procedures
- SOP-FMPC-0518, Completion of NEPA Documentation

Step 4b In situ Maintenance for Operations and Maintenance (O&M)

- IN-6029, Asbestos Operations & Maintenance Manual
- FMPC-0516, Control of Permits for Accomplishing Hazardous Work
- SP-P-41-006, Issuing Permits for Asbestos Work

Step 5 Removal

- 20-C-604, Control and Utilization of Contaminated Trash Dumpsters
- IH-03, Control of Work Involving Asbestos

INDEX

- FMPC-0516, Control of Permits for Accomplishing Hazardous Work
- SP-P-41-006, Issuing Permits for Asbestos Work
- IN-6029, Asbestos Operations & Maintenance Manual

Step 6 Waste Management Program

- PP-0134, Packaging, On-Site Movement and Off-Site Shipment of Material
- Low Level Waste Management Procedures**

Step 7 Ongoing Hazard Assessments

- DOE Order 5480.10, "Industrial Hygiene Program"
- FMPC 2128, IH&S Manual*
- IH-03, Control of Work Involving Asbestos

Step 8 Long Term Plans (RI/FS; Safe Shutdown, RA #12)

- Safe Shutdown Work Plan**
- Asbestos Survey & Assessment for the FEMP*
- OU3 RI/FS Work Plan Addendum*
- Study for Systematic Removal of Buildings and Facilities*
- Work Plan for Plant 7 Dismantling*
- RI Report/Baseline Risk Assessment*
- FS Report/Proposed Plan*

Step 9 Self-Assessment and Program Evaluation

- Asbestos Program Internal Audit/Self-Assessment System
- DOE Self-Assessment Guidance Document

INDEX

3288

Step 10 Training and Corrective Action Implementation/Communication

- Asbestos Program Training Matrix

* To be transmitted to USEPA as part of a future Consent Agreement deliverable or upon request.

** Previously transmitted as part of another Removal Action Work Plan

Attachment II

REMOVAL ACTION NO. 26
ASBESTOS ABATEMENT REMOVAL ACTION

3288

Introduction

In September 1991, the U. S. EPA (USEPA), and the U. S. Department of Energy (DOE) jointly signed an amended Consent Agreement pertaining to the Fernald Environmental Management Project (FEMP), formerly known as the Feed Materials Production Center (FMPC). Consistent with the terms of this amended Agreement, on January 15, 1992, a listing of potential new removal actions (termed Phase III) was submitted to the USEPA by USDOE for review and approval. This listing of potential new removal actions was subsequently approved by the USEPA at the February 25, 1992, Program Managers Meeting. One of these removal actions identified that activities performed under the scope of the current-ongoing FEMP Asbestos Program would constitute a Removal Action consistent with Section IX.F.2 of the Consent Agreement and the provisions of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This Asbestos Removal Program-Removal Action is designated as number twenty-six (26), termed "Asbestos Removals (Asbestos Program)".

The January 15, 1992, Phase III submittal established that the DOE would submit a removal action work plan consisting of a compendium of existing procedures and documentation for the ongoing Asbestos Abatement Program. This deliverable has been compiled to fulfill the terms of the agreement for Removal Action No. 26 scheduled to be submitted to USEPA on May 19, 1992.

This submittal provides a brief overview of the FEMP Asbestos Program and a review of the policies and procedures governing the program. The focus of this submittal is to transmit to the USEPA a compilation of FEMP facility documentation supporting the FEMP Asbestos Program.

Background

The FMPC was built in the early 1950's to provide high purity uranium metal and other forms to support U.S. defense initiatives. The name of the facility was changed to the FEMP in 1991 after production ceased in 1989 and the site mission changed from metals production to environmental remediation. During construction of the facility and throughout the production phase of operations, asbestos materials were used as building materials (building siding, floor tiles, ceiling tiles, etc.) and as process support materials for producing uranium and by-products (insulations, liners, etc.). Some of the asbestos materials have become radiologically contaminated as a consequence of 37 years of production process operations. Asbestos has been identified as posing a potential health hazard and environmental contamination problem from migration induced through weathering, and the human exposures resulting from the increased potential for contact with personnel performing environmental remediation. This problem is present across the FEMP due to the extensive quantities, condition, and ubiquitous nature of asbestos and asbestos containing material (ACM).

Background (con't)

This removal action will address the comprehensive plan for asbestos abatement at the FEMP. The ongoing and planned activities comprising this Removal Action are expected to be consistent with the final remedy identified from the Remedial Investigation/Feasibility Study (RI/FS) process. The primary regulatory drivers for Program activities are OSHA (29 CFR 1926.58), U.S. EPA NESHAP (40 CFR 61 Subpart M) and OEPA (OAC 3745-20) regulations.

As a result of concern for potential exposures to site workers and releases to the environment due to the nature and condition of the ACM, an Asbestos Abatement Program was established at the FEMP. A trained dedicated crew of Asbestos Abatement workers was formed in 1990 and an Asbestos Program Coordinator was hired to provide inter-department daily oversight of site activities involving ACM. As the site completely shifted its focus to environmental remediation, a centralized Asbestos Management Committee was organized to ensure line management involvement across departments.

Asbestos Program

The FEMP Asbestos Program is a comprehensive program that is intended to provide management oversight for all support activities that involve asbestos containing material (ACM) or are conducted in areas where ACM is located. The Program is defined by an evolving Asbestos Management Plan that enacts an Asbestos Control Policy (see Figure 1) focusing on worker protection, prevention of environmental emissions and compliance with the applicable regulations or legal agreements. An Asbestos Management Committee (AMC), representing the principal FEMP organizations involved in abatement activities, ensures the principles expressed in the Control Policy are established by developing sitewide procedures, setting specific abatement and management goals, periodically evaluating progress towards these goals, and communicating corrective activities or general information to their respective organizations. Many of the AMC members are State of Ohio certified Asbestos Hazard Evaluation Specialists and Asbestos Hazard Abatement Specialists (AHAS), trained to ensure the Asbestos Program meets the requirements in OSHA 1926.58, OSHA 1910.120, CAA NESHAP subpart M, OAC 3745-20, DOE Orders, legal agreements and all the CERCLA regulations associated with the FEMP cleanup.

The Asbestos Program Coordinator is the chairman of the Asbestos Management Committee and reports to the Manager of the WEMCO Clean Air Program (CAP). The CAP is managed within the Clean Air and Water Programs section of the WEMCO Environmental Management Dept., to ensure that the program is ultimately managed as part of a CERCLA, multimedia (air, water, soil) environmental restoration of the FEMP.

Figure 2 is a logic flowsheet identifying the elements that comprise the Asbestos Program from identification of the hazardous material to final disposition of the removed ACM waste (covered as part of the Removal of Waste Inventories Removal Action #9). As illustrated in the FEMP Document Hierarchy (Figure 3), the various elements that comprise the Program are executed by describing the requirements (DOE Orders, Laws and Regulations, et al.) in Policy and Directives that are enacted through Sitewide and Department documents. Table I summarizes all the directives, policies, plans and procedures that constitute the site guidance documents. A step by step review of Figure 2, its relationship with the FEMP Document Hierarchy and the current site documents, best illustrates how the Program is directed to meet all the requirements.

Asbestos Program (con't)

Step 1 - Identification of Asbestos Containing Material (ACM)
As Step 1 of Figure 2 indicates, the first element of the Program involves identification of the ACM at the FEMP. A site survey was recently completed by certified Asbestos Hazard Evaluation Specialists (AHES) who were contracted to do an Asbestos Hazard Evaluation and Response Act (AHERA) based survey of the entire site. Certified Asbestos Hazard Evaluation Specialists from the site oversaw the surveyors, and validated every aspect of the survey to ensure the sampling, analysis, labeling and disposition of the sampled material met the AHERA, OSHA and CAA requirements.

As described in Table I, the current Asbestos Management Plan is the document describing how the survey was performed, and the Asbestos Survey & Assessment report summarizes 3000 pages of detailed information from the evaluation of 74 buildings. Over 2,500,000 sq. ft. of asbestos transite, 120,000 linear ft. of asbestos insulation and 32,000 sq. ft. of miscellaneous ACM (tile, etc.) have been identified in 56 buildings on site. The Site Survey is part of the supporting documentation in the Administrative Record for Operable Unit (OU) 3, and was transmitted to the DOE Fernald Office, February 28, 1992.

Step 2 - Characterization of the ACM
The original Asbestos Management Plan (AMP) also provided for a two step characterization of the ACM, utilizing the AHERA hazard ranking, and the Air Force "grade" algorithm to assess the condition and potential for disturbance of the material. Each homogeneous area was numerically prioritized to categorize the material for in situ maintenance or removal. The survey is kept current through ongoing site hazard assessments (Step 7) performed by certified AHES and Industrial Hygiene technicians. Facility inspections are also conducted in the presence of certified AHES, and the survey records are updated by OSHA competent Clean Air Program (CAP) personnel to reflect progress in ongoing asbestos abatement projects.

In addition to the Asbestos Management Plan, the "Control of Work Involving Asbestos" document and the Industrial Hygiene & Safety Manual provide guidance during any of the work required to characterize the ACM.

Step 3 - Determining the Appropriate Abatement
The Step 3 determination of appropriate abatement is a process that involves a comprehensive evaluation of the hazards of the ACM and the other CERCLA hazardous substances within the particular facility. The National Environmental Policy Act (NEPA) documentation is prepared per SOP-FMPC-0518 to determine whether an Environmental Assessment or Environmental Impact Statement is appropriate. Friable material with a significant hazard ranking, as described in the AMP and quantified by the Site Survey, is

Asbestos Program (con't)

targeted for immediate abatement. Non-friable asbestos is evaluated with information from the ongoing Health & Safety Hazard Assessments (Step 7), the OU3 RI/FS, Safe Shutdown Program, and other OU3 removal actions (Step 8) to determine whether abatement is appropriate and compatible with final remedial design for OU3. Since much of the ACM on site is presently non-friable, the consideration for radiological concerns is often as great as the hazard associated with airborne asbestos. Thus, ongoing abatement activity to address the potentially more hazardous ACM on site is performed by a dedicated team of asbestos workers who are certified by the Ohio Department of Health (DOH) as asbestos hazard abatement specialists, and, who are also trained in the other radiological, physical, and chemical hazards at the FEMP.

Step 4a - Agency Notification
Once the determination of the appropriate action has been made, the Southwest Ohio Air Pollution Control Agency (SWOAPCA) is notified of all demolition and renovation activities, as prescribed by Step 4a. These notifications are made for all demolitions and renovations, regardless of size, as prescribed by department procedure N-5, 90-100. This fulfills the reporting requirements of 40 CFR 61.145 and OAC 3745-20.

In October 1991, all asbestos abatement activities at the FEMP were categorically excluded from further National Environmental Policy Act (NEPA) documentation for 1992 and 1993. Additional documentation for 1994 and beyond will be processed per SOP-FMPC-0518 when the present exclusion expires.

Step 4b - In situ Maintenance
If it is determined that small scale, short duration abatement work or wet wrapping is required, the site Asbestos Operations & Maintenance (O&M) manual and IRS&T department procedures ("Control of Permits for Accomplishing Hazardous Work", "Issuing Permits for Asbestos Work") detail the in-situ maintenance or minor removal/renovation practices to be followed in Step 4b.

These standards comply fully with the construction and general abatement requirements of OSHA 1926.58 and OSHA 1910.120 for small scale, short duration work. All work performed is done by trained abatement workers or DOH licensed asbestos abatement contractors.

Asbestos Program (con't)

Step 5 - Asbestos Removal
When large scale removals, demolitions, or renovations involving ACM are required (Step 5), the major abatement projects require oversight by the Industrial Hygiene Section, as described by the department procedure "Control of Work Involving Asbestos." This document, coupled with the procedures for specifying how and when to issue site permits for asbestos abatement or hazardous work, provides for the necessary program management oversight to ensure compliance with the removal and renovation requirements in OSHA and CAA regulations.

The Asbestos O&M manual also provides guidance for minor removals, consistent with the "Control of Work" documents. Interim storage of the removed ACM is addressed in the Waste Management procedure for "Control and Utilization of Contaminated Trash Dumpsters".

Step 6 - Asbestos Waste Management
As Step 6 and the Asbestos Control Policy indicate, removed waste is managed as part of the comprehensive Waste Management Program at the FEMP. This program was previously described in an earlier compendium submittal for Removal Action #9. To ensure a safe program transition after the material is removed, packaging requirements specified by the "Packaging of Low Level Waste" procedure, and directions previously discussed in the "Control & Utilization of Contaminated Trash" procedure, provide guidance for the preparation of asbestos waste for management within the sitewide Waste Management Program.

Presently, there are approximately 1,000,000 lbs. of packaged ACM waste stored at the FEMP. Most, if not all, of this material is targeted for shipment to the Nevada Test Site (NTS) as low level radioactive waste. Authorization to ship contaminated asbestos waste is still being negotiated with NTS, but other DOE and commercial asbestos landfills are being considered. On site segregation of radiologically contaminated ACM from non-radiologically contaminated material is being pursued in an effort to broaden the possibilities for off site disposal, as well as reduce the costs and burden of burial as low level waste at NTS.

Step 7 - Ongoing Hazard Assessment
During the implementation of the Asbestos Program from the first step "Identification of the ACM" hazard to its "Removal" (Step 5) and final disposition under "Waste Management" (Step 6), the age and condition of the asbestos material require surveillance and assessment to ensure the current characterization of the ACM is accurate.

Asbestos Program (con't)

DOE Order 5480.10 prescribes the type of Industrial Hygiene Program that is required to ensure hazards such as ACM are routinely investigated. The Industrial Health & Safety manual defines the specific requirements and responsibilities for performing hazard assessments and the Control of Work procedure details the precautions to be taken during the work involving asbestos.

Step 8 - Long Term Plans

As the condition and quantities of ACM are subject to change, other activities at this site effect and sometimes mandate changes in the plans for removal or in-situ maintenance of asbestos. The long term plans for removal or in-situ maintenance of asbestos are presently being developed compatible with the "Study for Systematic Removal of Buildings and Facilities", "Plant 7 Dismantling Work Plan", "OU3 RI/FS Work Plan Addendum", "OU3 Remedial Investigation Report", and the "OU3 Feasibility Study Report". All of these documents are scheduled for submittal after this Removal Action Work Plan, so the current plans only reflect information from the "Asbestos Survey Assessment for the FEMP" and the "Safe Shutdown Work Plan". Those plans call for the immediate abatement of nearly 3,000 linear ft. of asbestos pipe insulation and approximately 100,000 sq. ft. of deteoriated asbestos transite from five buildings at the FEMP. The demolition of Plant 7 also involves asbestos removal, but that non-critical abatement will be performed as part of Removal Action #19.
Another 75 minor removals will be scheduled to address the ACM requiring prompt attention (hazard ranking of 7), as identified during the Site Survey.

Steps 9 and 10 - Training and Quality Assurance

Steps 9 and 10 identify the Training and Quality Assurance support systems that are designed to ensure that all the ACM regulatory requirements, Asbestos program site procedural requirements and related hazardous material requirements are not only communicated, but are implemented correctly, and updated to represent the most accurate information available.

As described in almost every preceding step, training is an integral part of nearly every element of the Asbestos Program. General sitewide hazard training per the requirements of OSHA 1910.120 is administered by the Centralized Training section of the IRS&T department. Additional specific Asbestos Program training, performed by EPA approved trainers, is provided for Asbestos Abatement workers and their supervisors.

Asbestos Program (con't)

The FEMP "Asbestos Training Requirements" mandated for the supervisors and Asbestos abatement workers exceeds the requirements specified in OSHA 1926.58, as all abatement workers receive EPA approved 32 hour OSHA 'competent person' training, regardless of the size of the abatement activity. All site personnel receive Asbestos Awareness training as part of the accredited sitewide training program developed to meet the requirements of OSHA 1910.120.

Additional OSHA training for facility owners and other personnel is provided to ensure individuals responsible for buildings containing ACM have a heightened awareness of their particular hazards.

A system for performing self-assessments and asbestos program evaluations pursuant to the DOE Self-Assessment Guidance Document has been instituted to ensure training, program elements and site documents are kept current with newly promulgated regulations or revisions to existing requirements. Audits along with other Asbestos Program quality assurance surveillances, are performed in support of this process. These complement the implementation of the sitewide Quality Assurance Plan, and ensure that the work practices follow the updated documents. Violations are noted in QA Deviation Corrective Action Reports that are reported to the Environmental Management department, where plans to correct the problem are developed and managed to completion.

General Information about Steps 1-10 and the Work Plan
It is recognized that revisions to existing policies and procedures to respond to evolving program needs or unique site conditions are an integral part of a successful program. The enclosed procedures are intended to be a living document, meeting current regulatory requirements while retaining the flexibility to respond to changes in an efficient manner. Changes or updates to the provided documentation may be necessary to ensure the continuity of operations, based on new requirements. Consistent with arrangements made in the January 15, 1992, Phase III annual review of potential new removal actions, updates to the compendium of existing procedures and documentation for the ongoing Asbestos Abatement Removal Action shall be submitted to the USEPA for review and approval on an annual basis, commencing on June 30, 1993.

Integration with the Operable Unit 3 (OU3) RI/FS

The inventory of asbestos and asbestos contaminated materials that currently exist on pipes, buildings, walls, tanks, and other surfaces of equipment used in the nine production plants are within the scope of OU3 of the ongoing site-wide RI/FS.

Integration with the Operable Unit 3 (OU3) RI/FS (con't)

Consistent with the provisions of the NCP, removal actions shall be appropriately integrated with ongoing RI/FS's including ensuring that appropriate documentation is entered into the Administrative Record. This integration is required to document any action taken which may affect site conditions relative to the Operable Unit as well as to ensure the removal action is supportive of potential final remedial objectives. Within the FEMP Administrative Record, a separate file shall be established for placement of supporting documentation for the Asbestos Removals (Asbestos Program) Removal Action No. 26. Included in the Administrative Record file will be all key program documentation, including this Work Plan submittal consisting of current Asbestos

Abatement Removal Action work procedures, and a compilation of appropriate materials disposition records for ACM encompassed within this Removal Action.

The implementation of Asbestos Abatement Removal Action activities clearly supports the remedial objectives for Operable Unit 3 by providing a necessary preliminary step for preparation of these areas for subsequent remedial activities. The Program actions are consistent with final remedial actions based on the fact that mitigation of personnel/environmental risk and safe, permanent disposition of FEMP wastes/materials are ultimate goals.

Close coordination will be maintained with the ongoing RI/FS for OU3 and other removal actions to ensure that planned activities appropriately support RI/FS field investigations and alternative evaluations by incorporating interim abatements of ACM into baseline risk determination and site characterizations.

ASBESTOS CONTROL POLICY

All FEMP activities that involve asbestos containing material (ACM) or are conducted in areas where ACM is located, will be performed in such a manner as to protect employees from harmful exposures, prevent environmental emissions that endanger public health or the environment, and ensure compliance with the regulations and legal agreements addressing such activities [DOE, OSHA, CAA, OAC, CERCLA, RCRA, CA, CD, FFCA, FFA].

In support of this policy statement, the following corollaries describe the fundamental principles upon which the Asbestos Management Plan and the Program organization have been established:

- A committee is to be established of the most knowledgeable individuals, representing the principal organizations involved in abatement activities at a level closest to the level of execution, to develop/update asbestos policies and procedures, set specific site goals, periodically evaluate progress, communicate information to their respective organizations, and self-assess the Asbestos Program.

- Adequate training is to be provided to ensure all employees understand the hazards of ACM in their work area and that abatement workers can demonstrate the procedures designed to accomplish their work, while protecting employee/public health and the environment.

- Asbestos abatement activities shall be communicated to SWOAPCA and performed according to the site specific procedures incorporating worker protection (OSHA 1926.58) standards, environmental standards (40 CFR 61, subpart M) and the other requirements detailed in the Asbestos Management Plan, as verified by self assessments and internal surveillance audits.

- ACM will be identified and initial hazard assessments used to plan short term (<5 years) abatement activities within an evolving program. Since asbestos abatement is part of a thirty year cleanup plan for the FEMP, and the scope of the project involving hazard abatement extends beyond asbestos, asbestos management is continually changing to reflect the changing regulations and the overall site activities regarding hazard abatement. The Asbestos program will be managed within the Clean Air Program (CAP) of the Environmental Management department where its activities will be planned, budgeted and scheduled consistent with the CERCLA based cleanup. Activities across/within departments will be coordinated by the CAP Asbestos Program Coordinator.

- Long term removal plans will be developed in five year increments for the life of the FEMP as part of the Asbestos Management Plan (AMP). The AMP will be annually updated to reflect the changing scope of the CERCLA remedial effort and the relative hazard of the ACM.

- Storage and disposal of removed ACM at the site will be managed as part of the comprehensive Waste Management Program at the FEMP.

- A compendia of the procedures used to control ACM will be forwarded to USEPA and annually updated/reissued in an effort to integrate asbestos abatement work with the CERCLA cleanup of the FEMP. REV. 0 - 12/27/91 PJB

Figure 1

ASBESTOS CONTROL POLICY

All FEMP activities that involve asbestos containing material (ACM) or are conducted in areas where ACM is located, will be performed in such a manner as to protect employees from harmful exposures, prevent environmental emissions that endanger public health or the environment, and ensure compliance with the regulations and legal agreements addressing such activities [DOE, OSHA, CAA, OAC, CERCLA, RCRA, CA, CD, FFCA, FFA].

In support of this policy statement, the following corollaries describe the fundamental principles upon which the Asbestos Management Plan and the Program organization have been established:

- o A committee is to be established of the most knowledgeable individuals, representing the principal organizations involved in abatement activities at a level closest to the level of execution, to develop/update asbestos policies and procedures, set specific site goals, periodically evaluate progress, communicate information to their respective organizations, and self-assess the Asbestos Program.

- o Adequate training is to be provided to ensure all employees understand the hazards of ACM in their work area and that abatement workers can demonstrate the procedures designed to accomplish their work, while protecting employee/public health and the environment.

- o Asbestos abatement activities shall be communicated to SWOAPCA and performed according to the site specific procedures incorporating worker protection (OSHA 1926.58) standards, environmental standards (40 CFR 61, subpart M) and the other requirements detailed in the Asbestos Management Plan, as verified by self assessments and internal surveillance audits.

- o ACM will be identified and initial hazard assessments used to plan short term (<5 years) abatement activities within an evolving program. Since asbestos abatement is part of a thirty year cleanup plan for the FEMP, and the scope of the project involving hazard abatement extends beyond asbestos, asbestos management is continually changing to reflect the changing regulations and the overall site activities regarding hazard abatement. The Asbestos program will be managed within the Clean Air Program (CAP) of the Environmental Management department where its activities will be planned, budgeted and scheduled consistent with the CERCLA based cleanup. Activities across/within departments will be coordinated by the CAP Asbestos Program Coordinator.

- o Long term removal plans will be developed in five year increments for the life of the FEMP as part of the Asbestos Management Plan (AMP). The AMP will be annually updated to reflect the changing scope of the CERCLA remedial effort and the relative hazard of the ACM.

- o Storage and disposal of removed ACM at the site will be managed as part of the comprehensive Waste Management Program at the FEMP.

- o A compendia of the procedures used to control ACM will be forwarded to USEPA and annually updated/reissued in an effort to integrate asbestos abatement work with the CERCLA cleanup of the FEMP. REV. 0 - 12/27/91 PJB

Figure 1

Logic Flow Chart for Asbestos Program

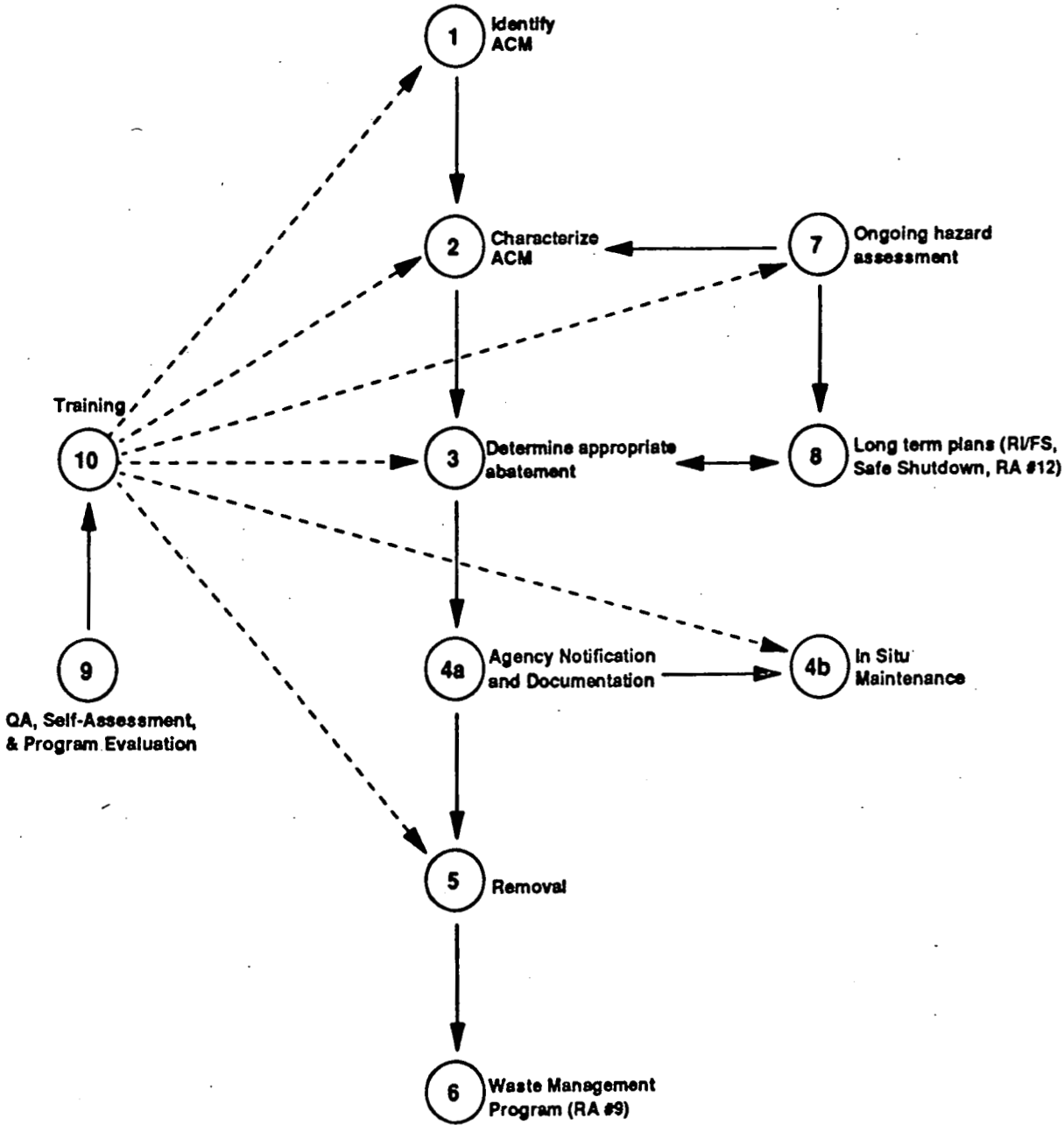


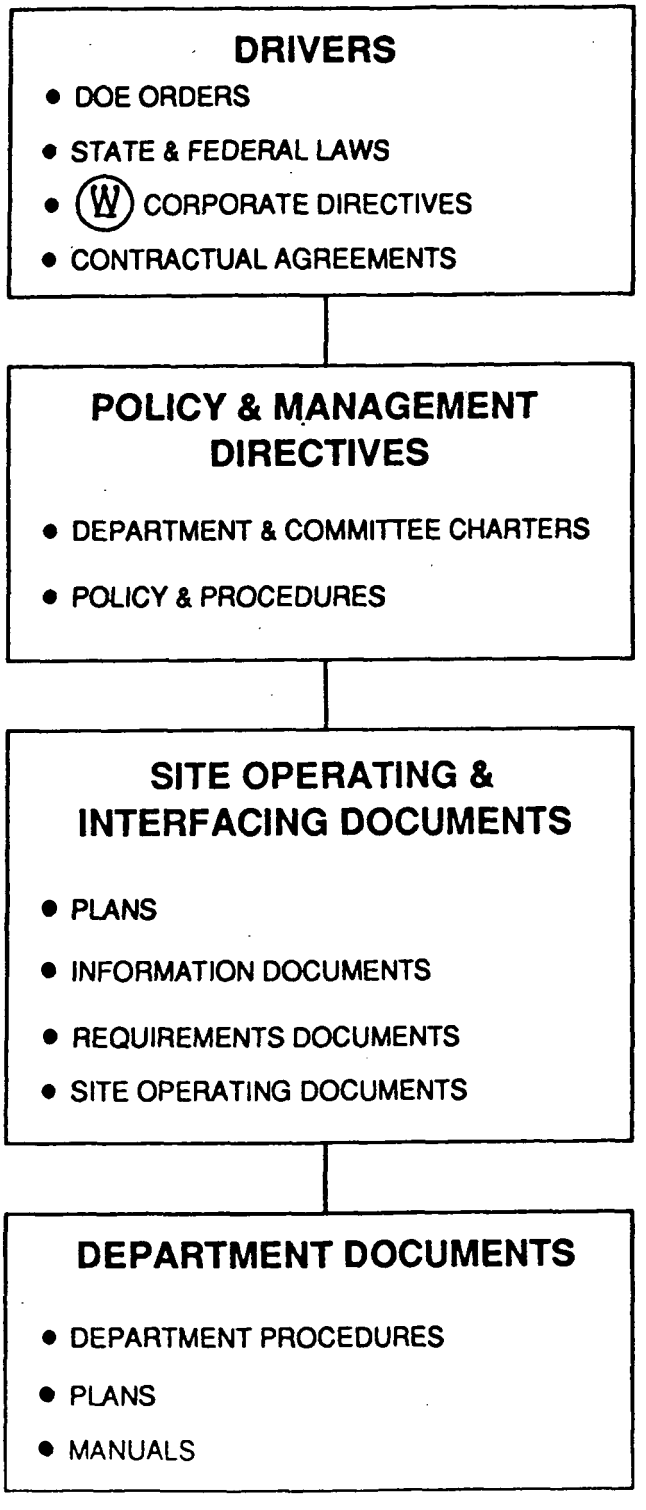
Figure 2

FIGURE 3

ASBESTOS REMOVALS - ASBESTOS PROGRAM

WEMCO SITE DOCUMENT PROGRAM HIERARCHY

3288



CHARTER - A document defining the work scope & responsibilities of a department, committee, council, board or function.

POLICY & PROCEDURE - A statement of management policy followed by a series of administrative instructions, including responsibilities & principal actions affecting two or more departments.

PLAN - A document identified as required by a driver or information defining actions to be taken to meet a requirement.

INFORMATION DOCUMENT - Information compiled on a subject and presented to be informative for personnel of the FEMP or as required by external organizations.

REQUIREMENTS DOCUMENT - A document defining requirements for an activity affecting two or more WEMCO organizations.

SITE OPERATING DOCUMENT - A procedure that provides detailed operating instructions for an activity to two or more WEMCO organizations.

DEPARTMENT PROCEDURE - A procedure that provides instructions to only one WEMCO organization.

PLAN - A document identified as required by a driver for only one WEMCO organization in order to meet a requirement.

MANUAL - A document that provides detailed requirements/ instruction affecting only one WEMCO organization.

TABLE I

STEP	REGULATION/PROCEDURE	DESCRIPTION/COMMENTS
GENERAL	IN-FMPC-6007, Site Documentation System	This site procedure defines the system of documents by which the FEMP is managed and details the requirements for development, preparation and control of these documents.
	SSOP-0023, Deviation and Corrective Action Reporting	This procedure identifies the assigned responsibilities and required actions for identifying, documenting, evaluating and providing dispositions and corrective action plans for deviations and corrective actions observed during audits, reviews, surveillances, inspections or tests performed at the Site by both internal and external organizations, as well as the evaluation of supplier-proposed dispositions and corrective actions plans.
	RM-FMPC-0002, Centralized Training Program Manual*	This site manual establishes the requirements for all personnel involved in the development and delivery of training. The manual is prepared in accordance with DOE Order 5480.18. The manual also references the DOE Training Accreditation Program (TAP) Manuals. Copies of this document will be made available upon request.

TABLE I

STEP	REGULATION/PROCEDURE	DESCRIPTION/COMMENTS
GENERAL	FMPC-2139, FMPC Quality Assurance Plan*	This site manual incorporates the policies for achieving or exceeding the required quality levels in the operation of the Site. The program is based on the criteria specified in ANSI/ASME NQA-1. DOE Orders 5700.6 and 5700.6B specify NQA-1 as the preferred standard for Quality Assurance. Copies of this document will be made available upon request.
	FMPC Site Health and Safety Plan*	This site plan provides the overall means for planning and implementing the job site characterization, health, and safety training and job orientation for personnel. Copies of this document will be made available upon request.
	Asbestos Control Policy	This Environmental Management Directive provides guidance and an outline for an Asbestos Management Plan and Program that protects FEMP employees, prevents environmental emissions and meets all regulatory requirements or FEMP legal agreements.

TABLE I

STEP	REGULATION/PROCEDURE	DESCRIPTION/COMMENTS
GENERAL	ASBESTOS MANAGMENT COMMITTEE CHARTER	This non-operational document details the responsibilities of the Asbestos Management Committee that was organized to ensure line management responsibility for implementing the Asbestos Control Policy and Management Plan.
	FMPC RESPIRATORY PROTECTION MANUAL, FMPC-2152	This non-operational document describes the Personal Protective Equipment required for all hazardous material work, citing specific asbestos respiratory requirements.
	MANAGEMENT OF HAZARDOUS WASTE, FMPC-0519	This Management Directive provides general guidance for the preparation of removed ACM for management in the FEMP Waste Management Program.
	FEMP RADIATION CONTROL MANUAL, FMPC 2084	This non-operational manual presents the specific radiological control requirements and protective measures that are to be employed at the FEMP.
	RADIATION CONTROL, FMPC-505	This procedure identifies the safety requirements and assigns the responsibilities for the control of radioactive materials and personnel radiation exposure and contamination at the FEMP.

TABLE I

STEP	REGULATION/PROCEDURE	DESCRIPTION/COMMENTS
STEP 1 Identification of ACM	ASBESTOS MANAGEMENT PLAN, PL-FMPC-3002	This Site Operation Work Plan details the methodology for identification and hazard assessment of ACM on site. Now that the Site Survey is complete, this document is currently being revised to describe the entire asbestos program in a non-operational plan.
	ASBESTOS SURVEY & ASSESSMENT FOR THE FEMP*	This report identifies and provides an assessment of the ACM at the FEMP during CY1991. It is currently being updated to reflect continuing abatement actions that are part of the Asbestos Program removal/remediation actions or other CERCLA removal/remedial actions, in an effort to keep the inventory accurate for final OU3 remediation. Copies of this document can be made available upon request.

STEP 2 Characterize ACM	CONTROL OF WORK INVOLVING ASBESTOS, IH-03	This IH section document provides general guidance and requirements for all work involving asbestos, focusing primarily on abatement work (contractors and WEMCO personnel). Section 5.7 describes emergency procedures i.e. handling spills or incidents involving asbestos.
	ASBESTOS MANAGEMENT PLAN PL-FMPC-3002	See above description/comments as described in Step 1.
	ASBESTOS SURVEY AND ASSESSMENT FOR THE FEMP*	See above description/comments as described in Step 1.
STEP 3 Determine appropriate abatement	COMPLETION OF NEPA DOCUMENTATION, SOP-FMPC-0518	This procedure describes the NEPA documentation Program.
	ASBESTOS MANAGMENT PLAN, PL-FMPC-3002	See above description/comments as described in Step 1.
	OU3 RI/FS WORK PLAN ADDENDUM	Due to U.S. EPA 6/2/92.
	ASBESTOS SURVEY AND ASSESSMENT FOR THE FEMP*	See above description/comments as described in Step 1.
STEP 4a Notify Regulatory Agencies and document removals, renovations, and demolitions involving ACM	NOTIFICATION PROCEDURES, RCG-90-100	This Site Standard Operating Procedure ensures that all removals, renovations and demolitions involving asbestos at the FEMP are conducted with proper regulatory notification.
	COMPLETION OF NEPA DOCUMENTATION, SOP-FMPC-0518	This policy describes the NEPA documentation program.

STEP 4b In situ Maintenance for Operations and Maintenance (O&M)	ASBESTOS OPERATIONS & MAINTENANCE MANUAL, IN-6029	This Site Operation document provides a detailed description of procedures to be followed during small scale, short duration asbestos work, performed primarily by WEMCO personnel.
	CONTROL OF PERMITS FOR ACCOMPLISHING HAZARDOUS WORK, FMPC-0516	This procedure establishes positive means for controlling work tasks that involve all hazardous or potentially hazardous materials, equipment, operations or activities. The procedure describes the responsibilities and means for control of work by WEMCO employees, subcontractor personnel, and/or others involved with any of the following activities: working with asbestos; working on a chemically-hazardous system; open flame and/or welding activities; working with a radioactive material; and entering or working in a confined space.
	ISSUING PERMITS FOR ASBESTOS WORK, SP-P-41-006	This section document provides specific instruction to ensure that exposures of employees to asbestos are prevented or within acceptable limits by having IH techs. preview the procedures for any job involving asbestos-containing materials.

STEP 5 Removal	CONTROL OF WORK INVOLVING ASBESTOS, IH-03	This document details the Health & Safety requirements for <u>any</u> asbestos work performed by WEMCO or subcontractor personnel at the FEMP.
	CONTROL AND UTILIZATION OF CONTAMINATED TRASH DUMPSTERS, 20-C-604	This department procedure describes the responsibilities for control of contaminated waste prior to offsite disposal.
	ASBESTOS OPERATIONS & MAINTENANCE MANUAL, IN-6029	See above description/comments as described in Step 4b.
	CONTROL OF PERMITS FOR ACCOMPLISHING HAZARDOUS WORK, FMPC-0516	See above description/comments as described in Step 4b.
	ISSUING PERMITS FOR ASBESTOS WORK, SP-P-41-006	See above description/comments as described in Step 4b.
STEP 6 Waste Management Program	PACKAGING, ON-SITE MOVEMENT AND OFF-SITE SHIPMENT OF MATERIAL, PP-0134	This department SOP describes the packagaing that must take place to ship (asbestos) material offsite. (NVO-325 requirements)
	LOW LEVEL WASTE MANAGEMENT PROCEDURES	See Compendium describing waste management program submitted to USEPA 8/31/91 to fulfill Consent Agreement (CA) IX1.b, "Removal of Waste Inventories," Removal Action (RA) #9.

STEP 7 Ongoing hazard assessments	DOE Order 5480.10, "Contractor Industrial Hygiene Program"	This Site Standard requirement guidance for the Industrial Hygiene Program, establishing a program for regular hazard assessments that is monitored by certified Industrial Hygienists.
	IH&S Manual, FMPC 2128	This Industrial, Radiological Safety and Training (IRS&T) department document details the specific Health & Safety practices that ensure worker protection from all FEMP hazards, including asbestos.
	CONTROL OF WORK INVOLVING ASBESTOS, IH-03	See above description/comments as described in Steps 2 & 5.

STEP 8 Long Term Plans (RI/FS; Safe Shutdown, RA #12)	Study for Systematic Removal of Buildings and Facilities*	Ref. CA 1X.4, this study will identify buildings no longer needed and will provide guidance for future demolitions and renovations which is key to determining appropriate abatement actions. Due to USEPA 1/15/93.
	Work Plan for Plant 7 Dismantling*	Ref. CA 1X.2, the Work Plan for Removal Action #19 is to be transmitted to USEPA 4/20/93.
	Safe Shutdown Work Plan*	Submitted to USEPA 10/31/91 in fulfillment of (CA) Consent Agreement Removal Action (RA) #9.
	Asbestos Survey & Assessment*	Completed 2/28/92. Available upon request.
	OU3 RI/FS Work Plan Addendum*	Due to USEPA, 6/2/92.
	OU3 Remedial Investigation Report*	Due to USEPA, 6/11/96.
	OU3 Feasibility Study Report*	Due to USEPA, 11/5/96.

STEP 9 Self-Assessment and Program Evaluation	Asbestos Program Internal Audit/Self-Assessment System DOE Self-Assessment Guidance Document	This Non-operational Plan details the schedule and contents of the Asbestos Program Self-Assessment and QA Audit system. This Site Standard requirement outlines the self-assessment program DOE facilities are required to have to ensure continuous program improvement.
STEP 10 Training	Asbestos Program Training Matrix	These Site Standard Requirements describe the Asbestos Program training requirements for Abatement workers, Supervisors of Abatement workers, Facility Owners and all other site personnel.

ASBESTOS PROGRAM
LIST OF ACRONYMS

ACM	- Asbestos Containing Material
AHAS	- Asbestos Hazard Abatement Specialist
AHERA	- Asbestos Hazard Evaluation Response Act
AHES	- Asbestos Hazard Evaluation Specialist
AMC	- Asbestos Management Committee
AMP	- Asbestos Management Plan
ARAR	- Applicable or Relevant and Appropriate Requirement
BI/MP	- Building Inspector/Management Planner
CA	- Consent Agreement
CAA	- Clean Air Act
CAP	- Clean Air Program
CERCLA	- Comprehensive Environmental Response, Compensation, and Liability Act
DOE	- Department of Energy
DOH	- Ohio Department of Health
EC&QA	- Environmental Compliance and Quality Assurance Department
IRS&T	- Industrial, Radiological Safety and Training
NCP	- National Contingency Plan
NEPA	- National Environmental Policy Act
NESHAP	- National Emission Standards for Hazardous Air Pollutants
OAC	- Ohio Administrative Code
OU3	- Operable Unit 3
QA	- Quality Assurance
RA	- Removal Action
RI/FS	- Remedial Investigation/Feasibility Study
ROD	- Record of Decision

3288

SOP	- Site Operating Procedure
SWOAPCA	- Southwest Ohio Air Pollution Control Agency
TAP	- Training Accreditation Program
USEPA	- United States Environmental Protection Agency
WEMCO	- Westinghouse Environmental Management Company of Ohio (previously WMCO)
WMCO	- Westinghouse Materials Company of Ohio (now WEMCO)

CONTROL NO. 94-1005

WESTINGHOUSE ENVIRONMENTAL MANAGEMENT COMPANY OF OHIO SITE DOCUMENT PROGRAM		**SITE POLICY AND PROCEDURE** Page 1 of 21
Title: **SITE DOCUMENT SYSTEM**		DOCUMENT NO: PP-0103 REVISION NO. 0
Authorization: (SOF) W. H. Britton, President	Supersedes: IN-FMPC-6007 Dated 6-28-91	Issue Date: 08-28-91

3288

1.0 POLICY

Westinghouse Environmental Management Company of Ohio (WEMCO) shall operate the Fernald Environmental Management Project (FEMP) in compliance with Department of Energy (DOE) contractual requirements, Westinghouse Corporate Directives, and state and federal laws/regulations. An integrated system of documents shall implement these identified requirements.

2.0 SCOPE

This procedure defines the system of documents by which the FEMP is managed and details the requirements for development, preparation, and control of these documents.

3.0 DEFINITIONS

3.1 Site Document System - The system of procedural documents governing the performance of administrative, technical, and operational activities at the FEMP. The document hierarchy is described in Figure 1.

3.2 Site Document Program - The document program by which all site applicable documents are issued except department and library documents.

3.3 Drivers - Operational and administrative requirements imposed on WEMCO by agreement, law, contract, DOE Directives, or Corporate Directives.

3.4 Policy and Management Directives - Documents by which the WEMCO President delegates responsibility for implementing requirements imposed by the drivers.

3.5 Site Operating and Interfacing Documents - Detailed instructions or requirements necessary to manage operations requiring participation by two or more departments.

3.6 Department Document - A document providing administrative, technical, or operating instructions to personnel within that department.

3.7 Interim Document - A document issued to satisfy an urgent need as identified by the WEMCO President or Staff Manager. Any site document may be selected for issue as an Interim document with an expiration date of sixty days from issue.

3288 3288

3.0 DEFINITIONS (cont.)

3.8 Temporary Revision - A document issued to satisfy an urgent need as identified by the document owner and having an expiration date of 90 days from issue.

3.9 Document Owner - The Staff Manager having primary responsibility for sitewide implementation of a driver or a manager other than a Staff Manager having a need for the document to permit safe and effective operation of activities for which they have primary responsibility. This manager may be the Staff Manager or manager designated by the responsible Staff Manager.

3.10 Procedure Technical Representative (PTR) - An individual that prepares the technical content of a site or department document at the request of the document owner.

3.11 Significant Review Comment (SRC) - A review comment that is considered by the approver to require satisfactory resolution before the document is acceptable for issue. SRC comments are only based on technical inaccuracies, noncompliance, or inconsistencies with established requirements, laws, regulations, and/or procedures. A significant review comment shall be concurred with by the staff manager (approver) if reviewed by an individual other than the approver.

3.12 Documentation Control (DC) - An organization within the Performance Assessment & Communications Department charged with developing, maintaining, and implementing a site document system.

4.0 RESPONSIBILITIES

4.1 Document Owner - Responsible for preparing, revising, and approving a document for area of responsibility.

4.2 Staff Manager - Responsible for preparing, approving, and maintaining current department charter and those site documents which implement their chartered responsibilities, and identifying those documents which require mandatory training or which require trained, qualified, and certified employees. Coordinates the required department review for site documents which affect their department by evaluating and consolidating comments to reflect a single department position and concurring with significant review comments.

4.3 WEMCO President - Responsible for authorizing the issue of documents which define and establish WEMCO Policies and Management Directives.

3288

4.0 **RESPONSIBILITIES** (cont.)

4.4 WEMCO Management - Responsible for reviewing issued site documents for applicability to their operation, assuring affected personnel are informed and trained to applicable documents, and ensuring implementation of issued document(s).

4.5 Documentation Control (DC) - A group within the Performance Assessment & Communications Department having responsibility for establishing and maintaining a controlled centralized document system translating external and internal customer requirements, and facilitating the development or update of the required procedures necessary to accomplish the WEMCO mission.

5.0 **GENERAL**

5.1 Site Document System Description

5.1.1 The Site Document System consists of all the actions necessary to control and record the following: review of drivers, development of documents, document reviews, document approvals, issue and distribution, and cancellation. The types of documents in this system and their relationships are shown in Figure 1.

5.1.2 A Site Policy and Procedure shall identify how a particular driver will be implemented by describing the necessary actions and identifying the position and/or organization(s) responsible for those actions. Detailed instructions, when necessary, shall be implemented through other site documents or department procedures.

5.1.3 Topical Manuals which have site applicability and were previously issued through the FEMP Library Report System shall be considered a site document. As Site Topical Manuals are revised, new manuals will be issued through the Site Document Program.

5.1.4 Technical reports and papers shall be issued through the FEMP Library Report System per FMPC-608 and FMPC-2070.

5.0 **GENERAL** (cont.)

3288

5.2 Document Initiation

5.2.1 Drivers enter the Site Document System by formal transmittal of a driver to the WEMCO President, formal transmittal of DOE Directives through the DOE Directives Administrator (Refer to FMPC-605), laws and regulations, or direct communication with a staff manager having responsibility for the implementing actions. Regardless of the route that the driver enters, a staff manager evaluates the driver for applicability to WEMCO operations and initiates actions to implement the driver.

5.2.2 A department charter shall be prepared and kept current by each staff manager as directed by the WEMCO President and shall follow the guidelines provided in this procedure.

5.3 Document Preparation, Approval and Authorization

5.3.1 The document owner or PTR shall identify document needs to DC and prepare a preliminary draft of the document.

5.3.2 The document owner/PTR is responsible for determining the required approvers. DC shall concur with the determination.

5.3.3 Approvers shall review the document and indicate comments on the Document Review Comment Sheet. Comments should be marked as SRC (Significant Review Comment) only when based on technical inaccuracies, noncompliance, or inconsistencies with established requirements, laws, regulations, and/or procedures. Significant review comments require an approval signature by the owner/approver if the SRC is not incorporated as verbatim as on the document review comment sheet. The owner/approver shall sign the document approval record as follows: (Signature)/with comments or no comments. DC shall be responsible to ensure signatures are obtained by the owner/PTR before document issue.

5.3.4 The document owner or the PTR is responsible for resolving and documenting on the document review comment sheet resolution of review comments. At the request of the document owner or PTR, DC will facilitate or resolve comments and document comment resolution.

5.3.5 A procedure development team may be formed for development, review or approval of documents.

3288

1) Step 5.3.3 is revised to read as follows:

5.3.3 Approvers shall review the document per requirements of Table A and indicate comments on the Document Review Comment Sheet. Comments should be marked as SRC (Significant Review Comment) only when based on technical inaccuracies, noncompliance, or inconsistencies with established requirements, laws, regulations, and/or procedures. Significant review comments require an approval signature by the owner/approver if the SRC is not incorporated verbatim as stated on the Document Review Comment Sheet. The owner/approver shall sign the document approval record as follows: (Signature)/with comments or no comments. DC shall ensure signatures are obtained by the owner/PTR before document issue.

2) A new Table "A" is added to read as follows:

TABLE A
REVIEWER REQUIREMENTS

1.	Review only for field of expertise. If discrepancies in other areas are noted, a comment may be made but should not be marked significant.
2.	Do not enter questions on the Document Review Comment Sheet. Make a definite statement. If necessary to resolve conflict, call the PTR indicated on the approval record.
3.	Comments shall apply only to the actions within the scope of the procedure. Comments that require modification of equipment or new equipment development should not be addressed in the review. Contact the PTR and/or the owner of the procedure.
4.	For a revision, review only portions of text indicated by an "R" in the margin. If changes are required to other parts of the text, notify the PTR indicated on the approval record.
5.	Do not designate comments as significant for spelling, punctuation, grammar, or organization titles.
6.	For questions pertaining to format, contact Documentation Control X-6545.
7.	Only indicate comments as "significant" if the change indicated is required to meet WEMCO policies and/or established regulations applicable to the FEMP operation. A comment which is a suggestion, concern, punctuation, grammar, spelling, organization title, or does not impact one or more of the following areas: safety, DOE requirement FEMP commitment, quality, compliance, technical content, or scope of procedure, shall not be considered significant.
8.	When comments are resolved, review only portions changed by comment resolution. Do not make new comments on other parts of procedure. If a required change was missed on the previous approval cycle, notify PTR or owner by phone.
9.	If the material is technically correct, do not change text because of personal opinion.
10.	Do not make comments on the review copy of the document. Use only a Document Review Comment Sheet for comments. Only comments on comments sheets will be considered for comment resolution.

5.0 **GENERAL** (cont.)

5.3.6 Unless a document requires extensive (50% or more) revision, changes shall be identified with an "R" in the left margin of each line revised.

5.3.7 Plans and Information Documents have no established format unless required by a driver.

5.3.8 Document format and content guideline requirements are identified in Figures 2, 3, and 4. Draft word processing for all documents shall be completed using one inch left and right margins.

5.3.9 Required document approval/authorization is identified in Table 1.

5.3.10 A record of issue/revisions shall be a part of each document.

5.4 Temporary Revision (TR) Preparation and Approval (See Figure 5)

5.4.1 A TR shall be written for each affected page or complete section of a document.

5.4.2 Permanently bound documents are excluded from the Temporary Revision System.

5.4.3 The document owner shall determine the need for a TR.

5.4.4 The document owner shall approve and authorize the TR.

5.4.5 Affected staff managers shall be identified by the document owner on the TR and shall review and submit comments within 30 days of TR issue to the document owner.

5.4.6 The affected staff manager(s) are responsible for reviewing the TR per "TR Review Requirements" as listed on TR.

5.4.7 The owner of the document shall evaluate TR comments and identify required TR changes within 60 days, if no change, DC shall incorporate TR in affected document before the expiration date. If there are no comments after 30 days, the owner may identify the TR for incorporation.

5.4.8 A maximum of 6 TRs may exist for a document before a revision is initiated by DC to incorporate the TRs.

5.0 **GENERAL** (cont.)

5.4.9 The TR shall be a controlled document.

5.4.10 All pages of the TR shall be printed on blue paper.

5.4.11 The document owner may initiate a request to cancel the TR until the date of expiration or date of incorporation.

5.5 Document Issue and Control

5.5.1 Full compliance with the requirements of site documents is required. Site documents are effective on the date they are issued. If a manager cannot comply with the requirements of the document as of the document issue date, the manager must take whatever actions are necessary to bring their organization into compliance as expeditiously as possible.

5.5.2 DC has the authority, without site review, to identify and correct minor editorial changes or corrections which do not impact technical content. These changes shall be completed by a document revision and be transmitted by controlled distribution.

5.5.3 Cancellation of a document shall require the same review and approval authority as an issued document. DC shall cancel existing documents when a document is assigned a new number, superseded by another document, or required strictly for records management purposes.

5.5.4 Each site document shall be reviewed at least annually by the document owner and reissued if applicable as determined by the document owner. DC shall notify the responsible staff manager when an annual review is required.

5.5.5 A Site Document Index shall be issued each month to include site and department documents. The index shall include only current documents.

5.5.6 Documents are authorized for issue by individuals identified in Table 2.

5.5.7 DC shall maintain approval, issue, control, and history records for documents issued through the Site Document Program.

5.0 **GENERAL** (cont.)

5.5.8 Holders of controlled documents are responsible for maintaining the current issue of the documents in their possession.

5.6 Department Documents

5.6.1 Department documents shall be prepared in accordance with a department document program authorized by the department manager and shall contain the elements listed in Table 2.

5.6.2 If requested by a department to administer a Department Document Program, DC may assist in document development and approval.

5.6.3 Department documents shall be formally reviewed at minimum every two years by the department manager and a record of the review maintained.

5.6.4 The first day of each month, a list of new or revised department documents for the month shall be transmitted by each department to DC for inclusion in the Site Document Index.

5.6.5 Department procedures shall not assign responsibilities to other departments.

5.7 Control Of Documents to Subcontractors

5.7.1 A document issued and controlled through the Site Document Program, the FEMP Library, or a Department Document Program, shall be transmitted by Documentation Control to a subcontractor by request of the contract administrator. The transmitted document may be controlled or non-controlled.

6.0 **PROCEDURE**

6.1 Review Applicability of Drivers

STAFF MANAGER

6.1.1 Review the driver for applicability in functional area of responsibility.

NOTE: DOE Directives are reviewed in accordance with FMPC-605, DOE Directives Administration.

6.0 PROCEDURE (cont.)

6.1.2 Take appropriate implementation actions and maintain records of the implementation actions.

6.2 Preparation, Approval, and Issue or Revision of a Site Document

DOCUMENT OWNER

6.2.1 Develop method or process for preparation of new or revision to document. Provide informal reviews for document development.

6.2.2 Identify the need for, or a change to, a site document and provide a draft to DC.

DOCUMENT OWNER/DC

6.2.3 Jointly develop an action plan for development, preparation, review/approval, and issue of a document.

DC

6.2.4 Formal document preparation by a technical writer shall be completed with concurrence of owner/PTR.

6.2.5 Facilitate document review/approval.

6.2.6 Assist the PTR as identified in the action plan in resolving review comments.

6.2.7 Prepare final document.

6.2.8 Obtain authorization.

6.2.9 Issue and control the document.

6.3 Preparation and Issue of a Temporary Revision (TR)

DOCUMENT OWNER

6.3.1 Identify the need for a TR and provide a draft to DC.

DC

6.3.2 Formal document preparation by a technical writer shall be completed with concurrence of owner/PTR.

6.0 **PROCEDURE** (cont.)

DC

6.3.3 Obtain authorization.

6.3.4 Issue and control the document.

7.0 **APPLICABLE DOCUMENTS**

7.1 Drivers

7.1.2 DOE Order 5700.6B, Quality Assurance

7.2 Reference Documents

7.2.1 FMPC-605, "DOE Directives Administration"

7.2.2 FMPC-608, "Preparation and Release of Technical Information"

7.2.3 FMPC-2070, "Style and Format Guide for Scientific and Technical Reports, Correspondence and other Presentations"

8.0 **APPLICABLE FORMS**

None

9.0 **ATTACHMENTS**

None

TABLE 1

DOCUMENT APPROVAL AND AUTHORIZATION

Document Type	Approval	Authorization
Interim Document	Staff Manager responsible for area of subject document	WEMCO President
Policy and Procedure	Affected Staff Managers	WEMCO President
Charter	Affected Staff Managers	WEMCO President
Plan	Affected Staff Managers	WEMCO President
Information Documents	Staff Manager responsible for area of subject document	Staff Manager responsible for area of subject document
Requirements Documents	Affected Staff Managers	WEMCO President
Site Operating Documents	Affected Staff Managers	WEMCO President
Temporary Revision (TR)	Document Owner	Document Owner
Department Documents	As identified by department document program	Department Mgr. or as identified by department program
Scientific and technical reports, correspondence and other presentations through the FEMP Library	Per FMPC-608 FMPC-2070	Per FMPC-608 FMPC-2070

TABLE 2

DEPARTMENT DOCUMENT PROGRAM ELEMENTS

1. Program description
2. Initiation of a new document or revision to an existing document
3. Identification of format for each type of document
4. Processing and review/approval for new or changes to documents
5. Identification of documents
6. Temporary Changes
7. Required approvals
8. Cancellation of Documents
9. Issuing authority
10. Document control
11. Records maintenance

WEMCO DOCUMENT HIERARCHY

DRIVERS

- DOE ORDERS
- STATE & FEDERAL LAWS
- W CORPORATE DIRECTIVES
- CONTRACTUAL AGREEMENTS

POLICY & MANAGEMENT DIRECTIVES

- DEPARTMENT & COMMITTEE CHARTERS
- POLICY & PROCEDURES

CHARTER - A DOCUMENT DEFINING THE WORK SCOPE & RESPONSIBILITIES OF A DEPARTMENT, COMMITTEE, COUNCIL, BOARD OR FUNCTION.

POLICY & PROCEDURE - A STATEMENT OF MANAGEMENT POLICY FOLLOWED BY A SERIES OF ADMINISTRATIVE INSTRUCTIONS, INCLUDING RESPONSIBILITIES & PRINCIPAL ACTIONS AFFECTING TWO OR MORE DEPARTMENTS.

SITE OPERATING & INTERFACING DOCUMENTS

- PLANS
- INFORMATION DOCUMENTS
- REQUIREMENTS DOCUMENTS
- SITE OPERATING DOCUMENTS

PLAN - A DOCUMENT IDENTIFIED AS REQUIRED BY A DRIVER OR INFORMATION DEFINING ACTIONS TO BE TAKEN TO MEET A REQUIREMENT.

INFORMATION DOCUMENT - INFORMATION COMPLIED ON A SUBJECT AND PRESENTED TO BE INFORMATIVE FOR PERSONNEL OF THE FEMP OR AS REQUIRED BY EXTERNAL ORGANIZATIONS.

REQUIREMENTS DOCUMENT - A DOCUMENT DEFINING REQUIREMENTS FOR AN ACTIVITY AFFECTING TWO OR MORE WEMCO ORGANIZATIONS.

SITE STANDARD OPERATING DOCUMENT - A PROCEDURE THAT PROVIDES DETAILED OPERATING INSTRUCTIONS FOR AN ACTIVITY TO TWO OR MORE WEMCO ORGANIZATIONS.

DEPARTMENT DOCUMENTS

- DEPARTMENT PROCEDURES
- PLANS
- MANUALS

DEPARTMENT PROCEDURE - A PROCEDURE THAT PROVIDES INSTRUCTIONS TO ONLY ONE WEMCO ORGANIZATION.

PLAN - A DOCUMENT IDENTIFIED AS REQUIRED BY A DRIVER FOR ONLY ONE WEMCO ORGANIZATION IN ORDER TO MEET A REQUIREMENT.

MANUAL - A DOCUMENT THAT PROVIDES DETAILED REQUIREMENTS/INSTRUCTIONS AFFECTING ONLY ONE WEMCO ORGANIZATION.

SITE DOCUMENT PROGRAM HIERARCHY
Figure 1

ORGANIZATION CHARTER FORMAT AND CONTENT GUIDELINES

1.0 **PURPOSE**

Identify the overall function of the organization.

2.0 **ORGANIZATION**

List subgroups and functions within the organization to describe purpose and goals. Describe interrelationships with other organizations.

3.0 **RESPONSIBILITIES**

List specific responsibilities of organization. If responsibilities are shared with other organizations, ensure shared organizations agree with established responsibilities.

4.0 **APPLICABLE DOCUMENTS**

Include in this section the specific documents that are applicable to the organization. If no documents exist, state "NONE."

4.1 Drivers - Administrative requirements creating need for the charter.

4.2 Reference Documents - Documents required to complete actions or portions of actions identified in the charter. Reference only documents issued through the Site Document Program. Department and Library Documents are not acceptable.

CHARTER FORMAT AND CONTENT GUIDELINES
Figure 2 (Sheet 1 of 2)

MEMBERSHIP CHARTER FORMAT AND CONTENT GUIDELINES

1.0 PURPOSE

Develop a statement of the purpose for the committee, council, or board.

2.0 MEMBERSHIP

List by title those individuals who serve as members and describe briefly how and whom members are chosen.

3.0 RESPONSIBILITIES

Include the responsibilities of the committee, council, or board, and, if appropriate, the unique responsibilities of the members. State the authority of the committee, council or board. Do not include responsibilities that are standard for any organization, such as the chairperson "chairs", the committee or the members participate in the meetings.

4.0 APPLICABLE DOCUMENTS

Include in this section the specific documents that are applicable to the particular committee, council, or board. If no documents exist, state "NONE."

4.1 Drivers - Administrative requirements creating the need for the charter.

4.2 Reference Documents - Documents required to complete actions or portions of actions identified in the charter. Reference only documents issued through the Site Document Program. Department and Library Documents are not acceptable.

3288

POLICY AND PROCEDURE FORMAT AND CONTENT GUIDELINES

1.0 **POLICY**

Provide a precise statement of the action(s) necessary to meet DOE Orders, Westinghouse Corporate Management Directives, or other identified requirements.

2.0 **SCOPE**

Describe briefly the purpose of the document and the functions, tasks, or situations that the procedure would be applicable.

3.0 **DEFINITIONS**

Define those unique terms used in the document that are important to the understanding of the document. Exclude from this section acronyms and abbreviations if the intent of inclusion is only identification and not definition.

4.0 **RESPONSIBILITIES**

Identify, by title, the individual or group responsible for the required action. This section shall provide an overview of the individual/organization actions and activities which, in a procedure, are presented in greater detail in Section 6.0.

5.0 **GENERAL**

Include explanatory information that is not specific to the procedure section but is necessary for the clarity and understanding of the document. If there are no general items, indicate by "None." Include figures and tables and locate as placed in this procedure.

6.0 **PROCEDURE**

6.1 Subsection Title Describing Following Series of Actions

WEMCO EMPLOYEE (Title of WEMCO employee or group responsible for completing the accompanying action steps)

POLICY AND PROCEDURE FORMAT AND CONTENT GUIDELINES
Figure 3 (Sheet 1 of 2)

POLICY AND PROCEDURE FORMAT AND CONTENT GUIDELINES (cont.)

6.0 **PROCEDURE** (cont.)

6.1.1 Indicate employee or group action in progressive order.

NOTE: Notes place emphasis on the continuity and logical sequence of actions. The use of notes within Section 6.0 shall be restricted to information necessary for user understanding of a particular procedural step. Notes shall not contain action steps.

7.0 **APPLICABLE DOCUMENTS**

7.1 Drivers - Administrative requirements creating need for the document.

7.2 Reference Documents - Documents required to complete actions or portions of actions identified in the document. Reference only documents issued through the Site Document Program. Department and Library Documents are not acceptable.

8.0 **APPLICABLE FORMS**

List forms and form numbers used in the Policy and Procedure.

9.0 **ATTACHMENTS**

Attachments should only supplement information contained in the procedure. The attachment shall not be used to direct procedure activities. Information in the attachment shall be within the borders of the formatted page and be identified at the bottom.

POLICY AND PROCEDURE FORMAT AND CONTENT GUIDELINES
Figure 3 (Sheet 2 of 2)

WESTINGHOUSE ENVIRONMENTAL MANAGEMENT COMPANY OF OHIO SITE DOCUMENT PROGRAM		**SITE POLICY AND PROCEDURE** Page 17 of 21
Title: **SITE DOCUMENT SYSTEM**		DOCUMENT NO: PP-0103 REVISION NO. 0
Authorization: W. H. Britton, President	Supersedes: IN-FMPC-6007 Dated 6-28-91	Issue Date: 08-28-91

SSOP FORMAT AND CONTENT GUIDELINES

1.0 PURPOSE

This section shall give a clear, concise statement explaining the intent of the procedure.

2.0 APPLICABILITY

This section shall summarize the reason and the specific case or circumstance for which the procedure applies and each organization to whom the procedure applies.

3.0 RESPONSIBILITIES

This section shall specify the responsibility and authority of the persons and/or organizations involved in the activity for which the procedure is written.

4.0 DEFINITIONS

This section shall include those terms and statements contained in the body of the document which require definition for uniform understanding.

5.0 GENERAL

Include explanatory information that is not specific to the procedure section but is necessary for the clarity and understanding of the document. If there are no general items, indicate by "NONE." Include figures and tables and locate as placed in this procedure.

6.0 INDUSTRIAL HEALTH AND SAFETY REQUIREMENTS (IF APPLICABLE)

This section shall contain statements and requirements regarding the environment, safety, and health of the activity. If there are no Industrial Health and Safety Requirements, indicate by "None".

SITE STANDARD OPERATING PROCEDURE (SSOP)
FORMAT AND CONTENT GUIDELINES
Figure 4 (Sheet 1 of 3)

SSOP FORMAT AND CONTENT GUIDELINES (cont.)

7.0 PROCEDURE

This section shall contain in detail all steps required to accomplish the activity.

7.1 Figures, tables, and guides shall be included at the end of the text and numbered consecutively.

NOTE: Forms shall be referenced in the text.

7.2 Note, Caution, Warning

7.2.1 A NOTE shall be incorporated in the text of a procedure to clearly define a condition or step of a procedure or present information that may be helpful in completing a task.

Example:

NOTE: A level below 500 gal. will cause pump shutdown.

7.2.2 A CAUTION shall be included in a procedure text when a condition will cause equipment/material damage or personnel injury.

Example:

CAUTION: **VALVE NO. 241 SHALL REMAIN OPEN. VALVE CLOSURE WILL CAUSE CUTTING HEAD DAMAGE AND PERSONAL INJURY.**

SITE STANDARD OPERATING PROCEDURE (SSOP)
FORMAT AND CONTENT GUIDELINES
Figure 4 (Sheet 2 of 3)

SSOP FORMAT AND CONTENT GUIDELINES (cont.)

7.2.3 A WARNING shall be used only for conditions that will cause equipment/material equipment failure and/or result in serious injury or death.

Example:

> **WARNING: THE IDENTIFIED HOLDING FIXTURE SHALL BE USED WHEN REMOVING THE DERBY FROM THE BREAKOUT AREA. USING A FIXTURE OTHER THAN IDENTIFIED, WILL RESULT IN DERBY BREAKAGE/CRANE FAILURE AND MAY RESULT IN SERIOUS INJURY.**

7.2.4 Photos may be included and shall be identified as a figure.

7.3 Subsection Title Describing Following Series of Actions

WEMCO Employee (Title of WEMCO employee or group responsible for completing the accompanying action steps)

7.3.1 Indicate employee or group action in progressive order.

8.0 APPLICABLE DOCUMENTS

8.1 Drivers - Administrative requirements creating need for the document.

8.2 Reference Documents - Documents required to complete actions or portions of actions identified in the document. Reference only documents issued through the Site Document Program. Department and Library Documents are not acceptable.

9.0 APPLICABLE FORMS

List form number and title used in the document.

10.0 FIGURES

10.1 List figure number and title of figures in the document.

SITE STANDARD OPERATING PROCEDURE (SSOP)
FORMAT AND CONTENT GUIDELINES
Figure 4 (Sheet 3 of 3)

CONTROL NO. _____

TEMPORARY REVISION

Page 1 of

SITE DOCUMENT PROGRAM

AFFECTED DOCUMENT NO. _____ TITLE:	TR NO. _____ ISSUE DATE: _____ EXPIRATION DATE: _____

FILING INSTRUCTIONS: File facing Page ___ of document _____, Rev. ___, Dated _____.

Owner/Staff Manager Authorization _____ Date _____

AFFECTED STAFF MANAGERS

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

TR REVIEW REQUIREMENTS

AFFECTED STAFF MANAGER REVIEW/COMMENT REQUIREMENTS:

1. Within 30 days of TR issue date review TR. If there are comments, transmit document review comment sheet to owner.

OWNER/STAFF MANAGER TR REVIEW COMMENT EVALUATION:

1. Review and determine applicability of affected manager TR review comments.
2. If TR review comments require change of TR as written, submit a request to revise affected document to Documentation Control within 60 days of TR issue date.

DOCUMENTATION CONTROL (DC)

1. DC shall incorporate TR in affected document as issued if no request has been submitted by document owner.

TEMPORARY REVISION DOCUMENT
Figure 5

WESTINGHOUSE ENVIRONMENTAL MANAGEMENT COMPANY OF OHIO SITE DOCUMENT PROGRAM		**SITE POLICY AND PROCEDURE** Page 21 of 21
Title: **SITE DOCUMENT SYSTEM**		DOCUMENT NO: PP-0103 REVISION NO. 0
Authorization: W. H. Britton, President	Supersedes: IN-FMPC-6007 Dated 6-28-91	Issue Date: 08-28-91

RECORD OF ISSUE/REVISIONS

Date	REV. NO.	DESCRIPTION AND AUTHORITY
08-28-91	0	New procedure required to define the FEMP Site Document System per Request No. P91-157, initiated by N. K. Weichold.

WESTINGHOUSE MATERIALS COMPANY OF OHIO SITE DOCUMENT PROGRAM		SITE STANDARD OPERATING PROCEDURE Page 1 of 21
Title: DEVIATION AND CORRECTIVE ACTION REPORTING		DOCUMENT NO: SSOP-0023 REVISION NO. 0
Authorization: (SOF) W. H. Britton, President	Supersedes: None	Issue Date: 06-27-91

1.0 POLICY

Westinghouse Materials Company of Ohio (WMCO) shall document, disposition and, where appropriate, identify root cause and take action to prevent the recurrence of deviations discovered in materials, processes and related documentation at the Site or at supplier facilities.

2.0 SCOPE

This procedure identifies the assigned responsibilities and required actions for identifying, documenting, evaluating and providing dispositions and corrective action plans for deviations and corrective actions observed during audits, reviews, surveillances, inspections or tests performed at the Site both internal and external organizations, as well as the evaluation of supplier-proposed dispositions and corrective actions plans.

3.0 DEFINITIONS

3.1 Condition Adverse to Quality (CAQ) - An all-inclusive term used in reference to any of the following: failures, malfunctions, deficiencies, defective items, violation of regulatory requirement or nonconformances.

3.2 Corrective Action - Measures taken to rectify significant conditions adverse to quality or violation of regulatory requirement and, where necessary, to preclude repetition.

3.3 Corrective Action Report (CAR) - A form used to document the corrective action process for significant conditions adverse to quality or violation of regulatory requirements discovered during audits, reviews, surveillances, inspections or tests performed by both internal and external organizations. This form can be either the CAR form shown in Attachment D or a computer generated form which contains the same information.

3.4 Deviation - As used in this procedure, "deviation" means a departure from a specified requirement discovered during an audit, review, surveillance, inspection or test. A deviation can be a condition in which characteristics of an item or service do not conform to prescribed limits; a required document is not available or is inadequate; a regulatory requirement was violated; or a procedure does not yield the desired results. These conditions can occur at any point in the fabrication, handling, shipment, storage, installation, operation of an item; the performance of a service; or the execution of quality assurance activities.

3.0 DEFINITIONS (cont.)

3.5 Deviation Report (DR) - A form used to document deviations, their disposition, verification and closure. This form can be either the DR form shown in Attachment A or a computer generated form which contains the same information.

3.6 Disposition - The action necessary to correct or resolve a specific deviation. Disposition involves the following:

3.6.1 Accept-as-is - item is acceptable for use when supported with technical justification.

3.6.2 Rework - item is processed further to conform to specified requirements.

3.6.3 Repair - item is processed to become acceptable for use but does not conform to specified requirements.

3.6.4 Reject - a decision that a nonconforming item cannot be accepted-as-is, reworked, or repaired. Rejected items shall be scrapped, identified and altered so as to be inapplicable for their original use, or returned to the supplier, as appropriate.

3.6.5 Other - describe in space provided on DR form the specific actions taken or to be taken such as revise procedure, develop procedure, provide training, etc.

3.7 External Corrective Action Report (XCAR) - A term used to signify the Corrective Action Report Form used to document findings discovered during external reviews by organizations other than WMCO and the corrective action process for addressing the findings.

3.8 Requisitioner - The individual who authorizes and/or initiates a purchase request.

3.9 Root Cause - The most basic reason for an effect, which, if corrected, will prevent recurrence of that effect. The correction must be achievable by WMCO and it cannot interfere with WMCO's goals and objectives. Most negative effects of interest will have a root cause that falls into one of three categories: Personnel Error, Procedural Error, or Equipment Failure.

3.10 Senior Management - Management reporting directly to the President of WMCO.

3.0 DEFINITIONS (cont.)

3.11 Significant Condition Adverse to Quality (SCAQ) - A condition which, if uncorrected, could have a impact on safety of employees and general public or operability, or violate a regulatory requirement.

4.0 RESPONSIBILITIES

4.1 WMCO Personnel/Preparer - Every WMCO employee is responsible for notifying Environmental Compliance/Quality Assurance of potential deviations by completing sections 1 and 2, as appropriate, of the Deviation Report (DR) form Attachment A.

4.2 Environmental Compliance and Quality Assurance - Is responsible for the following actions associated with deviations from reviews, surveillances, inspections and tests conducted at the Site and supplier facilities:

4.2.1 Identifying, documenting, issuing and requesting disposition of deviations on a DR form. Also assures clear description of deviation is provided.

4.2.2 Evaluating deviations and requesting root cause determination and corrective action where warranted.

4.2.3 Evaluating proposed disposition, root cause and corrective actions.

4.2.4 Verifying disposition/corrective actions are complete and acceptable, and closes DRs and CARs.

4.2.5 Retaining official records and files related to the documentation of deviations and their disposition and/or corrective action.

4.2.6 Tracking of the status of deviations.

4.3 Performance Assessment and Communications - Is responsible for the following actions associated with deviations from QA Program audits, trend analysis programs and external review findings:

4.3.1 Identifying, documenting, issuing and requesting disposition of deviations on a CAR form. Also assures clear description of deviation is provided.

4.3.2 Evaluating deviations and requesting root cause determination and corrective action where warranted.

4.0 RESPONSIBILITIES (cont.)

4.3.3 Evaluating proposed disposition, root cause and corrective actions.

4.3.4 Conducting actions to verify disposition/corrective actions are complete and acceptable.

4.3.5 Issuing final closure upon verification of corrective action.

4.3.6 Performing trend analysis of deviations.

4.3.7 Retaining official records and files related to the documentation of deviations and their disposition and/or corrective action.

4.3.8 Tracking of the status of deviations.

4.4 Senior Management/Activity Manager/Cognizant Engineer - Evaluates and determines root cause for the deviation. Proposes and accomplishes disposition/corrective actions. Approves Supplier Disposition Requests.

4.5 Procurement - Coordinates Supplier Disposition Requests for disposition/corrective action approval.

4.6 Evaluator - A person from Environmental Compliance and Quality Assurance or Performance Assessment and Communications, who is responsible to perform the following steps in processing a DR or CAR:

4.6.1 Determine whether a DR or CAR will be issued.

4.6.2 Accept the proposed disposition, root cause and corrective action.

4.6.3 Perform verification of disposition or corrective action.

4.6.4 Closeout the DR or CAR.

5.0 GENERAL

5.1 Deviations may or may not adversely affect the quality of the item or service involved, depending on the severity of the condition. Those deviations determined to be significant conditions adverse to quality require corrective action in accordance with this procedure. Deviations shall be evaluated for root cause determinations.

WESTINGHOUSE MATERIALS COMPANY OF OHIO SITE DOCUMENT PROGRAM		SITE STANDARD OPERATING PROCEDURE Page 5 of 21
Title: DEVIATION AND CORRECTIVE ACTION REPORTING		DOCUMENT NO: SSOP-0023 REVISION NO. 0
Authorization: W. H. Britton, President	Supersedes: None	Issue Date: 06-27-91

5.0 GENERAL (cont.)

5.2 Repetitive non-significant deviations of the same kind noted over a short period of time require corrective action in accordance with the requirements of this procedure.

5.3 A trend analysis of DRs, CARs and XCARs is performed by Performance Assessment to identify chronic problem areas. Results of this trend analysis are reported to responsible management, who review the data to determine root causes and develop corrective action(s) to prevent recurrence.

6.0 PROCEDURE

6.1 Deviation Reports

WMCO PERSONNEL/PREPARER

6.1.1 Identify and document potential deviations, as outlined in Attachment A, in Sections 1 and 2 of the Deviation Report (DR) form.

6.1.2 Verbally notify the responsible management of the potential deviation the same day it was discovered.

6.1.3 Sign and date the Prepared By block in section 2.

6.1.4 Forward the DR to Environmental Compliance/Quality Assurance for evaluation.

EVALUATOR

6.1.5 Evaluate the potential deviation for actual violation of requirements/specifications and assures clear description of deviation is provided. If an actual DR is not required notify preparer a DR is not required. If a DR is required proceed with step 6.1.6.

6.1.6 Obtain and enter a DR number from the computer DR data base or from the Administrator, Deviation and Corrective Action Control on the DR form . The unique number is composed of the current year and a three digit number (Example 89-001)

6.0 PROCEDURE (cont.)

6.1.7 When a nonconforming item (hardware or material) is discovered, ensure that a Quality Nonconformance Tag, Form FMPC-QA-2708 (Attachment B) is attached to it, where practical. If not practical to affix Nonconformance Tag, ensure other precautions are taken to preclude inadvertent use or further processing.

NOTE: Quality Nonconformance Tags shall be removed only after completion of the disposition action identified on the DR by the evaluator.

6.1.8 Evaluate deviations for Significant Conditions Adverse to Quality (SCAQ). See Attachment C for criteria and examples for determining the need for a Corrective Action Report. For those deviations determined to be SCAQ complete a Corrective Action Report in accordance with 6.2, if DR is no longer required close it out based upon the issue of a CAR.

6.1.9 Request disposition from the activity manager/cognizant engineer of the organization responsible for item or activity in which the deviation was discovered.

NOTE: When a deviation is identified at receiving inspection, the disposition shall be determined by the requisitioner/cognizant engineer.

ACTIVITY MANAGERS/COGNIZANT ENGINEER

6.1.10 Segregate hardware items in designated hold areas or implement other precautions to preclude inadvertent use, as appropriate.

6.1.11 Evaluate deviations for reportability under the occurrence reporting system. See PR-FMPC-4006, Occurrence Reports (OR). If an Occurrence Report is required, enter this as the proposed disposition and the DR will be closed out based upon the issue of an OR.

6.1.12 Enter the proposed disposition by checking the appropriate block in Section 3 of the DR. For non-hardware deviations check the "Other" block and enter the disposition in the space provided. Include the scheduled completion date for dispositioning action.

6.0 PROCEDURE (cont.)

6.1.13 Provide a technical justification for items which are dispositioned "Accept-As-Is" or "Repair". This justification must identify specific engineering calculations or higher tier documents which provide evidence that the item will function reliably and safely even though it does not conform to the original requirement. An unsupported belief, opinion, or recommendation is not an acceptable technical justification.

NOTE: When "accept-as-is" or "repair" are used for the disposition, configuration control records shall be updated to reflect changes.

6.1.14 Return the disposition for the DR to the Evaluator within the requested time frame.

EVALUATOR

6.1.15 Evaluate proposed disposition action(s) and notify the activity manager/cognizant engineer of the responsible organization of the results by signing the "Evaluation of Disposition" section of the DR form.

6.1.16 Obtain customer approval of proposed dispositions for deviations associated with accountability of nuclear materials and for products that do not conform to customer specification requirements.

ACTIVITY MANAGERS/COGNIZANT ENGINEER

6.1.17 Accomplish disposition action(s) as scheduled.

6.1.18 Notify the evaluator when disposition action(s) is completed by signing the "Verification of Disposition Action Completion" section of the DR form.

EVALUATOR

6.1.19 Monitor accomplishment of disposition action(s) and verify completeness and acceptability.

6.1.20 Close DR and notify the activity manager/cognizant engineer, of the organization responsible for disposition action, of closure.

6.1.21 Ensure Nonconformance tags are removed and release any hardware items involved from hold status.

6.0 PROCEDURE (cont.)

6.2 Corrective Action Reports

EVALUATOR

6.2.1 Evaluate deviations for Significant Conditions Adverse to Quality (SCAQ). See Attachment C for criteria and examples for determining the need for a Corrective Action Report (CAR).

6.2.2 Evaluate the need to issue the CAR to Senior Management in accordance with Attachment C. If a CAR is required obtain a CAR number from the computer CAR data base or from the Administrator, Deviation and Corrective Action Control. The unique number is composed of the current year and a three digit number (Example 89-001)

6.2.3 Verbally notify the responsible management the same day as identified.

6.2.4 Identify and document the request for corrective actions, as outlined in Attachment D, in sections 1 and 2 of the CAR form.

6.2.5 Obtain the concurrence of the Evaluator's manager.

6.2.6 Issue the Corrective Action Report to the senior management/activity manager of the organization responsible for the deviation.

ACTIVITY MANAGER

6.2.7 Evaluate deviations for reportability under the occurrences reporting system. See PR-FMPC-4006, Occurrence Report (OR).

6.2.8 Determine the underlying (root) cause of the problem and document it in Section 3A of the CAR form.

6.2.9 If necessary, perform an investigation to determine if any similar work is affected by the problem and, if so, identify the action taken/proposed and the schedule to correct it in Section 3B of the CAR form.

6.2.10 Describe the action taken/proposed to correct the root cause and to prevent recurrence of the problem in Section 3C of the DCAR form. Enter the scheduled completion date for corrective action in Section 3D.

6.0 PROCEDURE (cont.)

6.2.11 Provide response to the CAR to the Evaluator within the time frame requested.

EVALUATOR

6.2.12 Evaluate proposed corrective action(s), obtain the evaluating manager's approval, sign block 4 of CAR form and notify the activity manager of the responsible organization of the results.

ACTIVITY MANAGERS

6.2.13 Accomplish corrective action(s) as scheduled.

6.2.14 Notify the evaluator when corrective action(s) is completed.

EVALUATOR

6.2.15 Monitor accomplishment of corrective action(s) and verify completeness and acceptability.

6.2.16 Close CAR, by signing block 5 of the CAR form, and notify the activity manager of the organization responsible for disposition action of closure.

6.3 External Corrective Action Reports (XCARs)

PERFORMANCE ASSESSMENT

6.3.1 Receive external findings from external organization (such as Tiger Teams, Technical Safety Appraisal, Westinghouse Corporate, etc.).

6.3.2 Obtain and enter an XCAR number from the computer XCAR data base or from the Administrator, External Corrective Action Control on the CAR form. Enter the XCAR data into the Commitment System. The unique number is composed of an X, the current year and a three digit number (Example X89-001).

6.3.3 Process the finding in accordance with 6.2 except the use of an XCAR number instead of a CAR number.

6.0 PROCEDURE (cont.)

6.4 Responding to Supplier Request for Disposition/Corrective Action Approval

BUYER

6.4.1 Receive Supplier Disposition Requests (SDR), Attachment E, with proposed dispositions.

6.4.2 Forward the SDR with proposed disposition to requisitioning department and a copy to Environmental Compliance and Quality Assurance for review and concurrence.

REQUISITIONER

6.4.3 Evaluate the supplier's proposed disposition, obtain concurrence from Environmental Compliance and Quality Assurance concerning its acceptability and if appropriate, approve the disposition action in an approval memorandum.

NOTE: If disposition action is unacceptable, the Requisitioner initiates correspondence through the Buyer back to the supplier until resolution is reached.

REQUISITIONER

6.4.4 Forward the approval memorandum and supporting documentation to the Buyer.

BUYER

6.4.5 Issue disposition approval memorandum to supplier.

6.4.6 File a copy of disposition approval memorandum, completed SDR and supporting documentation in the purchase order file.

6.5 Trend Analysis

PERFORMANCE ASSESSMENT AND COMMUNICATIONS

6.5.1 Maintain a trend analysis program for the Deviation Reports, Corrective Action Reports and External Corrective Action Reports.

WESTINGHOUSE MATERIALS COMPANY OF OHIO SITE DOCUMENT PROGRAM		SITE STANDARD OPERATING PROCEDURE Page 11 of 21
Title: DEVIATION AND CORRECTIVE ACTION REPORTING		DOCUMENT NO: SSOP-0023 REVISION NO. 0
Authorization: W. H. Britton, President	Supersedes: None	Issue Date: 06-27-91

6.0 PROCEDURE (cont.)

6.6 Tracking of Deviations

ENVIRONMENTAL COMPLIANCE AND QUALITY ASSURANCE

6.6.1 Maintain a computer tracking/history system on open and closed Deviation Reports and Corrective Action Reports.

PERFORMANCE ASSESSMENT AND COMMUNICATIONS

6.6.2 Maintain a computer tracking/history system on open and closed External Corrective Action Reports.

6.7 Records

ENVIRONMENTAL COMPLIANCE AND QUALITY ASSURANCE

6.7.1 Maintain completed Deviation Reports and Corrective Action Reports as Quality Records.

PERFORMANCE ASSESSMENT AND COMMUNICATIONS

6.7.2 Maintain completed External Corrective Action Reports as Quality Records.

7.0 APPLICABLE DOCUMENTS

7.1 PR-FMPC-4006, Occurrence Reports (OR)

8.0 APPLICABLE FORMS

8.1 Form FMPC-EC&QA-2909 Deviation Report (DR)

8.2 Form FMPC-Q-2708, Quality Nonconformance Tag

8.3 Form FMPC-EC&QA-2909-1, Corrective Action Report (CAR)

8.4 Form FMPC-QA-2642, Supplier Disposition Request

9.0 ATTACHMENTS

9.1 Attachment A - Deviation Report (DR).

9.2 Attachment B - Quality Nonconformance Tag.

9.3 Attachment C - Criteria for Determining If a Corrective Action Report Is Required - Criteria for Determining If a Corrective Action Report Is Required To Be Issued To Senior Management

9.4 Attachment D - Corrective Action Report Form (CAR)

9.5 Attachment E - Supplier Disposition Request (SDR)

WESTINGHOUSE MATERIALS COMPANY OF OHIO SITE DOCUMENT PROGRAM		SITE STANDARD OPERATING PROCEDURE Page 13 of 21
Title: DEVIATION AND CORRECTIVE ACTION REPORTING		DOCUMENT NO: SSOP-0023 REVISION NO. 0
Authorization: W. H. Britton, President	Supersedes: None	Issue Date: 06-27-91

Attachment A
Page 1 of 2

DR NO.:	DEVIATION REPORT	REVISION:

1 Date of Discovery: _____ Responsible Organization: _____

Responsible Organization Representative: _____

Activity: _____ Location: _____

2 Requirements: _____

Deviation: _____

Verbally Notified Management: _____ (DATE) Prepared By: _____ Date: _____

Is Corrective Action Report Required? ☐ YES ☐ NO Provide Disposition by: _____

Evaluator: _____ Date: _____

3 Is Deviation Reportable Under OR? ☐ *Yes (UOR No. ____) ☐ No

*If yes, proceed in accordance with PR-FMPC-4006 and close this DR.

Disposition: ☐ Accept-As-Is ☐ Rework ☐ Repair ☐ Reject ☐ Other

Accept-As-Is/Repair Justification: _____

_____ Scheduled Completion Date: _____

Responsible Organization's Representative: _____ Date: _____

4 Evaluation of Disposition:

Evaluator: _____ Date: _____

5 Verification of Disposition Action Completion:

Preparer

Complete Section 1 and 2 as follows:

- Date of Discovery - Enter date the deviation was discovered.
- Responsible Organization - Enter the organization responsible for the item or activity in which a deviation is discovered.
- Responsible Organizations Representative - Enter name of the representative responsible for disposition/corrective action.
- Activity - Enter activity performed. (Example Audit 189-1)
- Location - Location of the activity. (Example Plant 8)
- Requirements - Identify the procedure, instruction, standard, or code which establishes the acceptance criteria for the activity or item being evaluated.
- Deviation - Fully describe the deviation as it relates to the requirements.
- Verbally Notified Management - List the date that the responsible organizations management was verbally notified of the potential deviation.
- Prepared By - The preparer signs and dates for Sections 2.

Evaluator

- Is Corrective Action Report Required - Evaluate deviation for issue of a Corrective Action Request. Check "Yes" if required or "No" if not required.
- DR No. - Obtain and enter on the DR Form a DR Number from the Computer DR Data Base or from the Administrator, Deviation Control and Corrective Action.
- Revision - Enter the current revision number 0, 1, etc.
- Provide Disposition By Date - Request the organization deemed responsible to provide dispositioning action by a certain date outlining steps taken or planned to correct immediate
- Evaluator - Sign & date Section 2 of the DR form.

Responsible Organization Representative

Completion of Disposition Action Section 3

- Is Deviation Reportable Under OR - Evaluate the deviation in accordance with PR-FMPC-4008 for Occurrence Reporting and check the appropriate block. If an OR is required sign or as complete and forward back to Evaluator.
- Disposition - for DR's not reportable as an OR, check the appropriate block for Accept-as-is, Rework, Repair, Reject or Other and indicate the appropriate disposition in the spac disposition is Accept-as-is or Repair provide a technical justification

Evaluator

Completion of the Receipt & Evaluation of Proposed Dispositions Section 4

- Review and evaluate the proposed disposition to determine its adequacy for solving the specific problem identified in the deviation report, which includes verification that a decision h by the Manager of the organization responsible, as to whether the deviation is reportable in accordance with PR-FMPC-4008 for Occurrence Report (OR). If the "Yes" box is checked, organization proceeds with the reportability process in accordance with PR-FMPC-4008 and the DR can be closed based upon the issue of a OR.
- Document acceptance of the proposed disposition in Block 4 by signature and date.
- Notify the organization responsible for disposition action of the rejection of the proposed disposition action and coordinate with the organization to obtain a revised respon

Completion of the Verification and Closure of Disposition Action Section 6

- Monitor the disposition and verify that the actions taken to correct the deviation have been completed satisfactorily.
- Approve acceptance of verified disposition in Section 6 by signature and date.
- Ensure the removal of nonconforming item tag(s) only after verifying satisfactory completion of all dispositioning actions.
- Forward the closed out deviation report (DR) to the Administrator, Deviation Control and Corrective Action with a copy to responsible organization management.

AJ

WESTINGHOUSE MATERIALS COMPANY OF OHIO SITE DOCUMENT PROGRAM		SITE STANDARD OPERATING PROCEDURE Page 15 of 21
Title: DEVIATION AND CORRECTIVE ACTION REPORTING		DOCUMENT NO: SSOP-0023 REVISION NO. 0
Authorization: W. H. Britton, President	Supersedes: None	Issue Date: 06-27-91

Attachment B

QUALITY NONCONFORMANCE

P.O./SHIPMENT/LOT/PACKAGE/CONTAINER I.D. No. _____

RECEIVING REPORT NO.: _____ INSPECTION REPORT NO.: _____

DESCRIPTION OF NONCONFORMANCE: _____

_____

_____

NAME _____ BADGE No _____ PHONE No _____

TO BE REMOVED BY AUTHORIZED PERSONNEL ONLY

FMPC-O-2708 (REV 8-29-90)

Westinghouse Materials Company of Ohio

DCAR No.: _____

DATE: _____

QUALITY NONCONFORMANCE

TO BE REMOVED BY AUTHORIZED PERSONNEL ONLY

FMPC O 2708 (REV 8 29 90)

TAG IS WHITE WITH RED LETTERS

Attachment C

CRITERIA FOR DETERMINING IF A CORRECTIVE ACTION REPORT IS REQUIRED

A Corrective Action Report shall be issued for deviations with:

- o Significance - Deviations which have, or may have, serious effect on safety, health, operability, environment or reliability.
- o Quantity/Frequency - Repetitive deviations or similar deviations resulting from activities or conditions which are common to the deviations.
- o Ineffective Implementation of Dispositions - Deviations which have not been properly or promptly dispositioned or resolved and which if uncorrected could result in other deviations or significant conditions adverse to quality.

The following are examples of significant conditions adverse to quality and shall be processed in accordance with this procedure:

- o Approved and released documents such as design documents, procurement documents, procedures, instructions, reports, and data found to contain significant errors or to be inadequate for their intended function.
- o In-process checks that indicate process or test limits may be exceeded and may have serious effect on safety, operability, or reliability.
- o Out-of-calibration standards or instruments used to verify process limits and may have serious effect on safety, operability, or reliability.
- o Significant Adverse trend analysis results.

CRITERIA FOR DETERMINING IF A CORRECTIVE ACTION REPORT IS REQUIRED TO BE ISSUED TO SENIOR MANAGEMENT

An evaluation shall be performed of each CAR for issue to Senior Management. If the CAR meets the following criteria, it shall be issued to Senior Management:

a) Significant and repetitive trends in deviation documents, audit/surveillance findings, and other inspections for which corrective action measures have proven ineffective or inadequate.

b) Delinquent Corrective Action that cannot be resolved at a lower level of Management.

c) Significant conditions adverse to quality which require more than a routine evaluation, analysis and corrective action.

Attachment D
Page 1 of 2

CAR NO.:	CORRECTIVE ACTION REPORT	REVISION:

1 Date of Discovery: _____ Responsible Organization: _____
Responsible Organization Representative: _____
Activity: _____ Location: _____

2 Requirements: _____

Deviation: _____

Verbally Notified Management: _____ Evaluator: _____ Date: _____

Provide Disposition by: _____ Evaluating Manager: _____ Date: _____

3 Response to the Request for Corrective Action:

Is Deviation Reportable Under OR? ☐ *Yes (OR No. ____) ☐ No
*If yes, proceed in accordance with PR-FMPC-4006 and close this CAR.

A. Reason for the Deviation (Root Cause): _____

B. Action Taken/Proposed to Investigate and Correct Similar Work: _____

C. Action Taken to Prevent Recurrence: _____

D. Date(s) Action(s) will be Complete: _____

Responsible Organization's Representative: _____ Date: _____

4 Evaluation of Corrective Action Response:

Evaluator: _____ Date: _____

Evaluating Manager: _____ Date: _____

5 Verification of Corrective Action Completion:

Evaluator

Complete Section 1 and 2 as follows:

- Date of Discovery - Enter date that corrective action was discovered to be required.
- Responsible Organization - Enter the organization responsible for the item or activity in which a corrective action is required.
- Responsible Organizations Representative - Enter name of the representative responsible for corrective action.
- Activity - Enter activity performed. (Example Audit 189-1)
- Location - Location of the activity. (Example Plant 8)
- Requirements - Identify the procedure, instruction, standard, or code which establishes the acceptance criteria for the activity or item being evaluated.
- Deviation - Fully describe the deviation as it relates to the requirements.
- Verbally Notified Management - List the date that the responsible organizations management was verbally notified of the potential deviation.
- CAR No. - Obtain and enter on the CAR Form a CAR Number from the Computer CAR Data Base or from the Administrator, Deviation Control and Corrective Action.
- Revision - Enter the current revision number 0, 1, etc.
- Provide Disposition By Date - Request the organization deemed responsible to provide dispositioning action by a certain date outlining steps taken or planned to correct immediate problem.
- Evaluator - Sign & date Section 2 of the DR form.
- Evaluating Manager - Obtain the concurrence of the Evaluator's Manager.

Responsible Organization Representative

Completion of Disposition Action Section 3

- Evaluate deviations for reportability under the occurrences reporting system. See PR-FMPC-4006, Occurrence Reporting (OR).
- A. Reason for the Deviation (Root Cause) - Determine the underlying (root) cause of the problem and document it in Section 3A of the CAR form.
- B. Action Taken/Proposed to Investigate and Correct Similar Work - If necessary, perform an investigation to determine if any similar work is affected by the problem and, if so, identify the action taken/proposed and the schedule to correct it in Section 3B of the CAR form.
- C. Action Taken to Prevent Recurrence - Describe action taken/proposed to correct the root cause and to prevent recurrence of the problem in Section 3C of the CAR form.
- D. Date(s) Action(s) will be Complete - Enter the scheduled completion date for corrective action in Section 3D.

Evaluator

Completion of the Evaluation of Corrective Action Response Section 4

- Review and evaluate the proposed corrective action to determine its adequacy for solving the specific problem identified in the deviation report, which includes verification that a decision has been made, by the Manager of the organization responsible, as to whether the deviation is reportable in accordance with PR-FMPC-4008 for Occurrence Report (OR). If the "Yes" box is checked, the responsible organization proceeds with the reportability process in accordance with PR-FMPC-4008 and the CAR can be closed based upon the issue of a OR.
- Document acceptance of the proposed disposition in Block 4 by signature and date.
- Notify the organization responsible for disposition action of the rejection of the proposed disposition action and coordinate with the organization to obtain a revised response.

Completion of the Verification and Closure of Disposition Action Section 5

- Monitor the disposition and verify that the actions taken to correct the deviation have been completed satisfactorily.
- Approve acceptance of verified disposition in Section 5 by signature and date.
- Ensure the removal of nonconforming item tag(s) only after verifying satisfactory completion of all dispositioning actions.
- Forward the closed out corrective action report (CAR) to the Administrator, Deviation Control and Corrective Action with a copy to responsible organization management.

WESTINGHOUSE MATERIALS COMPANY OF OHIO SITE DOCUMENT PROGRAM		SITE STANDARD OPERATING PROCEDURE Page 21 of 21
Title: DEVIATION AND CORRECTIVE ACTION REPORTING		DOCUMENT NO: SSOP-0023 REVISION NO. 0
Authorization: W. H. Britton, President	Supersedes: None	Issue Date: 06-27-91

RECORD OF ISSUE/REVISIONS

DATE	REV. NO	DESCRIPTION AND AUTHORITY
06-27-91	0	Issued to identify the assigned responsibilities and required actions for identifying, documenting, and providing dispositions for deviations and corrective actions observed during audits, reviews, initiated by M. A. Malone per Request No. P91-220.

WESTINGHOUSE ENVIRONMENTAL MANAGEMENT COMPANY OF OHIO SITE DOCUMENT PROGRAM		POLICY Page 1 of 4
Title: **ASBESTOS CONTROL POLICY**		DOCUMENT NO: PO-1003 REVISION NO. 0
Authorization: H. F. Daugherty, President	Supersedes: None	Effective Date: Draft: 04-03-92

3288

(For Questions Contact PTR P. Beirne X-8444)

1.0 POLICY

It is Westinghouse Environmental Management Company of Ohio (WEMCO) policy that all Fernald Environmental Management Project (FEMP) activities involving asbestos-containing material (ACM), or conducted in areas where ACM is located, be performed in such a manner as to protect employees from harmful exposures, prevent environmental emissions that endanger public health or the environment, and ensure compliance with the regulations and legal agreements addressing such activities.

DRAFT

2.0 SCOPE

This policy covers all on-site FEMP activities involving ACM.

3.0 ELEMENTS

3.1 In support of the policy statement, the following corollaries describe the fundamental principles upon which the Asbestos Management Plan, PL-FMPC-3002, and the program organization have been established:

3.1.1 A committee of the most knowledgeable individuals, from each of the principal organizations involved in abatement activities at a level closest to the level of execution shall be established to:

- Develop/update asbestos policies and procedures,
- Set specific site goals,
- Periodically evaluate progress,
- Communicate information to their respective organizations,
- and perform self-assessment of the Asbestos Program.

3.1.2 Adequate training shall be provided to ensure all employees understand the hazards of ACM in their work area and that abatement workers can demonstrate the procedures designed to accomplish their work, while protecting employee and public health and the environment.

3.1.3 Asbestos abatement activities shall be communicated to Southwest Ohio Air Pollution Control Agency (SWOAPCA) and performed according to the site-specific procedures incorporating worker protection standards (OSHA 1926.58), Environmental standards (40 CFR 61, subpart M) and the other requirements detailed in Asbestos Management Plan, PL-FMPC-3002, as verified by self-assessments and internal surveillance audits.

3.0 ELEMENTS (cont.)

3.1.4 ACM will be identified and initial hazard assessments used to plan short-term (less than 5 years) abatement activities within an evolving program. Since asbestos abatement is part of a 30-year cleanup plan for the FEMP, and the scope of the project involving hazard abatement extends beyond asbestos, management is continually changing to reflect the changing regulations and the overall site activities regarding hazard abatement. The Asbestos Program will be managed within the Clean Air Program (CAP) of the Environmental Management department, where its activities will be planned, budgeted, and scheduled consistent with the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) based cleanup. Activities between and within departments will be coordinated by the CAP Asbestos Program Coordinator.

3.1.5 Long-term removal plans will be developed in 5-year increments for the life of the FEMP as part of the Asbestos Management Plan (AMP). The AMP will be updated annually to reflect the changing scope of the CERCLA remedial effort and the relative hazard of the ACM.

3.1.6 Storage and disposal of ACM at the site will be managed as part of the comprehensive Waste Management Program at the FEMP.

3.1.7 A compendium of the procedures used to control ACM will be forwarded to the U.S. Environmental Protection Agency (U.S. EPA) and annually updated or reissued in an effort to integrate asbestos abatement work with the CERCLA cleanup of the FEMP.

4.0 IMPLEMENTATION

Environmental Management shall be responsible for implementing the Asbestos Control Policy.

5.0 APPLICABLE DOCUMENTS

5.1 Drivers

5.1.1 AM-90-11-16-B, "1990 ES&H and QA Functional Appraisal Deficiency Finding"

5.1.2 Clean Air Act, 40CFR.61, Subpart M

5.1.3 Consent Agreement Removal Action No. 26

5.1.4 Ohio Administrative Code, OAC 3745.20

3288

5.0 APPLICABLE DOCUMENTS (cont.)

5.1.5 OSHA 1926.58

5.2 Reference Documents

5.2.1 PL-FMPC-3002, "Asbestos Management Plan"

WESTINGHOUSE ENVIRONMENTAL MANAGEMENT COMPANY OF OHIO SITE DOCUMENT PROGRAM		POLICY Page 4 of 4
Title: **ASBESTOS CONTROL POLICY**		DOCUMENT NO: PO-1003 REVISION NO. 0
Authorization: H. F. Daugherty, President	Supersedes: None	Effective Date: Draft: 04-03-92

(For Questions Contact PTR P. Beirne X-8444)

RECORD OF ISSUE/REVISIONS

DATE	REV. NO	DESCRIPTION AND AUTHORITY
Draft	0	Document stating the policy for asbestos control at the FEMP per Request No. S92-091, initiated by P. Beirne.

WESTINGHOUSE ENVIRONMENTAL MANAGEMENT COMPANY OF OHIO SITE DOCUMENT PROGRAM	CHARTER Page 1 of 3
Title: **ASBESTOS MANAGEMENT COMMITTEE CHARTER**	DOCUMENT NO: CH-2005 REVISION NO. 0
Authorization: H. F. Daugherty, President Supersedes: None	Effective Date: 04-20-92

NON-CONTROLLED COPY

1.0 PURPOSE

The purpose of this document is to describe the function, organization, and responsibilities of the Asbestos Management Committee (AMC) and to define how the Committee helps ensure compliance with the following Asbestos Control Policy Statement:

> "All FEMP activities that involve asbestos containing material (ACM), or are conducted in areas where ACM is located, will be performed in such a manner as to protect employees from harmful exposures, prevent environmental emissions that endanger public health or the environment, and ensure compliance with the regulations and legal agreements addressing such activities."

The AMC is the group of FEMP site personnel most knowledgeable about asbestos control technology, representing the principal organizations involved in abatement activities at the closest level of execution.

2.0 MEMBERSHIP

2.1 The AMC shall have a chairperson, and membership shall consist of representatives from the following departments:

- 2.1.1 Industrial, Radiological Safety & Training (IRS&T)
- 2.1.2 Site Services
- 2.1.3 Project Management & Acquisition (PM&A)
- 2.1.4 Environmental Compliance & Quality Assurance (EC&QA)
- 2.1.5 Environmental Management
- 2.1.6 Environmental Restoration
- 2.1.7 Resource Planning, Scheduling, and Integration.

2.2 The Environmental Management Manager shall appoint the AMC Chairperson.

2.3 Staff managers shall appoint departmental representatives to the AMC.

2.4 An Alternate Chairperson shall be appointed by the Chairperson to act in all capacities in the absence of the chairperson.

2.5 Representatives from the Department of Energy (DOE) and Fernald Atomic Trade and Labor Council (FAT&LC) shall be invited to attend AMC meetings, as appropriate.

3288

3.0 RESPONSIBILITIES

3.1 The AMC shall perform the following functions:

3.1.1 Establish asbestos management goals;

3.1.2 Evaluate progress toward goals and provide written input for the asbestos program quarterly status report;

3.1.3 Identify the need for any asbestos policies and procedures and ensure their development, approval, and implementation;

3.1.4 Advise the Clean Air Program Manager of effective asbestos program administration;

3.1.5 Assess compliance with asbestos-related site policies and procedures as well as federal and state laws and regulations;

3.1.6 Monitor and aid in the correction of any asbestos-related audit items or deficiencies;

3.1.7 Serve as a "sounding board" in reviewing new and anticipated regulatory changes, new products and procedures, and ways in which other Government Owned Contractor Operated (GOCO) sites could profit from the FEMP ACM experience.

3.2 The number of AMC meetings needed to perform the identified functions shall be determined by the Chairperson. However, meetings of the full AMC shall be held not less than once per calendar month.

3.3 The AMC Chairperson schedules and presides over meetings, identifies project proposals to be reviewed by the AMC, and delegates tasks as necessary to accomplish the purposes and functions of the AMC.

3.4 The Executive Vice-President sponsors the AMC, and approves goals.

4.0 APPLICABLE DOCUMENTS

4.1 Drivers

4.1.1 AW:10, "Asbestos Removal", September 3, 1990

4.1.2 IH&S-IH-03, "Control of Work Involving Asbestos", March 20, 1989

4.2 Reference Documents

4.2.1 PL-FMPC-3002, "Asbestos Management Plan"

3288

RECORD OF ISSUE/REVISIONS

DATE	REV. NO	DESCRIPTION AND AUTHORITY
04-20-92	0	Document describing the function of the Asbestos Management Committee, per Request No. P91-254, initiated by M. McCullough.

CONTROL COPY

FMPC-2152
REVISION 1
TOPICAL MANUAL

FMPC RESPIRATORY PROTECTION MANUAL

BY

INDUSTRIAL HYGIENE SUBSECTION
IRS&T DEPARTMENT

April 27, 1990

FEED MATERIALS PRODUCTION CENTER
WESTINGHOUSE MATERIALS COMPANY OF OHIO
P. O. BOX 398704
CINCINNATI, OHIO 45239 - 8704

PREPARED FOR THE
U. S. DEPARTMENT OF ENERGY
OAK RIDGE OPERATIONS OFFICE
UNDER CONTRACT DE-AC05-860R21600

APPROVED BY:

J. J. Volpe, Vice President,
IRS&T

M. B. Boswell, President

TABLE OF CONTENTS

		Page
1.0	Introduction	1-1
2.0	WMCO General Policy Statement	2-1
3.0	Available Equipment, Limitations and Capabilities	3-1
4.0	Pre-Use Requirements for Respirators	4-1
5.0	Storage	5-1
6.0	General Usage Requirements	6-1
7.0	Emergency, Rescue, & Non-Routine Use	7-1
8.0	Recycling Receptacles	8-1
9.0	Cleaning, Sanitizing, and Reconditioning	9-1
10.0	Requirements for Subcontractors, Vendors, and Visitors	10-1
11.0	Medical Surveillance	11-1
12.0	Hazard Surveillance	12-1
13.0	Final Word of Advice	13-1

APPENDICES

A	Job Classifications in Program	A-1
B	Stores Numbers	B-1
C	Useful References	C-1
D	Glossary	D-1

LIST OF TABLES

		Page
#3-1	Air-Purifying Respirators Available at the FMPC.	3-2
#3-2	Air-Supplied Respirators Available at the FMPC.	3-5
#3-3	Cartridges and Canisters Available at the FMPC.	3-9
#4-1	Available Respirator-Related Training Courses at the FMPC.	4-3
#6-1	Minimum Pressure Settings For Airline Respirators.	6-12

LIST OF FIGURES

		Page
#3-1	Three half-mask respirators. From left to right, a MSA silicone respirator, a North silicone respirator, and a MSA Belt-Mounted Comfo II hycar rubber respirator.	3-3
#3-2	Two full-face respirators. From left to right, a MSA Ultravue silicone respirator and a MSA Ultra-Twin silicone respirator.	3-4
#3-3	A Bullard TIC-20 hooded airline respirator and anti-contamination protective clothing.	3-6
#3-4	SurvivAir Mark 2 SCBA.	3-7
#3-5	An ISI Emergency Life Support Apparatus.	3-8
#4-1	Demonstration of how to perform a positive pressure test.	4-5
#4-2	Demonstration of how to perform a negative pressure test.	4-6
#4-3	Use of the Los Alamos Computer-controlled fit test unit to determine which full-face respirator provides the best face-to-mask seal.	4-10
#4-4	Front (left) and back (right) design of FMPC Fit Test Cards.	4-11
#5-1	A typical FMPC respirator storage Cabinet.	5-3
#6-1	A Schraeder male (left) and female (right) quick disconnect airline respirator hose fitting.	6-4
#6-2	A completed deficient respirator tag for a respirator with a deformed face piece is shown above.	6-5
#6-3	The Respirator Selection Chart Guide used by Industrial Hygiene and Radiological Safety is shown above.	6-7
#6-4	A caution tag to be hung on airline stations and hoses during use and removed after use.	6-9
#6-5	A Vortex cooling or heating tube to cool air going into a Bullard hooded airline respirator.	6-10

LIST OF FIGURES

		Page
#6-6	A properly green and white labelled airline station.	6-11
#6-7	A face-sealing area for a typical half-mask respirator	6-14
#6-8	The face-sealing area for a typical full-face respirator	6-15
#8-1	A typical recycling receptacle.	8-2
#11-1	Employee undergoing spirometric testing, to assess lung function for respirator use.	11-1
#12-1	The Miran 1B Infrared Analyzer. This instrument is used by Industrial Hygiene to monitor concentrations of gases and vapors.	12-2
#12-2	The personal sampling pump equipped with a filter cassette to trap particulates in the workplace air. Because it is small and lightweight, the pump can be worn on a person's belt to allow breathing zone samples to be taken.	12-3

SECTION 1.0

INTRODUCTION

This Manual presents the FMPC Respiratory Protection Program control policies, requirements, responsibilities, and protective measures. WMCO is striving to create a safe and healthful work environment for its employees. Potential respiratory hazards are still encountered when working in some areas or at some jobs at the FMPC. Therefore it may be necessary to wear respirators to guard against unseen airborne contaminants or other potential health risks. Even though wearing a respirator may cause a slight degree of discomfort, it could be a life saver.

This Manual identifies requirements and provides practical guidance on the issuance, use, and care of the respiratory protection equipment at the FMPC. In the event that questions or concerns arise that have not specifically been addressed in this Manual, contact the Respiratory Protection Program Administrator in Industrial Hygiene.

SECTION 2.0

WMCO GENERAL POLICY STATEMENT

At WMCO, the prevention and control of potential respiratory hazards is accomplished as far as feasible by accepted engineering control measures (e.g. enclosure or confinement of the operation, general or local ventilation, etc.) Where these controls are not feasible, when they are not sufficient by themselves, or while they are being developed and instituted, respiratory protection equipment shall be furnished by WMCO and used in accordance with this manual, and applicable WMCO procedures which are designed to comply with DOE/OSHA requirements. The policies and requirements of this manual take precedence over all other WMCO documents on respiratory protection. Where conflicts are known to exist the Respiratory Protection Program Administrator shall be contacted. Respiratory protection is required for FMPC employees whenever potential respiratory hazards are present at concentrations that could present a health concern or as dictated by good industrial hygiene and health physics practices.

No employee shall use respiratory equipment until the appropriate medical certification, training, and fit testing are completed. Employees are required to follow and observe all FMPC Respiratory Protection Program requirements.

The safety and health of FMPC employees is the primary concern. Every effort will be made to provide those employees with necessary protective equipment that will ensure the maintenance of their good health.

Requirements are specified throughout the manual. The words "shall", "must", "should", and "may" were used to specify the level of compliance required per this manual. The words "shall" and "must" indicate a requirement and compliance is mandatory; "should" indicates a recommendation; and "may" denotes permission.

SECTION 3.0

AVAILABLE EQUIPMENT, LIMITATIONS AND CAPABILITIES

3.1 AVAILABLE EQUIPMENT

Respiratory protection equipment shall be selected for use at the FMPC by the FMPC Respiratory Protection Program Administrator on the basis of the quality of equipment fit on FMPC employees, the nature of the work being performed, possible respiratory hazards which might be encountered, past experiences with equipment, employee preferences (i.e. comfort and general acceptance; etc.), and the limitations and capabilities of equipment. Only NIOSH-approved equipment shall be selected.

Tables #3-1 through #3-3 list the types of air-purifying respirators, air-supplied respirators, and cartridges and canisters available for use at the FMPC. Typical examples of respiratory protection equipment are shown in Figures #3-1 through #3-5. Both air-purifying and air-supplied respirators shall be used in accordance with their limitations and capabilities listed in Sections 3.2 and 3.3. Contact Industrial Hygiene for proper respiratory protection equipment selection for specific jobs or work activities when chemical concerns are involved. For radiation concerns contact Radiological Safety for proper selection.

Table #3-1

Air-Purifying Respirators Available at the FMPC

Half-Mask Respirators:

MSA Comfo II Hycar Rubber Respirator
MSA Comfo II Silicone Respirator
North 7500 Non-Silicone Respirator
North 7700 Silicone Respirator
MSA Belt-Mounted Comfo II Hycar Rubber Respirator

Full-Face Respirators:

MSA Ultra-Twin Silicone Respirator
MSA Ultravue Silicone Respirator

Powered Air-Purifying Respirators:*

MSA Powered Air-Purifying Respirator with Ultravue Facepiece

* Only for use in special circumstances as specified by Industrial Hygiene; e.g. some asbestos removal jobs and other unusual situations.

Figure #3-1 Three half-mask respirators. From left to right, a MSA silicone respirator, a North silicone respirator, and a MSA Belt-Mounted Comfo II hycar rubber respirator.

Figure #3-2 Two full-face respirators. From left to right, a MSA Ultravue silicone respirator and a MSA Ultra-Twin silicone respirator.

Table #3-2

Air-Supplied Respirators Available at the FMPC

Airline Respirators:

MSA Comfo Welder's Half Mask Hycar Rubber Airline Respirator
MSA Full-Face Silicone Full-Face Airline Respirator
MSA Sandblast II Abrasive Blasting Hooded Airline Respirator
Bullard TIC-20 Hooded Airline Respirator
North 85300 Series Hooded Airline Respirator
*SurvivAir Combination Self Contained Breathing Apparatus (HIP-PAC) and Supplied Air Airline Respirator (Pressure Demand Class)**

Self-Contained Breathing Apparatus Units (SCBA):

SurvivAir 30 Minute SCBA Unit
SurvivAir Mark 2 SCBA 30 Minute HP Series 9840 Unit
SurvivAir Mark 2 SCBA 60 Minute HP Series 9870 Unit

Emergency Life Support Apparatus Units (ELSA):

ISI Emergency Life Support Apparatus

* Only for use in special circumstances as specified by Industrial Hygiene; e.g. some entrances into confined spaces and other unusual situations.

Figure #3-3 Bullard TIC-20 hooded airline respirator and anti-contamination protective clothing.

Figure #3-4 SurvivAir Mark 2 SCBA.

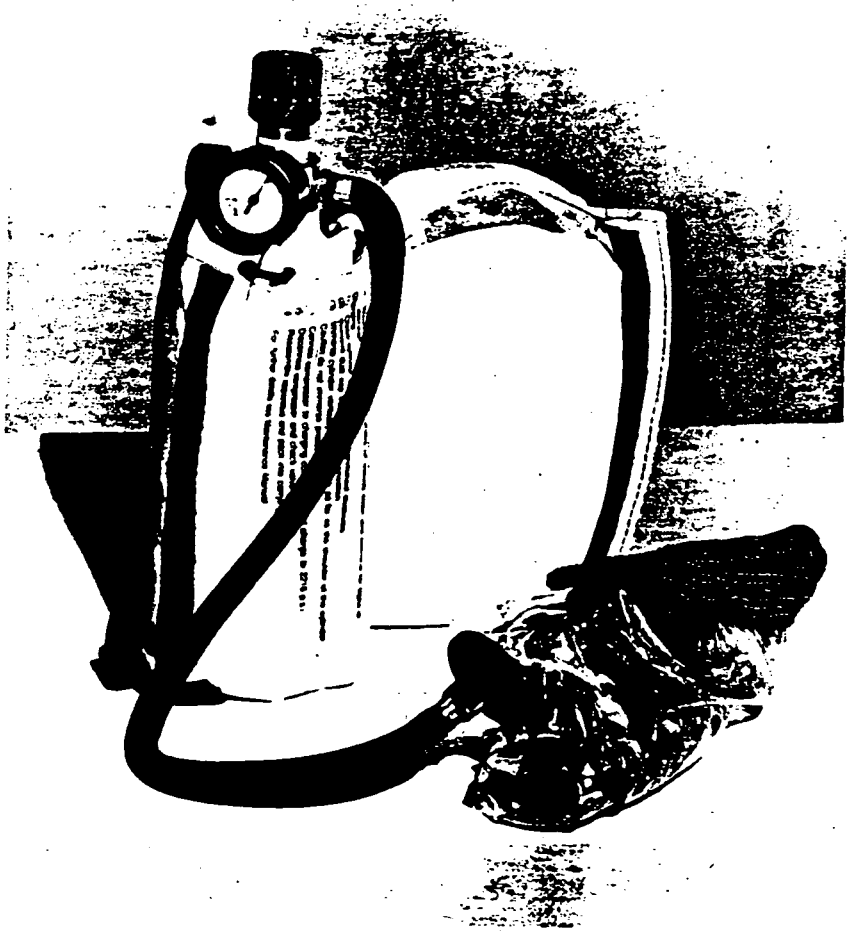


Figure #3-5 An ISI Emergency Life Support Apparatus.

Table #3-3

Cartridges and Canisters Available at the FMPC

MSA Cartridges:

GMA	*Chemical Cartridge (Black) for Organic Vapors*
GMC	*Chemical Cartridge (Yellow) for Organic Vapors and Acid Gases*
GMC-H	*Chemical/Filter Combination Cartridge (Purple and Yellow) for Organic and Formaldehyde Vapors, Chlorine, Hydrogen Chloride, Sulfur Dioxide, and against Dusts, Fumes, Mists, and Radionuclides*
GMD	*Chemical Cartridge (Green) for Ammonia and Methyl Amine*
Type F	*Pre-Filter for Dusts and Mists*
Type H	*Ultra Filter Cartridge (Purple) for Highly Toxic Dusts, Fumes, Mists, Asbestos-containing Dusts, Mists, and Radionuclides*
Mersorb	*Indicator Cartridge (Orange) for Metallic Mercury Vapor and Chlorine*

North Cartridges:

N7500-1	*Chemical Cartridge (Black) for Organic Vapors*
N7500-3	*Chemical Cartridge (Yellow) for Organic Vapors and Acid Gases*
N7500-4	*Chemical Cartridge (Green) Ammonia*
N7500-8	*Filter Cartridge (Purple) for Highly Toxic Particulates*
N7500-83	*Chemical/Filter Combination Cartridge (Purple and Yellow) for Organic Vapors, Acid Gases and Highly Toxic Particulates*

MSA Canisters:

GMD-C	*Chemical Canister (Dark Green with Orange Stripe) for Ammonia, Non-toxic Dusts and Mists*
GMHF-C	*Chemical Canister (Green with Purple Stripe) for Hydrogen Fluoride and Radioactive Particulate Matter*
Type H	*Ultra Filter Canister (Purple) for Highly Toxic Dusts, Fumes, Mists Asbestos-containing Dusts, Mists, and Radionuclides*

3.2 LIMITATIONS AND CAPABILITIES FOR AIR-PURIFYING RESPIRATORS

1. Air-purifying respirators shall not be worn for any use other than that identified on the type cartridge/canister installed. Contact Industrial Hygiene for cartridge/canister selection information.

2. Mersorb-Indicator cartridges for protection against mercury vapor shall only be used when a Belt-Mounted Comfo II Respirator is worn.

3. Air-purifying respirators shall not be used for protection against gases or vapors which have poor warning properties. A substance is said to have poor warning properties when its odor, taste, or irritation effects are not detectable or not persistent at concentrations at or below the exposure limit.

4. Air-purifying respirators shall not be used as protection against gases which have extremely low occupational exposure limits.

5. Half-mask respirators shall not be used as protection against materials present in concentrations sufficient to cause eye irritation.

6. Air-purifying respirators shall not be used in atmospheres containing less than 19.5% oxygen or for entry into atmospheres which could quickly and unexpectedly become immediately dangerous to life or health.

7. Air-purifying respirators shall not to be used by employees unless they are clean-shaven in all face-sealing areas (see Figures #6-7 and #6-8).

3.3 LIMITATIONS AND CAPABILITIES FOR AIR-SUPPLIED RESPIRATORS

1. Air-supplied respirators shall not be used in atmospheres containing less than 19.5% oxygen or for entry into atmospheres which could quickly and unexpectedly become immediately dangerous to life or health.

2. Airline respirators shall only be used in atmospheres from which a user can escape, if necessary, without the aid of a respirator.

3. The face covering provided by a Hooded Airline Respirator does not provide eye protection. Safety glasses or chemical splash goggles shall be worn when using Hooded airline or Half-mask Airline respirators.

4. Only SurvivAir Combination [illegible]ntained Breathing Apparatus (HIP-PAC) and SCBA units shall b[illegible]ned spaces and other atmospheres when Industrial Hygiene o[illegible]etermined that conditions are or could quickly and unexpectedly become immediately dangerous to life or health and escape can be made within 5 minutes.

5. Airline respirators and ELSA units shall not be used for fire fighting, rescue activities or entry into immediately dangerous to life or health atmospheres.

6. SCBA units shall be used in accordance with applicable Safety and Fire Services Section training, instructions, and requirements.

7. ELSA units only shall be used to escape from potentially hazardous areas. (ELSA units contain only a five minute supply of compressed breathing air.)

8. Air-supplied respirators shall not be used by employees unless they are clean-shaven in all face-sealing areas.

LIST OF FIGURES

		Page
#3-1	Three half-mask respirators. From left to right, a MSA silicone respirator, a North silicone respirator, and a MSA Belt-Mounted Comfo II hycar rubber respirator.	3-3
#3-2	Two full-face respirators. From left to right, a MSA Ultravue silicone respirator and a MSA Ultra-Twin silicone respirator.	3-4
#3-3	A Bullard TIC-20 hooded airline respirator and anti-contamination protective clothing.	3-6
#3-4	SurvivAir Mark 2 SCBA.	3-7
#3-5	An ISI Emergency Life Support Apparatus.	3-8
#4-1	Demonstration of how to perform a positive pressure test.	4-5
#4-2	Demonstration of how to perform a negative pressure test.	4-6
#4-3	Use of the Los Alamos Computer-controlled fit test unit to determine which full-face respirator provides the best face-to-mask seal.	4-10
#4-4	Front (left) and back (right) design of FMPC Fit Test Cards.	4-11
#5-1	A typical FMPC respirator storage Cabinet.	5-3
#6-1	A Schraeder male (left) and female (right) quick disconnect airline respirator hose fitting.	6-4
#6-2	A completed deficient respirator tag for a respirator with a deformed face piece is shown above.	6-5
#6-3	The Respirator Selection Chart Guide used by Industrial Hygiene and Radiological Safety is shown above.	6-7
#6-4	A caution tag to be hung on airline stations and hoses during use and removed after use.	6-9
#6-5	A Vortex cooling or heating tube to cool air going into a Bullard hooded airline respirator.	6-10

SECTION 4.0

PRE-USE REQUIREMENTS FOR RESPIRATORS

4.1 GENERAL INFORMATION ON PRE-USE REQUIREMENTS FOR RESPIRATORS

4.2 MEDICAL CERTIFICATION

4.3 TRAINING

4.4 FIT TESTING

Field or Self-Fit Checks

- Positive Pressure Test
- Negative Pressure Test
- Precautions for Performing Self-Fit Checks

Qualitative Fit Tests

- Irritant Smoke
- Isoamyl Acetate or "Banana Oil"
- Saccharin or Sugar Solution

Quantitative Fit Tests

Fit Test Cards

SECTION 4.0

PRE-USE REQUIREMENTS FOR RESPIRATORS

4.1 GENERAL INFORMATION ON PRE-USE REQUIREMENTS FOR RESPIRATORS

FMPC employees shall be medically certified, trained, and fit tested prior to using a respirator. Those who are unable to be medically certified, trained, or fit tested when required may be restricted from some work areas and/or job assignments. A training course is required before employees are permitted to use SCBA units. Subsections, 4.2 Medical Certification, 4.3 Training, and 4.4 Fit Testing, should be consulted for specific information on pre-use requirements for respirators.

4.2 MEDICAL CERTIFICATION

Medical certification of respiratory protection equipment users is a vital part the FMPC respiratory protection program. Medical certification ensures that only individuals who are medically able to use respirators are authorized to do so.

As a result of medical reviews, FMPC employees are certified as either respirator-eligible, airline-only eligible, or non-eligible, and as either SCBA-eligible or non-SCBA-eligible by WMCO Medical Services physicians. These classifications can impact where employees work and what job assignments they are given.

Respirator-eligible employees are certified by Medical Services as capable of using both air-purifying and air-supplied (not including SCBAs) respirators. Employees certified as airline-only-eligible are only permitted to use airline respirators at the FMPC, although they may use either tight-fitting (half-mask and full-face) or hooded airline respirators. Non-eligible employees are not permitted to wear any air-purifying or air-supplied respirator. SCBA-eligible employees are certified as capable of using SCBAs at the FMPC while non-SCBA-eligible employees are not permitted to do so.

Employees shall not be permitted to use equipment for which they are not medically certified.

4.3 TRAINING

Even though employees are provided with the best respiratory protection equipment available, it will not benefit them unless they know how to properly use and care for that equipment. At the FMPC, training may consist of watching a video cassette or movie, listening to a lecture, participating in class discussions, or a combination of learning methods. Class participation with demonstration and hands-on training has proven to be the most effective means of learning, and therefore is emphasized in respirator training classes.

Table #4-1 lists the respirator training classes required at the FMPC, their approximate time lengths, the required frequencies, and the classes required for specific groups of employees.

Table #4-1
Available Respirator - Related Training Courses at the FMPC

Training Course Title	Approximate Course Length (hours)	Frequency	Required Attendees
Basic Principles of Respiratory Protection	*2.0*	*Annually*	*All Respirator Program Participants*
SCBA and Acid Suit Training	*4.0*	*Annually*	*Respirator Program Participants as determined by Safety and Fire Services and Supervision*

Supervisors shall be responsible for ensuring that their personnel attend required classes. Supervisors shall be given additional instruction covering respirator issuance and other aspects of the respirator program for which they are responsible.

In addition to the required training listed in Table #4-1, the following are also available which supplement information given in the basic principles class:

1. a training video tape titled "Airline Respirator Use and Maintenance" lasting 0.5 hours, designed for airline users.

2. a training class and exercise titled "ELSA Training" lasting 0.5 hours, designed for personnel who may use Emergency Life Support Apparatus (ELSA).

4.4 FIT TESTING

Respirator fit testing, conducted by Industrial Hygiene, is required for all respirator program participants. (See Appendix A.) This test is used to determine the size and make of respirator(s) which provides acceptable protection from the inhalation of potential respiratory hazards for each individual.

The respirator user shall be issued a fit test card after the successful completion of the test which identifies respirator(s) approved for use. In addition, the respirator user must perform the following each time a respirator is used: (a) inspect the respirator; and (b) perform a negative and/or positive field fit test (described in detail below). An improperly fitting respirator could allow the worker to be exposed to potential respiratory hazards.

No employee at the FMPC shall be fit tested or shall be allowed to wear a respirator unless he is clean-shaven in all face-sealing areas and is not wearing glasses or other objects that enter into or could obstruct a face-sealing area. Employees also shall not chew gum or tobacco during fit testing or respirator use.

There are three methods which may be used to fit test respirators worn by workers: field or self fit-checks, qualitative fit tests, and quantitative fit tests. Field or self-fit checks and quantitative fit tests are conducted at the FMPC to ensure employees receive and maintain good respirator seals.

Field or Self-Fit Checks

Field or self fit-checks shall be conducted by respirator wearers to check their own face-to-respirator seals with the particular respirator types with which they successfully quantitatively or qualitatively were fit tested. They do not require any special equipment or materials. There are two types of self-fit checks, the positive pressure test and the negative pressure test. These tests (described in detail below) shall be conducted by workers every time they wear a respirator.

Positive Pressure Test

Wearers shall perform this test in the field before they enter the area where respiratory protection is necessary. To perform this test, wearers must place the palm of one hand over their exhalation valve cover and exhale gently into their facepieces. This test is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage. For a poor-fitting half-mask respirator, leakage of air is usually felt around the eyes or neck. For a poor-fitting full-face respirator, leakage of air is felt around the temples, forehead, or neck. If leakage is detected, the wearer must attempt to readjust the respirator position on the face, tighten the head straps, or both. The test must then be tried again. If the respirator fails again, a second respirator must be tested. If a successful fit cannot be achieved after trying three respirators, Industrial Hygiene shall be contacted for assistance.

For some respirators, such as the North 7500 respirator, a positive pressure test cannot be performed by the wearer because of its unique exhalation valve assembly design. In such cases, the wearer must rely on the careful performance of a negative pressure test. This test can only be performed for tight-fitting air-purifying respirators.

Figure #4-1 Demonstration of how to perform a positive pressure test.

Negative Pressure Test

Negative pressure tests, like positive pressure tests, shall be performed in the field by workers before entering an area where respiratory protection is necessary. To perform this test, wearers must place the palms of their hands over the respirator cartridges or canister and inhale gently. As they inhale, their respirator facepieces should collapse. If they have a good respirator-to-face seal they will be able to hold their breath for 5 to 10 seconds without the facepiece filling up with air (i.e., air leaking into the deflated facepiece). If the facepiece fills with air during this 5 to 10 second period, the worker must attempt to either reposition his respirator, tighten its straps, or both. The test must then be tried again. If the respirator fails again, a second respirator must be tested. If a successful fit can not be achieved after trying three respirators, Industrial Hygiene shall be contacted for assistance. This test can be performed for both tight-fitting air-purifying and air-supplied respirators.

Figure #4-2 Demonstration of how to perform a negative pressure test.

Precaution for Performing Self-fit Checks

Although easy to do, self-fit checks, must be performed carefully. Wearers must make sure they do not distort or reposition their respirators while performing these tests. If a respirator face position is accidentally changed/shifted, the wearer must reposition it and then perform the self-fit checks again.

Qualitative Fit Tests

Qualitative fit tests are not normally conducted at the FMPC, but are described here for information. Qualitative fit tests do not require complicated, expensive equipment, but they require several rooms or a room and a test chamber. When done properly they require more time per test than either self-fit checks or quantitative fit tests. They do not provide exact results, but instead rely on subjective irritation responses by workers (i.e., reporting specific odor or taste or an involuntary response to an induced test agent). They must be performed by careful, skilled personnel so that the worker's ability to detect the test agent's odor or taste is not dulled or worn out before the completion of the fit test.

Irritant Smoke

Irritant smoke can be used by trained personnel for performing qualitative fit tests on employees. To conduct a fit test, the fit tester produces a weak concentration of an irritant smoke around the wearer's face, usually using a smoke tube. The wearer then performs a series of seven fit test exercises in this weak irritant smoke atmosphere. This agent has the advantage of being able to provoke an involuntary reaction (e.g., coughing and/or sneezing) in workers wearing poorly fitting respirators. This reduces the chances of a false indication of a proper fit during a test. If wearers are unable to detect penetrations of the smoke during any of the fit test exercises, their respirator-to-face seals are satisfactory.

Isoamyl Acetate or "Banana Oil"

Isoamyl acetate or "banana oil" can be used by trained personnel for performing qualitative fit tests on employees. To conduct a fit test, a worker enters a test chamber with a weak concentration of isoamyl acetate inside. If the worker has a poor respirator-to-face seal, banana odor will be detected during one or more of the fit test exercises. If no odor is detected during any of the fit test exercises, the worker has a satisfactory respirator fit. The fit tester must be careful while using isoamyl acetate that he does not temporarily desensitize the worker's sense of smell for isoamyl acetate, making it harder, if not impossible, for that worker to detect the presence of isoamyl acetate that penetrates the respirator and must also make sure the worker has a sense of smell which can detect the material.

Saccharin or Sugar Solution

Saccharin or sugar solution can be used by trained personnel for performing qualitative fit tests for employees. This test must be performed in a test chamber. If a worker exposed to this test agent has a poor respirator-to-face seal, a sweet or sugar taste will be detected during one or more of the fit test exercises. If no taste is detected during any of the fit test exercises, the worker has a satisfactory respirator fit. The worker's taste buds can also be desensitized during this test, making it harder or impossible for that worker to detect the presence of saccharin that penetrates the respirator.

Quantitative Fit Tests

Quantitative fit tests are used at the FMPC and are considered to be the most reliable means for determining which respirators provide the best face-to-mask seals. They require sophisticated equipment that can only be operated by highly-trained personnel. Several types of instruments are available at FMPC for performing quantitative fit tests.

To perform quantitative fit tests, a fit test instrument, a test agent (usually confined in a specially designed chamber or booth), and a trained operator are necessary. Corn oil is used as the test agent in the FMPC fit test booth which uses the computerized Los Alamos National Laboratory Respiratory Studies Branch fit test instrument. Ambient dust is used as the test agent for the TSI, Incorporated PortaCount Fit test unit. (The Portacount unit utilizes a device known as a condensation nuclei counter which can increase the size of ordinary dust particles in air, allowing them to be detected by the unit's sensitive photo detection system.) Both fit test units provide FMPC employees with state-of-the-art fit tests.

To begin a quantitative fit test, the operator has the employee put on and conduct both negative and positive pressure tests with the respirator that the operator has helped the employee select. The employee then enters the fit test booth or fit test area and waits while the fit test instrument automatically runs through a beginning calibration sequence. The operator then guides the employee through a series of fit test exercises. The fit test instrument then automatically runs through an end calibration sequence and the employee is instructed to leave the booth or fit test area.

After the completion of the fit test exercises and appropriate calibration sequences, the instrument calculates the fit test factor for the employee being tested. A fit test factor (FTF) is the ratio of the concentration of the test material inside the booth to the concentration of test material inside the respirator being fitted. A FTF of 1,000, for example, would indicate to the operator that for every particle of corn oil or dust particle that got inside the fitted respirator, 1,000 particles just like it were prevented from entering the respirator. (A FTF of 1,000 is equal to a leakage rate of 0.1%.)

Both OSHA and ANSI require that a FTF of 10 be obtained for half-mask and 100 for full-face respirators. At the FMPC, a minimum FTF of 50 for half-mask and 200 for full-face respirators must be obtained, although much higher levels exceeding 1000 of protection are usually achieved.

Figure #4-3 Use of the Los Alamos computer-controlled fit test unit to determine which full-face respirator provides the best face-to-mask seal.

FIT TEST CARDS

Fit test cards shall be issued following successful fit tests by WMCO Industrial Hygiene personnel to FMPC respirator-eligible employees who have been medically certified and have successfully attended the "Basic Principles of Respiratory Protection" training class. Airline-only-eligible employees shall be issued fit test cards after being medically certified and successfully attending the "Basic Principles of Respiratory Protection" training class.

The fit test card shown below in Figure #4-4 shall include the name, badge number, and picture of employee, list of brands, types, styles, and size of respirator the employee can use at the FMPC, the fit test date, the card expiration date, and employee and fit tester signature. Airline-only-eligible employee fit test cards shall have "Airline Respirators Only" written on them rather than a specific listing of respirator brands, types, styles, or sizes. Employees are only allowed to wear the air-purifying respirator brands, types, styles, and sizes listed on their cards. If a card specifies that a North Silicone medium half-mask respirator and a MSA silicone medium full-face respirator are to be worn, then only those two respirators can be used by the employee at the FMPC. Fit test cards are valid only at the FMPC.

...es are included on fit test cards to document acceptable facial hair status. On ... test cards, general WMCO rules for respirator use at the FMPC are

If a fit test card is found and its owner cannot be located, it should be returned to Industrial Hygiene. Industrial Hygiene will return it to the employee. If a fit test card is lost, Industrial Hygiene should be contacted so that a replacement card can be made.

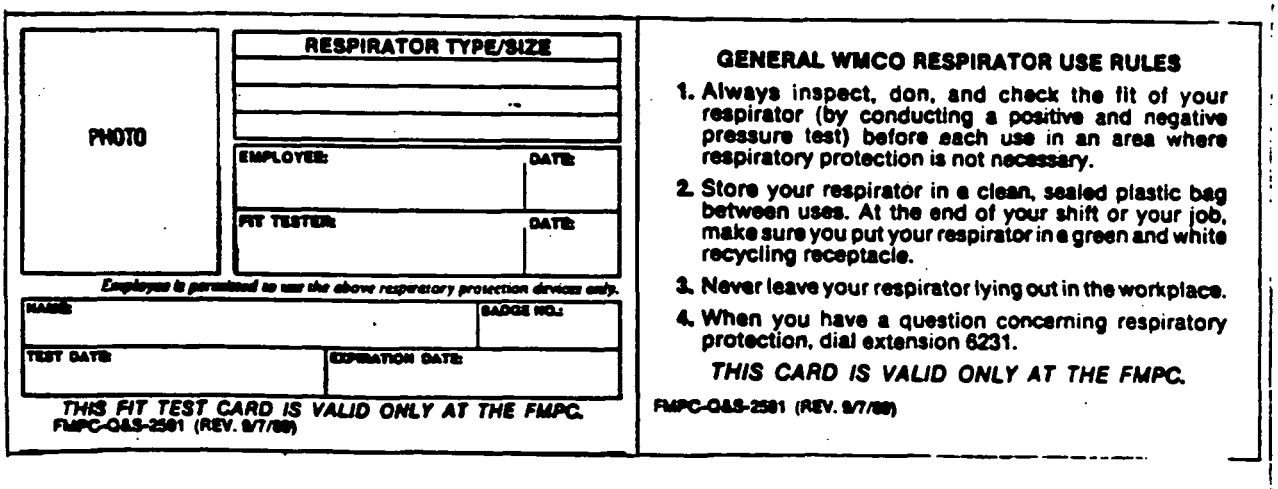


Figure #4-4 Front (left) and back (right) design of FMPC Fit Test Cards.

SECTION 5.0

STORAGE

5.1 STORAGE CABINET GUIDELINES

5.2 AIR-PURIFYING RESPIRATOR STORAGE REQUIREMENTS

5.3 AIRLINE RESPIRATOR STORAGE REQUIREMENTS

5.4 SCBA AND ELSA STORAGE REQUIREMENTS

SECTION 5.0

STORAGE

5.1 STORAGE CABINET GUIDELINES

1. Each plant/building/area/or section using respirators should have its own respirator storage cabinet.

2. Only unused new or clean reconditioned respiratory protection equipment and other unused safety and health equipment (i.e., ear plugs, extra goggles, gloves, etc.) should be kept in storage cabinets.

3. Respirator storage cabinets should be painted green and white and labelled. (See Figure #5-1 for an example of a typical respirator storage cabinet.) Contact the Paint Shop Supervisor for proper painting requirements.

4. Respirator storage cabinets should be located as far away from potentially contaminated areas as possible.

5. Storage cabinet doors should be kept unlocked and unblocked at all times to allow employee access. Their doors shall be kept closed at all times when not in use.

6. Respirator storage cabinets should be kept clean, both inside and outside.

7. Adequate supplies of necessary respirator types and sizes should be maintained based on employee needs. They should be neatly arranged and organized, with separate clearly-marked compartments for respirator types and sizes as appropriate.

8. Current fit test result summaries should be posted in cabinets by supervisors to serve as reminders for employees of which types and sizes of respirators they are authorized to use. Industrial Hygiene periodically provides updated summaries to supervisors.

9. Supervisors with respirator storage cabinets within their jurisdiction are responsible for ensuring maintenance and cleaning of those cabinets.

10. SCBA units are stored in separate cabinets, which shall be opened only in case of emergency use or for monthly Safety and Fire Services inspection.

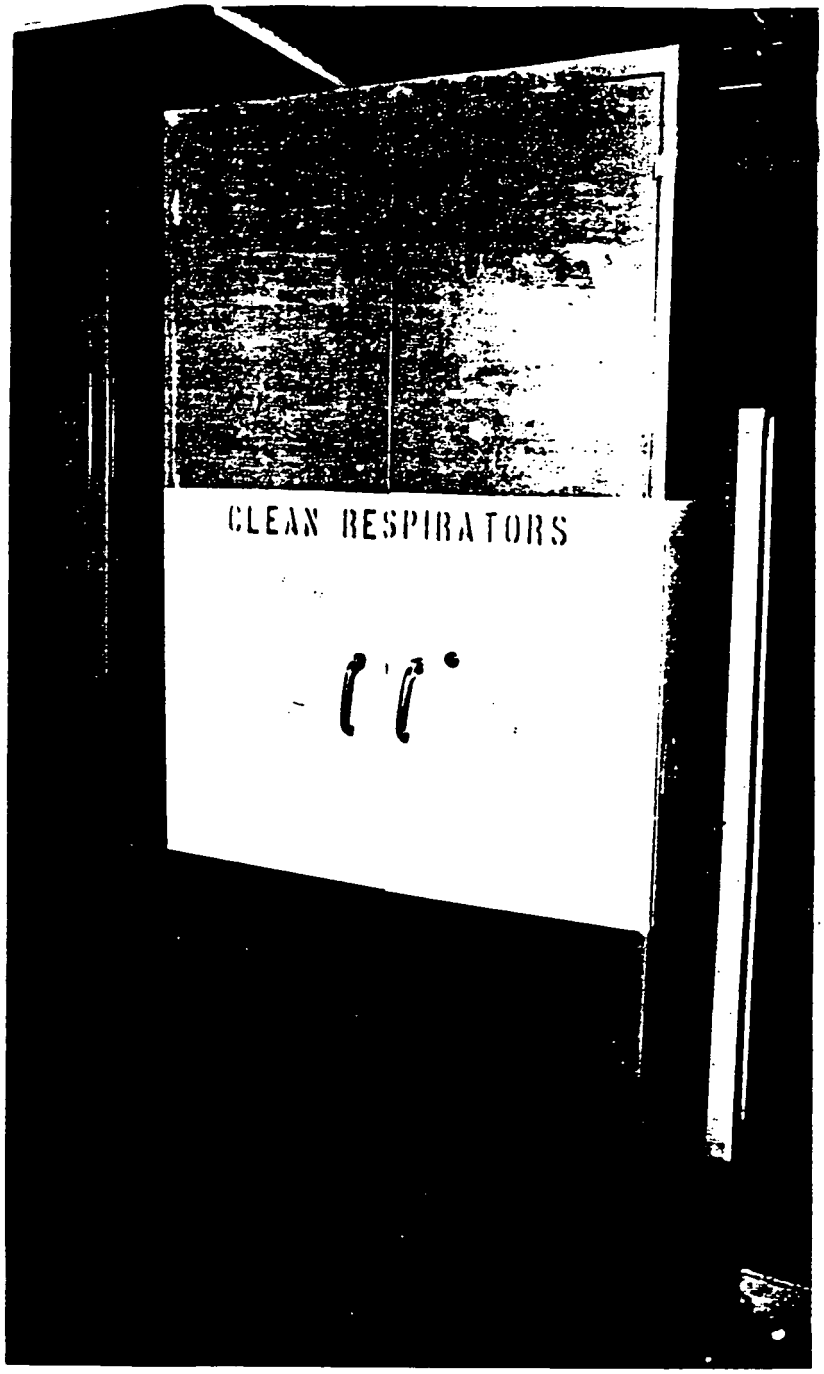


Figure #5-1 A typical FMPC respirator storage Cabinet.

5.2 AIR-PURIFYING RESPIRATOR STORAGE REQUIREMENTS

1. Clean respirators awaiting use shall be stored in clean, sealed plastic bags.

2. Respirators shall not be stored in a locker or tool box.

3. Employees shall be responsible for returning used respirators to recycling receptacles at the end of the day or job, whichever is sooner.

4. Respirators that have not been inspected within the last 12 months as indicated by the tag placed in their sealed storage bag or carton shall be taken out of storage, and reinspected, and recycled, if necessary.

5.3 AIRLINE RESPIRATOR STORAGE REQUIREMENTS

1. Clean airline respirator facepieces, breathing tubes, and belts shall be stored in sealed, clean plastic bags in storage cabinets.

2. Airline hoses shall be capped on both ends or attached together, coiled, and stored in sealed clean plastic bags in a separate cabinet when not in use.

3. Airline hoses not in use, but at the job location, shall be capped and hung off the floor.

5.4 SCBA AND ELSA STORAGE REQUIREMENTS

1. SCBA and ELSA units shall be stored in clean plastic bags or cases inside specially designed cabinets, which are located near the entrances to buildings or other areas easily accessible in emergencies.

2. After use Safety and Fire Services shall be notified immediately by the user or his/her supervisor, so that a replacement SCBA or ELSA unit can be substituted while the emptied air bottle is refilled.

SECTION 6.0

GENERAL USAGE REQUIREMENTS

6.1 GENERAL WMCO RESPIRATOR USAGE REQUIREMENTS

6.2 RESPIRATOR PRE-USE INSPECTION

6.3 SELECTION AND ISSUANCE OF RESPIRATORY PROTECTION EQUIPMENT

6.4 AIR-PURIFYING RESPIRATOR USAGE

6.5 AIRLINE RESPIRATOR USAGE

6.6 SCBA AND ELSA USAGE

6.7 FACIAL HAIR POLICY

6.8 CORRECTIVE LENSES AND DENTURES USAGE

SECTION 6.0

GENERAL USAGE REQUIREMENTS

6.1 RESPIRATOR USAGE REQUIREMENTS

1. Respirators shall be inspected, donned, and checked for proper fit (by conducting a negative and/or positive pressure test) by users before each use in an area where respiratory protection is not necessary.

2. Respirators shall not be removed until the user has entered an area where respiratory protection is not necessary.

3. Respirators shall be stored in a clean, sealed plastic bag between uses on one job. Reconditioned respirators are supplied in plastic bags. Newly purchased respirators are supplied with a plastic bag in their cartons. At the end of the shift or job, whichever is sooner, respirators are to be placed in a green and white recycling receptacle. The same respirator shall not be used for more than one shift.

4. Respirators shall not be left lying out in the workplace.

5. Users may leave a respirator area at any time for relief from respirator use in the event of equipment malfunction, physical or psychological distress, procedural or communication failure, significant deterioration of operating conditions, or any other condition that might require such relief. Examples of such conditions might include the need for an employee to get a drink of water because of a dry throat due to using an airline respirator, the need to replace used cartridges or a canister, or the need for an employee to wash and dry his face to prevent sweat from interfering with his face seal.

6.2 RESPIRATOR PRE-USE INSPECTION

Respirator users shall carefully and thoroughly inspect respiratory protection equipment prior to each use of that equipment. Users must ensure that all equipment parts are present and in proper working order, and that the equipment has an inspection tag placed either in its plastic storage bag, or in its storage carton, that verifies that the equipment has been inspected within one year (12 months) of its intended use. (Equipment not inspected within one year of the intended use shall immediately be placed in a recycling receptacle.) Excluded from point of use inspection shall be SCBAs which are inspected monthly by Safety and Fire Protection Services.

The following shall be inspected for defects during pre-use inspections:

Facepieces - Ensure there are no cracks, tears, or deformities in shape.

Straps/Harnesses - Ensure that there are no cracks in plastic components, no fraying (loose threads) in cloth/elastic components, that rubber/elastic components are functioning properly and still elastic, and that all necessary buckles, snaps and/or fittings are present.

Valves - Verify that inhalation and exhalation valves are loose and flat and not cracked, torn, warped, or deformed. Also verify that the plastic valve seats are clean and not cracked. Ensure exhalation covers are tightly affixed and not cracked.

Cartridge/Canister Receptacles - Ensure threads are not worn, MSA units have gaskets present and not cracked, and the receptacle is not cracked.

Lenses - Observe that full-face and airline hood lenses are not scratched or cracked and visibility is clear and unobstructed.

Speaking Diaphragm Assembly - Check that the speaking diaphragm is present, the retaining ring is screwed in tightly, and that the speaking diaphragm assembly is securely attached to the facepiece by its metal clamp ring.

Hoods - Observe for any tears, cracks, or material defects.

Hoses - Make sure there are no cracks, holes, worn areas, kinks, or rusted fittings on hoses, that quick-disconnect fittings are Schraeder (Figure 6.1) and that quick-disconnect fittings are not used to attach airline hoses together.

Also inspect all parts to ensure that foreign materials; e.g., dust, chemical or radioactive materials, etc., are not present.

Figure #6-1 A Schraeder male (left) and female (right) quick disconnect airline respirator hose fitting.

If deficiencies are discovered during inspection, a Deficient Respirator tag (form FMPC-ES&H 2946) should be completed, attached to the deficient respirator, and the respirator placed in a recycling receptacle. To complete a tag, the respirator user should write which respirator part is defective or missing. If the part is defective, a brief description of how the part is defective should be written in the "description of defect" space. Then the area where the respirator was found should be listed on the tag, as well as the inspector's name and badge number, and the date. A sample completed tag for a respirator with a defective part is shown in Figure #6-2.

Completed tags should be collected by the respirator cleaning and sanitizing facility and forwarded to Industrial Hygiene. These tags will enable Industrial Hygiene to determine if there are any negative patterns developing and, if necessary, thus ensuring that corrective measures are taken. This will ensure that the WMCO respirator cleaning and sanitizing facility's quality service is maintained. The deficient respirators will be repaired/reconditioned, rewashed, and resanitized or discarded as appropriate.

FMPC
ENVIRONMENT, SAFETY & HEALTH · INDUSTRIAL HYGIENE & SAFETY
DEFICIENT RESPIRATOR

Missing Part: _____

Defective Part: Facepiece

Brief Description of Problem:
Deformed in face sealing area

Area Found: Plant 19

NAME:	BADGE NO.:	DATE:
J. Doe	9999	1-3-88

FMPC-ESH-0046 (3/15/88)

Figure #6-2 A completed deficient respirator tag for a respirator with a deformed facepiece is shown above.

6.3 SELECTION AND ISSUANCE OF RESPIRATORY PROTECTION EQUIPMENT

Only Industrial Hygiene and Radiological Safety personnel shall specify what respiratory protection equipment will be purchased for use at the FMPC. Industrial Hygiene personnel shall be responsible for ensuring the proper selection of respiratory protection equipment for all potential hazards from airborne contaminants, other than radioactivity, including dust, mists, fumes, gases, and vapors. Radiological Safety personnel shall be responsible for ensuring proper selection of respiratory protection equipment for potential hazards from airborne contaminants due to radioactivity.

Selections shall be made for each job or work area based upon the type(s) of contaminant(s) present or likely to be present and its (their) expected concentration(s). Factors such as skin, head, and eye protection as well as employee comfort shall also be considered.

Respiratory protection equipment selections are communicated to supervisors through either specific or general standard operating procedures, work permits, memorandums, workplace warning or informational signs, or by other appropriate means. Supervisors shall be responsible for ensuring that their employees are issued the proper equipment. Periodic checks shall be made to ensure that only properly issued equipment is used by employees. Note that "issued" does not mean that supervisors must hand their employees the appropriate respirators. It does mean that they must ensure that their employees use appropriate respirators and cartridges/canisters as required by Industrial Hygiene/Radiological Safety. The Respirator Selection Chart Guide used by Industrial Hygiene and Radiological Safety is shown in Figure #6-3.

Questions regarding proper selection or issuance regarding non-radioactive respiratory protection concerns shall be referred to Industrial Hygiene. Questions regarding proper selection or issuance regarding radioactive respiratory protection concerns shall be referred to Radiological Safety.

6.4 AIR-PURIFYING RESPIRATOR USAGE

1. Half-mask and/or full-face air-purifying respirators shall be used in situations where atmospheric organic vapors, acid gases, radioactive and non-radioactive dusts, and mists are present or are likely to be present in low concentrations that could constitute a potential health hazard.

2. Full-face respirators shall be used instead of half-mask respirators when there is a danger that harmful contaminants could splash or blow into wearers' eyes or when the chemical gas or vapor is irritating to the eyes, or when additional respiratory protection is required.

3. The use of air-purifying respirators is subject to the capabilities and limitations listed in Section 3.0 of this Manual.

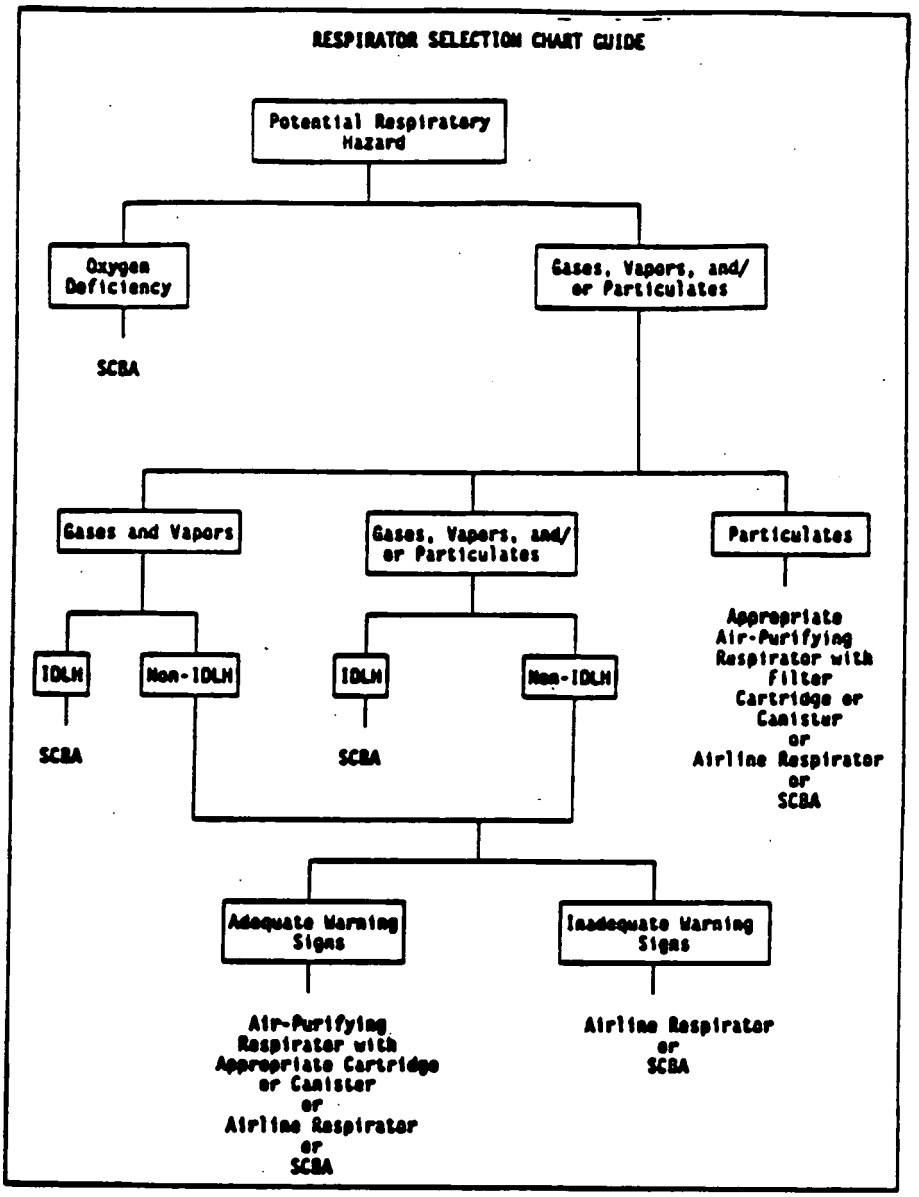


Figure #6-3 The Industrial Hygiene and Radiological Safety Respirator Selection Chart Guide.

6.5 AIRLINE RESPIRATOR USE

1. An airline respirator may be required when confined space or enclosure entry is necessary and it is verified and known that the atmosphere of the confined space or enclosure is not immediately dangerous to life or health (IDLH), and in situations where atmospheric chemical contaminants and/or dusts and mists could be present in concentrations that exceed acceptable levels for air-purifying equipment.

2. Half-mask airline respirators shall only be used in non-IDLH atmospheres which do not contain eye or skin irritants.

3. Hooded airlines may be used in non-IDLH atmospheres in which some possible eye or skin irritants could exist at lower concentrations. These devices shall only be worn for protection against materials which will not react with or penetrate the hoods or other protective clothing worn. Wearers must also wear safety glasses inside these hoods.

4. SurvivAir Combination SCBA (HIP-PAC) and Supplied-Air Respirators and similar devices shall be used in non-IDLH atmospheres in which there is an absence of skin irritants, but there may be the possibility that the atmosphere could change from non-IDLH to IDLH, requiring immediate escape of the user. This device shall not be worn in atmospheres that can change from non-IDLH to IDLH suddenly and without clear warning signs (i.e., odor of leak, sound of exploding valve, or sight of escaping gas).

5. Caution tags (which should be stored in respirator storage cabinets near airline respiratory protection equipment) with the words "Do Not Disconnect Airline Respirator in Use" shall be attached at airline stations and between all 25 and 50 foot connected hoses in use. These tags shall be removed only by the user immediately upon the completion of airline respirator use. An example of this tag is shown in Figure #6-4.

6. Schraeder quick disconnect fittings (Figure #6-1) shall be the only fittings used at the FMPC in conjunction with breathing air equipment. Schraeder fittings shall be used to connect airline hoses to airline station outlets and to the short breathing tubes attached directly to the airline respirator. Airline hoses shall be connected together using their own threaded hose couplings, not by Schraeder fittings.

Figure 6-4 A caution tag to be hung on airline stations and hoses and removed after use.

7. Airline hoses should be routed carefully such that they will not be damaged by or present safety hazards to ground traffic. They should be routed overhead when possible to prevent damage from moving traffic and to eliminate tripping hazards.

8. Vortex cooling and heating tubes such as the one shown in Figure #6-5 may be used in conjunction with hooded airline respirators to provide cooling or heating relief for respirator users exposed to hot or cold working environments.

9. Signs are posted above airline stations clearly labelling their location as shown in Figure #6-6.

Figure #6-5 A Vortex cooling or heating tube to cool air going into a Bullard hooded airline respirator.

Figure #6-6 A properly green and white labelled airline station.

10. Airline respirators should be used with at least the minimum pressure setting listed in Table #6-1. This sign shall be posted at airline stations to remind employees of proper air pressure settings. If the pressure at the station cannot be set high enough to accommodate the use of a particular respirator type or a vortex tube, then the airline respirator shall not be used at that station.

Table #6-1

Minimum Pressure Settings For Airline Respirators

Airline Respirator	Pressure Setting (psig)*
Welder's Half Mask	*35-40*
Full-Face	*35-40*
Hood	*12-45*
Bullard Hood With Vortex Tube	*80-90*

* *Do Not Use Less Than The Recommended Pressure Setting. Do Not Use More Than 300 Feet of Hose per Respirator*

11. No more than 300 feet of hose shall be used per airline respirator.

12. An automatic carbon monoxide alarm to monitor breathing air is in constant service at the FMPC. When the carbon monoxide alarm signal (4-1, 4-1) is sounded, employees shall, as soon as it can be safely accomplished (e.g., after turning off welding flames, exiting the area requiring a respirator, closing enclosure doors, etc.), cease using airline respirators throughout the entire FMPC site, until a Supervisory Alert signal (3-3, 3-3) is sounded and a message is given over the Emergency Message System confirming that the problem has been resolved. Supervisors and other employees shall make sure that airline users in their areas have heard the alarm, left the respirator area, and removed their airline respirators.

13. Use of airline respirators is subject to the capabilities and limitations listed in Section 3.0 of this Manual.

14. Industrial Hygiene routinely monitors the breathing air quality of FMPC airline stations to ensure that it meets the specifications of American National Standard Commodity Specifications for Air, ANSI Z86.1-1973 (Compressed Gas Association Commodity Specification for Air, G-7.1, 1973) for oxygen, carbon monoxide, carbon dioxide, condensed hydrocarbons, water vapor, and odor.

6.6 SCBA AND ELSA USAGE

1. SCBA use shall be required in any situation where atmospheric contaminants and/or dusts and mists could be or are likely to be present in concentrations which exceed the capacity of or cannot be captured by other respiratory protection devices.

2. SCBAs shall be used in IDLH atmospheres only with proper precautions; e.g., appropriate standby personnel present as determined by the Safety and Fire Services, proper protective clothing worn, etc. (SCBA units have either a 30 minute or one hour air supply under normal conditions.)

3. ELSA units shall be worn when immediate escape is required from a potentially IDLH atmosphere. (ELSA units have a 5 minute air supply.) ELSA units shall not be used for any other purpose.

4. Only specially trained personnel shall use SCBA. (See Section 5.3.)

5. Use of SCBA and ELSA units is subject to the capabilities and limitations listed in Section 3.0 of this Manual.

6.7 FACIAL HAIR POLICY

Determination of which employees are FMPC Respiratory Protection Program participants is based upon need; e.g., employees who work at jobs or enter into areas where respiratory protection is or may be required, who may have to participate in activities during non-routine, situations which may require respiratory protection, or who may require respiratory protection as a part of an emergency response function. These criteria have been used to derive the list of job classifications shown in Appendix A.

Employees who fall into one of these job classifications are participants in the FMPC Respiratory Protection Program and shall comply with all of the program requirements. Program participants shall become and remain clean-shaven in all face-sealing areas.

Based on this requirement, Program participants shall have no interfering facial hair, defined as more than one days growth, below one finger's width of their lower lip (unless falls on the neck beneath the face-sealing area). The typical half-mask respirator sealing area is shown as the shaded face region in Figure #6-7. The typical full-face respirator sealing area is shown as the shaded region in Figure #6-8.

Supervisors shall ensure that all their employees who are Respirator Program participants comply with these facial hair requirements. Employees found not to be in compliance shall be prohibited respirator use and subject to discipline according to the Company Policy.

Typical half-mask respirator
Face-sealing area

Figure #6-7 A face-sealing area for a typical half-mask respirator.

Typical full-facepiece respirator
Face-sealing area

Figure #6-8 **The face-sealing area for a typical full-face respirator.**

6.8 CORRECTIVE LENSES AND DENTURES USAGE

1. Standard prescription glasses shall not be worn inside full-face respirators due to their interference with proper mask-to-face seals.

2. When necessary, prescription glasses mounted completely inside the facepiece will be provided by WMCO. To obtain spectacle kits for a respirator, employees should order a kit from Inventory Control and Warehousing and provide it and a current lens prescription (less than 12 months old) to Safety and Fire Services. Note: Different spectacle kits are necessary for use with air-purifying and airline full-face respirators than the ones used in SCBA units.

3. As an option, contact lenses, regardless of type, can be worn inside full-face respirators provided a WMCO Medical Services Section staff physician determines that the employee is able to wear contacts when using respiratory protection equipment.

4. Caution: Contact lenses can be worn without restriction with non-full-face respirators, but shall not be worn in areas where air contaminants may come into contact with eyes. Contacts shall not be worn in atmospheres that may contain ammonia or hydrogen fluoride. Appropriate eye protection; i.e., safety glasses or goggles, must be worn over contact lens.

5. Dentures may be worn while using a respirator only if those dentures were worn when the respirator was successfully fit tested by Industrial Hygiene.

SECTION 7.0

EMERGENCY, RESCUE, AND NON-ROUTINE USE

Respiratory protection shall be required for FMPC employees whenever potential respiratory hazards are present at concentrations that could present a health concern. This is true for routine situations as well as for emergency, rescue, and non-routine situations.

Emergency situations requiring the use of respiratory protection devices for escapes from a work area are unlikely at the FMPC. However, respiratory protection suitable for escape is available in specific areas (e.g. Reactor Decks at the Pilot Plant, Security, or at the Plant 4 Elevator). In all other areas at the FMPC, employees should be able to escape/leave without the need of respiratory protection equipment by following emergency procedures and by leaving the area by the quickest available route while avoiding the release or spill.

Rescue situations requiring the use of respiratory protection devices are also unlikely anywhere at the FMPC. However, in the event they are needed, SCBA units are located at strategic points in specially designed and labelled cases throughout the FMPC site for use by trained personnel.

In the event of an unplanned release, spill, other emergency, and/or rescue situation, only a Self-Contained Breathing Apparatus (SCBA), worn with appropriate protective clothing, is permissible for entry into hazardous areas. They shall be worn only by trained personnel. The IRS&T Department may authorize the use of other equipment as appropriate.

For non-routine situations, such as unscheduled maintenance activities, each individual situation shall be evaluated by Industrial Hygiene and/or Radiological Safety. In situations where known concentrations of known radioactive or chemical contaminants are present, appropriate air-purifying or air-supplied respirators, as determined by Industrial Hygiene (for chemical contaminants) or Radiological Safety (for radioactive contaminants), shall be required. In situations where unknown concentrations of known or unknown radioactive or chemical contaminants are present, only SCBA units shall be worn.

SECTION 8.0

RECYCLING RECEPTACLES

1. Each plant/building/area/section using respirators should have an adequate number of recycling receptacles for used respirators. These receptacles are typically a 30 or a 55 gallon drum such as shown in Figure #8-1.

2. Recycling receptacles should be painted green and white and labelled. Contact the Paint Shop Supervisor for proper painting requirements.

3. Only used, defective, or outdated respiratory protection equipment shall be placed in recycling receptacles. Used disposable items such as Tyvek hoods, cartridges, and canisters should be disposed of separately, in containers for other potentially contaminated materials.

4. Recycling receptacles should be lined with plastic bags and have tightly affixed lids which should be kept in place except while loading or unloading receptacles.

5. Supervisors with recycling receptacles in their areas of responsibility shall be responsible for maintaining such receptacles and for ensuring that they are emptied periodically, e.g., at least weekly or whenever full, and that their contents are delivered to the respirator reconditioning facility.

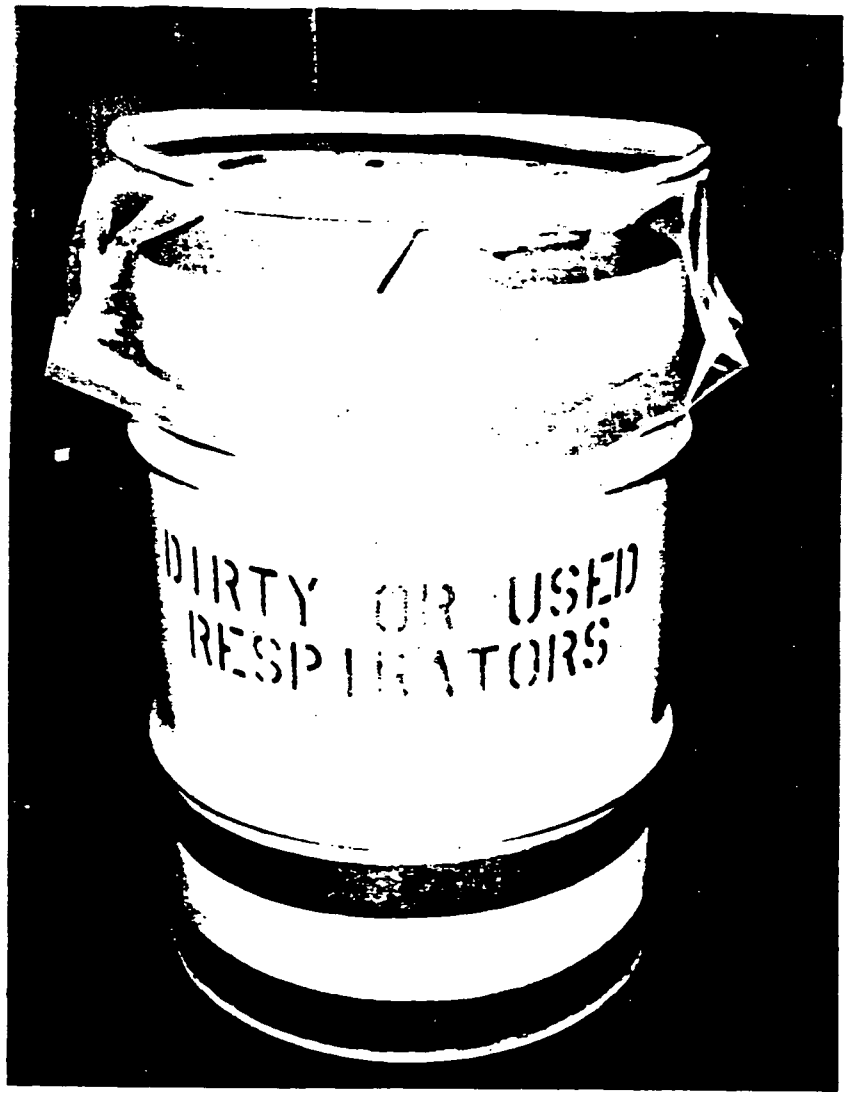


Figure #8-1 A typical recycling receptacle.

SECTION 9.0

CLEANING, SANITIZING, AND RECONDITIONING

Cleaning, sanitizing, reconditioning, and inspection of respiratory protection equipment is one of the most important components of the Respiratory Protection Program. Cleaning, will remove any foreign materials from respirators. Sanitizing respirators assures that all remaining living matter, whether bacterial or viral, is destroyed. Finally, by reconditioning respirators, one ensures that any defective or missing parts are repaired or replaced. Unrepairable equipment shall be discarded.

Recycled respirators (respirators placed in recycling receptacles) shall be thoroughly cleaned, sanitized, and reconditioned. They shall be reinspected, leak-checked, and checked for possible radioactive contamination by Industrial Hygiene personnel prior to being sent out to Inventory Control and Warehousing for reissue. This is required when the respirator is recycled because of use. Respirators in storage found to have expired dates (greater than 12 months) shall be reinspected and recycled if defective; otherwise, new expiration dates shall be added.

While both Laundry and Industrial Hygiene make every effort to ensure that only full operational respirators are sent to Inventory Control and Warehousing for reissuance, a respirator with defective or missing parts could possibly get through the system. That is why it is vital for the individual's own protection that he/she fully inspect each respirator prior to using it.

SECTION 10.0

REQUIREMENTS FOR SUBCONTRACTORS, VENDORS, AND VISITORS

10.1 GENERAL REQUIREMENTS

10.2 MINIMAL ACCEPTABLE RECORDS FOR RESPIRATOR USE AT FMPC

Proper Medical Certification Records

Training Records

Proper Fit Test Records

SECTION 10.0

REQUIREMENTS FOR SUBCONTRACTORS, VENDORS, AND VISITORS

10.1 GENERAL REQUIREMENTS

Subcontractors, vendors, and visitors must be medically certified, trained and fit tested before they will be permitted to use respiratory protection equipment at the FMPC. WMCO personnel who request the services or presence of such individuals shall be responsible for ensuring that they are properly qualified to use respirators required for access to FMPC areas where they might encounter potential respiratory hazards. WMCO personnel requesting these services must monitor these individual's use of respiratory protection equipment.

Subcontractors, vendors and visitors may arrange to use the services of competent organizations of their own choice to be medically certified, trained and/or fit tested. They may also arrange to use WMCO facilities for this purpose. WMCO personnel who request the services or presence of subcontractors, vendors, and visitors shall be responsible for providing the appropriate documentation verifying that those individuals have been properly medically certified, trained and/or fit tested and forwarding it to the Industrial Hygiene Subsection for review and approval. Industrial Hygiene may also consult the Medical Services Section regarding the documentation of medical certification. All documentation must comply with WMCO's minimal acceptable requirements (See Section 10.2).

Industrial Hygiene shall notify the responsible subcontractor or WMCO supervisors of whether or not the documentation has been approved and of what further actions are necessary, if any.

If WMCO facilities will be required to provide medical certification, training and/or fit testing, the Industrial Hygiene Subsection shall be contacted well in advance to allow for the necessary scheduling. WMCO will accommodate schedules whenever possible.

If non-FMPC respiratory protection equipment is to be used on site by any subcontractor, vendor or visitor, Industrial Hygiene approval shall be obtained before it is brought on site. Only NIOSH-approved equipment shall be used on site.

Only WMCO-trained personnel shall be permitted to use WMCO self-contained breathing apparatus (SCBA) units. Additional information regarding the FMPC Respiratory Protection Program requirements for non-FMPC employees may be obtained by contacting Industrial Hygiene.

10.2 MINIMAL ACCEPTABLE RECORDS FOR RESPIRATOR USE AT FMPC

Proper Medical Certification Records

The medical record must contain the conclusions of a competent physician regarding an evaluation of the potential respiratory protection equipment user and must indicate whether the potential user is medically able to use respiratory protection equipment.

The evaluation must state whether the potential user is able to either wear air-purifying respirators, airline respirators, or both.

The medical records shall be signed by the evaluating physician and dated within one year of the date of the intended use of the respiratory protection equipment. If the evaluating physician is a non-Medical Services Section staff physician, the record shall be approved by Industrial Hygiene before it will be considered valid.

Training Records

Training records must document that the potential user received respirator training within one year of intended use and must be signed by an official of the company. Industrial Hygiene must approve records before they will be considered valid.

Proper Fit Test Records

The fit test records must document that the potential user was fit tested by a competent tester with reliable testing equipment. The fit test records must document the following:

1. specific make, size, and model respirator tested;
2. name of person tested;
3. name of person giving test;
4. date of test (must be within one year of intended use);
5. result (fit test factor or percent leakage) for respirator fitted.
6. if asbestos work will be involved, fulfillment of the respirator fit test requirements given in Appendix C of 29 CFR 1926.58.

Industrial Hygiene must approve such records before they will be considered valid.

APR 27 1990

SECTION 11.0

MEDICAL SURVEILLANCE

Medical Services Section may, as necessary, conduct medical surveillance studies of respirator users to determine if users are being provided with adequate respiratory protection. Such studies may include physical examinations, blood tests, spirometric testing as pictured in Figure #11-1 below, urine sampling, and other necessary tests. The Medical Services Section shall be contacted for further information on medical surveillance studies.

Industrial Hygiene and/or Radiological Safety may, following incidents, upon request, or when otherwise necessary, conduct bioassay surveillance studies of respirator users to determine if users are being provided with adequate respiratory protection. Such studies may include urine analysis for either Fluorides and/or Uranium. The Bio Assay Laboratory may also analyze FMPC urine Samples.

Figure #11-1 Employee undergoing spirometric testing, to assess lung function for respirator use.

SECTION 12.0

HAZARD SURVEILLANCE

The Industrial Hygiene subsection routinely monitors for potential non-radioactive respiratory hazards in the workplace as part of the WMCO general air sampling program. Radiological Safety also routinely monitors for potential radioactive hazards in the workplace. Monitoring is performed or samples are taken to ensure that FMPC employees are not working near or around potential respiratory hazards without proper protection. Typical air sampling equipment is shown in Figures #12-1 & #12-2.

Sample results are evaluated by Industrial Hygiene for chemical concerns, and by Radiological Safety for radiation concerns, to determine whether respiratory protection is necessary and if so, the level of protection that is required. Factors such as employee comfort, eye protection, and skin protection are also considered in equipment selection.

Industrial Hygiene and Radiological Safety equipment selections are provided to supervisors via Standard Operating Procedures, Work Permits, memorandums, etc. Supervisors are responsible for ensuring that their employees are issued and use the proper equipment. Questions concerning selection shall be referred to Industrial Hygiene for chemical concerns or to Radiological Safety for radiation concerns.

SECTION 13.0

FINAL WORDS OF ADVICE

Ultimately, it is up to the user to ensure that respiratory protection equipment is used properly and at all the appropriate times. If respiratory protection equipment is not worn or is worn incorrectly, the user/wearer could be exposed to health risks from inhaled airborne contaminants.

WMCO believes that the proper care and use of respiratory protection equipment at the FMPC is an important and integral part its Safety and Health Program. It is the responsibility of supervisors and their personnel to use their equipment when necessary and according to the requirements presented in this manual. Respiratory protection equipment will control potential respiratory hazards only when it is used and cared for correctly.

APPENDIX A

JOB CLASSIFICATIONS IN PROGRAM

WMCO PERSONNEL

IRS&T Department

Industrial Hygiene & Safety
- Fire Protection Engineer
- Fire & Safety Inspector
- Fire Protection Engineer
- Fire Protection Specialist
- Industrial Hygiene Manager
- Industrial Hygiene Technologist
- Industrial Hygiene Technician
- Safety Engineer

Radiological Safety
- RAD Engineer
- Radiological Support Supervisor
- Technicians
- Technical Trainee

Operations Department

Operations Quality Control
- Inspector
- Gauge Set-Up Worker

Maintenance Group
- Apprentice
- Carpenter
- Electrician
- Engineer
- Instrument Mechanic
- Laborer
- Mason
- Millwright
- Oiler
- Painter
- Pipefitter
- Planner-Estimator
- Supervisor
- Welder

Operations Department (contd.)

Power Plant & Utilities
- Assist. Pump Operator
- Assist. Water Plant Operator
- Boiler Operator
- Boiler Operator Helper
- Bulldozer Operator
- Power Plant Oiler
- Pump Operator
- Stationary Engineer
- Utility Engineer
- Waste Treatment Operator
- Water Plant Operator

Manufacturing Group
- Chemical Operator
- Decontaminator
- Degreaser
- Engineer
- Graphite Machinist
- Industrial Cleaner
- Laborer
- Machine Set Up Operator
- Machine Tool Operator
- Packer
- Site Service Worker
- Supervisor
- Technical Trainee

Laundry & Housekeeping
- Laundry Worker
- Laundry & Housekeeping Supervisor

Traffic & Transportation
- Heavy Equipment Operator
- Industrial Mechanic
- Laborer
- Motor Vehicle Operator
- Transportation Supervisor

WMCO PERSONNEL (Continued)

Administration

Safeguards & Secu.
- Armorer
- Police Lieutenant
- Security Police Officer

Inventory Control & Warehousing
- Inventory Control Supervisor
- Storeroom Attendant

Construction Department

Construction Coordination & Support
- Construction Field Coordinator

Other employees as authorized by supervision and Industrial Hygiene

NON-WMCO PERSONNEL

RUST Engineering

- Area Manager
- Quality Assurance Inspector
- General Foreman
- Safety Coordinator
- Foremen
- Project Engineer
- Craftsmen (RUST Employees)

SUBCONTRACTORS, VENDORS AND VISITORS

Subcontractors, Vendors and Visitors as determined by Industrial Hygiene depending on activity/job.

APPENDIX B

STORES NUMBERS

ITEM DESCRIPTION	STORES NUMBER
Air-Purifying Respirators & Parts	
North Respirators & Parts	
North Silicone Half-Mask, Small	M-594
North Silicone Half-Mask, Medium	M-593
North Silicone Half-Mask, Large	M-595
North Rubber Half-Mask, Small	M-533
North Rubber Half-Mask, Medium	M-528
North Rubber Half-Mask, Large	M-515
North Black Cartridge	M-464
North Green Cartridge	M-473
North Purple Cartridge	M-466
North Yellow Cartridge	M-465
North Purple/Yellow Cartridge	M-574
North Paint Spray Prefilter	M-490
North Pesticide Prefilter	M-509
North PaintSpray/Pesticide Prefilter Cover	M-510
MSA Respirators & Parts	
MSA Silicone Half-Mask, Small	M-616
MSA Silicone Half-Mask, Medium	M-615
MSA Silicone Half-Mask, Large	M-614
MSA Rubber Half-Mask, Small	M-524
MSA Rubber Half-Mask, Medium	M-521
MSA Rubber Half-Mask, Large	M-525
MSA Silicone Half-Mask Belt-Mounted, Small	M-706
MSA Silicone Half-Mask Belt-Mounted, Medium	M-707
MSA Silicone Half-Mask Belt-Mounted, Large	M-708
MSA Silicone UltraTwin Full-Face, Small	M-636
MSA Silicone UltraTwin Full-Face, Medium	M-637
MSA Silicone UltraTwin Full-Face, Large	M-638
MSA Silicone UltraVue Full-Face, Small	M-610
MSA Silicone UltraVue Full-Face, Medium	M-611
MSA Silicone UltraVue Full-Face, Large	M-612
MSA Black Cartridge	M-118
MSA Green Cartridge	M-474

ITEM DESCRIPTION	STORES NUMBER
Air-Purifying Respirators & Parts	
MSA Respirators & Parts (continued)	
MSA Purple Cartridge	M-392
MSA Yellow Cartridge	M-081
MSA Purple/Yellow Cartridge	M-573
MSA Paint Spray Prefilter	M-118
MSA Paint Spray Prefilter Cover	M-512
MSA Prefilter Dispenser, 20	M-511
MSA Orange Cartridge	M-714
MSA Green Canister	M-703
MSA Purple Canister	M-701
MSA HF Canister	M-626
MSA Spectacle Kit for Full-Face Respirators	M-609
MSA Plastic Cover Lens for Full-Face Respirators	M-635A
MSA Nose Cup for Full-Face Respirators, Medium	M-813
MSA Nose Cup for Full-Face Respirators, Large	M-814
MSA Welder's Adapter	M-645
MSA Welder's Glass Cover	M-646
MSA Spring Lens Welder Adapter	M-647
MSA Welder's Adapter Filter Plate, Shade 6	M-812
MSA Welder's Adapter Filter Plate, Shade 10	M-648
MSA Welder's Adapter Filter Plate, Shade 12	M-649
Nomex Hood with Shoulder Cowl for MSA Welder's Adaptor	M-644
General Air-Purifying Accessories	
Belt-Mounted Carrying Bag for Half-Mask	M-627
Fog-Pruf Tissues	M-756
MSA Cleaner-Sanitizer II	M-699
Plastic Storage Bags	M-531
Ties for Plastic Storage Bags	S-255
Deficient Respirator Tags	K-728
North & MSA Air-Purifying Respirator Repair Parts	
MSA Half-Mask Respirator Exhalation Valve	M-527
MSA Ultra Vue Full-Face Respirator Canister Adapter	M-758
MSA Thick Plastic Lens for Full-Face Respirators	M-635
MSA Headbands for MSA Half-Mask Respirators	M-090
North Headbands for North Silicone Half-Mask Respirator	M-815
North Silicone Half-Mask Valve Cover	M-816

ITEM DESCRIPTION	STORES NUMBER
Airline Respirators & Parts	
North Respirators & Parts	
North Hooded Airline Respirator	M-735
North Replacement Hood	M-734
North 25 Foot Airline Hose	M-784
Coupling 3/8" Female NPT x 1/4" Male NPT for North Hoses	M-817
MSA Respirators & Parts	
MSA Welder's Half-Mask Airline, Small	M-782
MSA Welder's Half-Mask Airline, Medium	M-549
MSA Welder's Half-Mask Airline, Large	M-783
MSA Full-Face Airline, Small	M-764
MSA Full-Face Airline, Medium	M-765
MSA Full-Face Airline, Large	M-766
MSA Sand-Blasting Hooded Airline Respirator 2250	M-516
MSA Replacement Window Screen for 2250	M-517
MSA Replacement Lens for 2250	M-518
MSA Replacement Window for 2250	M-519
MSA 25 Foot Airline Hose	M-382
MSA 50 Foot Airline Hose	M-390
MSA Web Belt	M-529
Coupling, 3/4" Female to 1/4" Male NPT	M-571
Coupling, 3/4" Male to 1/4" Male NPT	M-396
Bullard Respirators & Parts	
Bullard Hooded Airline Respirator	M-619
Bullard Hooded Airline Respirator with Hard Hat	M-810
Bullard Replacement Hood	M-619A
Bullard 25 Foot Starter Airline Hose	M-779
Bullard 25 Foot Airline Hose	M-778
Bullard Climate Control (Vortex) Tube Kit	M-763
General Airline Station Items	
Compressed Breathing Air, 244 cu. ft. cylinder	C-429
MSA Airline Station Filter Assembly Complete	M-393
MSA Airline Station Filter Cartridge	M-498
MSA Airline Station Chemical Cartridge	M-497
MSA Airline Station Pressure Regulator with Gauge	M-811
MSA Airline Station Filter Gasket I	M-651
MSA Airline Station Filter Gasket II	M-652
CO Monitor Replacement Sensor	M-620
Airline Station Outlet Fitting Plug & Chains	M-704
"Airline Station" Signs	S-252
"Airline Respirator Minimum Pressure" Signs	S-257

ITEM DESCRIPTION	STORES NUMBER
Airline Respirators & Parts	
General Airline Station Items	
"Do Not Disconnect - Airline Respirator in Use" Tags	S-260
"Deficient Respirator" Tag	K-728
PVA Plastic Bags for Disposing Asbestos Respirators	S-261
Coupling, 1/4" Male NPT to 1/4" Male Schraeder	M-522
Coupling, 1/4" Female NPT to 1/4" Female Schraeder	M-383
Coupling, 1/4" Female NPT to 1/4" Male Schraeder	M-384

APPENDIX C

USEFUL REFERENCES

ANSI Z88.2-1980, "Practices for Respiratory Protection"

DOE, Order No. 5480.1, Chapter No. 1, "Environmental Protection, Safety, and Health Standards"

NRC, 41 CFR 20, "Standards for Protection Against Radiation"

NRC, Regulatory Guide, 8.15, "Acceptable Practices for Respiratory Protection"

OSHA, 29 CFR 1910.134, "Respiratory Protection"

APPENDIX A

JOB CLASSIFICATIONS IN PROGRAM

WMCO PERSONNEL

IRS&T Department

Industrial Hygiene & Safety
- Fire Protection Engineer
- Fire & Safety Inspector
- Fire Protection Engineer
- Fire Protection Specialist
- Industrial Hygiene Manager
- Industrial Hygiene Technologist
- Industrial Hygiene Technician
- Safety Engineer

Radiological Safety
- RAD Engineer
- Radiological Support Supervisor
- Technicians
- Technical Trainee

Operations Department

Operations Quality Control
- Inspector
- Gauge Set-Up Worker

Maintenance Group
- Apprentice
- Carpenter
- Electrician
- Engineer
- Instrument Mechanic
- Laborer
- Mason
- Millwright
- Oiler
- Painter
- Pipefitter
- Planner-Estimator
- Supervisor
- Welder

Operations Department (contd.)

Power Plant & Utilities
- Assist. Pump Operator
- Assist. Water Plant Operator
- Boiler Operator
- Boiler Operator Helper
- Bulldozer Operator
- Power Plant Oiler
- Pump Operator
- Stationary Engineer
- Utility Engineer
- Waste Treatment Operator
- Water Plant Operator

Manufacturing Group
- Chemical Operator
- Decontaminator
- Degreaser
- Engineer
- Graphite Machinist
- Industrial Cleaner
- Laborer
- Machine Set Up Operator
- Machine Tool Operator
- Packer
- Site Service Worker
- Supervisor
- Technical Trainee

Laundry & Housekeeping
- Laundry Worker
- Laundry & Housekeeping Supervisor

Traffic & Transportation
- Heavy Equipment Operator
- Industrial Mechanic
- Laborer
- Motor Vehicle Operator
- Transportation Supervisor

WMCO PERSONNEL (Continued)

Administration Department

Safeguards & Security
- Armorer
- Police Lieutenant
- Security Police Officer

Inventory Control & Warehousing
- Inventory Control Supervisor
- Storeroom Attendant

Construction Department

Construction Coordination & Support
- Construction Field Coordinator

Other employees as authorized by supervision and Industrial Hygiene

NON-WMCO PERSONNEL

RUST Engineering

- Area Manager
- Quality Assurance Inspector
- General Foreman
- Safety Coordinator
- Foremen
- Project Engineer
- Craftsmen (RUST Employees)

SUBCONTRACTORS, VENDORS AND VISITORS

Subcontractors, Vendors and Visitors as determined by Industrial Hygiene depending on activity/job.

APPENDIX B

STORES NUMBERS

ITEM DESCRIPTION	STORES NUMBER
Air-Purifying Respirators & Parts	
North Respirators & Parts	
North Silicone Half-Mask, Small	M-594
North Silicone Half-Mask, Medium	M-593
North Silicone Half-Mask, Large	M-595
North Rubber Half-Mask, Small	M-533
North Rubber Half-Mask, Medium	M-528
North Rubber Half-Mask, Large	M-515
North Black Cartridge	M-464
North Green Cartridge	M-473
North Purple Cartridge	M-466
North Yellow Cartridge	M-465
North Purple/Yellow Cartridge	M-574
North Paint Spray Prefilter	M-490
North Pesticide Prefilter	M-509
North PaintSpray/Pesticide Prefilter Cover	M-510
MSA Respirators & Parts	
MSA Silicone Half-Mask, Small	M-616
MSA Silicone Half-Mask, Medium	M-615
MSA Silicone Half-Mask, Large	M-614
MSA Rubber Half-Mask, Small	M-524
MSA Rubber Half-Mask, Medium	M-521
MSA Rubber Half-Mask, Large	M-525
MSA Silicone Half-Mask Belt-Mounted, Small	M-706
MSA Silicone Half-Mask Belt-Mounted, Medium	M-707
MSA Silicone Half-Mask Belt-Mounted, Large	M-708
MSA Silicone UltraTwin Full-Face, Small	M-636
MSA Silicone UltraTwin Full-Face, Medium	M-637
MSA Silicone UltraTwin Full-Face, Large	M-638
MSA Silicone UltraVue Full-Face, Small	M-610
MSA Silicone UltraVue Full-Face, Medium	M-611
MSA Silicone UltraVue Full-Face, Large	M-612
MSA Black Cartridge	M-118
MSA Green Cartridge	M-474

ITEM DESCRIPTION	STORES NUMBER
Air-Purifying Respirators & Parts	
MSA Respirators & Parts (continu.	
MSA Purple Cartridge	M-392
MSA Yellow Cartridge	M-081
MSA Purple/Yellow Cartridge	M-573
MSA Paint Spray Prefilter	M-118
MSA Paint Spray Prefilter Cover	M-512
MSA Prefilter Dispenser, 20	M-511
MSA Orange Cartridge	M-714
MSA Green Canister	M-703
MSA Purple Canister	M-701
MSA HF Canister	M-626
MSA Spectacle Kit for Full-Face Respirators	M-609
MSA Plastic Cover Lens for Full-Face Respirators	M-635A
MSA Nose Cup for Full-Face Respirators, Medium	M-813
MSA Nose Cup for Full-Face Respirators, Large	M-814
MSA Welder's Adapter	M-645
MSA Welder's Glass Cover	M-646
MSA Spring Lens Welder Adapter	M-647
MSA Welder's Adapter Filter Plate, Shade 6	M-812
MSA Welder's Adapter Filter Plate, Shade 10	M-648
MSA Welder's Adapter Filter Plate, Shade 12	M-649
Nomex Hood with Shoulder Cowl for MSA Welder's Adaptor	M-644
General Air-Purifying Accessories	
Belt-Mounted Carrying Bag for Half-Mask	M-627
Fog-Pruf Tissues	M-756
MSA Cleaner-Sanitizer II	M-699
Plastic Storage Bags	M-531
Ties for Plastic Storage Bags	S-255
Deficient Respirator Tags	K-728
North & MSA Air-Purifying Respirator Repair Parts	
MSA Half-Mask Respirator Exhalation Valve	M-527
MSA Ultra Vue Full-Face Respirator Canister Adapter	M-758
MSA Thick Plastic Lens for Full-Face Respirators	M-635
MSA Headbands for MSA Half-Mask Respirators	M-090
North Headbands for North Silicone Half-Mask Respirator	M-815
North Silicone Half-Mask Valve Cover	M-816

ITEM DESCRIPTION	STORES NUMBER
Airline Respirators & Parts	
North Respirators & Parts	
North Hooded Airline Respirator	M-735
North Replacement Hood	M-734
North 25 Foot Airline Hose	M-784
Coupling 3/8" Female NPT x 1/4" Male NPT for North Hoses	M-817
MSA Respirators & Parts	
MSA Welder's Half-Mask Airline, Small	M-782
MSA Welder's Half-Mask Airline, Medium	M-549
MSA Welder's Half-Mask Airline, Large	M-783
MSA Full-Face Airline, Small	M-764
MSA Full-Face Airline, Medium	M-765
MSA Full-Face Airline, Large	M-766
MSA Sand-Blasting Hooded Airline Respirator 2250	M-516
MSA Replacement Window Screen for 2250	M-517
MSA Replacement Lens for 2250	M-518
MSA Replacement Window for 2250	M-519
MSA 25 Foot Airline Hose	M-382
MSA 50 Foot Airline Hose	M-390
MSA Web Belt	M-529
Coupling, 3/4" Female to 1/4" Male NPT	M-571
Coupling, 3/4" Male to 1/4" Male NPT	M-396
Bullard Respirators & Parts	
Bullard Hooded Airline Respirator	M-619
Bullard Hooded Airline Respirator with Hard Hat	M-810
Bullard Replacement Hood	M-619A
Bullard 25 Foot Starter Airline Hose	M-779
Bullard 25 Foot Airline Hose	M-778
Bullard Climate Control (Vortex) Tube Kit	M-763
General Airline Station Items	
Compressed Breathing Air, 244 cu. ft. cylinder	C-429
MSA Airline Station Filter Assembly Complete	M-393
MSA Airline Station Filter Cartridge	M-498
MSA Airline Station Chemical Cartridge	M-497
MSA Airline Station Pressure Regulator with Gauge	M-811
MSA Airline Station Filter Gasket I	M-651
MSA Airline Station Filter Gasket II	M-652
CO Monitor Replacement Sensor	M-620
Airline Station Outlet Fitting Plug & Chains	M-704
"Airline Station" Signs	S-252
"Airline Respirator Minimum Pressure" Signs	S-257

ITEM DESCRIPTION	STORES NUMBER
Airline Respirat & Parts	
General Airline S ns	
"Do Not Discon ine Respirator in Use" Tags	S-260
"Deficient Respir	K-728
PVA Plastic Bags f sposing Asbestos Respirators	S-261
Coupling, 1/4" Male to 1/4" Male Schraeder	M-522
Coupling, 1/4" Femal o 1/4" Female Schraeder	M-383
Coupling, 1/4" Female 1/4" Male Schraeder	M-384

APPENDIX D

GLOSSARY OF COMMON RESPIRATORY PROTECTION TERMS

Administrator - Individual designated by the Industrial Hygiene Manager, responsible for developing and maintaining the FMPC Respiratory Protection Program.

Administrative Controls - Methods to decrease employee exposures to contaminants by job-rotations, work assignments, work practices or time periods away from contaminants, training, and warning and/or information sign postings.

Airline-Only-Eligible - Cannot use any type of respiratory protection equipment other than airline respirators and ELSA units.

ANSI - American National Standards Institute; an organization composed of experts from industry, universities, and safety and health organizations which drafts and publishes consensus standards on safety and health issues, including respiratory protection.

Breathing Air - Respirable air which meets CGA, G-7.1-1973, Grade D, Type I specifications.

Canister - Large container filled with air-purifying media including sorbents, catalysts, and/or aerosol filters that remove gases, vapors, and/or particulates that are drawn through it.

Cartridge - Small container filled with air-purifying media. See definition for canister above.

CGA - Compressed Gas Association, Inc.

Contaminants - Undesired airborne materials in employee's potential breathing zone.

Dusts - Solid airborne particles generated by handling, crushing, grinding, rapid impact, detonation, and cracking of materials.

Engineering Controls - Attempts to decrease employee exposures by modifying sources or reducing quantities of contaminants released into work environments. Examples of such controls include ventilation systems, shielding, and replacement of toxic materials with less toxic materials.

Facepiece - Portion of respirator that covers wearer's nose and mouth (half-mask respirator); or nose and eyes (full-face respirator).

Fit test - Method used to determine whether a respirator provides a good seal for a worker. Qualitative and quantitative fit tests can be used to determine which respirator types, materials and sizes provide employees with the best face-to-mask seals.

Fit test Factor (FTF) - Ratio of concentration in the test chamber or fit test area to its concentration outside the respirator. Higher FTFs indicate better respirator fits.

Fumes - Tiny solid airborne particles formed by condensation of vapors of heated solid materials, such as lead, uranium being welded.

Immediately Dangerous to Life or Health (IDLH) - Any atmosphere which poses an immediate hazard to life or produces immediate adverse effects on health.

Medical Certification - Determination made by a medical physician on basis of medical evaluation of potential user's ability to use respiratory protection equipment.

Mists - Suspended liquid airborne droplets generated by condensation from gaseous to liquid state or by breaking up liquid into dispersed state (examples include splashing, foaming, or atomizing).

MSHA - Mine Safety and Health Administration.

NIOSH - National Institute for Occupational Safety and Health.

Non-eligible - Determined medically unable to use any type of respiratory protection equipment.

Non-SCBA-eligible - Determined medically unable to use a SCBA unit.

NRC - Nuclear Regulatory Commission.

OSHA - Occupational Safety and Health Act or Occupational Safety and Health Administration.

PEL - Permissible Exposure Limit, employee's permitted exposure to airborne contaminant materials listed in Table Z-1, Z-2, or Z-3 of OSHA regulations section 29 CFR 1910.1000.

Personal Controls - Devices such as earplugs and respirators, used to protect employees from safety and health concerns found or likely to be found in the work place.

Physician - Medical Doctor responsible for evaluating whether employees are medically able to use respiratory protective equipment.

Pliable - Easily stretchable; state of usable rubber straps on respirator.

Protection Factor (PF) - Actual protection given to a respirator user against potential respiratory hazard. A PF is usually represented as ratio of a contaminant's concentration in ambient air to the concentration in air inside the respirator facepiece. Higher ratios indicate greater levels of protection.

Respirator - Device worn by employee for protection from inhalation of harmful airborne contaminants.

Respirator-Eligible - Determined medically able to use both air-purifying and airline respirators.

SCBA-Eligible - Determined medically able to use a SCBA unit.

Subcontractors - Employees of non-WMCO organizations which require access to the FMPC for the purpose of providing supplies (or performing some service or construction activity) at the FMPC in performance of their employers' contractual obligations. On-site employees of other DOE prime contractors are considered subcontractors.

TLV - Threshold Limit Value, exposure level under which most people can work for eight hours a day, five days a week, over a working lifetime with no harmful effects. TLV's are established by American Conference of Governmental Industrial Hygienists.

Training - ANSI Z88.2-1980, Section 7.2.3, training requirements for potential respirator users.

TWA - Time Weighted Average, average exposure of worker during an eight hour work day as determined by either periodic or continuous sampling.

Vendors - Employees of non-WMCO organizations which require access to the FMPC for the purpose of providing supplies or performing some service at the FMPC in performance of their employers' contractual obligations.

Visitors - Any person (to include temporary employees and Internal Westinghouse Requisition personnel), other than WMCO/DOE employees, subcontractor or vendor personnel who has been properly authorized and issued temporary or permanent credentials for access to the FMPC.

3288 PJB

Westinghouse Materials Company of Ohio — FMPC

SITE POLICY AND PROCEDURE

NUMBER:	REVISION:	ISSUE DATE:
FMPC-519	0	7/28/89

TITLE: MANAGEMENT OF HAZARDOUS WASTE

APPROVED BY: M. B. Boswell, President

1.0 POLICY

Westinghouse Materials Company of Ohio (WMCO) shall manage hazardous and mixed waste at the Feed Materials Production Center (FMPC) to maintain compliance with all Federal and State regulations in accordance with DOE Orders.

2.0 SCOPE

The procedures implementing this policy are in compliance with the Resource Conservation and Recovery Act (RCRA) regulations which are enforced and audited by the United States Environmental Protection Agency (EPA) and the Ohio EPA. The procedures apply to all personnel who handle or manage hazardous and/or mixed waste.

3.0 DEFINITIONS

3.1 Hazardous Waste - A waste material exhibiting the characteristics of ignitability, corrositivity, reactivity, or toxicity or listed in 40 CFR 261 (RCRA) or identified in applicable state regulations.

3.2 Mixed Waste - Waste containing both radioactive and hazardous components.

3.3 Approved Container - Containers which meet specific Department of Transportation (DOT) specifications (40 CFR Part 173).

3.4 Satellite Accumulation Areas - A defined location approved for waste storage during its accumulation preferably adjacent to a waste generation point.

3.5 Storage Location - A defined area, usually a warehouse, approved for long-term storage.

3.6 Generator - The FMPC operation actually producing the hazardous/mixed waste.

4.0 RESPONSIBILITIES

4.1 WMCO Solid Waste Compliance - Responsible for coordinating the preparation of permit applications for hazardous and mixed waste storage; interpreting requirements as they relate to the management of waste at FMPC; conducting surveillance and issuing reports of findings of all RCRA activities to assure compliance; preparing and submitting reports as required by Regulatory agencies and the maintenance of all required RCRA records. Responsible for making a RCRA hazardous waste determination for all FMPC waste streams; also, responsible for determining whether FMPC waste streams are restricted from landfill disposal.

154

4.0 RESPONSIBILITIES (Continued)

4.2 WMCO Materials Control and Accountability - Responsible for developing of sampling requirements for hazardous waste; providing statistical evaluation of hazardous waste analytical data; arranging and documenting the transfer of containers of hazardous waste from satellite accumulation areas to interim storage areas and between storage areas; preparing and maintaining a current inventory listing of all hazardous materials containers by specific location within the interim storage areas; maintaining a second lock on the interim storage warehouse along with that of Waste Operations to control movement of containers to and from the area; monitoring an annual physical inventory of the containers in the interim storage area by Waste Operations; assisting and advising in the identification of hazardous materials according to the "FMPC Lot Marking System."

4.3 WMCO Analytical - Responsible for providing and reporting analyses of samples of hazardous and/or mixed waste to enable a proper disposition of the waste to be performed. Requests for analysis may range from a RCRA, non-RCRA determination to a complete physical and chemical analysis to meet specified acceptance criteria at an off-site treatment facility.

4.4 WMCO Transportation - Responsible for the on-site movement of hazardous and/or mixed waste in accordance with appropriate procedures which shall specify applicable safety standards. This includes providing manpower and equipment to transfer waste from accumulation areas to storage locations onsite; preparing of procedures which define state and federal requirements for off-site shipments, and supplying containers on request.

4.5 WMCO Supervisor, Hazardous Waste Accumulation Area - Responsible for the control of a designated waste accumulation area ensuring compliance with approved departmental procedures. Specifically this responsibility includes ensuring the following:

- o area is properly established with appropriate signs;
- o the removal of full containers in a timely manner;
- o approved containers are closed when not in use;
- o proper documentation is generated and maintained for each container of waste, identification of both the container and the waste is required;
- o all spills of hazardous/mixed waste are reported;
- o all generators (users of the accumulation area) are fully trained to approved procedures;
- o all containers are properly packaged, labelled, and marked.

4.6 WMCO Generator - Ensures that hazardous/mixed waste when generated is placed into proper containers in a safe, timely manner in accordance with approved procedures.

4.0 RESPONSIBILITIES (Continued)

4.7 WMCO Training Development - Responsible for developing a comprehensive training program based upon input from technical experts. Training program shall ensure all personnel working on-site have a full sitewide understanding of environmental requirements for hazardous/mixed waste. Job specific training programs and maintenance of personnel training records are also the responsibility of Training Development.

4.8 WMCO Performance Assessment - Responsible for conducting periodic audits of the hazardous/mixed waste program to ensure compliance with operating procedures that implement regulatory requirements at FMPC.

4.9 WMCO Environmental Engineering - Responsible for the engineering and technical management of the hazardous and mixed waste program. Specifically this includes:

- o preparing operating procedures to ensure Federal and State Regulatory requirements are implemented;
- o maintaining a sampling and analysis program, which may include on-site and off-site laboratory work, to enable a complete characterization of all waste streams;
- o ensuring compatibility of containers and storage locations with types of waste generated;
- o managing the FMPC Waste Minimization Program and issuing annual waste minimization status report;
- o coordinating off-site shipments of wastes to licensed facilities in accordance with specified acceptance criteria.

4.10 WMCO Waste Operations - Responsible for containerizing, handling and safe storage of hazardous and mixed waste in accordance with Federal and State Regulatory requirements. Specifically this includes:

- o conducting periodic inspections of stored waste and maintaining records of drum locations;
- o redrumming, as necessary, to maintain container integrity;
- o ensuring the availability and maintenance of spill clean-up equipment;
- o maintaining restricted access to storage areas;
- o obtaining samples of waste for characterization and analysis;
- o preparation of waste shipments off-site;
- o preparation and maintenance of RCRA operating records.

NUMBER: FMPC-519	REVISION: 0	ISSUE DATE: 7/28/89

4.0 RESPONSIBILITIES (Continued)

4.11 WMCO Quality and Safety - Responsible for ensuring that applicable worker safety standards are met and conducting the formal review(s) of mixed waste storage area(s).

5.0 GENERAL

5.1 Satellite accumulation areas shall be set up at designated locations throughout the site in accordance with approved departmental procedures. Each accumulation area location is designated and recorded by Solid Waste Compliance which shall perform periodic surveillances to ensure compliance. In the event the accumulation area is no longer required (due to a change in operation, for example), the inspection log for that area will be transferred to and retained by Solid Waste Compliance.

5.2 Spills and releases of hazardous/mixed waste shall be reported to the supervisor of the area in which the spill or release occurred. The supervisor shall notify the Assistant Emergency Duty Officer (AEDO) in accordance with FMPC-503, "FMPC Spill Incident Reporting and Clean-up". A fire, explosion, or release of a hazardous/mixed waste that threatens human health or the environment shall require implementation of the RCRA Contingency Plan.

5.3 Waste Minimization is the responsibility of all site personnel to become familiar with and put into practice waste minimization techniques. As an example, significant waste reduction may be achieved by the investigation and prudent use of alternative solvents, that do not contain RCRA controlled substances.

5.4 It is the goal of WMCO to reduce the volume and toxicity of hazardous waste generated at the FMPC and ensure available methods of treating, storing, or disposing of the hazardous waste to minimize present and future threats to human health and the environment from such waste.

6.0 PROCEDURE

Mandatory procedural requirements, to ensure the implementation of this FMPC Site Policy, are contained in approved standard operating procedures, department procedures, and supporting documents. Specific responsibilities for the control of waste from generation point to storage location are defined. Training to these procedures, as well as general awareness and job specific training shall be provided and documented.

7.0 APPLICABLE DOCUMENTS

7.1 Code of Federal Regulations, (CFR) Title 40 Parts 260 through 265.

7.2 Code of Federal Regulations, Title 49 Parts 171 through 173 and 178.

7.3 Ohio Administrative Code, "Hazardous Waste Rules"

7.4 FMPC Standard Operating Procedures and Department Procedures.

7.0 APPLICABLE DOCUMENTS (Continued)

7.5 FMPC 503, "FMPC Spill Incident Reporting and Clean-up"

7.6 FMPC-2178, "Lot Marking and Color Coding System"

7.7. Code of Federal Regulations, (CFR) Title 29 Parts 1910 and 1926

7.8 DOE Order 5820.2A Management of Low Level and Hazardous Wastes

8.0 FORMS USED

None

9.0 ATTACHMENTS

None

FMPC-2084
REVISION 4
TOPICAL MANUAL

FMPC RADIATION CONTROL MANUAL

December 31, 1990

FEED MATERIALS PRODUCTION CENTER
WESTINGHOUSE MATERIALS COMPANY OF OHIO
P. O. BOX 398704
CINCINNATI, OHIO 45239-8704

CHANGE CONTROL RECORD WESTINGHOUSE MATERIALS COMPANY OF OHIO	TITLE: FMPC Radiation Control Manual	DOCUMENT NO. FMPC-2084

REV. NO/DATE	CHANGE RELEASE DOCUMENT	PAGES AFFECTED	REMARKS
Rev. 0 10/87	Initial Release		Originally FMPC-2084
Rev. 1		All	Marginal notation of revisions omitted due to extent and number of changes.
Rev. 2		3-4, 5-1 - 5-4, 5-7, 5-8, 13-1, 13-2	Radiation safety training requirements and organizational designations updated.
Rev. 3		iv, ix, 7-4	Revise labeling requirements for radioactive material

NUMBER	REVISION	ISSUE DATE
FMPC-2084	1	04/26/89

Distribution:

RADIOLOGICAL CONTROLS MANUAL

3288

TABLE OF CONTENTS

Section 1 - INTRODUCTION AND PURPOSE

1.1 General - Scope 1-1

1.2 Summary - Policy and Responsibilities 1-2

1.3 Applicable Terms 1-3

Section 2 - RADIATION DOSE LIMITS

2.1 General 2-1

2.2 Dosimetry Records 2-3

Section 3 - DOSIMETRY

3.1 External Dosimetry Requirements 3-1

3.2 Internal Radiation 3-4

Section 4 - ENGINEERING AND ADMINISTRATIVE CONTROLS FOR RADIOLOGICAL SAFETY

4.1 WMCO ALARA Programs 4-1

4.2 Engineering Controls for Facility Design/Modification 4-4

4.3 Radiological Engineering Evaluation 4-7

4.4 Administrative Controls: Work Procedures 4-8

Section 5 - REQUIREMENTS FOR WORKING IN RADIOLOGICAL AREAS

5.1 Controlled Area Access Requirements 5-1

5.2 Radiological Areas Postings 5-2

5.3 Protective Clothing 5-2

Section 6 - REQUIREMENTS FOR WORKING IN RADIATION AREAS

6.1 Controlling Exposure in Radiation Areas 6-1

6.2 Exposure Limits for Radiation Areas 6-1

6.3 Requirements for Working in Radiation Areas 6-1

6.4 Radiation Surveys 6-4

3288

Section 7 - RADIOACTIVE CONTAMINATION

7.1 General 7-1

7.2 Contamination Limits and Posting Requirements 7-1

7.3 Clothing Requirements 7-2

7.4 Survey Requirements 7-3

Section 8 - REQUIREMENTS FOR WORKING IN AIRBORNE RADIOACTIVITY AREAS

8.1 Controlling Airborne Radioactivity 8-1

8.2 Limits for Airborne Radioactivity 8-1

8.3 Requirements for Working in Airborne Radioactive Areas 8-2

8.4 Monitoring for Airborne Radioactivity 8-5

Section 9 - RESPONDING TO RADIATION INCIDENTS

9.1 Incident Response 9-1

9.2 High Radiation Alarm 9-4

9.3 Airborne Radioactivity Alarm 9-5

9.4 Radioactive Material Spills 9-5

9.5 Radioactive Material Fires 9-6

Section 10 - RADIOACTIVE SOURCE CONTROL

10.1 Purpose 10-1

10.2 Scope 10-1

10.3 Requirements 10-1

10.4 Responsibilities 10-2

10.5 Accountability and Control 10-4

10.6 Records 10-4

10.7 Labeling 10-5

10.8 Training 10-5

Section 11 - RADIOACTIVE MATERIAL SHIPPING AND RECEIVING

11.1 General Requirements 11-1

11.2 Transportation Standards 11-1

11.3 Surveying of Shipments 11-2

11.4 Radiation and Contamination Limits 11-2

11.5 Marking, Labeling and Placarding 11-3

SECTION 12 - RECORDKEEPING

12.1 Radiological Monitoring Records 12-1

12.2 Work Place Monitoring 12-1

12.3 Personnel Exposure 12-1

SECTION 13 - RADIATION SAFETY TRAINING

13.1 Radiation Safety Training 13-1

13.2 Training Records 13-3

SECTION 14 - RADIATION EFFECTS

14.1 Exposure Effects 14-1

14.2 Control of Collective Dose 14-1

14.3 Radiation Risk 14-2

APPENDIX

A .. Radiation Safety Terminology

B .. Derived Air Concentrations for Controlling Radiation Exposure to Workers at DOE Facilities

C .. Concerning Risks from Occupational Radiation Exposure

D .. Surface Radioactivity Guides

E .. Use of Contaminants

TABLE OF CONTENTS

3288

LIST OF FIGURES

Figure	Title	
4-1	Radiation Work Permit	4-12
10-1	Radiation Source Permit - Title Page	10-12
10-2	Radiation Source Permit - Data and Requirements	10-13

LIST OF TABLES

Table	Title	
2.1	Radiation Dose Equivalent Limits	2-2
8.1	Respiratory Protective Equipment	8-4
8.2	Location and Solubility Class of Potential Airborne Radionuclides at FMPC	8-7
10.1	Activities Required to Qualify as a Radioactive Source	10-7

TABLE OF ACRONYMS

ACRONYM	DESCRIPTION
AEDO	Assistant Emergency Duty Officer
ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
BZ	Breathing Zone
CAM	Constant Air Monitor
CFR	Code of Federal Regulations
DAC	Derived Air Concentrations
D&I	Dosimetry and Instrumentation
DOE	Department of Energy
DOT	Department of Transportation
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
ERT	Emergency Response Team
FMPC	Feed Materials Production Center
HEPA	High Efficiency Particulate Air Filter
ICRP	International Commission on Radiological Protection
LSA	Low Specific Activity
MPLB	Maximum Permissible Lung Burden
NCRP	National Council on Radiation Protection and Measurements
NRC	Nuclear Regulatory Commission
OS&H	Operations Safety and Health
OSHA	Occupational Safety and Health Administration
PF	Protection Factor
RDA	Radiation Detection Alarm
RS	Radiological Safety
RWP	Radiation Work Permit
SCBA	Self-Contained Breathing Apparatus
SOP	Standard Operating Procedure
SPP	Site Policy and Procedure

TLD Thermoluminescent Dosimeter

WMCO Westinghouse Materials Company of Ohio

3288

TABLE OF ACRONYMS

ACRONYM	DESCRIPTION
AEDO	Assistant Emergency Duty Officer
ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
BZ	Breathing Zone
CAM	Constant Air Monitor
CFR	Code of Federal Regulations
DAC	Derived Air Concentrations
D&I	Dosimetry and Instrumentation
DOE	Department of Energy
DOT	Department of Transportation
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
ERT	Emergency Response Team
FMPC	Feed Materials Production Center
HEPA	High Efficiency Particulate Air Filter
ICRP	International Commission on Radiological Protection
LSA	Low Specific Activity
MPLB	Maximum Permissible Lung Burden
NCRP	National Council on Radiation Protection and Measurements
NRC	Nuclear Regulatory Commission
OSHA	Occupational Safety and Health Administration
Q&S	Quality and Safety
PF	Protection Factor
RDA	Radiation Detection Alarm
RS	Radiological Safety
RWP	Radiation Work Permit
SCBA	Self-Contained Breathing Apparatus
SOP	Standard Operating Procedure
SPP	Site Policy and Procedure
TLD	Thermoluminescent Dosimeter
WMCO	Westinghouse Materials Company of Ohio

3288

RECORD OF REVISIONS

REV. NO	REV. DATE	REMARKS
0	10/87	Originally FMPC-2084
1	04/26/89	Marginal notation of revisions omitted due to extent and number of changes.
2	08/01/89	Radiation safety training requirements and organizational designations updated.
3	07/16/90	Revise labeling requirements for radioactive material.
4	12/31/90	Revised to include requirements of DOE Order 5480.11.
5	01/30/91	Revised to include requirements of DOE/ORO Radioactive Source Control Policy.
6	04/30/91	Revised to include requirements of DOE Order 5480.11.
7	08/30/91	Revised to include requirements for Contamination Containment Areas.
8	10/29/91	Revised to include the requirement of a displayed radiation work permit.

LIST OF EFFECTIVE PAGES

SECTION	PAGE	REV. NO	ISSUE DATE
	ii	4	12-31-90
	iii	5	01-30-91
	iv	7	08-30-91
	v	5	01-30-91
	vi thru vii	4	12-31-90
	viii	3	07-16-90
	ix	8	10-29-91
	x	8	10-29-91
	xi	8	10-29-91
1	1-1 thru 1-6	4	12-31-90
2	2-1 thru 2-5	4	12-31-90
3	3-1 thru 3-7	4	12-31-90
4	4-1 thru 4-12	4	12-31-90
4	4-13	5	10-29-91
4	4-14	4	12-31-90
5	5-1 thru 5-7	4	12-31-90
6	6-1	6	04-30-91
6	6-2 thru 6-6	1	04-26-89
7	7-1 thru 7-4	4	12-31-90
8	8-1 thru 8-7	1	04-26-89
9	9-1 thru 9-6	1	04-26-90
10	10-1 thru 10-13	5	01-30-91

LIST OF EFFECTIVE PAGES (cont.)

3288

SECTION	PAGE	REV. NO	ISSUE DATE
11	11-1 thru 11-5	1	04-26-89
12	12-1	1	04-26-89
13	13-1 thru 13-3	2	08-01-89
14	14-1 thru 14-2	1	04-26-89
Appendix A	A-1 thru A-18	1	04-26-89
Appendix B	B-1 thru B-23	1	04-26-89
Appendix C	C-1 thru C-13	1	04-26-89
Appendix D	D-1 thru D-2	4	12-31-90
Appendix E	E-1 thru E-6	7	08-30-91

3288

SECTION 1

INTRODUCTION AND PURPOSE

1.1 General - Scope

1.2 Summary - Policy and Responsibilities

1.2.1 Management Responsibilities for Radiation Control

1.3 Applicable Terms

1.3.1 Airborne Radioactivity Area
1.3.2 Contamination Area
1.3.3 Controlled Area
1.3.4 Derived Air Concentration (DAC)
1.3.5 External Radiation Exposure
1.3.6 Fertile Female
1.3.7 Internal Radiation Exposure
1.3.8 Ionizing Radiation
1.3.9 Nonpenetrating Dose
1.3.10 Nonradiological Area
1.3.11 Penetrating Dose
1.3.12 Radiation
1.3.13 Radiation Dose Terms and Units
1.3.14 Radiation Source
1.3.15 Radiation Worker
1.3.16 Radiation Work Permit
1.3.17 Radiological Area
1.3.18 Radioactive Contamination
1.3.19 Radioactivity
1.3.20 Radioactivity Quantities and Units
1.3.21 Respirator Area

SECTION 1 - INTRODUCTION AND PURPOSE

1.1 General - Scope

This manual presents the specific radiological control requirements, responsibilities and protective measures that are employed by Westinghouse Materials Company of Ohio (WMCO) in the operation of the Feed Materials Production Center (FMPC), as well as some of the underlying information that forms the basis for those radiological controls. The requirements of this manual take precedence over any other FMPC topical manuals and departmental procedures on radiological control. Where conflicts exist, the Manager of Radiological Safety shall be contacted.

The radiological control requirements in this manual are based on the recommendations and requirements of the Department of Energy, the Environmental Protection Agency (which has incorporated the functions of the Federal Radiation Council), the National Council on Radiation Protection and Measurements, the International Commission on Radiological Protection, the Department of Transportation, the U.S. Nuclear Regulatory Commission, the State of Ohio, and on standards which have been reviewed and accepted by the U.S. Public Health Service and U.S. Department of Labor (Occupational Safety and Health Administration). Thus, they compare with radiological health standards used throughout the United States and the rest of the world. Compliance with the requirements in this manual is mandatory.

Radioactive materials in several forms are present at the FMPC. The presence of potential hazards from radiation exposure and radioactive contamination in otherwise normal jobs requires the establishment of protective controls. The primary purpose of this manual is to establish requirements that will ensure satisfactory control is exercised over exposure of personnel to radiation and radioactive contamination.

It must be clearly understood that in emergencies where personnel health and safety are involved, life saving actions of personnel take precedence over the radiological controls specified in this manual.

1.2 Summary - Policy and Responsibilities

Requirements are specified throughout this manual. The word "should" indicates a recommendation. The word "shall" indicates a requirement and compliance is mandatory. Failure to follow the requirements of this manual may result in disciplinary action under the WMCO Rules of Conduct.

Maintaining radiological controls is the shared responsibility of every individual working on site. Individual responsibilities include being aware of radiological conditions and alert to potential radiological problems.

1.2.1 Management Responsibilities for Radiation Control

3288

Management responsibilities addressed in this manual include:

- Providing necessary equipment to safely control radiological conditions.
- Providing appropriate training in methods and procedures for keeping exposures as low as reasonably achievable (ALARA) and for minimizing or limiting the spread of contamination.
- Maintaining records of occupational radiation doses and, upon written request, providing employees with a copy of their recorded occupational radiation dose history.
- Providing each employee with an annual summary of his/her recorded occupational radiation doses.
- Notifying each affected employee promptly after the determination has been made of any radiation dose which exceeds the DOE occupational dose limits.
- Providing each employee, upon termination of employment, with a written procedure to obtain a written summary of his/her cumulative recorded occupational radiation doses received during employment at the FMPC.
- Notifying employees of the above responsibilities by posting Occupational Safety and Health Protection for DOE Contractor Employees at Government-Owned Contractor-Operated Facility notice DOE-F-5480.5 (9-83).
- Controlling the use of radioactive material to keep radiation exposures as low as reasonably achievable (ALARA).

Overall responsibility for administration of health and safety programs relative to FMPC operations and its surrounding environment rests with the Industrial, Radiological Safety and Training (IRS&T) Department and the Medical Services Section of the Human Resources Department. On-site radiological protection functions are centralized in the Radiological Safety Section. A summary of tasks performed by this section are as follows:

- Conduct routine radiological monitoring of personnel areas, buildings, equipment, materials, vehicles, and trash.
- Provide radiological monitoring of chemical and metals plant operations, receipts and shipments of radioactive materials and renovation and construction project sites.

174

- Determine dosimetry and bioassay (both in vitro and in vivo) requirements. Determine results of dosimetry and in vivo monitoring. Evaluate results of all dosimetry and bioassay measurements.

- Evaluate work conditions and practices for adequacy of radiological protection.

- Plan, initiate, and evaluate programs for air monitoring, contamination control, and radiation exposure reduction.

- Provide technical support for assessing radiological impact of new or modified facilities and procedures.

- Approve content of radiation worker training.

- Operate a site-wide radiation source control program.

1.3 Applicable Terms

The following terms are necessary for understanding radiological controls at DOE facilities. Other terms commonly used in the nuclear industry are listed in Appendix A. (Appendix A is a copy of the U. S. Nuclear Regulatory Commission document, NUREG-0770, "Glossary of Terms: Nuclear Power and Radiation," June 1981.)

1.3.1 Airborne Radioactivity Area - Any area within a radiological area where the routine potential exists for airborne radioactivity concentrations greater than 10 percent of the DAC.

1.3.2 Contamination Area - Any area within a radiological area where high potential for contamination exists, or where known levels of contamination exceed the radiological area limits. (See Section 7)

1.3.3 Controlled Area - Any area to which access is controlled in order to protect individuals from exposure to radiation and radioactive materials.

1.3.4 DAC (Derived Airborne Concentration) - the average concentration of a radionuclide suspended in air that if inhaled or ingested for a 2000-hour working year, would irradiate a person to the limiting radiation dose value for control of the workplace. Exposure to airborne radioactivity is measured in DAC-hours, that is the time (hours) at the DAC value.

1.3.5 External Radiation Exposure - The dose of radiation received by an individual from a source of ionizing radiation outside the body. Measurements of external radiation doses are made for penetrating and nonpenetrating radiation.

1.3.6 Fertile Female - Any woman below the age of 50, unless exempted by the Medical Services Section. 3288

1.3.7 Internal Radiation Exposure - The dose of radiation received to the internal organs of the body from radionuclides ingested, inhaled or absorbed into the body.

1.3.8 Ionizing Radiation - Any radiation capable of displacing electrons either directly or indirectly from atoms or molecules, thereby producing ions. Examples: alpha, beta, gamma, X rays, and neutrons.

1.3.9 Nonpenetrating Dose - The radiation dose to the skin at a depth of 0.007 cm.

1.3.10 Nonradiological Area- Any area within a Controlled Area which does not exceed radiological conditions which would require posting as a Radiological Area as defined below.

1.3.11 Penetrating Dose - The radiation dose penetrating all tissue beyond the skin surface at a depth of 0.007 cm.

1.3.12 Radiation - Energy emitted in the form of alpha, beta, gamma, neutron or X-ray during the process of radioactive decay of an unstable atom, or by the operation of a radiation generating device.

1.3.13 Radiation Dose Terms and Units

Dose - the amount of energy deposited in tissue (unit = rad).

Dose Equivalent - the dose multiplied by a quality factor (QF). QF for Beta and Gamma is one; for alpha, it is twenty. (units = rem).

Effective Dose Equivalent- the summation of organ dose equivalents multiplied by organ-specific weighting factor (W_T). (unit = rem).

Organ/ Tissue (T)	Weight (W_T)
Gonads	0.25
Breast	0.15
Red Marrow	0.12
Lung	0.12
Thyroid	0.03
Bone Surfaces	0.03
Remainder	0.30

(A weighting factor of 0.01 has been suggested for skin.)[1]

176

Committed Effective Dose Equivalent - The effective dose equivalent that would be received over a fifty-year period by an individual with internally deposited radionuclides. (unit = rem)

1.3.14 Radiation Source - A discrete quantity of a radionuclide or a machine which produces ionizing radiation.

1.3.15 Radiation Worker - An occupational worker whose job assignment requires work on, with, or in the proximity of radiation producing machines or radioactive materials, and/or who has the potential of being routinely exposed above 0.1 rem per year, which is the sum of the annual effective dose equivalent from external irradiation and the effective dose equivalent from internal irradiation.

1.3.16 Radiation Work Permit - A permit to administratively control either nonroutine tasks or routine tasks which involve the potential for significant radiation exposures.

1.3.17 Radiological Area - Any area within a Controlled Area where an individual can receive a dose equivalent greater than five mrem in one hour at 30 cm from the radiation source or any surface through which the radiation penetrates, or where airborne radioactive concentrations greater than one-tenth of the derived air concentrations are present (or likely to be), or where surface contamination levels greater than those specified in Appendix D are present.

1.3.18 Radioactive Contamination - A deposit of uncontained or unwanted radioactive material on the surface of structures, areas, objects or personnel (surface contamination) or embedded or contained in other materials (e.g. air, water, etc.).

1.3.19 Radioactivity - The spontaneous emission of radiation, generally alpha or beta particles, often accompanied by gamma rays or X-rays, from the nucleus of an unstable atom.

1.3.20 Radioactivity Quantities and Units - Curie is the basic unit used to describe the amount of radioactivity in a sample of material. It is based upon the approximate decay rate of 1 gram of radium which is 37 billion disintegrations per second.

3288

Conversion Factors:

1 Curie (Ci) = 3.7×10^{10} disintegrations per second = 2.22×10^{12} disintegrations per minute.

1 Millicurie (mCi) = 3.7×10^{7} disintegrations per second = 2.22×10^{9} disintegrations per minute (dpm).

1 Microcurie (uCi) = 3.7×10^{4} disintegrations per second = 2.22×10^{6} dpm.

1 x 10-11 uCi/cc = 22 disintegrations per minute per cubic meter

1.3.21 Respirator Area - Any area within a Radiological Area where actual airborne radioactivity concentrations exceed 2.0 DAC-hours per shift when averaged over one calendar quarter or 8.0 DAC-hours during any single shift.

[1] Reference: Kocher, D. C., Eckerman, K. F., 1988, "On Inclusion of the Dose to the Skin in the Effective Dose Equivalent," Health Physics, 55, 813-815.

178

SECTION 2

RADIATION DOSE LIMITS

2.1 General

2.1.1 Basis for Limits
2.1.2 Exceptions to Limits

2.2 Dosimetry Records

2.3 The Fertile Female

2.3.1 Limits to Individuals Who May Be Pregnant
2.3.2 Pregnancy Test Requirement
2.3.3 Restriction of Pregnant Women from Radiological Areas
2.3.4 Nursing Mothers

2.4 Minors

2.5 General Public

SECTION 2 - RADIATION DOSE LIMITS

2.1 General

The radiation dose limits and administrative dose controls identified in this manual are used for controlling personnel occupational radiation exposure. Radiation that is received as a result of medical or dental exams or radiotherapy is not included in occupational radiation exposure. The limits and controls in this section are for exposure to ionizing radiation associated with operation of the FMPC.

2.1.1 Basis for Limits

These limits are such that no significant biological effects are expected, even if exposures extend for a lifetime at these levels. Nevertheless, personnel exposure shall be maintained as low as reasonably achievable (ALARA) below these limits. WMCO has established administrative action limits at levels below the DOE limits in order to identify and investigate exposures before they approach DOE limits.

The radiation exposure limits identified in this manual have been promulgated by the Department of Energy and are consistent with the requirements of Federal agencies such as the Environmental Protection Agency, Nuclear Regulatory Commission and Occupational Safety and Health Administration, and recommendations of scientific organizations such as the National Council on Radiation Protection. The limits as established by DOE Order 5480.11 are listed in Table 2.1 (on page 2-2) along with the WMCO administrative action levels.

The limit for exposure to the whole body pertains to penetrating exposure plus internal exposure, combined into a quantity called "effective dose equivalent." Methods for calculating internal exposures shall be selected by the Dosimetry Subsection and shall be in accordance with recommendations of widely accepted, published methods. The whole body includes the most sensitive areas: the blood forming organs and gonads.

The limit for all other organs includes exposure to the skin, extremities or the total radiation dose received by internal organs whether from external or internal radiation. Extremities include hands, forearms, feet and legs below the knee. This category includes the least sensitive areas of the body.

3288

TABLE 2.1

RADIATION DOSE EQUIVALENT LIMITS

Exposure Category	Annual Limit (rem)	
	WMCO[2]	DOE[1]
Occupational		
Whole body (effective dose equivalent)	3	5
Lens of eye	9	15
All other organs, skin and extremities	30	50
Embryo and fetus (entire gestation period)	0[3]	0.5
Minors (Committed effective dose equivalent)		0.1
General Public		
All Pathways		
Whole body, prolonged period of exposure offsite or in a Controlled Area		0.1
Airborne Emissions Only		
Whole body (Effective dose equivalent; contribution from radon not included)		0.010
Any organ		0.075
Drinking Water Only		0.004

(1) Occupational radiation exposure limits per DOE Order 5480.5; radiation exposure limits to the general public per DOE Order 5400.5.

(2) Administrative action levels established by WMCO.

(3) Restricted to dose equivalent accumulated at the time pregnancy is confirmed.

181

2.1.2 Exceptions to Limits

The limit for occupational whole body dose may only be exceeded in the event of an emergency situation. During emergency situations personnel may volunteer to exceed normal exposure limits for life saving rescue and other emergency situations. The potential exposures due to the emergency are subject to limits approved by the Assistant Emergency Duty Officer.

Planned special exposures (non-emergency) may be allowed in unusual situations where alternatives which would avoid higher exposures are unavailable or impractical. The annual occupational dose received or anticipated to be received in that year, shall not exceed 2 times the annual effective dose equivalent limit. Planned special exposures require the approval of the Head of the DOE Field Organization. Documentation of planned special exposures must be maintained in the individual's occupational exposure history.

2.2 Dosimetry Records

A permanent record of exposures received at the FMPC is maintained for all personnel.

2.3 The Fertile Female

2.3.1 Limits to Individuals Who May Be Pregnant

Radiation exposure of an embryo and fetus shall not exceed 500 mrem from occupational sources. This is achieved by restricting the radiation exposure of the fertile female employee to 500 mrem in a nine month period.

All female employees below the age of 50 years shall be considered as fertile unless exempted by the Medical Services Section. The Radiological Safety (RS) Section shall identify job classifications and work locations in which female employees are likely to receive 500 mrem or greater effective dose equivalent in a nine-month period.

2.3.2 Pregnancy Test Requirement

Fertile females shall immediately notify the Medical Services Section to arrange for a pregnancy test when pregnancy is suspected. Upon the verification of pregnancy, RS shall notify the individual and her supervisor of any work restrictions. The supervisor shall change the work assignment based on recommendations of RS.

3288

When a fertile female's effective dose equivalent level reaches 400 mrem in less than a nine month exposure period, pregnancy test shall be required to verify non-pregnancy and establish a new nine month exposure period.

Fertile female employees who are expected to receive exposure in excess of 500 mrem penetrating radiation in any 30 calendar day period shall be required to verify non-pregnancy within seven days prior to the authorization of the assignments. After the assignment has been made, reverification of non-pregnancy shall be required at two week intervals or at the discretion of Radiological Safety based upon exposure assessments of the job.

2.3.3 Restriction of Pregnant Women from Radiological Areas

Any individual confirmed to be pregnant shall be restricted from Radiological Areas during the time of pregnancy. She shall meet with the Manager of Radiological Safety or designee who shall explain the potential hazards associated with exposure to ionizing radiation during pregnancy, and answer associated questions that may arise.

The necessity for a change in work assignment shall be assessed by Radiological Safety. Radiological Safety shall inform the employee and her supervisor of any restrictions or changes in restrictions.

Every effort should be made to reassign the individual to an available job within the job classification having minimal exposure potential. If assignment is not possible within the employee's classification, the employee should be reassigned to an open position for which the employee is qualified. Any provisions of applicable bargaining agreements shall apply.

2.3.4 Nursing Mothers

New mothers returning to work who may need to enter Radiological Areas shall inform Radiological Safety if they are nursing. Work assignments for nursing mothers shall be evaluated by Radiological Safety for radiological conditions. Nursing mothers shall be restricted from areas and work that are likely to result in internally deposited radionuclides (based on historical bioassay or in vivo results) and current radiological conditions.

183

2.4 Minors

Individuals under age 18 shall not be allowed to exceed 0.1 rem per year.

2.5 General Public

The dose limits to the general public are established by DOE Order 5400.5. The calculation of dose to members of the general public are based upon ICRP (International Commission on Radiological Protection) Publication 30 models and parameters used by DOE environmental programs.

3288

SECTION 3

DOSIMETRY

3.1 External Dosimetry Requirements

3.1.1 Dosimetry for Measuring Whole Body Exposure
3.1.2 Dosimetry Wearer's Responsibilities
3.1.3 Extremity Dosimetry
3.1.4 Direct Reading Dosimeters
3.1.5 Personnel Accident Dosimeters
3.1.6 Nuclear Criticality Accident Dosimetry
3.1.7 Radiation Exposure Investigations

3.2 Internal Radiation

3.2.1 Urinalysis
3.2.2 Fecal Monitoring
3.2.3 In Vivo Monitoring
3.2.4 Internal Dose Assessments
3.2.5 Reports to Employees

SECTION 3 - DOSIMETRY

3.1 External Dosimetry Requirements

The Radiological Safety Section provides dosimeters for all personnel requiring them at the FMPC, operates and maintains dosimetry processing equipment, and records and reports dosimetry results. In addition, Radiological Safety identifies personnel for whom dosimetry is required. Appropriate personnel dosimetry is required for radiation workers having the potential to exceed any one of the following exposures from external sources in one year:

(a) One hundred mrem annual effective dose equivalent to the whole body;

(b) One rem annual dose equivalent to the skin;

(c) Five rem annual dose equivalent to any extremity;

(d) One and a half rem annual dose equivalent to the lens of the eye.

All personnel entering the FMPC are responsible for wearing dosimeters whenever they are required in accordance with the usage rules listed below for each type of dosimeter. On occasion, individuals may be required to participate in special studies which involve the wearing of special dosimeters in addition to their personal TLD.

3.1.1 Dosimetry for Measuring Whole Body Exposure

Thermoluminescent dosimeters (TLDs) are utilized to measure personnel radiation exposure to radiation penetrating to depths which give a dose to the skin, the lens of the eye, and to the whole body.

A multi-element dosimeter measures the radiation exposure, as well as the type and penetrating power of the radiation. Radiological Safety uses a calculational method, called an algorithm to determine the radiation dose.

The depth of penetration corresponds to radiation doses to human skin, lens of the eye and whole body. Depth of penetration is dependent on density; therefore, the unit "density thickness" is used for various "depths" of penetration as follows:

3288

Dose assigned to	Density Thickness
Skin	7 mg/cm^2
Lens of eye	300 mg/cm^2
Whole body	1000 mg/cm^2

Radiological Safety is responsible for developing suitable algorithms for the radiation types that exist at FMPC, and for maintaining radiation dose reports and records. The whole body external dosimetry program is subject to the requirements of the Department of Energy Laboratory Accreditation Program (DOELAP) for dosimetry processing, which are contained in DOE Order 5480.15 and the various documents referenced therein.

3.1.2 Dosimetry Wearer's Responsibilities

Requirements for issuing dosimeters, processing dosimeters (including frequency of processing), storing dosimeters, and reporting of dosimetry results are established by IRS&T. All individuals who enter the FMPC are responsible for compliance with the requirements listed below for whole body dosimeter usage.

a. Dosimeters shall be worn at all times in areas where they are required; these areas are posted "TLD Required for Entry" or a similar message.

b. Dosimeters shall be worn at all times in Controlled Areas except where Radiological Safety approves entry without dosimetry. Exceptions may be made only where the exposure levels of 3.1 above will not be exceeded. (Exceptions are routinely allowed for certain delivery personnel.)

c. Dosimeters shall be worn on the torso, above the waist outside of all clothing unless directed otherwise by Radiological Safety.

d. Dosimeters shall be worn only by the individuals assigned to them.

e. Dosimeters shall be stored in designated storage racks when not being worn.

f. Lost or damaged dosimeters shall be immediately reported to Radiological Safety, Dosimetry Subsection.

187

 181

3.1.3 Extremity Dosimetry

The FMPC extremity monitoring program utilizes single-element thermoluminescent dosimeters mounted in ring badges. On occasion, wrist dosimeters may be used for special studies. Extremity dosimeters are processed and calibrated in order to determine the radiation dose to the skin of the extremity, i.e., at a density thickness of 7 mg/cm^2. These exposures are recorded as extremity doses, not skin doses.

Radiological Safety identifies personnel who are required to wear extremity dosimetry and establishes requirements for issuing, processing (including frequency of processing), and storing dosimeters, and reporting results. All personnel issued extremity dosimeters are responsible for compliance with the following requirements:

a. Extremity dosimeters shall be worn by personnel designated by Radiological Safety as requiring extremity dosimetry.

b. Ring dosimeters shall be worn with the element facing the palm side of the hand, under gloves, unless directed otherwise by Radiological Safety.

c. Personnel shall wear only the dosimeters that have been assigned to them.

d. Dosimeters shall be stored in designated storage areas when not being worn.

e. Personnel shall immediately report lost or damaged dosimeters to Radiological Safety.

3.1.4 Direct Reading Dosimeters

Direct reading dosimeters (DRDs) are utilized to allow real time indication of worker exposure to penetrating radiation. The DRD has a single ion chamber which measures gamma exposure. Visual indication is provided by a viewing window in the chamber with a scale marked in milli Roentgen.

DRDs will be issued by the Radiological Safety Section to those personnel that may require them. Comparisons are performed between the DRD and TLD results to verify accuracy within allowable limits.

3.1.5. Personnel Accident Dosimeters

Inside of each assigned personnel dosimeter badge, is a packet containing the personnel accident dosimeter. These dosimeters contain a sulfur pellet, and three different types of metal foils which are activated by the neutron flux associated with a criticality accident. Analysis of the radioactivity in the pellet and foils will provide indication of an individual's absorbed neutron dose.

3.1.6. Nuclear Criticality Accident Dosimetry

Permanently mounted dosimeter units shall be located by IRS&T throughout each work area where enriched nuclear material is handled. These dosimeters contain eight metal foils and three pellets of various materials each of which are activated by a neutron flux such as occurs in a criticality accident. By analyzing the radioactivity in these foils and pellets, the amount of absorbed neutron dose in each location can be determined.

3.1.7. Radiation Exposure Investigations

Radiological Safety establishes external exposure action levels for investigation, change of work assignments, and restriction of personnel from additional radiation exposure; performs exposure investigations; and informs management of work restrictions.

All WMCO departments shall provide information on work assignments as requested by IRS&T to enable evaluations of required participation in the dosimetry program, or evaluations to determine which personnel should be issued permanent dosimeters.

3.2 Internal Radiation

Internal radiation monitoring at the FMPC is routinely accomplished by performing in vitro and in vivo bioassay measurements. Radiological Safety defines the internal radiation monitoring program for all personnel at the FMPC.

Radiological Safety is responsible for:

- identifying personnel for whom internal monitoring is required;
- determining what type of bioassay measurements will be performed;
- setting the frequency of measurements;

- o interpreting bioassay results;
- o establishing internal monitoring action levels for investigation;
- o restricting work assignments;
- o restricting personnel from additional radiation exposure;
- o performing exposure investigations;
- o informing managers and supervisors of work restrictions.

Internal radiation monitoring is required for all radiation workers exposed to surface or airborne radioactive contamination where the worker could receive 100 mrem annual effective dose equivalent from all intakes of all radionuclides from occupational sources, or if any organ or tissue dose equivalent could exceed 5 rem annual dose equivalent.

Managers and supervisors shall provide information on work assignments to Radiological Safety on request to enable evaluation of required participation in an internal monitoring program. Managers and supervisors shall also identify individuals whose work assignments meet criteria provided by Radiological Safety as requiring internal monitoring.

All personnel are responsible for reporting for in vivo examinations when scheduled, and for leaving excreta samples for in vitro analysis when requested. Failure to comply is considered a serious offense under the WMCO Rules of Conduct and may result in disciplinary action or restriction from radiological areas.

3.2.1 Urinalysis

Routine uranium urinalysis samples are analyzed for total uranium. The results are reported as concentration of uranium in the sample (mg U/L). These samples are screening samples, intended to identify potential intakes of uranium which can then be further evaluated by additional bioassay measurements. The schedule for collecting routine samples and the criteria for collecting non-routine (i.e., incident or special samples) are established by Radiological Safety.

Reasons for collecting special samples include, but are not limited to, analysis for uranium isotopes, analysis for radionuclides other than uranium, evaluation of daily excretion of radioactive material without relying on standard models for relating urinary concentration to daily output, and special studies.

3.2.2 Fecal Monitoring

Fecal monitoring is not performed routinely, but may be required when urine sampling is not adequate or appropriate for the radionuclide and chemical form of interest, or when it would be helpful in determining the magnitude and nature of a suspected intake of radioactive material.

3.2.3 In Vivo Monitoring

In vivo monitoring is the detection and quantification of radioactive materials in the body by means of measuring the photons emitted from organs within the body. The In Vivo Examination Center (IVEC) utilizes intrinsic germanium detectors inside a shielded counting chamber to provide sensitive, high resolution measurements of radioactive materials that emit low energy photons.

In vivo monitoring may also include use of a whole body scanner which utilizes a thick detector of sodium iodide crystal with thallium impurities [NaI(Tl)] to measure radioactive materials that emit higher energy photons.

3.2.4 Internal Dose Assessments

Internal dose assessments are performed to determine intakes of radioactive material that are dosimetrically significant. Dose assessments are generally performed according to ICRP-30 methodology. Radiological Safety may modify the approach if recent publications or actual bioassay data indicate that this would be appropriate.

In general, dose assessments are based on bioassay data, rather than air sampling results. However, in circumstances when bioassay data are not available or not appropriate, air sampling results may be used to estimate internal exposure. Dose assessments from exposure to radon and its decay products will generally be based on air sampling results. Results of dose assessments shall be included in personnel exposure records. The information that is retained in these records includes the following:

SECTION 4

ENGINEERING AND ADMINISTRATIVE CONTROLS FOR RADIOLOGICAL SAFETY

4.1 WMCO ALARA Program

4.1.1 Statement of Policy
4.1.2 Responsibilities
4.1.3 The Radiation Protection/ALARA Program Considerations

4.2 Engineering Controls for Facility Design/Modification

4.2.1 Ventilation Systems
4.2.2 Storage of Radioactive Material

4.3 Radiological Engineering Evaluation

4.4 Administrative Controls: Work Procedures

4.4.1 Plan Access
4.4.2 Provide for Service Lines
4.4.3 Communication
4.4.4 Remove Sources of Radiation
4.4.5 Work Outside Radiological Areas
4.4.6 Tools
4.4.7 Special Tools
4.4.8 Estimate Radiation Exposure
4.4.9 Review Exposure
4.4.10 Accident Situations
4.4.11 Inspection Requirements

4.5 Administrative Controls: Radiation Work Permit (RWP)

4.5.1 General
4.5.2 Responsibilities
4.5.3 Continuous Coverage Requirements
4.5.4 Procedure
4.5.5 Determination of Time Limits

4.6 Administrative Controls: Work in the Administrative Area of the FMPC

SECTION 4 - ENGINEERING AND ADMINISTRATIVE CONTROLS FOR RADIOLOGICAL SAFETY

4.1 WMCO ALARA Program

4.1.1 Statement of Policy

It is the policy of WMCO that:

- o No practice involving radiation exposure shall be adopted unless its introduction produces a positive net benefit;
- o All exposures shall be kept as low as reasonably achievable (ALARA), with economic and social factors taken into account;
- o The dose limits identified in Section 2 of this manual shall not be exceeded.

4.1.2 Responsibilities

A. All Managers and Supervisors

- o Enforce all radiation protection rules and limits.
- o Identify locations, operations, and conditions that have the potential for causing exposure or environmental releases that are not ALARA.
- o Specify and accomplish goals and objectives for FMPC operations which incorporate the ALARA philosophy and objectives.
- o Review all plans for modification or installation of equipment or facilities under their cognizance to ensure that radiation exposures and environmental releases are ALARA.

B. Manager, Industrial, Radiological Safety and Training (IRS&T)

The Manager of IRS&T is responsible for implementation of the radiation protection program and to this end, shall:

- o Ensure that all operations involving work with radioactive materials is supported by adequate radiation protection coverage, both in field support and engineering support.

- o Review and recommend changes in operating procedures to maintain occupational exposures ALARA.
- o Promote the development of training programs related to work performed in radiation areas or with radioactive materials.
- o Support the collection, analysis, and evaluation of radiological data and information as it pertains to the Radiation Protection/ALARA Program.

C. Radiological Safety Section (RS)

The RS Section is responsible for the technical development and adequacy of the radiation protection program. RS also has the ongoing responsibility for surveillance and supervisory action in the implementation of the program. The section also has the responsibility to:

- o Identify locations, operations, and conditions which have the potential for causing significant personnel exposures to radiation.
- o Maintain a routine surveillance program including air sampling and surface contamination measurements in all nominally occupied areas.
- o Review and recommend changes in standard operating procedures to maintain exposures ALARA.
- o Participate in the development and implementation of training programs related to work in radiation areas or involving radioactive materials.
- o Conduct investigations of radiation exposures which are near or exceed established administrative and regulatory guidelines or are outside of the expected norms.
- o Review all process equipment and facility designs to ensure that the potential for significant radiation exposures and environmental releases are minimized.
- o Review all modifications of current equipment or facilities to ensure that radiation exposures and environmental releases are ALARA.

- Ensure ALARA considerations are engineered and incorporated into designs, installations, and retrofitting of equipment.

D. The FMPC ALARA Committee

The ALARA Committee membership and responsibilities, are identified in FMPC-203, "ALARA Committee Charter."

E. All Individuals at the FMPC

The ALARA program is only as effective as each individual's performance, therefore all individuals at the FMPC shall:

- Comply with all rules for radiation protection.
- Comply with requirements identified in Radiation Work Permits.
- Use time, distance and shielding to minimize exposure. Avoid any unnecessary exposure.
- Report to Radiological Safety and/or the ALARA Committee via the SURE Line (ext. 6100) any process malfunctions or violations of rules or procedures which could result in increased radiation exposure to an individual or to the environment.
- Suggest improvements for the Radiation Protection/ALARA Program and for the radiologically safe operation of workplace processes and equipment.

4.1.3 The Radiation Protection/ALARA Program Considerations

Radiological Safety and the ALARA Committee jointly provide for a Radiation Protection Program that maintains radiation exposure ALARA.

The following must be considered for an effective program:

- Special radiological projects with exposure potential greater than one man-rem effective dose equivalent shall require radiation dose budgets and the incorporation of ALARA principles and concepts into work procedures prior to the initiation of the work.

3288

- Job preplanning, work procedures, and worker briefings shall be conducted prior to nonroutine radiological work. Rehearsals of work to be performed in radiation areas shall be performed in low background areas prior to entry into the specific radiation work area when such rehearsals are ALARA based on cost-benefit analyses.

- Radiological surveys and monitoring shall be conducted to obtain information with respect to radiation levels, contamination levels, and airborne radioactivity concentrations before, during and after work as appropriate. These surveys and monitoring will provide the data necessary to establish the radiation safety requirement to be incorporated into the radiological work procedure to keep exposure ALARA.

- Radiation exposure rates shall be reduced either by decontamination, shielding or by removing radiation sources from the work areas as appropriate to keep radiation doses ALARA.

- The ALARA concepts of minimizing time in a radiation area, maximizing distance from sources, and use of shielding shall be applied to all aspects of radiation work in order to keep exposures ALARA.

- Radiation Work Permits shall be used for specific jobs to identify and document job requirements and to control radiation exposures. Supervisors and individuals performing the work shall review the required protective features before the start of work.

- High efficiency (HEPA) filtered exhaust ventilation systems shall be used where practical in order to keep radioactive air concentrations ALARA.

- Protective equipment such as anti-contamination clothing, respirators, dosimetry devices, and monitoring equipment shall be used in the workplace as required by Radiological Safety to minimize skin contamination, monitor exposure and maintain radiation exposures ALARA.

4.2 Engineering Controls for Facility Design/Modification

The concept of maintaining radiation exposures ALARA shall be incorporated into the design of all facilities at FMPC.

196

The design of facilities, processes, and equipment necessary for the performance of work involved with radioactive materials provides one of the earliest and best opportunities for ensuring radiation exposures are kept ALARA.

When designing or modifying radiological facilities, processes, and equipment the following factors shall be considered:

- Radiation Shielding
- Access Control of Radiation Areas
- Control of Airborne Contaminants (Ventilation)
- Contamination Control (Isolation and Decontamination)
- Need for Local Change Rooms
- Radiation Monitoring Systems
- Design shall limit exposure to one-fifth of the applicable DOE dose limits (i.e., 1 rem/year whole body).
- Environmental Protection Systems:

  Gaseous - HEPA filtration, dust collectors, scrubbers, demisters, etc.

  Liquid - Water treatment systems.
- Primary means for assuring personnel protection shall be through engineered safeguards, e.g., remote handling equipment, shielding, ventilation, etc.
- Interior surfaces of components and facilities as well as layout of ducts and pipes, shall be designed to minimize buildup of contamination.
- Equipment and components requiring frequent servicing shall be located in areas with the lowest practicable radiation fields and outside process enclosures whenever possible.
- Ventilation systems shall be designed to assure proper control of airborne contaminants. Redundant equipment should be provided in all exhaust systems servicing contaminated and potentially contaminated areas. The system should permit easy and safe access for servicing.
- Decommissioning requirements shall be considered in the design of facilities and equipment.

- New equipment or modifications to existing equipment shall be designed in such a manner that a minimum of "hands on" contact with radioactive material is required. Remote handling tools, robotics, etc., should be considered.

- Enclosures shall be designed with a negative pressure with respect to the surrounding environment. The exhaust from these enclosures shall be routed through a filtration media before being vented to the atmosphere.

- All facility or process design/modification involving a radiological environment shall be reviewed and approved by the Radiological Safety Section.

4.2.1 Ventilation Systems

Plant ventilation equipment shall be designed and used to remove contamination from the work area. The optimal ventilation design should cause contaminated air to be moved away from workers and be equipped with a filtering system to prevent significant amounts of contamination from reaching the environment.

The Industrial Ventilation Manual published by the American Conference of Governmental Industrial Hygienists shall be used as a design guide for ventilation systems for both new and old systems.

4.2.2 Storage of Radioactive Material

Storage Definitions

- Interim Storage - Storage outside the work area for six months or less.

- Short Term Storage - Storage for more than six months but less than three years.

- Long Term Storage - Storage for more than three years.

- Temporary Storage - Work place storage within a plant. Distinguished from material in process.

Design Criteria Requirements

- Dose rates at the warehouse exterior should not exceed 5 mrem/hr.

- Radioactive materials shall be stored in such a manner as to facilitate access (where access is necessary) and minimize exposure during storage, access, and retrieval.

- Work area exposure rates from temporarily stored radioactive materials shall not exceed 0.5 mrem/hr.

- Short term and long term storage facilities with penetrating radiation levels in excess of 100 mrem/hour must be locked and shall require an RWP for entry.

4.3 Radiological Engineering Evaluation

Radiological Safety Section evaluations are required on all projects involving changes in plant equipment, any activity that significantly increases personnel to external or internal radiation exposure. This will be accomplished by Radiological Engineering review of the applicable design review, SOP or Health and Safety Plan.

To ensure that ALARA is practiced in the workplace the following guidelines shall be considered:

4.3.1 Plan in Advance: Many of the methods for reducing exposure to radiation require considerable planning, construction, and training prior to the start of work.

4.3.2 Delete Unnecessary Work: Determine exactly what is to be accomplished. If secondary work requiring additional exposure can be accomplished in conjunction with the primary task without additional exposure, it should be planned and scheduled. An example would be to remove waste material either during or immediately after the task is completed. Do not allow the material to remain until a later time and require another work group to re-enter the area for material removal.

4.3.3 Monitor and Evaluate Radiation Levels: Radiation surveys shall be performed periodically in any facility utilizing radioactive materials. Reports of these surveys provide information on the general radiation levels encountered in most work. These radiation surveys provided in conjunction with inspections or other activities can define the nature of the radiation fields and identify favorable locations where personnel may take advantage of available shielding, distance, geometry, and other factors that affect the magnitude of the exposure rate or the portions of the body exposed to radiation.

When sufficient advance notification of work is provided, it is possible to obtain more detailed surveys. Interpretation of surveys can be improved if requests for detailed surveys are accompanied by photographs, drawings, or sketches on which RS Technicians can record or indicate the location of the radiation levels measured. In addition, a survey of work areas prior to starting the work will be necessary to determine any changes from earlier survey data.

4.3.4 Consider Design Changes: If existing equipment needs replacing or facilities require modification, consideration shall be given to design changes which could be made to reduce exposure to radiation.

4.4 Administrative Controls: Work Procedures

Detailed written work procedures shall be used for routine work with radioactive materials. Procedures shall include or refer to information for minimizing exposure to radiation and limiting the spread of contamination. Each of the following items shall be incorporated, as applicable, into the work procedures:

4.4.1 Plan Access to and exit from work area. In plans for access to and exit from the work area, include a convenient and large enough area for donning and removing anti-C clothing, for briefing personnel before entry and for surveying personnel for radioactive contamination. Where considerable work is to be done in a highly contaminated area, provide direct access from the work area to a change area. Plan the entrance and exit to radiological work areas to avoid having personnel waiting in areas where significant radiation levels exist; for example, locate the personnel monitoring station so that when several people are leaving a work area they do not have to wait inside a radiation area while the people ahead are self-monitoring.

4.4.2 Provide for Service Lines. Plan in advance for service lines, including lines for air, welding and ventilation, and specify, in the work procedure, methods to minimize exposure to radiation associated with their installation, maintenance and removal, and to control their interference with personnel access. Minimize the number of lines going into and inside a contaminated area. Minimize unnecessary accumulation of equipment. Use types of lines that can be readily decontaminated or use covers for the lines to prevent their being contaminated.

4.4.3 Provide Communication. Between workers inside areas with significant levels of radiation or contamination, and supervision and RS Technicians outside the area. Provision for communication devices, headsets, or speaker systems can reduce radiation exposure by reducing the time required to make decisions on matters not foreseen in work procedures. Avoid the condition where headsets become contaminated and then have the potential of causing contamination of subsequent users. Use of a communication system also allows supervising personnel to maintain effective control of a job even though continuous visual observation is impractical because of high radiation levels.

4.4.4 Remove Sources of Radiation. Significant reductions in radiation exposure can be obtained by eliminating some sources of radiation.

4.4.5 Perform as Much Work as Practicable Outside Radiological Areas. Prefabrication shall be considered to minimize the work done in radiation posted areas; for example, prefabrication of temporary shielding to reduce installation time.

4.4.6 State requirements for standard Tools. By requiring supervisors to determine standard tools known to be needed for the job and requiring that they be available near the job location, radiation exposure of working personnel waiting for tools can be minimized.

4.4.7 Consider Special Tools. For certain jobs, special tools or jigs may reduce in radiation exposure through simplification, reduction in time, or reduction of mistakes. These tools should be designed, built, and tested on full-scale models prior to their use in radiation areas if previous usage experience does not exist. In addition, individuals using these tools for the first time should be trained in the proper use, handling, and restrictions of the tool prior to use in the radiation area.

4.4.8 Estimate Radiation Exposure. After planning the details of the work procedure where exposure to significant radiation levels will be experienced and prior to performing the work, an estimate of the radiation exposure to personnel on the job should be made. This estimate should be based upon radiation levels measured at the work location, and the estimated time it will take in radiation fields to complete each phase of the job. The estimate should reflect experience gained by others who have performed similar work.

3288

Exposure estimates should be considered for enhancement in the work procedure. For example, special tools might be developed to reduce working time.

4.4.9 Review Exposure. During and after the work, the actual dose received shall be compared with the estimates. Determining the reasons for discrepancies promptly and correcting them can reduce radiation dose.

4.4.10 Consider Accident Situations. Potential accident situations and unusual occurrences (such as gross contamination, leakage, pressure surges, fires, personnel injury) shall be considered during the preparation of the work plans. Contingency planning can reduce the potential for such occurrences and enhance the capability for rapid mitigation of an accident.

4.4.11 ProvideInspection Requirements for Radiological Controls. Radiological coverage may be enhanced if steps requiring radiological control inspections are included in work procedures. Radiological Safety should be contacted whenever operations could cause the need for increased protection and/or posting of radiological conditions.

4.5 Administrative Controls: Radiation Work Permit (RWP)

4.5.1 General. Radiation Work Permits shall be issued for the performance of any task that involves exposure to radiation or radioactive material or involves the breaching of potentially contaminated systems and for which there is not an approved work procedure. Radiation Work Permits are also required for tasks performed under approved work procedures if those tasks involve work in high radiation fields or in areas where radiation levels have the potential for increasing or are unknown. The RWP identifies the work activity, the radiological conditions and the protective measures required to accomplish the work (see Figure 4-1).

4.5.2 Responsibilities:

4.5.2.1 Job Supervisor. The requesting supervisor initiates an RWP by describing on the RWP form the work to be performed, and arranges for an RS Technician to perform a radiation survey. It is the responsibility of the RS Technicians to complete the radiation survey, calculate the maximum time allowed by the work permit, specify work precautions, issue direct reading dosimeters (if required), and record readings from direct reading dosimeters.

202

4.5.2.2 Workers. It is the responsibility of the worker(s) involved with the job to read the description of work on the RWP and understand the work restrictions. They will signify that they have been informed of the radiological protective requirements on the RWP by signing the form.

4.5.3 Continuous Coverage Requirements. A Radiological Safety Technician shall be in attendance at any job where the following conditions are defined and until the condition no longer exists:

4.5.3.1. Whenever airborne radioactivity is greater than ten times the derived air concentration (DAC) limits of Appendix B.

4.5.3.2 Whenever the average removable surface contamination on accessible work surfaces is greater than 100 times the limits of Appendix D.

4.5.3.3 Whenever penetrating whole body dose rates for the job exceed 100 mrem/hr or whole body skin dose rates exceed 1 rem/hr.

4.5.3.4 Whenever there is a high potential for radioactive environmental release.

4.5.3.5 Whenever the scope of work procedures could cause changes in the work environment such that any of the above criteria could be met.

4.5.4 Procedure

4.5.4.1 The requesting supervisor shall describe work on the RWP form in sufficient detail so as to leave no questions of the work to be done. If additional space is required, attachments may be added.

4.5.4.2 Requesting supervisor notifies an RS Technician of the work to be done.

4.5.4.3 The RS Technician determines if the area has been properly prepared for work. The considerations of Section 4.1.3 shall be invoked.

Figure 4-1

RADIATION WORK PERMIT FORM
FMPC - ES&H - 1372 (Rev. 5/18/87)

RADIATION WORK PERMIT No.: 13292

SECTION I: *TO BE COMPLETED BY THE JOB SUPERVISOR*

(1) JOB LOCATION	(2) ISSUE DATE:	(3) SHIFT:	(4) EXPIRATION DATE:*
BUILDING: DATE:			

JOB DESCRIPTION

REQUESTING SUPERVISOR'S SIGNATURE:

* Maximum 7 days from issuance.

SECTION II: *TO BE COMPLETED BY ERMT*

(5) RADIATION LOCATION	INSTRUMENT READING (6) OW OPEN WINDOW mRad/hr	(7) CW CLOSED WINDOW mRad/hr	EXTREMITIES (8) OPEN WINDOW mRad/hr
1.			
2.			
3.			
4.			

(9) STAY TIME CALCULATIONS

BETA DOSE	SKIN DOSE	EXTREMITY
CORRECTION FACTOR (OW-CW)*9 = mRem/hr		
	WHOLE BODY	TIME LIMIT
Side Window GM		
F = 0 mRem/hr		
CP Ion Chamber		
F = 3 mRem/hr		

INSTRUMENT TYPE	SERIAL NUMBER	CALIBRATION DATE

(10) AMBIENT BACKGROUND B/γ mRem/hr

(11) RADIOLOGICAL SURVEY FORM ATTACHED ☐ YES ☐ NO

(12) SURVEY MAP ATTACHED ☐ YES ☐ NO

(13) MONITORING REQUIREMENTS

- ☐ At start of job
- ☐ Intermittent
- ☐ Continuous
- ☐ On completion of job
- ☐ Not required
- ☐ Personnel survey at completion
- ☐ Air monitoring

(14) DOSIMETRY REQUIREMENTS**

- ☐ Direct reading dosimeter
- ☐ Wrist dosimeter
- ☐ Ring dosimeter
- ☐ Other _____

** *TLD required for all radiation work*

(15) PROTECTIVE EQUIPMENT

WHOLE BODY
- ☐ None
- ☐ Cloth coveralls
- ☐ Disposable coveralls
- ☐ Lab coat
- ☐ Tape openings
- ☐ Other _____

BREATHING REQUIREMENTS
- ☐ Half face respirator
- ☐ Full face respirator
- ☐ Airline respirator
- ☐ Airline hood
- ☐ Combination canister
- ☐ SCBA
- ☐ Other _____

HEAD
- ☐ Safety glasses
- ☐ Goggles
- ☐ Face shield
- ☐ Cap
- ☐ Hood
- ☐ Hard hat

HANDS (GLOVES)
- ☐ Cotton
- ☐ Rubberized
- ☐ Surgical
- ☐ Gauntlet
- ☐ Other _____

SHIELDING
- ☐ Rubber Mat
- ☐ Aluminum
- ☐ Plywood
- ☐ Other _____

FEET AND LEGS
- ☐ Latex shoe covers
- ☐ Disposable shoe covers
- ☐ Safety shoes
- ☐ Safety boots
- ☐ Other _____

(16) SPECIAL HEALTH PHYSICS INSTRUCTIONS AND REQUIREMENTS

ERMT SIGNATURE: DATE: TIME ISSUED:

SECTION III: *APPROVAL SIGNATURES (as required)*

NO.	DISTRIBUTION OF COPIES
1	Posting
2	ERM Supervisor
3	Health Physics

SECTION IV: *TO BE COMPLETED BY EMPLOYEE* ***

(17) NAME(S) OF EMPLOYEE(S) (SIGNATURE)	(18) BADGE NUMBER	(19) RESPIRATOR FIT TEST	(20) RADIATION WORKER TRAINING
1.		☐ YES ☐ NO	☐ YES ☐ NO
2.		☐ YES ☐ NO	☐ YES ☐ NO
3.		☐ YES ☐ NO	☐ YES ☐ NO
4.		☐ YES ☐ NO	☐ YES ☐ NO
5.		☐ YES ☐ NO	☐ YES ☐ NO
6.		☐ YES ☐ NO	☐ YES ☐ NO

*** *Signature indicates employe has read this RWP.*

FMPC-ES&H-1372 (REV. 5/18/87)

4.5.4.4 The RST shall provide for Radiological Monitoring and protective equipment requirements in Section II of the RWP. They shall be identified consistent with this manual, applicable department procedures, applicable health and safety plans and good health physics practices.

4.5.4.5 Special instructions shall be given to employees prior to working on grossly contaminated items, such as bag filter-changes, cleaning of large ventilation ducts, use of containment devices, etc.

4.5.4.6 After Section II is completed, the requesting supervisor shall review the precautions required for the job, have the person(s) doing the work read the permit and sign it, signifying that they have read the radiological protection requirements. The RS Technician also signs, dates, and inserts the time of RWP issuance.

4.5.4.7 After all signatures are on the RWP form, the RS Technician shall give the first copy to the requesting supervisor for posting at the work location. The radiation work permit shall be conspicuously posted at the main entrance to the work area and shall remain there until the job is completed or a revised RWP is posted as a replacement. The second copy is retained for Radiological Safety Section records. The third copy of the RWP is forwarded to the cognizant Radiological Engineer for review and evaluation of exposure control.

R
R
R
R
R

4.5.4.8 The work permit shall remain in force for the duration of the job, not to exceed seven calendar days, as long as conditions remain the same, i.e., all materials, equipment, shielding, and structures that were present when the survey was performed have not been adjusted or moved during the performance of work is such a way as to modify the conditions of the original permit.

4.5.5 Determination of Time Limits - A time limit for work performed under the RWP will be established by one of the following methods:

4.5.5.1 Weekly Exposure Controls - Weekly dose control values that are used to establish work permit time limits are:

Whole Body Penetrating	150 mrem
Skin	300 mrem
Extremities	1500 mrem

3288

4.5.5.2 Quarterly Dose Controls - Quarterly dose control values that are used to establish work permit time limits are:

Whole Body	2400 mrem
Skin	4000 mrem
Extremities	20,000 mrem

The Manager of Radiological Safety must approve the use of quarterly dose limits if they are to be used to calculate the maximum time allowed on a work permit.

4.5.5.3 If the extremity dose is limiting, the worker shall be required to wear a pair of ring dosimeters. The worker should record the ring dosimeter numbers on the drawer used for storage.

The time limit will be determined by whichever dose rate (whole body, skin or extremity) is limiting, (the one which allows the shortest time).

4.6 Administrative Controls: Work in the Administrative Area of the FMPC

Radiation Work Permits must be obtained for the following types of work performed in the Administrative Area (that is, the buildings and grounds between the FMPC parking lot and the former Process Area):

- o any breaching of cooling water systems;
- o movement of walls or permanently installed equipment such as lockers which were put in place prior to 1987;
- o breaching of ventilation systems which have not been completely replaced since 1987.

These requirements are needed for the following reasons:

- o Prior to 1987, contamination control at the FMPC did not prevent tracking of contamination into the Administrative Area. Since this time, floors and accessible surfaces have been cleaned of removable contamination. However, contamination may still be present under permanently installed fixtures.
- o The plant cooling water system is internally contaminated from years of operations. Cooling towers operated in the process area during uranium processing operations.
- o Ventilation systems have accumulated airborne uranium due to airborne discharges from processing operations.

206

SECTION 5 - GENERAL REQUIREMENTS FOR CONTROLLED AREAS

5.1 Controlled Area Access Requirements

5.1.1 Dosimetry

Dosimetry requirements are specified in Section 3.1.2.

5.1.2 Radiation Safety Training

Individuals entering Radiological Areas must successfully complete the Radiation Worker Training Program before any unsupervised work assignment is made, in accordance with Section 13, unless directed otherwise by the Manager, IRS&T. All other individuals must successfully complete Radiation Safety Training commensurate with their job assignments. This training shall be successfully completed every two years.

WMCO's construction contractor, RUST Engineering Company, shall provide radiation worker training for its employees and subcontractors.

Vendors and personnel providing short-term repairs on nonradiological equipment shall be provided a brief orientation of the FMPC operations and safety programs. All visitors entering the Radiological Areas of the FMPC shall be escorted by a qualified radiation worker unless the visitor has satisfactorily completed Radiation Worker Training.

Short-term visitors, such as drivers of delivery vehicles, who do not enter Radiological Areas need not attend Radiation Safety Training.

Other training may be required to meet OSHA and EPA standards as determined by IRS&T Centralized Training Section.

5.1.3 Open Wounds, Medical Tests with Radionuclides

The existence of open wounds shall be reported to the Medical Services Section prior to work in Radiological Areas. To minimize the potential for internal contamination the Medical Services Section shall provide guidance on restriction options. Radiological Safety will confer with Medical Services, then provide requirements for any appropriate restrictions. Restrictions may include additional clothing requirements, bandage requirements or complete restriction from controlled and/or Radiological Areas.

SECTION 5

GENERAL REQUIREMENTS FOR CONTROLLED AREAS

5.1 Controlled Area Access Requirements

5.1.1 Dosimetry

5.1.2 Radiation Safety Training

5.1.3 Open Wounds, Medical Tests with Radionuclides

5.2 Radiological Area Postings

5.3 Protective Clothing

5.4 Food, Beverages, Tobacco

5.4.1 Radiological Areas

5.4.2 Controlled Area - Beverage Drinking and Tobacco Smoking

5.4.3 Controlled Area - Food

5.5 General Rules for Work in the Controlled Area

5.5.1 Contamination Control

5.6 Exiting from the Controlled Area and Radiological Areas

This clothing shall not be worn outside of Controlled Areas. Exceptions may be made by Radiological Safety for personnel who must travel from one Controlled Area to another or who must briefly work outside of a Controlled Area. A whole body contamination survey must be successfully performed to allow any exception.

5.3.2 Personal Clothing

Personal clothing may be worn in Controlled Areas, but is restricted in Radiological Areas. WMCO provides lab coats or smocks and shoe covers for use as identified in Section 7.

5.3.3 Other Clothing

WMCO-provided clothes which may be used outside of Controlled Areas are:

Brown coveralls
Green coveralls with brown collars.

This clothing may also be worn in the Controlled Area but not in Contamination Areas.

Additionally, anti-contamination clothing is provided as described in Section 7.

5.3.4 Laundry Operations

Clothing suspected of being contaminated such as outer Controlled Area clothing shall be laundered separately from other clothing such as undergarments.

Monitoring shall be performed to assure that clothing having fixed contamination exceeding 15,000 dpm/100cm^2 beta-gamma is not issued.

5.4 Food, Beverages, Tobacco

5.4.1 Radiological Areas

Vending machines for tobacco and food shall be prohibited in Radiological Areas.

Personnel who are returning to work following tests or therapy with radioisotopes shall report to Medical Services. Generally, workers will be excluded from the Radiological Area until the radioactive material is eliminated from the body. This is because radiation from medical radioisotopes cannot be distinguished from contamination by radioactive materials in the Radiological Area, making personnel contamination monitoring inaccurate.

5.2 Radiological Area Postings

Sections of the Controlled Area are posted to identify elevated levels of radiation, surface contamination or airborne radioactivity as follows:

Radiological Area, as defined in 1.3.17, identifies the presence of one or more of the above.

Radiological postings for Regulated Area and Contamination Area warn of surface contamination in accordance with Section 7.

Airborne Radioactivity Area and Respirator Area warn personnel of airborne radioactivity and the requirement for respiratory protection as per Section 8.

Radiological postings shall have the radiation symbol (the trefoil marker) in black or magenta on a yellow background. Sign design shall conform to ANSI N12.1-1971 and ANSI N2.1-1971.

5.3 Protective Clothing

5.3.1 Controlled Area Clothing

To prevent contamination of personal clothing, WMCO provides Controlled Area clothing (formerly called Process Clothes) to individuals who work in Contamination Areas or work with radioactive material which has the potential of spreading contamination.

The following WMCO-provided clothing is provided for use in the Controlled Area:

White coveralls
Green coveralls with green collars
Blue coveralls
Blue pants and shirt
Undergarments

5.4.4 Prescription Drugs

Prescription drugs and endorsed by Medical Services Section over-the-counter drugs shall be treated the same as beverages.

5.4.5 Controlled Area - Water Fountains

Water fountains may be used in Controlled Areas provided that they are kept clean and surveyed daily during work days to verify they are not contaminated. Operational water fountains may not be located in Contamination Areas.

5.4.6 Controlled Area - Liquids in Remote Areas

Workers may take liquids to remote areas of the FMPC when the nature of their work requires them to be away from other sources of drinking water for extended periods subject to the conditions below. Industrial Hygiene and Safety may be consulted for determination of need, if necessary.

- o A Radiation Work Permit must identify the allowance for liquids and any special precautions to be taken.
- o The liquid must be obtained outside of the Controlled Area.
- o The liquid must be transported and maintained in a closed container with a spigot, or in squirt-bottles.
- o Disposable cups may be used, provided that they are stored in a closed dispenser prior to use.
- o The liquid must be kept inside a vehicle. The vehicle must be surveyed prior to such use and at least daily.
- o Personnel monitoring of the hands and face must be performed prior to drinking. A survey meter must be obtained and source-checked daily.

5.5 General Rules for Work in Controlled Areas

Radiological controls at the FMPC are necessary in areas where radioactive materials are handled and in areas where potentially contaminated materials and personnel may be located. Radioactive contamination and elevated radiation levels exist in the production areas and waste storage areas of the site. The following rules shall be followed by all individuals to control or minimize radiological hazards:

Eating, smoking, tobacco chewing and drinking, except from clean drinking fountains shall be prohibited in Radiological Areas.

5.4.2 Controlled Area - Beverage Drinking and Tobacco

With the approval of IRS&T, drinking and smoking areas may be established in offices, break rooms and other areas where contamination levels are maintained below the limits of Appendix D.

These areas must be surveyed at least weekly. Personnel monitoring shall be required for entry into break rooms.

Beverages or beverage ingredients in closed containers may be carried to approved areas, but only if taken directly to the area. The outside containers shall be surveyed by the carrier wherever personnel monitoring is required for entry into the area.

Chewing tobacco shall be prohibited from the Controlled Area. This is necessary to allow hygienic sorting of Controlled Area trash.

5.4.3 Controlled Area - Food

Food may not be taken into the Controlled Area unless the following conditions are met:

- Approval of the Vice President of IRS&T must be obtained in writing. Approval will only be granted for sound plans describing the path for carrying food and the cleaning support which is available. Plans must be formalized in a written procedure.

- An eating area is established where contamination levels are maintained below the limits of Attachment D. The area must be proven as being unlikely to become contaminated.

- No process clothing, smocks or shoe covers shall be permitted in eating areas.

- Food in closed containers may be taken to the eating area only along an approved, direct path. The outside containers shall be surveyed prior to entry into eating areas within the Controlled Area.

3288

- Know the emergency alarm signals and the required work area response actions.

5.5.1 Contamination Control

An ongoing program of contamination control shall be part of the commitment to Total Quality at the FMPC.

General administrative and engineering controls and their importance in reducing and maintaining contamination at a low level are identified in Section 4. Section 7 identifies survey frequencies, limits and decontamination methods.

5.6 Exiting from Controlled Areas and Radiological Areas

All anti-contamination clothing shall be removed and left for laundering or disposal at the exit point from Contamination Areas. Dosimeters shall be stored in their designated storage area.

All personnel exiting from the Controlled Area must monitor for contamination, using the hand and foot monitors or personnel contamination monitors and friskers provided. All personal articles carried from the Controlled Area must be monitored.

If an alarm is received and verified during monitoring, follow the posted procedure for decontaminating and obtaining RS assistance.

After any alarm, a whole body frisk is required. If elevated levels of contamination are found on any areas of skin or personal clothes, contact RS. Do not leave the area, if possible.

Vehicles, equipment, and materials being removed from the Controlled Area are subject to contamination monitoring. A pass card will be issued to the vehicle operator as evidence of a contamination survey. Items with contamination greater than approved limits will not be permitted to leave the Controlled Area unless a conditional release under controlled conditions is authorized by the RS manager.

213

- Obey promptly, "stop work" and "evacuate" orders of Radiological Safety personnel.
- Obey posted, written and verbal radiological control instructions.
- Wear personal dosimetry devices and air samplers as required by this manual, signs, procedures, labels, or by Radiological Safety personnel.
- Maintain an awareness of personal radiation dose status to avoid exceeding limits. Report prior or concurrent occupational radiation dose to the Dosimetry Subsection.
- Remain in as low a radiation exposure area as practicable.
- Do not loiter in radiation areas.
- Eat, drink, chew, or smoke only in designated areas.
- Wear Anti-C clothing and respiratory protection equipment properly.
- Monitor for contamination with personnel contamination monitors, hand and foot monitors or friskers as indicated by postings when entering a break area or leaving any Radiological Area or Controlled Area that requires the use of personnel monitors.
- Follow good "housekeeping" practices to minimize the spread of contamination and the amount of material that has to be decontaminated or disposed of as radioactive waste. Work areas should be returned to "as found" or better radiological conditions to the maximum extent practicable.
- Avoid contact with contaminated surfaces and prevent clothing, tools, or other equipment from doing so.
- For a known or possible spill of radioactive material, minimize its spread and immediately notify the AEDO, supervision and Radiological Safety (RS).
- Report the presence of open wounds to the Medical Services Section and Radiological Safety Section personnel prior to work in areas where radioactive contamination exists. If a wound occurs while in the work area, report immediately to RS personnel and Medical Services Section (first shift weekdays) or Fire and Safety Inspector (back shifts, weekends, holidays).

3288

6.0 Requirements for Working in Radiation Areas

6.1 Controlling Exposure in Radiation Areas

Radiation Exposure Control shall be maintained through the use of physical barriers, operating procedures, Radiation Work Permits, surveillance, training and engineered modifications to equipment. Work areas that produce high personnel exposures shall be identified and changes should be engineered to lower exposures. Functions that result in elevated exposures to personnel shall also be evaluated and appropriate changes made. These changes may include, but are not limited to, remote handling equipment, robotics, total enclosures, improved ventilation, and shielding.

All personnel have the responsibility of working in a safe manner and identifying potential hazards to supervision who shall investigate and recommend appropriate remedial actions. WMCO has the responsibility to provide a safe work environment and to investigate and resolve radiological safety concerns in a conscientious manner.

6.2 Exposure Limits for Radiation Areas

External exposure control is accomplished by identifying areas containing sources of radiation and controlling personnel access into these areas or by removing the radiation source. Radiation Areas are accessible areas where a major portion of the body could
R receive a dose equivalent greater than 5.0 mrem, but less than 100 mrem, in one hour.

High Radiation Areas are areas where a major portion of the body could receive a dose equivalent of 100 mrem or more in one hour. Major portions of the body are defined as the head, trunk, upper arms, thighs, and gonads.

6.3 Requirements for Working in Radiation Areas

6.3.1 Posting Requirements

Radiation and High Radiation Areas are defined by the following exposure rates:

	Area	Effective Dose Rate Equivalent
R	Radiation Area	>5.0 <100 mrem/hr.
	High Radiation Area	>100 mrem/hr.

Radiation Areas shall be conspicuously posted by the RS Technician with the standard magenta radiation symbol on a yellow background and the words "Radiation Area". The posting should display any additional information which may be appropriate in aiding individuals to minimize exposure to radiation.

215

215

SECTION 6

REQUIREMENTS FOR WORKING IN RADIATION AREAS

6.1 Controlling Exposure in Radiation Areas

6.2 Exposure Limits for Radiation Areas

6.3 Requirements for Working in Radiation Areas

6.3.1 Posting Requirements

6.3.2 Access to High Radiation Areas

6.3.3 Authorization for Work in Radiation and High Radiation Areas

6.3.4 Shielding

6.4 Radiation Surveys

6.4.1 Requirements

6.4.2 Routine Surveys

6.4.3 Nonroutine Surveys

6.4.4 Survey Techniques

3288

- o Locking personnel in a High Radiation Area.

- o Failing to post a High Radiation Area or failing to lock or guard a High Radiation Area. The Unusual Occurrence Report is not required if the area is properly controlled after its initial identification.

6.3.3 Authorization Work for in Radiation and High Radiation Areas

Radiation Work Permits are required for tasks performed under approved work procedures if those tasks involve work in high radiation fields or in areas where radiation fields are unknown or where large significant variations are possible in the radiation field. The RWP identifies the work activity, the associated radiological conditions and protective measures required to accomplish the work (See Section 4.4.2).

6.3.4 Shielding

Permanent shielding shall be designed and installed as part of construction of new facilities and during modifications to existing facilities where routine operations, materials or equipment produce or involve high radiation levels or where an unusual occurrence could result at such levels.

Changes in the use or operation of facilities which could affect radiation levels outside the shielding in excess of design levels, and changes in use of areas surrounding the shielding shall require prior review and approval by Q&S Management. Removal of permanent shielding shall not be permitted unless approval has been obtained from the Manager of Q&S. Radiation surveys are required any time shielding configurations are altered.

Temporary shielding shall be used in areas where its use is reasonably beneficial, for example where crucibles, derbies, and flats are being temporarily stored. Incorrect installation, unauthorized movement, or removal of temporary shielding can result in significant changes in work area radiation levels; therefore, control of temporary shielding is essential. Radiological Safety shall specify the locations where temporary shielding is required.

Rubber matting shall be routinely used on individual items such as a derby or an ingot. The rubber matting is very effective in reducing the beta exposure rate on individual components. The practice of covering the product will significantly reduce skin exposures.

Beta radiation can also be shielded with light metals, plywood, or heavy plastic. Aluminum and plywood are very good shielding materials. Heavy plastic shall not be used inside any building without approval of WMCO Safety and Fire

217

The boundaries of a Radiation Area or a High Radiation Area that are not formed by permanent structures (walls, doors, fences, etc.), shall be barricaded by radiation rope/ribbon installed at approximately waist height. Radiation posting signs must be attached.

High Radiation Areas shall be conspicuously posted by the RS Technicians with the standard magenta radiation symbol on a yellow background and the words "HIGH RADIATION AREA". The posting should include the maximum radiation level and location within the area. The information may be on the High Radiation Area sign or on a separate plant view or sketch. The posting at the entry shall contain special instructions and requirements which may be appropriate in minimizing exposure to radiation.

High Radiation Areas that have posted survey dates more than 90 days old must be resurveyed by the RS Technicians prior to allowing work in the area. If the conditions producing high radiation in an area are inherent to the facility or operation, and are relatively stable and not subject to change, permanent signs may be posted with the radiation symbol "HIGH RADIATION AREA" and appropriate information and instructions. The use of permanent signs shall be approved by the Manager, RS or his designate.

6.3.2 Access to High Radiation Areas

The boundaries of a High Radiation Area shall be evaluated by RS personnel for all possible means of access and those not formed by solid physical structures (walls, doors, fences, etc.), shall be barricaded to preclude unauthorized entry.

Access(es) to the High Radiation Area shall be locked or maintained under continuous surveillance. When locking systems are used, a key control system shall be established, the number of keys shall be minimized and the personnel authorized to sign out the keys shall be specifically designated in writing.

Positive controls shall be established for each individual entry such that no individual is prevented from leaving the area. Prior to locking an area, the area shall be inspected to ensure that no personnel remain inside.

No loitering or entry by unauthorized personnel shall be allowed in these areas.

Instances in which High Radiation Areas are not controlled as required by this paragraph shall be reported as Unusual Occurrences. These instances include the following:

Protection Engineering. Materials with a high atomic number (Z), i.e., lead, steel, should not be used as the primary shield against beta radiation since the X ray generated by beta absorption can contribute significantly to the penetrating radiation dose. 3288

6.4 Radiation Surveys

The primary objective of radiation surveys is to identify existing and potential radiation levels. This is to assure that exposures are maintained as low as reasonably achievable (ALARA). Survey results are utilized to:

- o Evaluate jobs for ALARA considerations.
- o Set up procedures.
- o Provide a baseline for trend analysis, investigation and correction of unusual conditions.
- o Detect departures from operating procedures or failure of radiation controls.
- o Identify the origin of radiation exposures in the plant by location, system or component.

6.4.1 Requirements

Radiation surveys shall be performed by RS personnel to preclude the possibility of personnel being exposed to elevated levels of radiation and exceeding established radiation dose limits. They shall be used to meet the requirements for posting Radiation and High Radiation Areas. The surveys shall be performed to determine the magnitude and extent of radiation levels.

Radiation surveys are typically divided into routine and nonroutine classifications.

6.4.2 Routine Surveys

Routine surveys shall be performed by RS personnel on a regular basis (e.g., daily, weekly, monthly, etc.), while nonroutine surveys are performed as necessary to support plant processing modifications, work activities, and any nonroutine conditions.

Routine and nonroutine radiation surveys shall be performed for alpha, beta, and gamma radiation.

Surveys shall be performed with instruments calibrated for the type and energy range of radiation being monitored. The instrument range should be high enough to read the highest exposure rate expected. The instrument used shall have a current calibration label and its operability verified.

219

A sufficient number of survey points shall be taken in order to adequately assess the radiological status of the area being surveyed.

Surveys shall be accurately and legibly documented in ink on a standard form. These survey records shall be filed and maintained by area in chronological order so that previous radiological conditions can be readily reconstructed and background data for radiological engineering evaluation is readily available.

- o The data shall be in sufficient detail so that the meaning and intent of the record is clear.
- o Ditto marks and continuation lines are unacceptable for repeated data.
- o Any corrections to a survey record shall be made by drawing a single line through the incorrect entry (incorrect entry shall remain legible) and recording the correct entry. The person making the correction shall initial and date the entry. The use of erasures or correction tape/fluid is prohibited. Correction of each copy of a survey record shall be completed in the same manner.

6.4.3 Nonroutine Surveys

Nonroutine surveys shall be performed by RS personnel as necessary to support plant operations, maintenance and modification efforts. Examples of nonroutine surveys are as follows:

- o An initial radiation survey shall be performed before and after a new facility using radioactive materials becomes operational. The survey shall also be required after completion of any modifications or changes in existing facilities that the Manager of Q&S determines might lead to a substantial change in the radiation hazards associated with operation of the facility. The survey shall be thorough with specific requirements determined by Q&S Management.
- o Radiation surveys to verify the effectiveness of permanent or temporary shielding.
- o During removal of shielding so that personnel are not unexpectedly exposed to radiation.
- o After changes in use of operation of a shielded facility (may be part of the survey required by the first example above).

3288

- o After modifications to the shield or changes in shield materials.

Radiation surveys shall be performed at predetermined points in active work areas and adjacent areas whenever operations are performed that have the potential for significantly changing radiation levels. Examples of these are movement

of permanent or temporary shielding, radioactive waste processing, and relocation of highly radioactive materials. The survey may be done as part of a radiological inspection.

Radiation surveys shall be performed upon initial entry into tanks or enclosures that contain radioactive piping or components or high levels of loose contaminated material. Surveys shall be conducted when performing operations which could result in personnel being exposed to small intense beams of radiation. Examples of such operations include removing shielding at the boundaries of a High Radiation Area and opening containers of high activity radiation sources such as radiography sources.

6.4.4 Survey Techniques

When surveying areas or equipment where intense small beams of radiation can be present, the radiation detection instrument shall be used with audible response. An audible response is necessary due to the lag time in meter response. The probe shall be moved slowly enough so that the instrument has a chance to give an audible increase for a large radiation level increase. Particular attention shall be given to thoroughly scanning suspected areas, such as portable shield sections and areas which are or are likely to be occupied. Small intense beams have occurred in places such as outside shields surrounding sources containing many curies. For equipment with complex shield design, surveyors shall obtain briefings on the equipment design so that areas most likely to have small beams can be given special attention.

221

SECTION 7

RADIOACTIVE CONTAMINATION

7.1 General

7.2 Contamination Limits and Posting Requirements

7.2.1 Barriers
7.2.2 Posting Responsibilities

7.3 Clothing Requirements

7.3.1 Full Anti-Contamination Clothing
7.3.2 Waterproof Anti-Contamination Clothing
7.3.3 Double Anti-Contamination Clothing
7.3.4 Exceptions

7.4 Survey Requirements

7.5 Cleaning in the Controlled Area

7.5.1 Decontamination Methods
7.5.2 Sweeping
7.5.3 Portable Vacuum Cleaners

SECTION 7 - RADIOACTIVE CONTAMINATION

7.1 General

Surface contamination is radioactive dust or finely divided radioactive particles lying loosely or fixed rigidly to surfaces which are otherwise non-radioactive.

Surface contamination is controlled to:

- o minimize the potential for ingestion of radioactivity;
- o minimize the potential for inhalation of radioactivity which could arise from surface contamination becoming airborne;
- o to minimize the potential for skin contamination which could result in ingestion or absorption of radionuclides or irradiation of the skin and body;
- o minimize the potential for release of radioactivity to the environment.

Requirements for entry and exit from Regulated and Contaminated Areas are identified in Section 5 of this manual.

7.2 Contamination Limits and Posting Requirements

When the limits of Appendix D Surface Radioactivity Guides are exceeded in an area, the area must be posted as a Radiological Area. In addition, the following postings shall be made:

Regulated Area - where surface contamination is present in excess of the levels of Appendix D (or likely to be) but less than ten times these levels.

Contamination Area - where surface contamination is in excess of ten times the levels of Appendix D or is likely to be.

Radiological Safety may establish lower values appropriate to minimize the potential for spread of contamination.

7.2.1 Barriers

Where loose surface contamination exceeds ten times the limits of Appendix D, or at lower levels specified by Radiological Safety to prevent the spread of contamination, Contamination Areas shall be isolated by barriers consisting of walls, fences, or yellow and magenta rope. Where necessary for the movement of material, Contamination Areas may be identified at material transfer points by conspicuously marking the surface of the transfer point. Signs shall be posted conspicuously for any approach to the area.

Step-off pads, friskers, and receptacles for laundry, waste, and respirators (as needed) shall be provided at exits from Contamination Areas.

7.2.2 Posting Responsibilities

Radiological Safety shall identify all areas where posting is required, specify sign requirements, and post all temporary or portable signs and barriers.

Operations Department shall install and maintain all permanent signs and barriers.

Facility owners shall ensure that all permanent signs and barriers are maintained.

7.3 Clothing Requirements

7.3.1 General: Regulated Areas Company-issued shoes with Controlled Area clothing or with lab coats or smocks and shoe covers over personal clothes shall be the minimum requirement.

Personal clothing worn under lab coats or smocks must cover the legs. Lab coats or smocks may not be worn over shorts, skirts, or dresses.

7.3.2 General: Contamination Areas Additional posted requirements shall be added by Radiological Safety as needed to prevent the spread of contamination. In general, Contamination Areas containing only fixed contamination will not have additional requirements beyond those for Regulated Areas.

Additional protective clothing may consist of the following:

- o booties (shoe and ankle covers)
- o overshoes
- o coveralls - cloth or disposable
- o gloves
- o hood

The type and quantity of protective clothing shall be specified by Radiological Safety based on contamination levels and work to be performed in an area. The notice, "Full Anti-C's Required for entry" (or equivalent) on a radiological sign means a complete set of the above

additional protective clothing, (full anti-contamination clothing).

7.3.3 Full Anti-Contamination clothing shall be required in areas where extensive removable contamination levels exceed fifty times the removable contamination limits of Appendix D and in areas with less contamination if there is a high potential for personnel contamination.

7.3.4 Waterproof Anti-Contamination clothing is required where radioactive liquids may be splashed on personnel.

7.3.5 Double anti-Contamination clothing shall be required in areas where extensive removable contamination levels exceed one hundred times the removable contamination limits of Appendix D. Double anti-Contamination clothing consists of full anti-Contamination clothing with an additional set of coveralls, gloves, hood, and booties.

7.3.6 Exceptions

7.3.6.1 If contamination is confined to floors or if personnel can pass through a Contamination Area without touching other contaminated surfaces, Radiological Safety may authorize entry with shoe covers and lab coat or other appropriate protective clothing. Authority to enter an area with less than the posted clothing requirements shall only be valid if an RS technician, supervisor, technologist, or manager is present.

7.3.6.2 The overall health and safety of the worker shall be considered when specifying protective clothing requirements. Clothing requirements less than those identified above may be specified where alternative steps can be taken to prevent personnel contamination and the spread of contamination. Such exceptions must be approved by a Radiological Safety Supervisor, Technologist or Manager.

7.4 Survey Requirements

Surveys for contamination shall be performed on a routine basis by Radiological Safety. Frequency requirements shall be promulgated by IRS&T department procedure and shall be sufficient to maintain correct posting of areas.

7.5 Cleaning in the Controlled Area

Cleaning methods must be selected to minimize the spread of

contamination and to minimize airborne radioactivity. HEPA-filtered vacuum cleaning is preferred for removing dust from floors and other surfaces. Wet wiping is also acceptable.

7.5.1 Decontamination methods

When cleaning is performed to remove contamination, care must be taken to not spread the contamination. This is accomplished by starting at areas of low contamination and working toward areas of higher contamination. Cleaning material shall be placed in radioactive material receptacles as soon as its usefulness is expired.

7.5.2 Sweeping

Dry sweeping is the least recommended cleaning method. It is prohibited in Contamination Areas unless specifically allowed by a radiation work permit.

Dry sweeping in Regulated Areas shall be performed only with the following precautions:

- The sweeper (and helper, if any) shall wear a half-face air purifying respirator,
- Sweeping compound shall be used to limit the potential for dust becoming airborne.

7.5.3 Portable Vacuum Cleaners

The spread of airborne radioactivity can be minimized by portable vacuums with a high efficiency particulate air (HEPA) filter. All proposed Controlled Area vacuum systems must be reviewed by Radiological Safety prior to use.

Portable vacuum units used for vacuuming radioactive materials or inside of Controlled Area buildings shall be equipped with a HEPA filter or the exhaust must be routed to the building's filtered exhaust system. HEPA vacuums shall be leak tested by conducting a DOP challenge of the system at the frequency specified in the IH&S Topical Manual, FMPC-2128. All HEPA vacuums shall bear evidence (e.g., a sticker) that they have been successfully leak tested within the time interval required by the manual. Units without such a sticker or with evidence that the seal has been broken since the sticker was applied, shall not be used until having satisfactorily passed a DOP test.

SECTION 8

REQUIREMENTS FOR WORKING IN AIRBORNE RADIOACTIVE AREAS

8.1 Controlling Airborne Radioactivity

8.2 Limits for Airborne Radioactivity

8.3 Requirements for Working in Airborne Radioactive Areas

8.3.1 Posting of Areas

8.3.2 Respiratory Protection

8.3.3 Authorization for Work in Airborne Radioactivity Areas

8.3.4 Containment of Airborne Radioactivity

8.4 Monitoring for Airborne Radioactivity

8.0 Requirements for Working in Airborne Radioactivity Areas

8.1 Controlling Airborne Radioactivity

Radioactivity can become airborne through such operations as burning, welding or grinding a contaminated component, decontamination, formation of particles from the products of process reactions, or disturbing deposited radioactivity on contaminated floors or other surfaces.

Airborne radioactivity at the FMPC is a combination of both particulate and gaseous radioactive material. Gaseous activity (e.g., radon, thoron) is experienced in very limited areas of the facility and does not normally represent a significant contribution to exposure.

Control of airborne radioactivity by the application of engineered controls is the primary means for minimizing inhalation of airborne radioactivity. In situations where engineered controls are not practicable such as in dust collector enclosures, respiratory protection shall be used.

Air samples shall be taken where significant concentrations of airborne radioactivity are probable or suspected within the work environment. Continuous air monitors (CAM's) are used to monitor selected nominally occupied areas. Continuous fixed-filter air samplers are used for monitoring the air exhausted in the plant stacks.

Other sampling equipment is available for specific applications. Portable, battery operated samplers are available for emergency sampling, such as at a fire. Working level monitors may be used for detecting the short-lived decay products of Rn-220 (Thoron) and Rn-222 (Radon). High volume samplers are required for quickly drawn samples which involve low DAC limit radionuclides, such as Th-232. Annular impactors may be used to eliminate radon and thoron decay products for early long-lived activity analyses.

8.2 Limits for Airborne Radioactivity

Limits for airborne radioactivity in occupied areas are listed in Appendix B to this manual. These limits are designated by the DOE as derived air concentrations (DAC) for airborne radioactivity and are limits for average concentrations of radionuclides of various solubility classes over a working year. The use of respiratory protection is prescribed on the basis of airborne concentrations present compared to the listed values. Measurement of air concentration is routinely reported at FMPC in units of uCi/cm^3.

3288

8.3 Requirements for Working in Airborne Radioactive Areas

8.3.1 Posting of Areas

Any area within a Radiological Area where the potential exists for airborne radioactivity concentrations greater than 0.8 DAC hours per shift shall be posted by RS personnel as an Airborne Radioactivity Area.

Any area within a Radiological Area where actual airborne radioactivity concentrations exceed 2.0 DAC hours per shift when averaged over one calendar quarter or 8.0 DAC hours during any single shift shall be posted as a Respirator Area.

In addition, areas where surface contamination exceeds 50,000 alpha dpm/100 cm^2, or 100,000 beta-gamma dpm/100 cm^2 shall be posted as Airborne Radioactivity Areas due to the potential for resuspension of radioactivity until air sampling shows air activity to be less than the limits.

The posting shall have the standard magenta radiation symbol on a yellow background and the words "Airborne Radioactivity Area." Special instructions or requirements for entry to airborne areas shall be conspicuously posted at the entrance.

8.3.2 Respiratory Protection

If the sources of airborne contamination cannot be eliminated, respiratory protection shall be required. Respirators shall be used in accordance with the FMPC Respiratory Protection Manual (FMPC-2152).

Air supplied respiratory protection may be required if significant amounts of radioactive material are airborne in the work area at the start of work or if there is a potential for the creation of airborne contaminants due to the nature of the work. Examples would be: Welding on a contaminated surface, cleaning up spills of dry material, and changing dust collector bags.

Respiratory protection shall be considered whenever burning, grinding, or welding takes place on a contaminated surface.

A. Respirator Selection

Different brands of respiratory protective equipment are available at the FMPC. These respirators have been chosen to facilitate proper fitting and optimal user protection and comfort.

Several factors govern respirator selection. These include.

1. The nature and extent of the hazard.

229

2. Work requirements and conditions.

3. Respiratory equipment protection limits.

4. Availability of approved equipment.

5. Facial characteristics (size, shape, etc.).

6. Skin reactions to the material from which the respirator is made.

B. Respirator Types

The types of respirators available for use are: Half-mask air-purifying respirators, full-face air-purifying respirators, air-supplied respirators with half- or full-face mask or hood and self-contained breathing apparatus (SCBAs). They are described in FMPC-2152.

C. Protection Factors

The overall protection provided by a respirator is defined as its protection factor (PF). Table 8.1 shows the protection factors for each type of respirator as listed in NRC Regulatory Guide 8.15.

The PF is defined as the ratio of the concentration of contaminants outside the respirator to that inside the respirator under conditions of use. For example, if the contaminant concentration inside a half mask respirator is less than 10 percent of that outside the respirator, it may be used for respiratory protection in atmospheres with a contaminant concentration up to 10 times the permissible exposure limit. When calculating the exposure of individuals wearing respiratory protection equipment from radioactive materials, the concentration of airborne radioactive contaminants is divided by the protection factor to determine actual intake. The PF is the lowest acceptable fit test factor (FTF) defined in FMPC-2152.

8.3.3 Authorization for Work in Airborne Radioactivity Areas

A Radiation Work Permit shall be required for the performance of any task that involves exposure to radioactive material for which there is not an approved work procedure. The RWP identifies the work activity, the associated radiological conditions and protective measures required to accomplish the work (See Section 4).

8.3.4 Containment of Airborne Radioactivity

The spread of airborne contamination should be minimized by employing a localized, high velocity, high efficiency particulate air (HEPA) filtered exhaust at the worksite. HEPA

3288

TABLE 8.1

RESPIRATORY PROTECTIVE EQUIPMENT

Type of Equipment	Condition Inside of Headpiece	Protection Factor [a]
1. Air-Purifying[b]		
(a) Half-Face	negative pressure	10
(b) Full-face Facepiece	negative pressure	50
2. Airline Respirator (Type "C" supplied air respirator)[c]		
(a) Half-mask	continuous air flow	1000
(b) Full-face facepiece with emergency supply of compressed air	continuous air flow	2000[d]
(c) Hood headpiece	continuous flow	2000
(d) Helmet headpiece	continuous flow	2000
3. Self-Contained Breathing Apparatus (SCBA)		
(a) Full-face facepiece - open circuit	pressure-demand	10,000[d]

NOTES:

[a] Protection factor is the multiplication constant used to determine the degree of protection from a properly used respirator (for example, the airborne limit for U-238 is 1×10^{-10} uCi/ml. A protection factor of 10 allows entrance into an environment with a concentration of 1×10^{-9} uCi/ml).

[b] An appropriate high efficiency radionuclide cartridge must be used in all cases.

[c] The equipment supplying breathing air and the air supplied shall meet the requirements in Compressed Gas Association (CGA) Standard G-7.1-1973 for Grade D air. The air in any breathing supply shall be tested initially and at least annually thereafter by Q&S.

[d] Approved for use in environments that are immediately dangerous to life and health.

filtered vacuum cleaners or portable air movers fitted with ducting and HEPA filters may be used for this application. Personnel are still required to use respiratory protection when the potential for airborne contamination exists. This requirement is not relaxed by the use of a localized HEPA filtered exhaust. Proposed worksite HEPA filtered exhaust systems shall be reviewed by the Q&S Department prior to their use.

To prevent cross contamination, designated vacuums shall be used in work areas. Hoses of vacuums used in contaminated work areas shall have the ends taped and tagged as radioactively contaminated after use.

Contamination containments shall be used to the maximum extent practicable to prevent personnel exposure to airborne radioactivity above the listed limits. This containment is required during radioactive work which has been known to cause or is expected to cause airborne radioactivity.

a. The exhaust from radiologically controlled containments shall be HEPA filtered whenever work is in progress in these containments to prevent the release of airborne contamination to the surrounding environment.

b. HEPA filters shall be installed in the exhaust from contamination containments to prevent personnel from being exposed to significant airborne radioactivity.

c. HEPA filters shall be installed and certified acceptable by Q&S in vacuum cleaners used for removing surface contamination.

8.4 Monitoring for Airborne Radioactivity

Air particulate surveys shall be performed by RS personnel. Records of the results of these surveys shall be reviewed by Radiological Safety personnel. The following air samples shall be the minimum performed:

a. During radioactive work which has been known to cause or is expected to cause airborne radioactivity, and in occupied surface contamination areas.

b. When opening a process system to the atmosphere for operation or maintenance. Air samples are not required during normal liquid sampling operations or when opening the system in a containment enclosure equipped with a high-efficiency filter.

c. When initially entering tanks containing potential radioactive piping or material.

d. Whenever airborne radioactivity levels above the acceptable limit are suspected.

3288

The precise location for air samples cannot be specified for all situations. The primary objective is to obtain "breathing zone" (BZ) air samples or general area air samples. BZ air samples are collected using a portable, battery powered air pump with a small filter located as close to the worker's immediate breathing zone as possible. General area sampling shall be performed continuously in normal work or process areas. The locations for air samples shall be based on the following: 1) the breathing zone of the worker, 2) the position of the sampler relative to the work zone and other operations which might contribute to elevated levels of radioactivity in the breathing zone, 3) the type of work being performed (for example, grinding), and 4) the containment enclosure arrangement used. The volume of air sampled depends on the equipment used and the radionuclides of concern.

Radionuclides and Their Chemical Forms at FMPC

The potential airborne radionuclides of limiting concern in the various plants and areas of FMPC are shown in Table 8.1. Solubility classes are listed based on conservative assumptions. The process activity or condition producing the chemical form is also listed.

When it is determined by Radiological Safety that an employee has been in an environment where the air concentration is equal to or greater than 40 DAC hours, without a respirator, he/she will leave a "special urine sample." This is based on requirements of DOE Order 5480.11, 9.g.2.

233

TABLE 8.2

LOCATION AND SOLUBILITY CLASS OF POTENTIAL AIRBORNE RADIONUCLIDES AT FMPC

Plant/Location	Radionuclide/Form	Class	Source
Pilot Plant			
autoclave/reactor	UF_4	W (U-238)	UF_6/UF_4 conversion
	UF_6	D (U-238)	UF_6/UF_4 conversion
grit blaster and plasma spray unit	UO_2, U_3O_8	Y (U-238)	
	Th-234 and Pr-234	Y	U-238 decay products
wet area	Rn-220 (Thoron) and decay products	N/A	Th-232 embedded in floor/equipment
	Th-232	W	Th-232 embedded in floor/equipment
Plant 1	Th-232	W	Most conservative limit for sampling and processing.
Plant 2/3	UO_2, U_3O_8 UO_3	Y (U-238) D (U-238)	Start of process. End of process.
Plant 4	U-238 oxides	W	U oxide to UF_4.
Plant 5	U-238 oxides/metal	Y	Area B
	Th-234 and Pr-234	Y	U-238 decay products
	UF_4	W (U-238)	Area A
Plant 6	U-238 oxides/metal	Y	Machining/pickling.
	Sodium diuranate	W	Water treatment.
Plant 8	U-238	Y	Most conservative U limit for processing many U compounds.
Plant 9	U-238 oxides/metal	Y	

Solubility Class

D = very soluble
W = moderately soluble
Y = relatively insoluble

SECTION 9

RESPONDING TO RADIATION INCIDENTS

9.1 Incident Repsonse

9.1.1 Basic Guidelines

9.1.2 Follow-up Actions

9.1.3 Radiological Safety Response to Incidents

9.2 High Radiation Alarm

9.3 Airborne Radioactive Alarm

9.4 Radioactive Material Spills

9.5 Radioactive Material Fires

9.0 Responding to Radiation Incidents

9.1 Incident Response

An incident is a sudden unexpected event requiring immediate response to limit the impact on people, property or the environment. When radioactive material is involved, Radiological Safety plays a major role in evaluating, controlling, and recovering from the event. Examples of incidents involving radioactive materials are: nuclear criticality, fire or explosion involving radioactive material, spill of radioactive material and an unexpected radiation detection alarm.

Radiological Safety personnel shall respond to all radiological emergency incidents. The ability to assess and evaluate the situation and the immediate steps to minimize the effects of the event are crucial for controlling the emergency (see FMPC-503).

An emergency response may be initiated by personnel observing the event, alarms or the Emergency Operations Center (EOC). A rapid response is required; however, undue risks shall be avoided and employee safety shall not be compromised.

The type of emergency determines the level of planning for response. For example, a CAM alarm or a small radioactive spill requires little planning for the initial response. However, when an emergency causes a facility/plant evacuation, preplanning (e.g., stay time, route of entry, decontamination method, etc.) and the approval of the AEDO are necessary for re-entry.

9.1.1 Basic Guidelines

The basic guidelines for emergency response include the following:

- o Radiation exposure considerations - These are not limiting factors for rescue of personnel.
- o Rendering first aid to injured employees - This may be administered by members of the ERT, Medical Staff or other trained personnel.
- o Attempt to stop the cause - Undue risks shall be avoided.
- o Warn other personnel - Keep unnecessary personnel away from the event.
- o Isolate the area - Install barriers as quickly as possible to establish a controlled area separating the affected area from the unaffected areas. In determining the size of the controlled area, the following should be considered: Gamma (penetrating) dose rates, possible spread of contamination, weather conditions, chemical hazards, nonradiological hazards, and security. Normal

operations outside of the controlled area may continue.

3288

- o Minimize Exposure - For initial response, unnecessary radiation exposure shall be avoided.

- o Survey - Define and assess the radiological problem and conditions. Interview people at the scene regarding the nature and extent of the incident. Perform radiological surveys; the type of survey is based on the event. Types of surveys include: personnel surveys, property and equipment surveys, dose rate estimates, air sampling, perimeter surveys, and re-entry surveys.

9.1.2 Follow-up Action

This includes, but is not limited to, decontamination, providing monitoring coverage, formal evaluations, restoration, and documentation. A planned operation is necessary to assure personnel exposures are minimized. Any planned exposure above the occupational dose limits requires the permission of the FMPC Site Manager and personnel who will be expected to receive the extra exposure.

Any employee involved in an incident which could have resulted in an intake of radioactive materials by inhalation, ingestion or absorption shall submit a urine sample at the end of employee's shift and again at the start of the next shift or as directed by Radiological Safety.

9.1.3 Radiological Safety Response to Incidents

The primary function of Radiological Safety is to provide the radiological data necessary to confirm and control the incident, determine the magnitude of the incident, minimize exposure to personnel, minimize contamination spread, and assist in the recovery actions. Radiological data is provided through surveys performed by Radiological Safety and by air sample monitors in or near the event area. Radiological surveys include radiation dose rates, radioactive contamination levels and air activity levels.

The primary purpose of all surveys is to assure personnel protection, to maintain exposure ALARA, and to minimize contamination of the area and personnel.

General Responsibilities of Radiological Safety Personnel

- o Respond to any potential emergency involving radioactive material.

- o Perform radiological surveys of personnel and the affected area.

237

- Document survey results.
- Establish boundaries and access control.

Communication

- Normally, communication is made to the AEDO or EOC.
- The primary method of communication with the RS supervisor is the two-way radio No. 355, and telephone system Extension 6889.
- Contact the emergency representative as soon as possible after reaching the assigned area. Maintain frequent contact to provide radiological data.

Preparation

- Availability of emergency kits and instrumentation.
- Availability of equipment and supplies.
- Protective clothing.
- Respiratory protection.
- Dosimetry
- Emergency vehicle.
- Two-way radio.

Area Survey and Access Control

- Don protective clothing as necessary.
- Approach the affected area cautiously, with instruments operating.
- Survey area to determine incident size.
- Determine and establish boundaries based on dose rate, contamination spread, and air sampling.
- Establish entry/exit point of control.
- Determine radiation background in staging area.
- Survey personnel who have evacuated for contamination.
- If applicable, segregate personnel in protective clothing.

- o Set priority of survey. Injured personnel should be given first priority. Personnel in protective clothing, personnel who evacuated surface contamination area, and remaining personnel should follow.

3288

- o Start air sampling.
- o Report survey results.
- o Survey all personnel and equipment leaving affected incident area.

Information to be Obtained

- o Time of incident.
- o Location of the incident.
- o Nature of the incident.
- o What radiological information is known.
  - Contamination (property and personnel).
  - Dose rate.
  - Isotopes involved and their solubility classes.
  - Air sampling data.
- o Availability of other personnel to support emergency activities.
- o Are nonradiological hazards involved (i.e., chemicals, explosive devices, fire, etc.)?
- o Plume tracking (if necessary).
- o Status of environmental protective actions (i.e., diverting storm drains, securing dust collectors, etc.).

9.2 High Radiation Alarm

Notification of a high radiation alarm will occur by means of the RDA system or a verbal warning from Q&S personnel or coworkers.

Immediate Action for High Radiation Alarm

- o Evacuate all personnel.
- o Stop any work or operation that may be causing the high radiation problem (for example, radiography).
- o Assure that personnel evacuated from contamination areas are surveyed for contamination.

239

- o Obtain information from evacuated personnel on the possible cause of the alarm.

- o If evacuated personnel are wearing direct self reading dosimeters, read the dosimeter and note any high reading.

- o Establish boundaries as necessary to control access until the source of the high dose rates have been identified, and eliminated or reduced to normal conditions.

9.3 Airborne Radioactivity Alarm

Notification of high airborne radioactivity may be either by means of a Constant Air Monitor (CAM) Alarm or a verbal warning from Q&S personnel or coworkers.

Immediate Actions for Airborne Radioactivity Alarm

- o Evacuate all unnecessary personnel from the area. If personnel must remain in the area due to operation considerations, they must don respiratory protection immediately.
- o Warn other personnel in the area.

- o Notify supervision and RS Technicians of the problem.

- o Request any work or operation that may be causing the airborne problem be suspended until further evaluation.

- o Turn off all unfiltered exhaust ventilation from the affected area.

- o Remain outside but adjacent to the affected area until released by RS personnel.

9.4 Radioactive Material Spills

Response actions are needed to minimize the spread of contamination if radioactive material is spilled. These apply to spilled radioactive material in dry or liquid form within or outside a facility/building.

CAUTION: If unfamiliar with the material or system, wait for qualified help. Do not move damaged containers. Evaluate potential for life threatening situations, such as toxic chemical fumes or criticality.

Immediate Actions for Radioactive Material Spill

- o Evacuate all unnecessary personnel in or near the spill area to a safe, central location. (Consider personal contamination surveys and nasal smears.)

- o Warn approaching personnel to remain outside of spill area.

3288

- o Evaluate the need for backup equipment and personnel.
- o Notify RS Supervisor.
- o Notify Operations Supervisor.
- o Notify AEDO if the spill is considered to contain more than one pound Uranium.
- o Notify appropriate Q&S personnel if spill is determined to have chemical or criticality concerns.

9.5 Radioactive Material Fires

Most of the facilities at the FMPC have been designed to prevent, detect, suppress, and confine fires and limit products of combustion. Most areas in the Production Plants have an automatic fire-suppression system (sprinkler system), which when activated will serve to extinguish the fire. In cases where the fire has been extinguished, and personnel have been evacuated to a safe distance, steps to isolate, control, and recover the area shall be performed by RS personnel.

Immediate Actions for Radioactive Material Fires

- o Notify Communications Center (call 6511) or activate fire pull box).
- o Evacuate all unnecessary personnel to a safe central location (consider personal contamination surveys and nasal smears).
- o SCBAs shall be worn by all personnel fighting the fire until airborne levels have been monitored and airborne concentrations permit other respiratory protection. Full-face respirators with purple cartridge shall be worn by all personnel required to enter an uncleared area or support fire fighting personnel.
- o Warn approaching personnel to stay clear of area, and away from smoke or fumes.

NOTE: The primary radiological danger during a radioactive fire is due to ingestion or inhalation of radioactive smoke, dust, vapors, or fumes. It is very important to keep personnel far enough away from the site of fire and smoke to prevent the inadvertent inhalation of possible airborne radioactivity. Whether inside or outside a building, personnel should remain upstream of air flow or plume.

- o Notify RS Supervisor
- o Notify operations supervisor
- o Notify appropriate Q&S section

241

SECTION 10

RADIOACTIVE SOURCE CONTROL

10.1 Purpose

10.2 Scope

10.3 Requirements

10.4 Responsibilities

10.5 Accountability and Control

10.6 Records

10.7 Labeling

10.8 Training

10.0 Radioactive Source Control

10.1 Purpose

The radioactive source controls identified in this manual are intended to ensure that sealed and unsealed radioactive sources received, possessed, used or transferred during routine operations at the FMPC are accounted for, controlled, and used properly such that exposures to these materials is kept as low as reasonably achievable. This manual provides a standard for radioactive source accountability and control.

10.2 Scope

10.2.1 For the purposes of this manual a radioactive source is defined as any amount of activity greater than or equal to the quantities shown in Table 1 used solely for the radiation that it emits. Examples of such sources are;

10.2.1.1 Sealed and unsealed radioactive sources used for calibrations and response checks.

10.2.1.2 Consumable liquid standards.

10.2.2 The following sources are exempt from this policy.

10.2.2.1 Fission chambers (i.e., equipment containing radioactive material which is inaccessible to personnel).

10.2.2.2 Process inventory (i.e., process flows, samples, products, etc.).

10.2.2.3 Consumer products such as luminescent exit signs, smoke detectors, and static eliminators.

10.2.3 The Site Radiation Source Controller, with the concurrence of the Manager of Radiological Safety and DOE, may exempt other specific sources or classes of sources. The justification for such exemptions shall be documented and maintained by the Site Radiation Source Controller.

10.3 Requirements

10.3.1 A permit shall be issued to each source custodian by the Site Radiation Source Controller identifying the use and storage location of the source(s). Permits shall be updated and approved by Site Source Controller at least annually and whenever a source is added to or deleted from the inventory.

3288

10.3.2 Examples of the Radiation Source Permit forms are shown in Figures 10-1 and 10-2. Figure 10-1 shows the title page(s) of the permit. Figure 10-2 illustrates the form provided for specific data and requirements of each radioactive source.

10.3.3 Radioactive sources shall be used according to written procedures or work permits approved by Radiological Safety.

10.4 Responsibilities

10.4.1 The Manager of Radiological Safety shall appoint a member of Radiological Safety to be the Site Radiation Source Controller.

10.4.2 The Site Radiation Source Controller is responsible for:

- o maintaining a master source inventory.
- o ensuring that the source custodians understand and comply with the requirements of this manual.
- o issuing and approving radiation source permits.

10.4.3 One individual (i.e. the source custodian) shall be assigned functional responsibility for each source. More than one source may be assigned to that individual.

10.4.4 The source custodian shall be assigned by the Manager of the funtional group which uses the sources.

10.4.5 The source custodian is responsible for the following:

244

- Performing semi-annual inventory checks of the sources for which he/she is responsible. Loss of or damaged sources shall be reported to the Site Source Controller immediately.

- Coordinating with Radiological Safety to have leak tests and other functional tests performed as indicated by the Radiation Source Permit.

  NOTE: Consumable liquid standards are exempt from the leak testing portions of this manual.

- Reporting the results of these inspections to the Site Radiation Source Controller.

- Reporting any changes in storage location to the Site Radiation Source Controller.

10.4.6 Radiological Safety shall have responsibility for the following:

- Leak tests of radioactive sources.

- Support inventory audits.

- Review procedures and work permits concerning transport and use of radioactive sources.

- Prompt notification to DOE of lost, damaged or leaking sources or theft of sources.

- Support acquisition/disposal/use of radioactive sources.

- Ensuring safe handling of radioactive sources.

10.4.7 Any WMCO employee or subcontractor directly bringing material on site that meets the definition of a source as outlined in this manual or indirectly by way of a vendor,subcontractor etc. is responsible for notifying Radiological Safety prior to bringing this material

on-site.

3288

10.5 Accountability and Control

10.5.1 A master inventory of all radioactive sources with activities greater than or equal to the limits shown in Table 1 shall be maintained and shall be confirmed with the assistance of the Source Custodian semi-annually.

10.5.2 Radioactive sources not attached to structures shall be stored in locked containers or other storage approved by Radiological Safety. Such containers or storage areas shall have appropriate radiological posting and labeling.

NOTE: Approved storage devices, utilizing tamper proof seals,and which are used to store multiple sources are considered to be inventoried if the seal is unbroken. Sources stored in such a manner would not need to be individually inventoried every 6 months. Sources stored in this manner shall be inventoried annually. Also such sources shall be leak tested prior to use unless the source has been leak tested within the last 6 months.

10.5.3 Radioactive sources shall not be permanently moved from their designated storage area without written approval of the Radiation Source Custodian. The Site Source Controller must be made aware of this so appropriate permit revisions can be made.

10.5.4 Appropriate dosimetry shall be used during use and handling of radioactive sources.

10.5.5 At no time shall any source be left unattended when not in its approved storage location.

10.5.6 Leaking or damaged radioactive sources shall not be used for calibration.

10.6 Records

10.6.1 Records of radioactive sources shall be maintained at the storage location as practicable. The records shall contain the

246

following information: source identification number,radiation type,material type(isotope and physical form),source activity,date of activity determination, half-life of isotope,Source Custodian's name,date of inventory,name of person performing inventory,and dose rates on contact and at 12 inches (as practicable). Copies of the Radiation Source Permit and Radiation Source Data and Requirements sheets may be used to serve this purpose.

10.6.2 A copy of the NIST Traceability Certificate shall be kept on file for each source that is NIST traceable.

10.7 Labeling

10.7.1 All radioactive sources with activities greater than or equal to those shown on Table 1 shall be permanently marked to permit individual source identification as follows:

- The label shall bear the radiation caution symbol and the words "Caution Radioactive Material" for sources which are capable of delivering a whole body dose of up to 1000 mR/hr.
- The label shall bear the radiation caution symbol and the words "Danger Radioactive Material" for sources which are capable of delivering a whole body dose of 1000 mR/hr or more.
- The label should also include the following information as practicable; identification number, isotopic identification, radiation type, dose rate at contact, activity, date of activity determination, and half life. Sources permanently stored within a container may have this information inscribed on the outer container.

10.8 Training

10.8.1 All source custodians shall have radioactive source control training commensurate with risk and their responsibilities prior to receiving an assignment of work involving

radioactive sources. Such training shall be documented.

3288

10.8.2 Radiological Safety shall review and concur with all training material with regard to radioactive source control.

248

Table 1

Activities Required to Qualify as a Radioactive Source

Material	Amount (uCi)
Americium 241	0.01
Antimony 122 (Sb 122)	100
Antimony 124 (Sb 124)	10
Antimony 125 (Sb 125)	10
Arsenic 73 (As 73)	100
Arsenic 74 (As 74)	10
Arsenic 76 (As 76)	10
Arsenic 77 (As 77)	100
Barium 131 (Ba 131)	10
Barium 133 (Ba 133)	10
Barium 140 (Ba 140)	10
Bismuth 210 (Bi 210)	1
Bromine 82 (Br 82)	10
Cadmium 109 (Cd 109)	10
Cadmium 115m (Cd 115m)	10
Cadmium 115 (Cd 115)	100
Calcium 45 (Ca 45)	10
Calcium 47 (Ca 47)	10
Carbon 14 (C 14)	100
Cerium 141 (Ce 141)	100
Cerium 143 (Ce 143)	100
Cerium 144 (Ce 144)	1
Cesium 131 (Cs 131)	1,000
Cesium 134m (Cs 134m)	100
Cesium 134 (Cs 134)	1
Cesium 135 (Cs 135)	10
Cesium 136 (Cs 136)	10
Cesium 137 (Cs 137)	10
Chlorine 36 (Cl 36)	10
Chlorine 38 (Cl 38)	10
Chromium 51 (Cr 51)	1,000
Cobalt 58m (Co 58m)	10
Cobalt 58 (Co 58)	10
Cobalt 60 (Co 60)	1
Copper 64 (Cu 64)	100
Dysprosium 165 (Dy 165)	10
Dysprosium 166 (Dy 166)	100
Erbium 169 (Er 169)	100
Erbium 171 (Er 171)	100
Europium 152 9.2 h (Eu 152 9.2h)	100
Europium 152 13 yr (Eu 152 13 yr)	1
Europium 154 (Eu 154)	1
Europium 155 (Eu 155)	10
Fluorine 18 (F 18)	1,000
Gadolinium 153 (Gd 153)	10
Gadolinium 159 (Gd 159)	100
Gallium 72 (Ga 72)	10
Germanium 71 (Ge 71)	100
Gold 198 (Au 198)	100

Table 1 (continued)

Activities Required to Qualify as a Radioactive Source

3288

Material	Amount (uCi)
Gold199(Au 199)	100
Hafnium 181 (Hf 181)	10
Holmium 166 (Ho 166)	100
Hydrogen 3 (H 3)	1,000
Indium 113m (In 113m)	100
Indium 114m (In 114m)	10
Indium 115m (In 115m)	100
Indium 115 (In 115)	10
Iodine 125 (I 125)	1
Iodine 126 (I 126)	1
Iodine 129 (I 129)	0.1
Iodine 131 (I 131)	1
Iodine 132 (I 132)	10
Iodine 133 (I 133)	1
Iodine 134 (I 134)	10
Iodine 135 (I 135)	10
Iridium 192 (Ir 192)	10
Iridium 194 (Ir 194)	100
Iron 55 (Fe 55)	100
Iron 59 (Fe 59)	10
Krypton 85 (Kr 85)	100
Krypton 87 (Kr 87)	10
Lanthanum 140 (La 140)	10
Lutetium 177 (Lu 177)	100
Manganese 52 (Mn 52)	10
Manganese 54 (Mn 54)	10
Manganese 56 (Mn 56)	10
Mercury 197m (Hg 197m)	100
Mercury 197 (Hg 197)	100
Mercury 203 (Hg 203)	10
Molybdenum 99 (Mo 99)	100
Neodymium 147 (Nd 147)	100
Neodymium 149 (Nd 149)	100
Nickel 59 (Ni 59)	100
Nickel 63 (Ni 63)	10
Nickel 65 (Ni 65)	100
Niobium 93m (Nb 93m)	10
Niobium 95 (Nb 95)	10
Niobium 97 (Nb 97)	10
Osmium 185 (Os 185)	10
Osmium 191m (Os 191m)	100
Osmium 191 (Os 191)	100
Osmium 193 (Os 193)	100
Palladium 103 (Pd 103)	100
Palladium 109 (Pd 109)	100
Phosphorus 32 (P 32)	10
Platinum 191 (Pt 191)	100
Platinum 193m (Pt 193m)	100
Platinum 193 (Pt 193)	100

250

Table 1 (continued)

Activities Required to Qualify as a Radioactive Source

Material	Amount (uCi)
Platinum 197m (Pt 197m)	100
Platinum 197 (Pt 197)	100
Plutonium 239	0.01
Polonium 210 (Po 210)	0.1
Potassium 42 (K 42)	10
Praseodymium 142 (Pr 142)	100
Praseodymium 143 (Pr 143)	100
Promethium 147 (Pm 147)	10
Promethium 149 (Pm 149)	10
Radium 226	0.01
Rhenium 186 (Re 186)	100
Rhenium 188 (Re 188)	100
Rhodium 103m (Rh 103m)	100
Rhodium 105 (Rh 105)	100
Rubidium 86 (Rb 86)	10
Rubidium 87 (Rb 87)	10
Ruthenium 97 (Ru 97)	100
Ruthenium 103 (Ru 103)	10
Ruthenium 105 (Ru 105)	10
Ruthenium 106 (Ru 106)	1
Samarium 151 (Sm 151)	10
Samarium 153 (Sm 153)	100
Scandium 46 (Sc 46)	10
Scandium 47 (Sc 47)	100
Scandium 48 (Sc 48)	10
Selenium 75 (Se 75)	10
Silicon 31 (Si 31)	100
Silver 105 (Ag 105)	10
Silver 110m (Ag 110m)	1
Silver 111 (Ag 111)	100
Sodium 24 (Na 24)	10
Strontium 85 (Sr 85)	10
Strontium 89 (Sr 89)	1
Strontium 90 (Sr 90)	0.1
Strontium 91 (Sr 91)	10
Strontium 92 (Sr 92)	10
Sulphur 35 (S 35)	100
Tantalum 182 (Ta 182)	10
Technetium 96 (Tc 96)	10
Technetium 97m (Tc 97m)	100
Technetium 97 (Tc 97)	100
Technetium 99m (Tc 99m)	100
Technetium 99 (Tc 99)	10
Tellurium 125m (Te 125m)	10
Tellurium 127m (Te 127m)	10
Tellurium 127 (Te 127)	100
Tellurium 129m (Te 129m)	10
Tellurium 129 (Te 129)	100
Tellurium 131m (Te 131m)	10

3288

Table 1 (continued)

Activities Required to Qualify as a Radioactive Source

Material	Amount (uCi)
Tellurium 132 (Te 132)	10
Terbium 160 (Tb 160)	10
Thallium 200 (Tl 200)	100
Thallium 201 (Tl 201)	100
Thallium 202 (Tl 202)	100
Thallium 204 (Tl 204)	10
Thorium (natural)[1]	1000
Thulium 170 (Tm 170)	10
Thulium 171 (Tm 171)	10
Tin 113 (Sn 113)	10
Tin 125 (Sn 125)	10
Tungsten 181 (W 181)	10
Tungsten 185 (W 185)	10
Tungsten 187 (W 187)	100
Uranium (natural)[2]	1000
Uranium 233	0.01
Uranium 234	0.01
Uranium 235	0.01
Vanadium 48 (V48)	10
Xenon 131m (Xe 131m)	1,000
Xenon 133 (Xe 133)	100
Xenon 135 (Xe 135)	100
Ytterbium 175 (Yb 175)	100
Yttrium 90 (Y 90)	10
Yttrium 91 (Y 91)	10
Yttrium 92 (Y 92)	100
Yttrium 93 (Y 93)	100
Zinc 65 (Zn 65)	10
Zinc 69m (Zn 69m)	100
Zinc 69 (Zn 69)	1,000
Zirconium 93 (Zr 93)	10
Zirconium 95 (Zr 95)	10
Zirconium 97 (Zr 97)	10

252

323

Table 1 (continued)

Activities Required to Qualify as a Radioactive Source

Any alpha emitting radionuclide not listed above or mixtures of alpha emitters of unknown composition	0.01
Any radionuclide other than alpha emitting radionuclides, not listed above, or mixtures of beta emitters of unknown composition.	0.1

[1] Based on alpha disintegration rate of Th-232, Th-230 and their daughter products.

[2] Based on alpha disintegration rate of U-238, U-234,and U-235.

FIGURE 10 - 1

RADIATION SOURCE PERMIT - TITLE PAGE

3288

FMPC
OPERATIONS SAFETY & HEALTH - RADIOLOGICAL SAFETY
RADIATION SOURCE PERMIT

DEPARTMENT: | SECTION(S):

SOURCE CUSTODIAN

NAME: | BADGE NUMBER:

SOURCE			LEAK/FUNCTION CHECK	
I.D. NUMBER	PAGE	DESCRIPTION	TYPE	FREQUENCY

APPROVAL	DATE
Source Custodian	
Department Head	
Site Radiation Source Controller	

FMPC-OS&H-2788 (1/28/88)

Page ____ of ____

FIGURE 10 - 2

RADIATION SOURCE PERMIT - DATA AND REQUIREMENTS

FMPC

OPERATIONS SAFETY & HEALTH - RADIOLOGICAL SAFETY

RADIATION SOURCE DATA AND REQUIREMENTS

SECTION 1 - *To be completed by Custodian*

SOURCE RADIONUCLIDE(S):

IDENTIFICATION NUMBER:	AMOUNT OF RADIOACTIVITY:	DATE OF ASSAY:

USE OF SOURCE:

USE LOCATION:

STORAGE LOCATION:

DESCRIPTION OF EQUIPMENT/CONTAINER/ENCAPSULATION:

SECTION 2 - *To be completed by Site Radiation Source Controller*

LEAK CHECK REQUIREMENT:

FUNCTIONAL CHECK REQUIREMENT:

FMPC-2584-F (1/28/88)

Page ____ of ____

255

SECTION 11

RADIOACTIVE MATERIAL SHIPPING AND RECEIVING

11.1 General Requirements

11.2 Transportation Standards

11.3 Surveying of Shipments

11.4 Radiation and Contamination Limits

11.5 Marking, Labeling and Placarding

11.0 Radioactive Material Shipping and Receiving

11.1 General Requirements

Radioactive materials received onto or shipped from the FMPC shall conform to U.S. Department of Transportation (DOT) and U.S. Department of Energy (DOE) rules and regulations. These rules and regulations apply to vehicles and packages used for the shipments as well as the materials themselves.

These rules and regulations shall apply to all radioactive materials received or shipped, to vehicles used to ship exclusive use shipments, and to vehicles which deliver exclusive use shipments, regardless of intent to reuse for an exclusive use shipment. It does not apply to materials transported exclusively on site. Requirements for on site transportation of radioactive materials are specified in FMPC-2089.

Personnel responsible for shipping radioactive material are responsible for packaging it in compliance with applicable rules and regulations.

The Transportation and Materials Management Department shall notify RS Technicians when vehicles carrying radioactive material arrive on site, are empty, are loaded and ready for dispatch, and for preparation of required shipping papers.

The Radiological Safety Section shall survey packages, vehicles, etc., maintain records, and make required reports and notifications.

11.2 Transportation Standards

The Federal DOT, through Title 49 of the Code of Federal Regulations (49 CFR), sets standards for shipping radioactive materials. These regulations specify how the material is to be packaged, how it is loaded, exposure rates, removable surface contamination levels, and in some cases, how it is routed.

The U.S. Nuclear Regulatory Commission, through Title 10, Part 71 of the Code of Federal Regulations (10 CFR 71), supplements the DOT regulations for large quantities or high levels of byproduct materials and significant quantities of fissile materials.

The types of radioactive material shipments generally made to or from FMPC are:

LSA (Low Specific Activity) and Limited Quantity. LSA is for shipment of thorium and nonenriched compounds of uranium via exclusive use vehicles. Limited quantity is for solid forms of natural thorium or uranium (not to exceed 15 g of uranium-235). Limited quantity packages must have a surface dose rate of 0.5 mrem/hour or less.

11.3 Surveying of Shipments

Surveys of packages and vehicles shall be performed by Radiological Safety within the following time frames:

- Incoming packages nonexclusive use vehicle - As soon as practical but not more than three (3) hours after receipt during normal working hours.
- Incoming exclusive use vehicle - prior to opening.
- All Vehicles - after unloading.
- Vehicle to be used for exclusive use - within 24 hours of loading.
- Outgoing package nonexclusive use vehicle - within 24 hours of leaving.
- Outgoing exclusive use vehicles - within three (3) hours of leaving.

Removable contamination "Swipe" surveys are conducted using dry filter paper. A 300 square centimeter (cm^2) area of each package is to be swiped. Large smooth surfaces ("T" hoppers, UF_6 cylinder, vehicles, etc.) may be rough checked by swiping a large area with a tissue/towelette (e.g., Kimwipe). If there is detectable activity on the tissue/towelette, a formal 300 cm^2 swipe will be required. Exclusive use vehicles shall be surveyed prior to being loaded.

Packages shall be surveyed for exposure rate at the surface and at one (1) meter.

Vehicles shall be surveyed for exposure rate at the surface and at two (2) meters.

If the surface dose equivalent rate is 1.5 mrem/hour or less, packages separated by eight (8) feet or more may be considered in low background. Higher surface dose rates, larger packages --- or arrays of packages, or closer spacing shall use the "<" (less than) symbol when measured exposure rates are recorded due to unknown contributions from other packages.

NOTE: Because definitions of limited quantity and the requirements for Radioactive I, II, III labels are based on dose rate measurements, the errors resulting from packages being too close together could adversely affect shipping requirements, even though otherwise legal and proper.

11.4 Radiation and Contamination Limits

Limits are: Limited quantity packages:

Surface Dose Rate = 0.5 mrem/hr for non-exclusive shipments 2.0 mrem/hr for exclusive shipment.

Removable Contamination = 22 dpm/cm^2 averaged over 300 cm (2.2 dpm/cm^2 if alpha emitters other than uranium or thorium are present).

Package for other than exclusive use of vehicle shipment:

Surface Dose Rate: 200 mrem/hr

The Transport Index, i.e., the maximum radiation level in mrem/hr at one meter, is limited to not more than 10 units per package and not more than 50 units per shipment.

Exclusive use of vehicle package:

Surface Dose Rate:	200 mrem/hr
Any "Surface" of Vehicle:	200 mrem/hr
2 Meters (6.6 ft):	10 mrem/hr
Any normally occupied position in vehicle (truck Ca.):	2 mrem/hr
Contamination Limits:	Same as limited quantity packages.

Enclosed Exclusive use Vehicle:

Surface Dose Rate:	1000 mrem/hr
Surface of Vehicle:	200 mrem/hr
2 meters from surface of vehicle:	10 mrem/hr
Any normally occupied position in vehicle:	2 mrem/hr
Removable Contamination:	Same as limited quantity packages.

Empty exclusive use vehicles not marked "For Radioactive Materials Use Only", shall have an interior surface dose rate of 0.5 mrem/hour or less and the removable contamination must be less than 22 dpm/cm^2 (or 2.2 dpm/cm^2 if transuranic materials are present) averaged over 300 square centimeters.

11.5 Marking, Labeling and Placarding

Radioactive materials received onto, or shipped from, the FMPC shall conform to the marking, labeling, and placarding requirements of the DOT and DOE rules and regulations as they apply to packages and vehicles.

Personnel responsible for shipping radioactive material are responsible for properly packaging, marking and labeling in compliance with applicable rules and regulations.

3288

The WMCO Transportation and Materials Management shall verify the labeling, marking and placarding of incoming materials, prior to acceptance, and to verify marking and labeling of outgoing packages, and to placard when placards are required on outgoing shipments.

The U.S. Department of Transportation (DOT) through Title 49 of the Code of Federal Regulations (49 CFR) establishes rules and regulations for labeling and placarding radioactive materials for shipment. The U.S. Department of Energy (DOE) establishes criteria for packaging and shipping radioactive materials through DOE Order 5480.3.

11.5.1 **Marking:** All packages except those shipped as either limited quantity or LSA/exclusive use of vehicle must be specification containers and shall be marked in accordance with the following sections of 49 CFR 172:

300	Applicability (what must be marked).
301	General requirements (information required in the marking).
304	Marking requirements, characteristics and location(s) of markings.
310	Radioactive materials - additional markings required for radioactive materials packages.
312	Liquid hazardous materials - "This side up" and prohibition on use of other arrows.
178	Specifies the requirements for the construction of specification containers and the required markings.

Tanks and portable tanks (49 CFR 171.8) have special marking requirements identified in the following sections of 49 CFR:

172.326	Portable tanks.
172.328	Cargo tanks.
172.332-336	Identification numbers (orange panels).

11.5.2 **Labels:** Packages of radioactive material shall be labeled in accordance with the following sections of 49 CFR unless they are LSA exclusive use or limited quantity shipments.

172.400	General labeling requirements.
172.402	Additional labeling requirements.
172.403	Radioactive materials additional labeling requirements.
172.406	Placement of required labels.
172.407	Label specifications (dimensions, colors, and wording).
173.29	"Empty" labels.
173.427	Specific requirements for use of "empty" labels on containers which have contained radioactive material.

260

11.5.3 **Placards:** Any vehicles carrying a package which has a "Radioactive Yellow III" label and exclusive use vehicles carrying LSA must be placarded. The following sections of 49 CFR pertain to placarding.

172.500	Applicability of placarding requirements.
172.504	General placarding requirements (NOTE: UF_6 in Table 1 and exclusive use shipments of LSA in Footnote 5).
172.506	Placards for highway.
172.508	Placards for railroads.
172.574	Cargo tanks and portable tanks.
172.516	Visibility and display of placards.
172.519	Specifications (construction, materials, shape) for placards.
172.556	"Radioactive" placard.

11.5.4 **Miscellaneous:** Transportation indexes for fissile material are given in Table 2 of 49 CFR 173.417.

Limited quantities of radioactive materials are defined by 49 CFR 173.421, 173.421-1, and 173.423.

LSA exemptions and marking, labeling, and placarding requirements are given in 49 CFR 173.425.

49 CFR 173.444 lists the sections which proved exceptions to labeling requirements.

SECTION 12

RECORDKEEPING

12.1 Radiological Monitoring Records

12.2 Work Place Monitoring

12.3 Personnel Exposure

12.0 Recordkeeping

12.1 Radiological Monitoring Records

All original radiological sampling data including maps, surveys and original sample worksheets shall be filed by Radiological Safety and kept indefinitely.

Laboratories (including offsite laboratories) shall maintain records of instrument serial numbers, calibration, calibration source identification along with documentation of a complete quality control program in accordance with NRC Regulatory Guide 4.15. This information shall also be maintained indefinitely.

12.2 Work Place Monitoring

Records of surveys, data sheets, maps, radiation work permits, health physics calculations, investigations, air sample results, worksheets and any other documentation directly related to work place monitoring shall be filed by Radiological Safety according to location (i.e., plant, building, project or location) and maintained for an indefinite length of time.

Data compiled on computer disks shall be trackable to original survey results and shall be controlled through the use of backup disks.

Documentation of work conditions affecting the results of work area monitoring shall be listed on the appropriate record with sufficient detail to allow understanding at an undefined future date. Data stored on disk shall not be construed as sufficient reason to destroy original information.

12.3 Personnel Exposure

Completed monthly dosimetry reports shall be retained. Each plant supervisor and the subcontractor shall receive a copy of his/her personnel's monthly dose.

A summary of annual, cumulative and committed effective dose equivalent shall be provided to each employee and subcontractor radiation worker on an annual basis. Dose records shall be kept indefinitely by Dosimetry and Instrumentation.

All raw data, corrected data and employee external radiation reports shall be retained in a folder labeled with the particular month.

An extremity dosimetry report is generated quarterly by Dosimetry and Instrumentation with extremity dose totals for each month, e.g., a March report will contain results for January, February, and March of that year.

588

SECTION 13

RADIATION SAFETY TRAINING

13.1 Radiation Safety Training

13.2 Training Records

13.0 Radiation Safety Training

13.1 Radiation Safety Training

Radiation safety training shall be provided to all WMCO employees and subcontractors by Q&S and all RUST subcontractor employees by RUST Engineering Company. The scope and depth of training is a function of the employee's work assignment. R

13.1.1 Employee Orientation

All employees shall receive an orientation in radiation safety within one month of their initial employment. Retraining shall be provided when there are significant changes to radiation protection policies and procedures which effect general plant employees, but at a sufficient frequency not to exceed two years. The initial orientation should include, but is not limited to:

- o the risk of low-level occupational radiation exposure, including cancer and genetic effects
- o the risk of prenatal radiation exposure
- o basic radiation protection concepts
- o DOE and WMCO radiation protection policies and procedures
- o employee and management responsibilities for radiation safety
- o emergency procedures

13.1.2 Radiation Worker Training

Radiation worker training programs shall be established and conducted at a sufficient frequency (not to exceed two years) to familiarize the worker with the fundamentals of radiation protection and the proper procedures for maintaining exposures ALARA. Training should include both classroom and applied training. Training shall precede or be concurrent with assignment as a radiation worker while under the supervision of a trained individual. The knowledge of radiation safety fundamentals possessed by radiation workers shall be certified by examination prior to an unsupervised assignment. Radiation dosimeters will not be issued unless this training has been satisfactorily completed. The level of training in the following topics shall be commensurate with each worker's assignment: R

- o radioactivity and radioactive decay
- o characteristics of ionizing radiation
- o man-made radiation sources

3288

- o acute effects of exposure to radiation
- o risks associated with occupational radiation exposures
- o special considerations in the exposure of women of reproductive age
- o dose equivalent limits
- o mode of exposure--internal and external
- o dose equivalent determinations
- o basic protective measures--time, distance, shielding
- o specific plant procedures for maintaining exposure as low as reasonably achievable (ALARA)
- o radiation survey instrumentation--calibration and limitations
- o radiation monitoring programs and procedures
- o contamination control, including protective clothing and equipment and workplace design
- o self-monitoring instruments for detection of contamination bioassay and in vivo measurements
- o personnel decontamination
- o emergency procedures
- o warning signs and alarms
- o responsibilities of employees and management
- o interaction with radiation protection staff

13.1.3 RS Technician Training

Radiation protection technician training programs shall be established and conducted at a sufficient frequency, not to exceed two years, to familiarize technicians with the fundamentals of radiation protection and the proper procedures for maintaining exposures ALARA. This program shall include both classroom and applied training and shall precede or be concurrent with assignment as a radiation protection technician while under the supervision of a trained individual. The knowledge of radiation safety fundamentals possessed by radiation protection technicians shall be certified by examination prior to an unsupervised work assignment. The training program should include the R

266

topics listed in the paragraph above and should emphasize procedures specific to the facility where the technician is assigned. The level of training in each topic shall be commensurate with the technician's assignment.

13.2 Training Records

Training records of plant employees, radiation workers, and radiation safety personnel shall be retained by Human Resources Department to document the level of understanding and proficiency of personnel who work with radioactive materials. Certification of successful completion of training programs and performance records shall also be retained.

SECTION 14

RADIATION EFFECTS

14.1 Exposure Effects

14.2 Control of Collective Dose

14.3 Radiation Risk

14.0 Radiation Effects

14.1 Exposure Effects

It is generally accepted by the scientific community that exposure to ionizing radiation can cause biological effects that are harmful to the exposed organism. These effects are classified into three categories:

Somatic Effects: Effects occurring in the exposed person that, in turn, may be divided into two classes:

Prompt effects that are observable soon after a large or acute dose (e.g., 100 rems or more to the whole body in a few hours), and

Delayed effects such as cancer that may occur years after exposure to radiation.

Genetic Effects: Abnormalities that may occur in the future children of exposed individuals and in subsequent generations. Genetic effects exceeding normal incidence have not been observed in any of the studies of exposed humans.

Teratogenic Effects: Effects that may be observed in children who were exposed during the fetal and embryonic stages of development.

14.2 Control of Collective Dose

Concerns about these biological effects have resulted in controls on dose to individual workers and in efforts to control the collective dose (person-rems) to the worker population.

Nuclear activities result in a significant fraction of the total occupational radiation exposure in the United States. Regulatory action has recently focused more attention on maintaining occupational radiation exposure at levels that are as low as reasonably achievable (ALARA). Radiation protection training for all workers who could be exposed to ionizing radiation is an essential component of any program designed to maintain exposure levels ALARA. A clear understanding of what is presently known about the biological risks associated with exposure to radiation will result in more effective radiation protection and should generate more interest on the part of the worker in minimizing both individual and collective doses. In addition, radiation workers have the right to whatever information on radiation risk is available to enable them to make informed decisions regarding the acceptance of these risks. It is intended that workers develop an understanding of the risks involved rather than excessive fear or indifference.

14.3 Radiation Risk

3288

At the low dose limits set for occupational radiation exposure in the United States, it is difficult to demonstrate a relationship between exposure and effect. There is considerable uncertainty and controversy regarding estimates of radiation risk. In Appendix C, a range of risk estimates is provided (see Table 1) as well as a discussion of the health risks due to radiation exposure. Information on radiation risk has been included from such sources as the 1980 National Academy of Sciences' Report of the Committee on the Biological Effects of Ionizing Radiation (BEIR-80), the International Commission on Radiological Protection (ICRP) Publication 27 entitled "Problems in Developing an Index of Harm," the 1979 report of the science work group of the Interagency Task Force on the Health Effects of Ionizing Radiation, the 1977 report of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR report), and numerous published articles (see the bibliography to Appendix C).

270

APPENDIX A

Radiation Safety Terminology

These are terms commonly used in nuclear industry.

(From NUREG-0770, Glossary of Terms: Nuclear Power and Radiation, June 1981. U.S. Nuclear Regulatory Commission.)

RADIATION SAFETY TERMINOLOGY

TERM	DEFINITIONS
absorber	Any material that absorbs or lessens the intensity of ionizing radiation. A thin sheet of paper will absorb alpha particles and a thin piece of aluminum will absorb all except the most energetic beta particles. Concrete and steel absorb gamma rays. Neutron absorbers (like boron, hafnium, and cadmium) are used in control rods for reactors. (See shielding.)
absorption	The process by which the number of particles or photons entering a body of matter is reduced or attenuated by interaction with the matter. (See neutron capture.
activation	The process of making a material radioactive by bombardment with neutrons, protons, or other nuclear radiation. (See induced radioactivity.)
air sampling	The collection and analysis of samples of air to measure its radioactivity or to detect the presence of radioactive substances, particulate matter or chemical pollutants.
ALARA	Acronym for "As Low As Reasonably Achievable," a basic concept of radiation protection that specifies that radioactive discharges from nuclear plants and radiation exposure to personnel be kept as far below regulatory limits as practical.
alpha particle	A positively charged particle ejected spontaneously from the nuclei of some radioactive elements. It is identical to a helium nucleus that has a mass number of 4 and an electrostatic charge of +2. It has low-penetrating power and short range. The most energetic alpha particle will generally fail to penetrate the skin. Alphas are hazardous when an alpha-emitting radioisotope is introduced into the body.
anion	Negatively charged ion. (See ionization)
atom	The smallest particle of an element that cannot be divided or broken up by chemical means. It consists of a central core called the nucleus, which contains protons and neutrons. Electrons orbit in the region surrounding the nucleus.
atomic number	The number of positively charged protons in the nucleus of an atom and the number of electrons on an electrically neutral atom.

atomic weight	See mass number.
attenuation	The process by which a beam of radiation is reduced in intensity when passing through some material. It is a combination of absorption and scattering processes.
background radiation	The natural radiation in man's environment, including cosmic rays and radiation from the naturally occurring radioactive elements, both outside and inside the bodies of humans and animals. An average individual exposure from background radiation is 125 millirem per year in mid latitudes at sea level.
beta particle	A charged particle emitted from a nucleus during radioactive decay, with a mass equal to 1/1837 that of a proton. A negatively charged beta particle is identical to an electron. A positively charged beta particle is called a positron. Large amounts of beta radiation may cause skin burns, and beta emitters are harmful if they enter the body. Beta particles are easily stopped by a thin sheet of metal or plastic.
becquerel	A unit, in the International System of Units (SI), for the measurement of radioactivity equal to one transformation or atomic disintegration per second.
bioassay	The collection and analysis of human hair, tissue, nasal smears, urine or fecal samples to determine the amount of radioactive material that might have been deposited in the body. Routes of possible entry are inhalation, ingestion or injection.
biological half-life	The time required for a biological system, such as that of a human, to eliminate by natural processes half the amount of a substance (such as a radioactive material) that is present within it.
biological shield	A mass of absorbing material placed around a reactor or radioactive source to reduce the radiation to a level safe for humans.
body burden	The amount of radioactive material which if deposited in the total body will produce the maximum permissible dose rate to the body organ considered the critical organ.
bone seeker	A radioisotope that tends to accumulate in the bones when it is introduced into the body. An example is strontium-90, which behaves chemically like calcium.
Bremsstrahlung	Secondary photon radiation produced by deceleration of charged particles passing through matter.
calibration	The check or correction of the accuracy of a measuring instrument to assure proper operational characteristics. (See counter.)

cask	A heavily shielded container used to store and/or ship radioactive materials. Lead and steel are common materials used in the manufacture of casks.
charged particle	An ion. An elementary particle carrying a positive or negative electric charge.
chronic exposure	See exposure.
committed dose equivalent	Predicted total dose equivalent to a given organ or tissue over a 50 year period after an intake of a radionuclide into the body.
compound	A chemical combination of two or more elements combined in a fixed and definite proportion by weight.
contamination, radioactive	The deposition of uncontained or unwanted radioactive material on the surfaces of structure, areas, objects, or personnel.
controlled area	A defined area in which the occupational exposure of personnel to radiation or radioactive material is under the control of an individual in charge of radiation protection.
control room (building)	An area in a plant from which most of the plant power production and emergency safety equipment can be operated by remote control.
cosmic radiation	Penetrating ionizing radiation, both particulate and electromagnetic, originating in space. Secondary cosmic rays, formed by interactions in the earth's atmosphere, account for about 45 to 50 millirem of the 125 millirem background radiation that an average individual receives a year.
counter	A general designation applied to radiation detection instruments or survey meters that detect and measure radiation. The signal that announces an ionization event is called a count. (See Geiger-Mueller counter.)
critical organ	The body organ receiving a radionuclide or radiation dose that results in the greatest overall risk.
criticality	A term used in radiation physics to describe the state when the number of neutrons released by fission is exactly balanced by the neutrons being absorbed (by the fuel and poisons) and escaping the pile. A reaction is said to be "critical" when it achieves a self-sustaining nuclear chain reaction.
crud	A colloquial term for corrosion and wear products (rust particles, etc.) that become radioactive under a radiation flux. (See induced radioactivity.)

cumulative dose	The total dose resulting from repeated exposures of radiation to the same region, or to the whole body, over a period of time.
curie (Ci)	The basic unit used to describe the quantity of radioactivity in a sample of material. The curie is equal to 37 billion disintegrations per second, which is the rate of decay of 1 gram of radium. A curie is also a quanitity of any radionuclide that decays at a rate of 37 billion disintegrations per second. Named for Marie and Pierre Curie, who discovered radium in 1898.
daughter products	Isotopes that are formed by the radioactive decay of some other radioisotope. In the case of radium-226, for example, there are 10 successive daughter products, ending in the stable isotope lead-206.
decay, radioactive	The decrease in the amount of any radioactive material with the passage of time, due to the spontaneous emission from the atomic nuclei of either alpha or beta particles, often accompanied by gamma radiation. (See half-life; radioactive.)
decontamination	The reduction or removal of contaminating radioactive material from a structure, area, object, or person. Decontamination may be accomplished by (1) treating the surface to remove or decrease the contamination; (2) letting the material stand so that the radioactivity is decreased as a result of natural decay.
depleted uranium	Uranium having a percentage of uranium-235 smaller than the 0.72 percent found in natural uranium. (See mill tailings.)
design-basis phenomena	Earthquakes, tornados, hurricanes, floods, etc., that a nuclear facility must be designed and built to withstand without loss to the systems, structures, and components necessary to assure public health and safety.
detector	A material or device that is sensitive to radiation and can produce a response signal suitable for measurement or analysis. A radiation detection instrument. (See counter.)
differential pressure (DP)	The difference in pressure between two points of a system, such as between the inlet and outlet of a pump.
disintegration	See decay, radioactive.
dose	A quantity (total or accumulated) of ionizing radiation received. The term "dose" is often used in the sense of the exposure, expressed in roentgens,

	which is a measure of the total amount of ionization that the quantity of X ray or gamma radiation could produce in air. This should be distinguished from the absorbed dose, given in rads, that represents the energy absorbed from any radiation in a gram of any material. Furthermore, the biological dose, given in rem, is a measure of the biological damage to living tissue from the radiation exposure.
dose equivalent	A term used to express the amount of biologically effective radiation when modifying factors have been considered. The product of absorbed dose multiplied by a quality factor multiplied by a distribution factor. It is expressed numerically in rem.
dosimeter	A portable instrument for measuring and registering the total accumulated exposure to ionizing radiation. (See dosimetry.)
dosimetry	The theory and application of the principles and techniques involved in the measurement and recording of radiation doses. Its practical aspect is concerned with the use of various types of radiation instruments with which measurements are made. (See film badge; survey meter.)
dose rate	The radiation dose delivered per unit of time. Measured, for example, in rem per hour.
effective half-life	The time required for the amount of a radioactive element present in a living organism to be diminished 50 percent as a result of the combined action of radioactive decay and biological elimination. (See biological half-life.)
electromagnetic (radiation)	A traveling wave motion resulting from changing electric and magnetic fields. Familiar electromagnetic radiations range from X rays (and gamma rays) of short wavelength, through the ultra-violet, visible, and infrared regions, to radar and radio waves of relatively long wavelength. All electromagnetic radiations travel in a vacuum with the velocity of light (See photon.)
electron	An elementary particle with a unit negative charge and a mass 1/1837 that of the proton. Electrons surround the positively charged nucleus and determine the chemical properties of the atom. (See beta particle.)
element	One of the 103 known chemical substances that cannot be broken down further without changing its chemical properties. Some examples include hydrogen, nitrogen, gold, lead, and uranium.
enrichment	See isotopic enrichment.

erythema	An abnormal redness of the skin due to distension of the capillaries with blood. It can be caused by many different agents -- heat, drugs, ultraviolet rays and ionizing radiation.
exposure	The act or condition of being subject to the effect or risk of a field of radiation or dispersion of radioactive material. Acute exposure is generally accepted to be a large exposure received over a short period of time. Chronic exposure is exposure received during a lifetime. (See dose.)
external radiation	Exposure to ionizing radiation when the radiation source is located outside the body.
extremities	The hands and forearms and the feet and ankles. (Permissible radiation exposures in these regions are generally greater than for the whole body because they contain less blood-forming material.)
fissile material	Although sometimes used as a synonym for fissionable material, this term has acquired a more restricted meaning; namely, any material fissionable by thermal (slow) neutrons. The three primarily fissile materials are uranium-233, uranium-235 and plutonium-239.
fission	The splitting of a nucleus into at least two other nuclei and the release of a relatively large amount of energy. Two or three neutrons are usually released during this type of transformation.
gamma ray (gamma radiation)	High-energy, short wavelength electromagnetic radiation emitted from the nucleus. Gamma radiation frequently accompanies alpha and beta emissions and always accompanies fission. Gamma rays are very penetrating and are best stopped or shielded against by dense materials, such as lead or uranium. Gamma rays are identical to X rays of the same energy.
gases	Normally formless fluids that completely fill the space and take the shape of their container.
gaseous diffusion (plant)	A method of isotopic separation based on the fact that gas atoms or molecules with different masses will diffuse through a porous barrier (or membrane) at different rates. This method is used to separate uranium-235 from uranium-238; it requires large gaseous diffusion plants and enormous amounts of electric power.

Geiger-Mueller counter	A radiation detection and measuring instrument. It consists of a gas-filled chamber, such as a tube containing electrodes, between which there is an electrical voltage but no current flowing. When ionizing radiation interacts in the chamber, a short, intense pulse of current passes from the negative electrode to the positive electrode and is measured or counted. The number of pulses per second measures the intensity of radiation. It was named for Hans Geiger and W. Mueller who invented it in the 1920s. It is sometimes called simply a Geiger counter, or a G-M counter.
graphite	A form of carbon, similar to the lead used in pencils, used as a moderator in some nuclear reactors also for molds in high temperature furnaces.
gray (Gy)	A unit, in the International System of Units (SI), of absorbed dose which is equal to 1 joule per kilogram. 1 Gy = 100 rad
half-life	The time in which half the atoms of a particular radioactive substance disintegrates to another nuclear form. Measured half-lives vary from millionths of a second to billions of years. Also called physical half-life.
half-life, biological	The time required for the body to eliminate by physiologic processes half of the material present in it.
half-life, effective	The time required for a radionuclide present in a biological system to be reduced by half as a combined result of radioactive decay and biological elimination.
half-thickness	The thickness of any given absorber that will reduce the intensity of a beam of radiation to one-half its initial value. This value varies with radiation energy and beam size and location of shielding. (See attenuation; shielding.)
health physics	The science concerned with recognition, evaluation and control of health hazards from ionizing and non-ionizing radiation.
heat exchanger	Any device that transfers heat from one fluid (liquid or gas) to another fluid or to the environment.
heat sink	Anything that absorbs heat; usually part of the environment, such as the air, a river or outer space.
high radiation area	Any area accessible to personnel, in which a major portion of the body could receive a radiation dose of 100 millirem (0.1 rem) in one hour. These areas must

	be posted as "high radiation areas" and access into these areas is maintained under strict control.
hot	A colloquial term meaning highly radioactive.
hot spot	The region in a radiation/contamination area in which the level of radiation/contamination is noticeably greater than in neighboring regions in the area.
induced radioactivity	See activation.
ion	An atom or group of atoms that carries a positive or negative charge as a result of having lost or gained electrons; an electron that is not associated with a nucleus. (See ionization.)
ionization	The process of adding one or more electrons to or removing one or more electrons from atoms or molecules, thereby creating ions. High temperatures, electrical discharges, or ionizing radiations can cause ionization.
ionization chamber	An instrument that detects and measures ionizing radiation by measuring the electrical current that flows when radiation ionizes gas in a chamber, making the gas a conductor of electricity. (See counter.)
ionizing radiation	Any radiation with sufficient energy to displace electrons from atoms or molecules, thereby producing ions. Examples: alpha, beta, gamma, X rays, neutrons and ultraviolet light. High doses of ionizing radiation may produce severe skin or tissue damage.
irradiation	Exposure to radiation.
isotope	One of two or more atoms with the same number of protons, but different number of neutrons in their nuclei. Thus, carbon-12, carbon-13 and carbon-14 are isotopes of the element carbon, the numbers denoting the approximate atomic weights. Isotopes have the same chemical properties, but often different physical properties (for example, carbon-12 and carbon-13 are stable, carbon-14 is radioactive.
isotope separation	The process of separating isotopes from one another, or changing their relative abundances, as by gaseous diffusion or electromagnetic separation. Isotope separation is a step in the isotopic enrichment process.
isotopic enrichment	A process by which the relative abundances of the isotopes of a given element are altered, thus producing a form of the element that has been enriched in one particular isotope and depleted in its other isotopic forms.

kilo-	A prefix that multiplies a basic unit by 1000. Example: 1 kilometer • 1000 meters.
kilovolt (kV)	The unit of electrical potential equal to 1000 volts.
LD 50/30	The acute dose of radiation expected to cause death within 30 days to 50 percent of those exposed without medical intervention. Generally accepted to range from 400 to 450 rem for humans when received over a short period of time.
low population zone (LPZ)	An area of low population density often required around a nuclear installation. The number and density of residents is of concern in emergency planning so that certain protective measures (such as notification and instructions to residents) can be accomplished in a timely manner.
lung counter	An instrument system used to identify and measure radioactivity in the lungs of human begins; it uses heavy shielding to keep background radiation interference low and ultra sensitive radiation detectors and electronic counting equipment.
mass-energy equation	The equation developed by Albert Einstein which is usually given as $E = mc^2$, showing that, the energy of a body, E (no matter what form the energy takes), varies with the product of the mass, m, of the body and a factor, c^2. The factor c^2, the square of the speed of light in a vacuum, may be regarded as the conversion factor relating units of mass and energy. The equation predicted the possibility of releasing enormous amounts of energy by the conversion of mass to energy. It is also called the Einstein equation.
mass number	The number of nucleons (neutrons and protons) in the nucleus of an atom. Also known as the atomic weight of an atom.
mega- (M)	A prefix that multiplies a basic unit by 1,000,000.
megacurie (MCi)	One million curies. (See curie.)
micro-	A prefix that divides a basic unit into one million parts.
microcurie (uCi)	A one-millionth part of a curie. (See curie.)
microsecond (us)	A one-millionth part of a second.
mill tailings	Naturally radioactive residue from the processing of uranium ore into yellowcake in a mill. Although the milling process recovers about 93 percent of the uranium, the residues, or tailings, contain several radioactive elements, including uranium, thorium, radium, polonium and radon.

3288

milli- (m)	A prefix that divides a basic unit by 1000.
millirem (mrem)	A one-thousandth part of a rem. (See rem.)
milliroentgen (mR)	A one-thousandth part of a roentgen. (See roentgen.)
molecule	A group of atoms held together by valence (electron) forces. A molecule is the smallest unit of a compound that can exist by itself and retain all its chemical properties.
monitoring	Periodic or continuous determination of the amount of ionizing radiation or radioactive contamination present in an occupied region, as a safety measure, for purposes of health protection or contamination control. (See radiological survey.)
nano- (n)	A prefix that divides a basic unit by one billion.
nanocurie (nCi)	One billionth part of a curie.
natural radiation	See background radiation.
natural uranium	Uranium as found in nature. It contains 0.7 percent uranium-235, 99.3 percent uranium-238 and a trace of uranium-234.
neutron	An uncharged elementary particle with a mass slightly greater than that of the proton, and found in the nucleus of every atom heavier than hydrogen and in two isotopes of hydrogen.
neutron capture	The process in which an atomic nucleus absorbs a neutron.
neutron chain reaction	A process in which some of the neutrons released in one fission event cause other fissions to occur. There are three types of chain reactions: (1) Nonsustaining chain reaction - An average of less than one fission is produced by the neutrons released by each previous fission (reactor subcriticality.) (2) Sustaining chain reaction - An average of exactly one fission is produced by the neutrons released by each previous fission (reactor criticality.) (3) Multiplying chain reaction - An average of more than one fission is produced by the neutrons released by previous fission (reactor supercriticality.)
noble gas	A gaseous chemical element that does not readily enter into chemical combination with other elements. An inert gas. (See fission gases.)

285

281

nuclear disintegration	See decay, radioactive.
nuclear energy	The energy liberated by a nuclear reaction (fission or fusion) or by radioactive decay.
nuclear fission	See fission.
nuclear force	A powerful short-ranged attractive force that holds together the particles inside an atomic nucleus.
nuclear radiation	See radiation, nuclear.
nuclear reaction	The process of inducing a disintegration of the nucleus of an atom.
nucleon	Common name for a constituent particle of the atomic nucleus. At present, applied to protons and neutrons but may include any other particles found to exist in the nucleus.
nucleus (or atomic nucleus); nuclei (plural)	The small, central, positively charged region of an atom that carries essentially all the mass. Except for the nucleus of ordinary (light) hydrogen, which has a single proton, all atomic nuclei contain both protons and neutrons. The number of protons determines the total positive charge, or atomic number; this is the same for all the atomic nuclei of a given chemical element. The total number of neutrons and protons is called the mass number. (See isotope.)
nuclide	A general term referring to all known isotopes, both stable (279) and unstable (about 5000), of the chemical elements.
occasional radiation worker	An individual who does not routinely work with or in the proximity of radiation generating devices or radioactive materials but whose duties may occasionally bring him/her into areas where radiation exposure may occur.
parent	A radionuclide that upon radioactive decay or disintegration yields a specific nuclide (the daughter).
parts per million (ppm)	Parts (molecules) of a substance contained in a million parts of air (or water) by volume.

periodic table	An arrangement of chemical elements in order of increasing atomic number. Elements of similar properties are placed one under the other, yielding groups or families of elements. Within each group, there is a variation of chemical and physical properties, but in general there is a similarity of chemical behavior within each group.
personnel monitoring	The determination of the degree of radioactive contamination on individuals using survey meters, or the determination of radiation exposure received by means of dosimetry devices.
photon	A quantum (or packet) of energy emitted in the form of electromagnetic radiation. Gamma rays and X rays are examples of photons.
pico- (p)	A prefix that divides a basic unit by one trillion.
picocurie (pCi)	One trillionth part of a curie.
pig	A container (usually lead) used to ship or store radioactive materials. The thick walls protect the person handling the container from radiation. Large containers are commonly called casks.
plutonium (Pu)	A heavy, radioactive, manmade metallic element with atomic number 94. Its most important isotope is fissile plutonium-239, which is produced by neutron irradiation of uranium-238.
pocket dosimeter	A small ionization detection instrument that indicates radiation exposure directly or indirectly. An auxiliary charging device is usually necessary.
positron	Particle equal in mass, but opposite in charge, to the electron; a positive electron.
proportional counter	An instrument in which an electronic detection system receives pulses that are proportional to the number of ions formed in a gas-filled chamber by ionizing radiation.
protection factor	The degree of protection provided by the proper fit and use of respiratory protective equipment.
proton	An elementary nuclear particle with a positive electric charge located in the nucleus of an atom. (See atomic number.)

quality factor	The principal factor by which the absorbed dose is to be multiplied to obtain a quantity that expresses, on a common scale for all ionizing radiations, the biological damage to exposed persons. It is used because some types of radiation, such as alpha particles, are more biologically damaging than other types.
rad	Acronym for radiation absorbed dose. The basic unit of absorbed dose of radiation. A dose of one rad means the absorption of 100 ergs (a small but measurable amount of energy) per gram of absorbing material.
radiac	An acronym derived from "radioactivity detection indication and computation," a generic term applying to radiological instruments or equipment.
radiation area	Any area, accessible to personnel, in which the level of radiation is such that a major portion of an individual's body could receive in any one hour a dose in excess of 5 millirem, or in any five consecutive days a dose in excess of 100 millirem.
radiation detection instrument	A device that detects and registers the characteristics of ionizing radiation. (See counter.)
radiation monitoring	See monitoring.
radiation, nuclear	Particles (alpha, beta, neutrons) or photons (gamma) emitted from the nucleus of an unstable (radioactive) atom as a result of radioactive decay.
radiation shielding	Reduction of radiation field by interposing a shield of absorbing material between any radiation source and a person's work area or radiation-sensitive device.
radiation source	Usually a man-made sealed source of radioactive material used in teletherapy, radiography, as a power source for batteries, or in various types of industrial gauges. Machines such as accelerators, X-ray units and radioisotope generators and natural radionuclides may be considered sources.
radiation standards	Exposure standards, radioactivity concentration guide, rules for safe handling, regulations for transportation, regulations for industrial control of radiation and control of radioactive material by legislative means.
radiation syndrome	See radiation sickness (syndrome).
radiation warning symbol	An officially prescribed symbol (a magenta trefoil) on a yellow background that must be displayed where certain quantities of radioactive materials are

	present or where certain doses of radiation could be received. Its uses are prescribed by law.
radioactive	Exhibiting radioactivity or pertaining to radioactivity.
radioactive contamination	Deposition of radioactive material in any place where it is not contained or wanted.
radioactive isotope	A radioisotope.
radioactive series	A succession of nuclides, each of which tranforms by radioactive disintegration into the next until a stable nuclide results. The first member is called the parent, the intermediate members are called daughters, and the final stable member is called the end product.
radioactive waste	See waste, radioactive.
radioactivity	The spontaneous emission of radiation, generally alpha or beta particles, often accompanied by gamma rays, from the nucleus of an unstable isotope.
radiobiology	The study of the effects of ionizing radiations upon living tissue or organisms.
radiography	The making of shadow images on photographic film by the action of ionizing radiation.
radioisotope	An unstable isotope of an element that decays or disintegrates spontaneously, emitting radiation. Approximately 5000 natural and artificial radioisotopes have been identified.
radiological survey	The evaluation of the radiation hazards accompanying the production, use, or existence of radioactive materials under a specific set of conditions. Such evaluation customarily includes a physical survey of the disposition of materials and equipment, measurements or estimates of the levels of radiation that my be involved, and a sufficient knowledge or processes affecting these materials to predict hazards resulting from expected or possible changes in materials or equipment.
radiology	That branch of medicine dealing with the diagnostic and therapeutic applications of radiant energy, including X rays and radioisotopes.
radionuclide	A radioisotope.
radiosensitivity	The relative susceptability of cells, tissues, organs, organisms, or other substances to the injurious action of ionizing radiation.

radium (Ra)	A radioactive metallic element with atomic number 88. As found in nature, the most common isotope has a mass number of 226. It occurs in minute quantities associated with uranium in pitchblend, carnotite and other minerals.
radon (Rn)	A radioactive element that is one of the heaviest gases known. Its atomic number is 86, and its mass number is 222. It is a daughter of radium.
reaction	Any process involving a chemical or nuclear change.
recycling	The reuse of fissionable material after it has been recovered by chemical processing from spent or depleted reactor fuel, re-enriched and refabricated into new fuel elements.
rem	Acronym of roentgen equivalent man. The unit of dose of any ionizing radiation that produces the same biological effect as a unit of absorbed dose of ordinary X rays. (See quality factor.)
restricted area	Any area to which access is controlled for the protection of individuals from exposure to radiation and radioactive materials.
roentgen (R)	A unit of exposure to ionizing radiation. It is that amount of gamma or X rays required to produce ions carrying 1 electrostatic unit of electrical charge in 1 cubic centimeter of dry air under standard conditions. Named after Wilhelm Roentgen, a German scientist who discovered X rays in 1895.
roentgen equivalent man (or mammal)	See rem.
scattered radiation	Radiation that, during its interaction with a substance, has been changed in direction. It may also have been modified by a decrease in energy. It is one form of secondary radiation.
scintillation detector or counter	The combination of phosphor, photomultiplier tube, and associated electronic circuits for counting light emissions produced in the phosphor by ionizing radiation. (See counter.)
secondary radiation	Radiation originating as the result of absorption of other radiation in matter. It may be either electromagnetic or particulate in nature.
shielding	Any material or obstruction that absorbs radiation and thus tends to protect personnel or material from the effects of ionizing radiation.
sievert (Sv)	A unit, in the International system of Units (SI), of dose equivalent. 1 Sv = 100 rem

soluble	Readily dissolved in body fluids.
somatic effects of radiation	Effects of radiation limited to the exposed individual, as distinguished from genetic effects, which may also affect subsequent unexposed generations.
special nuclear material	Includes plutonium, uranium-233, or uranium enriched in the isotopes uranium-233 or uranium-235.
spent (depleted) fuel	Nuclear reactor fuel that has been used to the extent that it can no longer effectively sustain a chain reaction.
source material	Any physical or chemical form of uranium or thorium or ores which contain by weight 0.05% or more of uranium or thorium.
stable isotope	An isotope that does not undergo radioactive decay.
stay time	The period during which personnel may remain in a restricted area before accumulating some permissible exposure.
subcritical mass	An amount of fissionable material insufficient in quantity or of improper geometry to sustain a fission chain reaction.
survey	A study to (1) find the radiation or contamination level of specific objects or locations within an area of interest; (2) locate regions of higher-than-average intensity; i.e., hot spots. (See personnel monitoring.)
survey meter	Any portable radiation detection instrument especially adapted to establish the existence and amount of ionizing radiation present. (See counter.)
tailings, tails	See mill tailings.
tenth thickness	The thickness of a given material that will decrease the amount (or dose) of radiation to one-tenth of the amount incident upon it. Two-tenth thicknesses will reduce the dose received by a factor of 10 x 10; i.e., 100, and so on. (See shielding.)
terrestrial radiation	The portion of natural radiation (background that is emitted by naturally occurring radioactive materials in the earth.
thermalization	The process undergone by high-energy (fast) neutrons as they lose energy by collision. (See neutron, thermal.)
toxicology	Is the study of the adverse effects of chemicals on living organisms.

tritium (^3H)	A radioactive isotope of hydrogen (one proton, two neutrons). Because it is chemically identical to natural hydrogen, tritium can easily be taken into the body by any inhalation, ingestion or absorption path. Decays by beta emission. Its radioactive half-life is about 12 1/2 years.
ultraviolet	Electromagnetic radiation of a wavelength between the shortest visible violet and low-energy X rays.
unrestricted area	The area outside the owner-controlled portion of a nuclear facility (usually the site boundary).
unstable isotope	A radioisotope.
uranium (U)	A radioactive element with the atomic number 92, and as found in natural ores, has an atomic weight of approximately 238. The two principal natural isotopes are uranium-235 (0.7 percent of natural uranium), which is fissile, and uranium-238 (99.3 percent of natural uranium), which is fissionable by fast neutrons and is fertile. Natural uranium also includes a minute amount of uranium-234.
uranium enrichment	See isotopic enrichment.
uranium millings (tails)	See mill tailings.
vapor	The gaseous form of substances that are normally in liquid or solid form.
waste, radioactive	Solid, liquid and gaseous materials from nuclear operations that are radioactive or become radioactive and for which there is no further use. Wastes are generally classified as high level (having radioactivity concentrations of hundreds of thousands of curies per gallon or cubic foot), low level (in the range of less than 1 microcurie per gallon or cubic foot), or intermediate level (between these extremes).
whole-body counter	A device used to identify and measure the radiation in the body (body burden) of human beings and animals; it uses heavy shielding to minimize the interference of background radiation on ultrasensitive radiation detectors and electronic counting equipment.
whole-body exposure	An exposure of the body to radiation, in which the entire body, rather than an isolated part, is irradiated. Where a radioisotope is uniformly distributed throughout the body tissues, rather than being concentrated in certain parts, the irradiation can be considered as a whole-body exposure.
wipe sample (swipe or smear)	A sample made for the purpose of determining the presence of removable radioactive contamination on a

surface. It is done by wiping, with slight pressure, a piece of soft filter paper over a representative type of surface area. It is also known as a "swipe sample." May also be called "smears" at some facilities.

X rays — Penetrating electromagnetic radiation (photon) having a wavelength that is much shorter than that of visible light. These rays are usually produced by excitation of the electron field around certain nuclei. In nuclear reactions, it is customary to refer to photons originating in the nucleus as gamma rays, and to those originating in the electron field of the atom as X rays. These rays are sometimes called roentgen rays after their discoverer, W. K. Roentgen.

yellowcake — A product of the uranium milling process, yellowcake is a solid uranium compound that takes its name from the color and texture. Yellowcake is the initial feed material to the fuel cycle.

APPENDIX B

Derived Air Concentrations (DAC)

for

Controlling Radiation Exposure to Workers at DOE Facilities

(From DOE Order 5480.11, Radiation Protection for Occupational Workers, (12/21/88), U.S. Department of Energy.)

DOE 5480.11

DERIVED AIR CONCENTRATIONS FOR CONTROLLING RADIATION EXPOSURE TO WORKERS AT DOE FACILITIES

The derived air concentrations (DAC) for limiting radiation exposures through inhalation of radionuclides by workers are listed in Table 1, Page B-3. The values are based on either a stochastic (committed effective dose equivalent) dose limit of 5 rem (0.05 Sv) or a nonstochastic (organ) dose limit of 50 rem (0.5 Sv) per year, whichever is more limiting. (Note: the 15 rem [0.15 Sv] dose limit for the lens of the eye does not appear as a critical organ dose limit.)

Table 1 contains five columns of information: (1) radionuclide; (2) inhaled air DAC for lung retention class D (uCi/mL); (3) inhaled air DAC for lung retention class W (uCi/mL); (4) inhaled air DAC for lung retention class Y (uC/mL); and (5) an indication of whether or not the DAC for each class is controlled by the stochastic (effective dose equivalent) or nonstochastic (tissue) dose. The classes D, W, and Y have been established by the International Commission on Radiological Protection (ICRP) to describe the clearance of inhaled radionuclides from the lung. This classification refers to the approximate length of retention in the pulmonary region. Thus, the range of half-times is less than 10 days for class D (days), from 10 to 100 days for class W (weeks), and greater than 100 days for class Y (years). The DACs in Table 1 are listed by radionuclide, in order of increasing atomic mass, and are based on the assumption that the particle size distribution of the inhaled material is unknown. For this situation, the ICRP recommends that an assumed particle size distribution of
1 um be used. For situations where the particle size distribution is known to differ significantly from 1 um, appropriate corrections (as described in the DOE report Internal Dose Conversion Factors for Calculation of Dose to the Public)[1/] can be made to both the estimated dose to workers and the DACs.

The following assumptions and procedures were used in calculating these DAC values for inhalation by workers:

(1) The worker is assumed to inhale 2,400 m^3 of air during a 2000-hour work year, as defined by the ICRP in its Publication No. 23.[2/]

(2) The internal dose factors used in calculating the DAC values were taken from the report Internal Dose Conversion Factors for Calculation of Dose to the Public.[1/] These factors are based on the metabolic data and dosimetry models recommended by the ICRP in its Publication No. 30.[3/]

1/ U.S. Department of Energy (DOE). 1988. Internal Dose Conversion Factors for Calculation of Dose to the Public. Washington, D.C.

2/ International Commission on Radiological Protection (ICRP). 1975. ICRP Publication 23: Report of the Task Group on Reference Man. Pergamon Press, New York, New York.

3/ International Commission on Radiological Protection (ICRP). 1979-1982. ICRP Publication 30: Limits for Intakes of Radionuclides by Workers. Parts 1 to 3 and Supplements 2(3/4) through 8(4), Pergamon Press, New York, New York.

oes

DOE 5480.11

3288

The DAC values are given for individual radionuclides. For known mixtures of radionuclides, the sum of the ratio of the observed concentration of a particular radionuclide and its corresponding DAC for all radionuclides in the mixture must not exceed 1.0.

Table 1

Derived Air Concentrations (DAC) for Controlling Radiation Exposures to Workers at DOE Facilities

Radionuclide	Inhaled Air - Lung Retention Class D (µCi/mL)	W (µCi/mL)	Y (µCi/mL)	Stochastic or Organ1/ (D / W / Y)
H-3 (Water)2/	2.E-05	2.E-05	2.E-05	St/St/St
H-3 (Elemental)2/	5.E-01	5.E-01	5.E-01	St/St/St
Be-7	-3/	9.E-06	8.E-06	/St/St
Be-10	-	6.E-08	6.E-09	/St/St
C-11 (Org)2/	2.E-04	2.E-04	2.E-04	St/St/St
C-11 (CO)2/	5.E-04	5.E-04	5.E-04	St/St/St
C-11 (CO_2)2/	3.E-04	3.E-04	3.E-04	St/St/St
C-14 (Org)2/	1.E-06	1.E-06	1.E-06	St/St/St
C-14 (CO)2/	7.E-04	7.E-04	7.E-04	St/St/St
C-14 (CO_2)2/	9.E-05	9.E-05	9.E-05	St/St/St
F-18	3.E-05	4.E-05	3.E-05	St/St/St
Na-22	3.E-07	-	-	St/ /
Na-24	2.E-06	-	-	St/ /
Mg-28	7.E-07	5.E-07	-	St/St/
Al-26	3.E-08	3.E-08	-	St/St/
Si-31	1.E-05	1.E-05	1.E-05	St/St/St
Si-32	1.E-07	5.E-08	2.E-09	St/St/St
P-32	4.E-07	2.E-07	-	St/St/
P-33	3.E-06	1.E-06	-	St/St/
S-35	7.E-06	9.E-07	-	St/St/
S-35 (Gas)	-	6.E-06	-	/St/
Cl-36	1.E-06	1.E-07	-	St/St/
Cl-38	2.E-05	2.E-05	-	St/St/
Cl-39	2.E-05	2.E-05	-	St/St/
K-40	2.E-07	-	-	St/ /
K-42	2.E-06	-	-	St/ /
K-43	4.E-06	-	-	St/ /
K-44	3.E-05	-	-	St/ /
K-45	5.E-05	-	-	St/ /

ses

Radionuclide	Inhaled Air - Lung Retention Class D (µCi/mL)	W (µCi/mL)	Y (µCi/mL)	Stochastic or Organ1/ (D / W / Y)
Ca-41	-	2.E-06	-	/E /
Ca-45	-	3.E-07	-	/St/
Ca-47	-	4.E-07	-	/St/
Sc-43	-	-	1.E-05	/ /St
Sc-44m	-	-	3.E-07	/ /St
Sc-44	-	-	5.E-06	/ /St
Sc-46	-	-	1.E-07	/ /St
Sc-47	-	-	1.E-06	/ /St
Sc-48	-	-	6.E-07	/ /St
Sc-49	-	-	2.E-05	/ /St
Ti-44	5.E-09	1.E-08	2.E-09	St/St/St
Ti-45	1.E-05	1.E-05	1.E-05	St/St/St
V-47	4.E-05	4.E-05	-	St/St/
V-48	4.E-07	3.E-07	-	St/St/
V-49	1.E-05	7.E-06	-	BS/St/
Cr-48	5.E-06	3.E-06	3.E-06	St/St/St
Cr-49	3.E-05	4.E-05	4.E-05	St/St/St
Cr-51	2.E-05	1.E-05	8.E-06	St/St/St
Mn-51	2.E-05	2.E-05	-	St/St/
Mn-52m	4.E-05	4.E-05	-	St/St/
Mn-52	5.E-07	4.E-07	-	St/St/
Mn-53	5.E-06	5.E-06	-	BS/St/
Mn-54	4.E-07	3.E-07	-	St/St/
Mn-56	6.E-06	9.E-06	-	St/St/
Fe-52	1.E-06	1.E-06	-	St/St/
Fe-55	8.E-07	2.E-06	-	St/St/
Fe-59	1.E-07	2.E-07	-	St/St/
Fe-60	3.E-09	8.E-09	-	St/St/
Co-55	-	1.E-06	1.E-06	/St/St
Co-56	-	1.E-07	8.E-08	/St/St
Co-57	-	1.E-06	3.E-07	/St/St
Co-58m	-	4.E-05	3.E-05	/St/St
Co-58	-	5.E-07	3.E-07	/St/St
Co-60m	-	2.E-03	1.E-03	/St/St
Co-60	-	7.E-08	1.E-08	/St/St
Co-61	-	3.E-05	2.E-05	/St/St
Co-62m	-	7.E-05	7.E-05	/St/St

Radionuclide	Inhaled Air - Lung Retention Class D (µCi/mL)	W (µCi/mL)	Y (µCi/mL)	Stochastic or Organ1/ (D / W / Y)
Ni-56 (Inorg)	8.E-07	5.E-07	-	St/St/
Ni-56 (Vapor)	-	5.E-07	-	/St/
Ni-57 (Inorg)	2.E-06	1.E-06	-	St/St/
Ni-57 (Vapor)	-	3.E-06	-	/St/
Ni-59 (Inorg)	2.E-06	3.E-06	-	St/St/
Ni-59 (Vapor)	-	8.E-07	-	/St/
Ni-63 (Inorg)	7.E-07	1.E-06	-	St/St/
Ni-63 (Vapor)	-	3.E-07	-	/St/
Ni-65 (Inorg)	1.E-05	1.E-05	-	St/St/
Ni-65 (Vapor)	-	7.E-06	-	/St/
Ni-66 (Inorg)	7.E-07	3.E-07	-	St/St/
Ni-66 (Vapor)	-	1.E-06	-	/St/
Cu-60	4.E-05	5.E-05	4.E-05	St/St/St
Cu-61	1.E-05	2.E-05	1.E-05	St/St/St
Cu-64	1.E-05	1.E-05	9.E-06	St/St/St
Cu-67	3.E-06	2.E-06	2.E-06	St/St/St
Zn-62	-	-	1.E-06	/ /St
Zn-63	-	-	3.E-05	/ /St
Zn-65	-	-	1.E-07	/ /St
Zn-69m	-	-	3.E-06	/ /St
Zn-69	-	-	6.E-05	/ /St
Zn-71m	-	-	7.E-06	/ /St
Zn-72	-	-	5.E-07	/ /St
Ga-65	7.E-05	8.E-05	-	St/St/
Ga-66	1.E-06	-	1.E-06	St/ /St
Ga-67	6.E-06	4.E-06	-	St/St/
Ga-68	2.E-05	2.E-05	-	St/St/
Ga-70	7.E-05	8.E-05	-	St/St/
Ga-72	2.E-06	1.E-06	-	St/St/
Ga-73	6.E-06	6.E-06	-	St/St/
Ge-66	1.E-05	8.E-06	-	St/St/
Ge-67	4.E-05	4.E-05	-	St/St/
Ge-68	2.E-06	4.E-08	-	St/St/
Ge-69	6.E-06	3.E-06	-	St/St/
Ge-71	2.E-04	2.E-05	-	St/St/
Ge-75	3.E-05	3.E-05	-	St/St/
Ge-77	4.E-06	2.E-06	-	St/St/
Ge-78	9.E-06	9.E-06	-	St/St/
As-69	-	5.E-05	-	/St/

DOE 5480.11

3288

Radionuclide	Inhaled Air - Lung Retention Class D (µCi/mL)	W (µCi/mL)	Y (µCi/mL)	Stochastic or Organ1/ (D / W / Y)
As-70	-	2.E-05	-	/St/
As-71	-	2.E-06	-	/St/
As-72	-	6.E-07	-	/St/
As-73	-	7.E-07	-	/St/
As-74	-	3.E-07	-	/St/
As-76	-	6.E-07	-	/St/
As-77	-	2.E-06	-	/St/
As-78	-	9.E-06	-	/St/
Se-70	1.E-05	2.E-05	-	St/St/
Se-73m	6.E-05	6.E-05	-	St/St/
Se-73	6.E-06	7.E-06	-	St/St/
Se-75	3.E-07	3.E-07	-	St/St/
Se-79	3.E-07	2.E-07	-	St/St/
Se-81m	3.E-05	3.E-05	-	St/St/
Se-81	9.E-05	1.E-04	-	St/St/
Se-83	5.E-05	5.E-05	-	St/St/
Br-74m	1.E-05	2.E-05	-	St/St/
Br-74	3.E-05	3.E-05	-	St/St/
Br-75	2.E-05	2.E-05	-	St/St/
Br-76	2.E-06	2.E-06	-	St/St/
Br-77	1.E-05	8.E-06	-	St/St/
Br-80m	7.E-06	6.E-06	-	St/St/
Br-80	8.E-05	9.E-05	-	St/St/
Br-82	2.E-06	2.E-06	-	St/St/
Br-83	3.E-05	3.E-05	-	St/St/
Br-84	2.E-05	3.E-05	-	St/St/
Rb-79	5.E-05	-	-	St/ /
Rb-81m	1.E-04	-	-	St/ /
Rb-81	2.E-05	-	-	St/ /
Rb-82m	7.E-06	-	-	St/ /
Rb-83	4.E-07	-	-	St/ /
Rb-84	3.E-07	-	-	St/ /
Rb-86	3.E-07	-	-	St/ /
Rb-87	6.E-07	-	-	St/ /
Rb-88	3.E-05	-	-	St/ /
Rb-89	6.E-05	-	-	St/ /
Sr-80	9.E-04	-	1.E-03	St/ /St
Sr-81	3.E-05	-	3.E-05	St/ /St
Sr-83	3.E-06	-	2.E-06	St/ /St
Sr-85m	3.E-04	-	3.E-04	St/ /St

296

Radionuclide	Inhaled Air - Lung Retention Class D (μCi/mL)	W (μCi/mL)	Y (μCi/mL)	Stochastic or Organ1/ (D / W / Y)
Sr-85	1.E-06	-	7.E-07	St/ /St
Sr-87m	5.E-05	-	6.E-05	St/ /St
Sr-89	3.E-07	-	6.E-08	St/ /St
Sr-90	8.E-09	-	2.E-09	BS/ /St
Sr-91	2.E-06	-	1.E-06	St/ /St
Sr-92	4.E-06	-	3.E-06	St/ /St
Y-86m	-	2.E-05	2.E-05	/St/St
Y-86	-	1.E-06	1.E-06	/St/St
Y-87	-	1.E-06	1.E-06	/St/St
Y-88	-	1.E-07	1.E-07	/St/St
Y-90m	-	5.E-06	5.E-06	/St/St
Y-90	-	3.E-07	3.E-07	/St/St
Y-91m	-	1.E-04	7.E-05	/St/St
Y-91	-	7.E-08	5.E-06	/St/St
Y-92	-	3.E-06	3.E-06	/St/St
Y-93	-	1.E-06	1.E-06	/St/St
Y-94	-	3.E-05	3.E-05	/St/St
Y-95	-	6.E-05	6.E-05	/St/St
Zr-86	2.E-06	1.E-06	1.E-06	St/St/St
Zr-88	9.E-08	2.E-07	1.E-07	St/St/St
Zr-89	2.E-06	1.E-06	1.E-06	St/St/St
Zr-93	3.E-09	1.E-08	2.E-08	BS/BS/BS
Zr-95	6.E-08	2.E-07	1.E-07	BS/St/St
Zr-97	8.E-07	6.E-07	5.E-07	St/St/St
Nb-88	-	1.E-04	9.E-05	/St/St
Nb-89 (66 min)	-	2.E-05	2.E-05	/St/St
Nb-89 (122 min)	-	8.E-06	7.E-06	/St/St
Nb-90	-	1.E-06	1.E-06	/St/St
Nb-93m	-	5.E-07	7.E-08	/St/St
Nb-94	-	8.E-08	6.E-09	/St/St
Nb-95m	-	1.E-06	9.E-07	/St/St
Nb-95	-	5.E-07	5.E-07	/St/St
Nb-96	-	1.E-06	1.E-06	/St/St
Nb-97	-	3.E-05	3.E-05	/St/St
Nb-98	-	2.E-05	2.E-05	/St/St
Mo-90	3.E-06	-	2.E-06	St/ /St
Mo-93m	7.E-06	-	6.E-06	St/ /St
Mo-93	2.E-06	-	7.E-08	St/ /St
Mo-99	1.E-06	-	6.E-07	St/ /St
Mo-101	6.E-05	-	6.E-05	St/ /St

Radionuclide	Inhaled Air - Lung Retention Class D (μCi/mL)	W (μCi/mL)	Y (μCi/mL)	Stochastic or Organ1/ (D / W / Y)
Tc-93m	7.E-05	1.E-04	-	St/St/
Tc-93	3.E-05	4.E-05	-	St/St/
Tc-94m	2.E-05	2.E-05	-	St/St/
Tc-94	8.E-06	1.E-05	-	St/St/
Tc-96m	1.E-04	1.E-04	-	St/St/
Tc-96	1.E-06	9.E-07	-	St/St/
Tc-97m	3.E-06	5.E-07	-	St/St/
Tc-97	2.E-05	2.E-06	-	SW/St/
Tc-98	7.E-07	1.E-07	-	St/St/
Tc-99m	6.E-05	1.E-04	-	St/St/
Tc-99	2.E-06	3.E-07	-	St/St/
Tc-101	1.E-04	2.E-04	-	SW/St/
Tc-104	3.E-05	4.E-05	-	St/St/
Ru-94	2.E-05	3.E-05	2.E-05	St/St/St
Ru-97	8.E-06	5.E-06	5.E-06	St/St/St
Ru-103	7.E-07	4.E-07	3.E-07	St/St/St
Ru-105	6.E-06	6.E-06	5.E-06	St/St/St
Ru-106	4.E-08	2.E-08	5.E-09	St/St/St
Rh-99m	2.E-05	3.E-05	3.E-05	St/St/St
Rh-99	1.E-06	9.E-07	8.E-07	St/St/St
Rh-100	2.E-06	2.E-06	2.E-06	St/St/St
Rh-101m	5.E-06	3.E-06	3.E-06	St/St/St
Rh-101	2.E-07	3.E-07	7.E-08	St/St/St
Rh-102m	2.E-07	2.E-07	5.E-08	St/St/St
Rh-102	4.E-08	7.E-08	2.E-08	St/St/St
Rh-103m	4.E-04	5.E-04	5.E-04	St/St/St
Rh-105	5.E-06	3.E-06	2.E-06	St/St/St
Rh-106m	1.E-05	1.E-05	1.E-05	St/St/St
Rh-107	1.E-04	1.E-04	1.E-04	St/St/St
Pd-100	6.E-07	5.E-07	6.E-07	St/St/St
Pd-101	1.E-05	1.E-05	1.E-05	St/St/St
Pd-103	3.E-06	2.E-06	1.E-06	St/St/St
Pd-107	9.E-06	3.E-06	2.E-07	K /St/St
Pd-109	3.E-06	2.E-06	2.E-06	St/St/St
Ag-102	8.E-05	9.E-05	8.E-05	St/St/St
Ag-103	4.E-05	6.E-05	5.E-05	St/St/St
Ag-104m	4.E-05	5.E-05	5.E-05	St/St/St
Ag-104	3.E-05	6.E-05	6.E-05	St/St/St
Ag-105	4.E-07	7.E-07	7.E-07	St/St/St

Radionuclide	Inhaled Air - Lung Retention Class D (µCi/mL)	W (µCi/mL)	Y (µCi/mL)	Stochastic or Organ1/ (D / W / Y)
Ag-106m	3.E-07	4.E-07	4.E-07	St/St/St
Ag-106	7.E-05	9.E-05	8.E-05	St/St/St
Ag-108m	8.E-08	1.E-07	1.E-06	St/St/St
Ag-110m	6.E-08	8.E-08	4.E-08	St/St/St
Ag-111	7.E-07	4.E-07	4.E-07	L /St/St
Ag-112	3.E-06	4.E-06	4.E-06	St/St/St
Ag-115	4.E-05	4.E-05	3.E-05	St/St/St
Cd-104	3.E-05	5.E-05	5.E-05	St/St/St
Cd-107	2.E-05	2.E-05	2.E-05	St/St/St
Cd-109	1.E-08	5.E-08	5.E-08	K /K /St
Cd-113m	1.E-09	4.E-09	5.E-09	K /K /St
Cd-113	9.E-10	3.E-09	6.E-09	K /K /St
Cd-115m	2.E-08	5.E-08	6.E-08	K /St/St
Cd-115	6.E-07	5.E-07	6.E-07	St/St/St
Cd-117m	5.E-06	7.E-06	6.E-06	St/St/St
Cd-117	5.E-06	7.E-06	6.E-06	St/St/St
In-109	2.E-05	3.E-05	-	St/St/
In-110 (69 min)	2.E-05	2.E-05	-	St/St/
In-110 (5 h)	7.E-06	8.E-06	-	St/St/
In-111	3.E-06	3.E-06	-	St/St/
In-112	3.E-04	3.E-04	-	St/St/
In-113m	6.E-05	8.E-05	-	St/St/
In-114m	3.E-08	4.E-08	-	St/St/
In-115m	2.E-05	2.E-05	-	St/St/
In-115	6.E-10	2.E-09	-	St/St/
In-116m	3.E-05	5.E-05	-	St/St/
In-117m	1.E-05	2.E-05	-	St/St/
In-117	7.E-05	9.E-05	-	St/St/
In-119m	5.E-05	6.E-05	-	St/St/
Sn-110	5.E-06	5.E-06	-	St/St/
Sn-111	9.E-05	1.E-04	-	St/St/
Sn-113	5.E-07	2.E-07	-	St/St/
Sn-117m	5.E-07	6.E-07	-	BS/St/
Sn-119m	1.E-06	4.E-07	-	St/St/
Sn-121m	4.E-07	2.E-07	-	St/St/
Sn-121	6.E-06	5.E-06	-	St/St/
Sn-123m	5.E-05	6.E-05	-	St/St/
Sn-123	3.E-07	7.E-08	-	St/St/
Sn-125	4.E-07	2.E-07	-	St/St/
Sn-126	2.E-08	3.E-08	-	St/St/
Sn-127	8.E-06	8.E-06	-	St/St/

Radionuclide	Inhaled Air - Lung Retention Class D (µCi/mL)	W (µCi/mL)	Y (µCi/mL)	Stochastic or Organ1/ (D / W / Y)
Sn-128	1.E-05	1.E-05	-	St/St/
Sb-115	1.E-04	1.E-04	-	St/St/
Sb-116m	3.E-05	6.E-05	-	St/St/
Sb-116	1.E-04	1.E-04	-	St/St/
Sb-117	9.E-05	1.E-04	-	St/St/
Sb-118m	8.E-06	9.E-06	-	St/St/
Sb-119	2.E-05	1.E-05	-	St/St/
Sb-120 (16 min)	2.E-04	2.E-04	-	St/St/
Sb-120 (6 d)	9.E-07	6.E-07	-	St/St/
Sb-122	1.E-06	4.E-07	-	St/St/
Sb-124m	3.E-04	3.E-04	-	St/St/
Sb-124	4.E-07	1.E-07	-	St/St/
Sb-125	1.E-06	2.E-07	-	St/St/
Sb-126m	8.E-05	8.E-05	-	St/St/
Sb-126	4.E-07	2.E-07	-	St/St/
Sb-127	9.E-07	4.E-07	-	St/St/
Sb-128 (9 h)	2.E-06	1.E-06	-	St/St/
Sb-128 (10 min)	2.E-04	2.E-04	-	St/St/
Sb-129	4.E-06	4.E-06	-	St/St/
Sb-130	3.E-05	3.E-05	-	St/St/
Sb-131	1.E-05	1.E-05	-	T /T /
Te-116	9.E-06	1.E-05	-	St/St/
Te-121m	8.E-08	2.E-07	-	BS/St/
Te-121	2.E-06	1.E-06	-	St/St/
Te-123m	9.E-08	2.E-07	-	BS/St/
Te-123	8.E-08	2.E-07	-	BS/BS/
Te-125m	2.E-07	3.E-07	-	BS/St/
Te-127m	1.E-07	1.E-07	-	BS/St/
Te-127	9.E-06	7.E-06	-	St/St/
Te-129m	3.E-07	1.E-07	-	St/St/
Te-129	3.E-05	3.E-05	-	St/St/
Te-131m	2.E-07	2.E-07	-	T /T /
Te-131	2.E-06	2.E-06	-	T /T /
Te-132	9.E-08	9.E-08	-	T /T /
Te-133m	2.E-06	2.E-06	-	T /T /
Te-133	9.E-06	9.E-06	-	T /T /
Te-134	1.E-05	1.E-05	-	T /T /
I-120m	9.E-06	-	-	St/ /
I-120	4.E-06	-	-	T / /
I-121	7.E-06	-	-	T / /
I-123	3.E-06	-	-	T / /

Radionuclide	Inhaled Air - Lung Retention Class D (µCi/mL)	W (µCi/mL)	Y (µCi/mL)	Stochastic or Organ/ (D / W / Y)
I-124	3.E-08	-	-	T / /
I-125	3.E-08	-	-	T / /
I-126	1.E-08	-	-	T / /
I-128	5.E-05	-	-	St/ /
I-129	4.E-09	-	-	T / /
I-130	3.E-07	-	-	T / /
I-131	2.E-08	-	-	T / /
I-132m	4.E-06	-	-	T / /
I-132	3.E-06	-	-	T / /
I-133	1.E-07	-	-	T / /
I-134	2.E-05	-	-	E / /
I-135	7.E-07	-	-	T / /
Cs-125	6.E-05	-	-	St/ /
Cs-127	4.E-05	-	-	St/ /
Cs-129	1.E-05	-	-	St/ /
Cs-130	8.E-05	-	-	St/ /
Cs-131	1.E-05	-	-	St/ /
Cs-132	2.E-06	-	-	St/ /
Cs-134m	6.E-05	-	-	St/ /
CS-134	4.E-08	-	-	St/ /
Cs-135m	8.E-05	-	-	St/ /
Cs-135	5.E-07	-	-	St/ /
Cs-136	3.E-07	-	-	St/ /
Cs-137	7.E-08	-	-	St/ /
Cs-138	2.E-05	-	-	St/ /
Ba-126	6.E-06	-	-	St/ /
Ba-128	7.E-07	-	-	St/ /
Ba-131m	6.E-04	-	-	St/ /
Ba-131	3.E-06	-	-	St/ /
Ba-133m	4.E-06	-	-	St/ /
Ba-133	3.E-07	-	-	St/ /
Ba-135m	5.E-06	-	-	St/ /
Ba-139	1.E-05	-	-	St/ /
Ba-140	6.E-07	-	-	St/ /
Ba-141	3.E-05	-	-	St/ /
Ba-142	6.E-05	-	-	St/ /
La-131	5.E-05	7.E-05	-	St/St/
La-132	4.E-06	5.E-06	-	St/St/
La-135	4.E-05	4.E-05	-	St/St/
La-137	3.E-08	1.E-07	-	L /E /
La-138	2.E-09	6.E-09	-	St/St/

Radionuclide	Inhaled Air – Lung Retention Class D (µCi/mL)	W (µCi/mL)	Y (µCi/mL)	Stochastic or Organ1/ (D / W / Y)
La-140	6.E-07	5.E-07	-	St/St/
La-141	4.E-06	5.E-06	-	St/St/
La-142	9.E-06	1.E-05	-	St/St/
La-143	4.E-05	4.E-05	-	St/St/
Ce-134	-	3.E-07	3.E-07	/St/St
Ce-135	-	2.E-06	2.E-06	/St/St
Ce-137m	-	2.E-06	2.E-06	/St/St
Ce-137	-	6.E-05	5.E-05	/St/St
Ce-139	-	3.E-07	3.E-07	/St/St
Ce-141	-	3.E-07	3.E-07	/St/St
Ce-143	-	8.E-07	7.E-07	/St/St
Ce-144	-	1.E-08	6.E-09	/St/St
Pr-136	-	1.E-04	9.E-05	/St/St
Pr-137	-	6.E-05	6.E-05	/St/St
Pr-138m	-	2.E-05	2.E-05	/St/St
Pr-139	-	5.E-05	5.E-05	/St/St
Pr-142m	-	7.E-05	6.E-05	/St/St
Pr-142	-	8.E-07	8.E-07	/St/St
Pr-143	-	3.E-07	3.E-07	/St/St
Pr-144	-	5.E-05	5.E-05	/St/St
Pr-145	-	4.E-06	3.E-06	/St/St
Pr-147	-	8.E-05	8.E-05	/St/St
Nd-136	-	2.E-05	2.E-05	/St/St
Nd-138	-	3.E-06	2.E-06	/St/St
Nd-139m	-	7.E-06	6.E-06	/St/St
Nd-139	-	1.E-04	1.E-04	/St/St
Nd-141	-	3.E-04	3.E-04	/St/St
Nd-147	-	4.E-07	3.E-07	/St/St
Nd-149	-	1.E-05	1.E-05	/St/St
Nd-151	-	8.E-05	8.E-05	/St/St
Pm-141	-	8.E-05	7.E-05	/St/St
Pm-143	-	3.E-07	3.E-07	/St/St
Pm-144	-	5.E-08	5.E-08	/St/St
Pm-145	-	7.E-08	8.E-08	/BS/St
Pm-146	-	2.E-08	2.E-08	/St/St
Pm-147	-	6.E-08	6.E-08	/BS/St
Pm-148m	-	1.E-07	1.E-07	/St/St
Pm-148	-	2.E-07	2.E-07	/St/St
Pm-149	-	8.E-07	8.E-07	/St/St
Pm-150	-	8.E-06	7.E-06	/St/St

DOE

Radionuclide	Inhaled Air - Lung Retention Class: D (µCi/mL)	W (µCi/mL)	Y (µCi/mL)	Stochastic or Organ1/ (D / W / Y)
Pm-151	-	2.E-06	1.E-06	/St/St
Sm-141m	-	4.E-05	-	/St/
Sm-141	-	7.E-05	-	/St/
Sm-142	-	1.E-05	-	/St/
Sm-145	-	2.E-07	-	/St/
Sm-146	-	1.E-11	-	/BS/
Sm-147	-	2.E-11	-	/BS/
Sm-151	-	4.E-08	-	/BS/
Sm-153	-	1.E-06	-	/St/
Sm-155	-	9.E-05	-	/St/
Sm-156	-	4.E-06	-	/St/
Eu-145	-	8.E-07	-	/St/
Eu-146	-	5.E-07	-	/St/
Eu-147	-	7.E-07	-	/St/
Eu-148	-	2.E-07	-	/St/
Eu-149	-	1.E-06	-	/St/
Eu-150 (12 h)	-	3.E-06	-	/St/
Eu-150 (34 yr)	-	8.E-09	-	/St/
Eu-152m	-	3.E-06	-	/St/
Eu-152	-	1.E-08	-	/St/
Eu-154	-	8.E-09	-	/St/
Eu-155	-	4.E-08	-	/BS/
Eu-156	-	2.E-07	-	/St/
Eu-157	-	2.E-06	-	/St/
Eu-158	-	2.E-05	-	/St/
Gd-145	7.E-05	7.E-05	-	St/St/
Gd-146	5.E-08	1.E-07	-	St/St/
Gd-147	2.E-06	2.E-06	-	St/St/
Gd-148	3.E-12	1.E-11	-	BS/BS/
Gd-149	9.E-07	1.E-06	-	St/St/
Gd-151	2.E-07	5.E-07	-	BS/St/
Gd-152	4.E-12	2.E-11	-	BS/BS/
Gd-153	6.E-08	3.E-07	-	BS/St/
Gd-159	3.E-06	2.E-06	-	St/St/
Tb-147	-	1.E-05	-	/St/
Tb-149	-	3.E-07	-	/St/
Tb-150	-	9.E-06	-	/St/
Tb-151	-	4.E-06	-	/St/
Tb-153	-	3.E-06	-	/St/
Tb-154	-	2.E-06	-	/St/

DOE 5480.11

3288

Radionuclide	Inhaled Air - Lung Retention Class D (µCi/mL)	W (µCi/mL)	Y (µCi/mL)	Stochastic or Organ1/ (D / W / Y)
Tb-153	-	3.E-06	-	/St/
Tb-156m (24 h)	-	3.E-06	-	/St/
Tb-156m (5 h)	-	1.E-05	-	/St/
Tb-156	-	6.E-07	-	/St/
Tb-157	-	1.E-07	-	/BS/
Tb-158	-	8.E-09	-	/St/
Tb-160	-	1.E-07	-	/St/
Tb-161	-	7.E-07	-	/St/
Dy-155	-	1.E-05	-	/St/
Dy-157	-	3.E-05	-	/St/
Dy-159	-	1.E-06	-	/St/
Dy-165	-	2.E-05	-	/St/
Dy-166	-	3.E-07	-	/St/
Ho-155	-	7.E-05	-	/St/
Ho-157	-	6.E-04	-	/St/
Ho-159	-	4.E-04	-	/St/
Ho-161	-	2.E-04	-	/St/
Ho-162m	-	1.E-04	-	/St/
Ho-162	-	1.E-03	-	/St/
Ho-164m	-	1.E-04	-	/St/
Ho-164	-	3.E-04	-	/St/
Ho-166m	-	3.E-09	-	/St/
Ho-166	-	7.E-07	-	/St/
Ho-167	-	2.E-05	-	/St/
Er-161	-	3.E-05	-	/St/
Er-165	-	8.E-05	-	/St/
Er-169	-	1.E-06	-	/St/
Er-171	-	4.E-06	-	/St/
Er-172	-	6.E-07	-	/St/
Tm-162	-	1.E-04	-	/St/
Tm-166	-	6.E-06	-	/St/
Tm-167	-	8.E-07	-	/St/
Tm-170	-	9.E-08	-	/St/
Tm-171	-	1.E-07	-	/BS/
Tm-172	-	5.E-07	-	/St/
Tm-173	-	5.E-06	-	/St/
Tm-175	-	1.E-04	-	/St/
Yb-162	-	1.E-04	1.E-04	/St/St
Yb-166	-	8.E-07	8.E-07	/St/St

Radionuclide	Inhaled Air - Lung Retention Class D (µCi/mL)	W (µCi/mL)	Y (µCi/mL)	Stochastic or Organ/ (D / W / Y)
Yb-167	-	3.E-04	3.E-04	/St/St
Yb-169	-	3.E-07	3.E-07	/St/St
Yb-175	-	1.E-06	1.E-06	/St/St
Yb-177	-	2.E-05	2.E-05	/St/St
Yb-178	-	2.E-05	1.E-05	/St/St
Lu-169	-	2.E-06	2.E-06	/St/St
Lu-170	-	9.E-07	8.E-07	/St/St
Lu-171	-	8.E-07	8.E-07	/St/St
Lu-172	-	5.E-07	5.E-07	/St/St
Lu-173	-	1.E-07	1.E-07	/BS/St
Lu-174m	-	1.E-07	9.E-08	/BS/St
Lu-174	-	5.E-08	7.E-08	/BS/St
Lu-176m	-	1.E-05	1.E-05	/St/St
Lu-176	-	2.E-09	3.E-09	/BS/St
Lu-177m	-	5.E-08	3.E-08	/BS/St
Lu-177	-	9.E-07	9.E-07	/St/St
Lu-178m	-	8.E-05	7.E-05	/St/St
Lu-178	-	5.E-05	5.E-05	/St/St
Lu-179	-	8.E-06	6.E-06	/St/St
Hf-170	2.E-06	2.E-06	-	St/St/
Hf-172	4.E-09	2.E-08	-	BS/BS/
Hf-173	5.E-06	5.E-06	-	St/St/
Hf-175	4.E-07	5.E-07	-	BS/St/
Hf-177m	2.E-05	4.E-05	-	St/St/
Hf-178m	6.E-10	2.E-09	-	BS/BS/
Hf-179m	1.E-07	3.E-07	-	BS/St/
Hf-180m	9.E-06	1.E-05	-	St/St/
Hf-181	7.E-08	2.E-07	-	BS/St/
Hf-182m	4.E-05	6.E-05	-	St/St/
Hf-182	3.E-10	1.E-09	-	BS/BS/
Hf-183	2.E-05	2.E-05	-	St/St/
Hf-184	3.E-06	3.E-06	-	St/St/
Ta-172	-	5.E-05	4.E-05	/St/St
Ta-173	-	8.E-06	7.E-06	/St/St
Ta-174	-	4.E-05	4.E-05	/St/St
Ta-175	-	7.E-06	6.E-06	/St/St
Ta-176	-	5.E-06	5.E-06	/St/St
Ta-177	-	8.E-06	7.E-06	/St/St
Ta-178	-	4.E-05	3.E-05	/St/St
Ta-179	-	2.E-06	4.E-07	/St/St
Ta-180m	-	3.E-05	2.E-05	/St/St

Radionuclide	Inhaled Air - Lung Retention Class D (µCi/mL)	W (µCi/mL)	Y (µCi/mL)	Stochastic or Organ1/ (D / W / Y)
Ta-180	-	2.E-07	1.E-08	/St/St
Ta-182m	-	2.E-04	2.E-04	/St/St
Ta-182	-	1.E-07	6.E-08	/St/St
Ta-183	-	5.E-07	4.E-07	/St/St
Ta-184	-	2.E-06	2.E-06	/St/St
Ta-185	-	3.E-05	3.E-05	/St/St
Ta-186	-	1.E-04	9.E-05	/St/St
W-176	2.E-05	-	-	St/ /
W-177	4.E-05	-	-	St/ /
W-178	8.E-06	-	-	St/ /
W-179	7.E-04	-	-	St/ /
W-181	1.E-05	-	-	St/ /
W-185	3.E-06	-	-	St/ /
W-187	4.E-06	-	-	St/ /
W-188	5.E-07	-	-	St/ /
Re-177	1.E-04	2.E-04	-	St/St/
Re-178	1.E-04	1.E-04	-	St/St/
Re-181	4.E-06	4.E-06	-	St/St/
Re-182 (64 h)	1.E-06	9.E-07	-	St/St/
Re-182 (12 h)	5.E-06	6.E-06	-	St/St/
Re-184m	1.E-06	2.E-07	-	St/St/
Re-184	2.E-06	6.E-07	-	St/St/
Re-186m	7.E-07	6.E-08	-	SW/St/
Re-186	1.E-06	7.E-07	-	St/St/
Re-187	3.E-04	4.E-05	-	SW/St/
Re-188m	6.E-05	6.E-05	-	St/St/
Re-188	1.E-06	1.E-06	-	St/St/
Re-189	2.E-06	2.E-06	-	St/St/
Os-180	2.E-04	2.E-04	2.E-04	St/St/St
Os-181	2.E-05	2.E-05	2.E-05	St/St/St
Os-182	2.E-06	2.E-06	2.E-06	St/St/St
Os-185	2.E-07	3.E-07	3.E-07	St/St/St
Os-189m	1.E-04	9.E-05	7.E-05	St/St/St
Os-191m	1.E-05	9.E-06	7.E-06	St/St/St
Os-191	9.E-07	7.E-07	6.E-07	St/St/St
Os-193	2.E-06	1.E-06	1.E-06	St/St/St
Os-194	2.E-08	2.E-08	3.E-09	St/St/St
Ir-182	6.E-05	6.E-05	5.E-05	St/St/St
Ir-184	1.E-05	1.E-05	1.E-05	St/St/St
Ir-185	5.E-06	5.E-06	4.E-06	St/St/St

DOE 5480

Radionuclide	Inhaled Air - Lung Retention Class D (µCi/mL)	W (µCi/mL)	Y (µCi/mL)	Stochastic or Organ1/ (D / W / Y)
Ir-186	3.E-06	3.E-06	2.E-06	St/St/St
Ir-187	1.E-05	1.E-05	1.E-05	St/St/St
Ir-188	2.E-06	2.E-06	1.E-06	St/St/St
Ir-189	2.E-06	2.E-06	2.E-06	St/St/St
Ir-190m	8.E-05	9.E-05	8.E-05	St/St/St
Ir-190	4.E-07	4.E-07	4.E-07	St/St/St
Ir-192m	4.E-08	9.E-08	6.E-09	St/St/St
Ir-192	1.E-07	2.E-07	9.E-08	St/St/St
Ir-194m	4.E-08	7.E-08	4.E-08	St/St/St
Ir-194	1.E-06	8.E-07	8.E-07	St/St/St
Ir-195m	1.E-05	1.E-05	9.E-06	St/St/St
Ir-195	2.E-05	2.E-05	2.E-05	St/St/St
Pt-186	2.E-05	-	-	St/ /
Pt-188	7.E-07	-	-	St/ /
Pt-189	1.E-05	-	-	St/ /
Pt-191	3.E-06	-	-	St/ /
Pt-193m	2.E-06	-	-	St/ /
Pt-193	1.E-05	-	-	St/ /
Pt-195m	2.E-06	-	-	St/ /
Pt-197m	2.E-05	-	-	St/ /
Pt-197	4.E-06	-	-	St/ /
Pt-199	6.E-05	-	-	St/ /
Pt-200	1.E-06	-	-	St/ /
Au-193	6.E-06	7.E-06	7.E-06	St/St/St
Au-194	2.E-06	2.E-06	2.E-06	St/St/St
Au-195	1.E-06	6.E-07	2.E-07	St/St/St
Au-198m	3.E-07	4.E-07	4.E-07	St/St/St
Au-198	5.E-07	1.E-06	1.E-06	St/St/St
Au-199	1.E-06	1.E-06	1.E-06	St/St/St
Au-200m	8.E-07	1.E-06	1.E-06	St/St/St
Au-200	2.E-05	3.E-05	3.E-05	St/St/St
Au-201	6.E-05	9.E-05	9.E-05	St/St/St
Hg-193m (Org)	6.E-06	-	-	St/ /
Hg-193m (Inorg)	4.E-06	3.E-06	-	St/St/
Hg-193m (Vapor)	-	4.E-06	-	/St/
Hg-193 (Org)	3.E-05	-	-	St/ /
Hg-193 (Inorg)	2.E-05	2.E-05	-	St/St/
Hg-193 (Vapor)	-	1.E-05	-	/St/
Hg-194 (Org)	1.E-08	-	-	St/ /
Hg-194 (Inorg)	2.E-08	5.E-08	-	St/St/
Hg-194 (Vapor)	-	1.E-08	-	/St/

Radionuclide	Inhaled Air - Lung Retention Class D (µCi/mL)	W (µCi/mL)	Y (µCi/mL)	Stochastic or Organ1/ (D / W / Y)
Hg-195m (Org)	3.E-06	-	-	St/ /
Hg-195m (Inorg)	2.E-06	2.E-06	-	St/St/
Hg-195m (Vapor)	-	2.E-06	-	/St/
Hg-195 (Org)	2.E-05	-	-	St/ /
Hg-195 (Inorg)	1.E-05	1.E-05	-	St/St/
Hg-195 (Vapor)	-	1.E-05	-	/St/
Hg-197m (Org)	4.E-06	-	-	St/ /
Hg-197m (Inorg)	3.E-06	2.E-06	-	St/St/
Hg-197m (Vapor)	-	2.E-06	-	/St/
Hg-197 (Org)	6.E-06	-	-	St/ /
Hg-197 (Inorg)	5.E-06	4.E-06	-	St/St/
Hg-197 (Vapor)	-	3.E-05	-	/St/
Hg-199m (Org)	7.E-05	-	-	St/ /
Hg-199m (Inorg)	6.E-05	7.E-05	-	St/St/
Hg-199m (Vapor)	-	3.E-05	-	/St/
Hg-203 (Org)	3.E-07	-	-	St/ /
Hg-203 (Inorg)	5.E-07	5.E-07	-	St/St/
Hg-203 (Vapor)	-	3.E-07	-	/St/
Tl-194m	6.E-05	-	-	St/ /
Tl-194	3.E-04	-	-	St/ /
Tl-195	5.E-05	-	-	St/ /
Tl-197	5.E-05	-	-	St/ /
Tl-198m	2.E-05	-	-	St/ /
Tl-198	1.E-05	-	-	St/ /
Tl-199	3.E-05	-	-	St/ /
Tl-200	5.E-06	-	-	St/ /
Tl-201	9.E-06	-	-	St/ /
Tl-202	2.E-06	-	-	St/ /
Tl-204	9.E-07	-	-	St/ /
Pb-195m	8.E-05	-	-	St/ /
Pb-198	3.E-05	-	-	St/ /
Pb-199	3.E-05	-	-	St/ /
Pb-200	3.E-06	-	-	St/ /
Pb-201	9.E-06	-	-	St/ /
Pb-202m	1.E-05	-	-	St/ /
Pb-202	2.E-08	-	-	St/ /
Pb-203	4.E-06	-	-	St/ /
Pb-205	6.E-07	-	-	St/ /
Pb-209	2.E-05	-	-	St/ /
Pb-210	1.E-10	-	-	St/ /
Pb-211	3.E-07	-	-	BS/ /
Pb-212	1.E-08	-	-	St/ /

Radionuclide	Inhaled Air - Lung Retention Class D (µCi/mL)	W (µCi/mL)	Y (µCi/mL)	Stochastic or Organ1/ (D / W / Y)
Pb-214	3.E-07	-	-	St/ /
Bi-200	3.E-05	4.E-05	-	St/St/
Bi-201	1.E-05	2.E-05	-	St/St/
Bi-202	2.E-05	3.E-05	-	St/St/
Bi-203	3.E-06	2.E-06	-	St/St/
Bi-205	1.E-06	5.E-07	-	St/St/
Bi-206	6.E-07	4.E-07	-	St/St/
Bi-207	7.E-07	2.E-07	-	St/St/
Bi-210m	2.E-09	3.E-10	-	St/St/
Bi-210	1.E-07	1.E-08	-	K /St/
Bi-212	1.E-07	1.E-07	-	K /St/
Bi-213	1.E-07	2.E-07	-	St/St/
Bi-214	3.E-07	4.E-07	-	St/St/
Po-203	3.E-05	4.E-05	-	St/St/
Po-205	2.E-05	3.E-05	-	St/St/
Po-207	1.E-05	1.E-05	-	St/St/
Po-210	3.E-10	3.E-10	-	E /St/
At-207	1.E-06	9.E-07	-	St/St/
At-211	3.E-08	2.E-08	-	St/St/
Rn-220	8.E-09[4/]	-[4/]	-[4/]	-[4/]
Rn-222	3.E-08[4/]	-[4/]	-[4/]	-[4/]
Fr-222	2.E-07	-	-	St/ /
Fr-223	3.E-07	-	-	St/ /
Ra-223	-	3.E-10	-	/St/
Ra-224	-	7.E-10	-	/St/
Ra-225	-	3.E-10	-	/St/
Ra-226	-	3.E-10	-	/St/
Ra-227	-	6.E-06	-	/BS/
Ra-228	-	5.E-10	-	/St/
Ac-224	1.E-08	2.E-08	2.E-08	BS/St/St
Ac-225	1.E-10	3.E-10	3.E-10	BS/St/St
Ac-226	1.E-09	2.E-09	2.E-09	BS/St/St
Ac-227	2.E-13	7.E-13	2.E-12	BS/BS/St
Ac-228	4.E-09	2.E-08	2.E-08	BS/BS/St
Th-226	-	7.E-08	6.E-08	/St/St
Th-227	-	1.E-10	1.E-10	/St/St

DOE 5480.11

3288

Radionuclide	Inhaled Air - Lung Retention Class D (µCi/mL)	W (µCi/mL)	Y (µCi/mL)	Stochastic or Organ1/ (D / W / Y)
Th-228	-	4.E-12	7.E-12	/BS/St
Th-229	-	4.E-13	1.E-12	/BS/BS
Th-230	-	3.E-12	7.E-12	/BS/BS
Th-231	-	3.E-06	3.E-06	/St/St
Th-232	-	5.E-13	1.E-12	/BS/BS
Th-234	-	9.E-08	6.E-08	/St/St
Pa-227	-	5.E-08	4.E-08	/St/St
Pa-228	-	5.E-09	5.E-09	/BS/St
Pa-230	-	2.E-09	1.E-09	/St/St
Pa-231	-	7.E-13	2.E-12	/BS/BS
Pa-232	-	9.E-09	2.E-08	/BS/BS
Pa-233	-	3.E-07	2.E-07	/St/St
Pa-234	-	3.E-06	3.E-06	/St/St
U-230	2.E-10	1.E-10	1.E-10	BS/St/St
U-231	3.E-06	2.E-06	2.E-06	St/St/St
U-232	9.E-11	2.E-10	3.E-12	BS/St/St
U-233	5.E-10	3.E-10	2.E-11	BS/St/St
U-234	5.E-10	3.E-10	2.E-11	BS/St/St
U-235	6.E-10	3.E-10	2.E-11	BS/St/St
U-236	6.E-10	3.E-10	2.E-11	BS/St/St
U-237	1.E-06	7.E-07	6.E-07	St/St/St
U-238	6.E-10	3.E-10	2.E-11	BS/St/St
U-239	8.E-05	7.E-05	6.E-05	St/St/St
U-240	2.E-06	1.E-06	1.E-06	St/St/St
Np-232	-	1.E-06[3]/	-	/BS/
Np-233	-	1.E-03[3]/	-	/St/
Np-234	-	1.E-06[3]/	-	/St/
Np-235	-	5.E-07[3]/	-	/BS/
Np-236 (1.E+05 yr)	-	1.E-11[3]/	-	/BS/
Np-236 (22 h)	-	2.E-08[3]/	-	/BS/
Np-237	-	2.E-12[3]/	-	/BS/
Np-238	-	4.E-08[3]/	-	/BS/
Np-239	-	1.E-06[3]/	-	/St/
Np-240	-	3.E-05[3]/	-	/St/
Pu-234	-	9.E-08[3]/	8.E-08[3]/	/St/St
Pu-235	-	1.E-03[3]/	1.E-03[3]/	/St/St
Pu-236	-	7.E-12[3]/	1.E-11[3]/	/BS/St
Pu-237	-	1.E-06[3]/	1.E-06[3]/	/St/St
Pu-238	-	3.E-12[3]/	7.E-12[3]/	/BS/BS
Pu-239	-	2.E-12[3]/	6.E-12[3]/	/BS/BS

Radionuclide	Inhaled Air - Lung Retention Class D (μCi/mL)	W (μCi/mL)	Y (μCi/mL)	Stochastic or Organ/ (D / W / Y)
Pu-240	-	2.E-12S/	6.E-12S/	/BS/BS
Pu-241	-	1.E-10S/	3.E-10S/	/BS/BS
Pu-242	-	2.E-12S/	6.E-12S/	/BS/BS
Pu-243	-	1.E-05S/	1.E-05S/	/St/St
Pu-244	-	2.E-12S/	6.E-12S/	/BS/BS
Pu-245	-	2.E-06S/	2.E-06S/	/St/St
Am-237	-	1.E-04S/	-	/St/
Am-238	-	1.E-06S/	-	/BS/
Am-239	-	5.E-06S/	-	/St/
Am-240	-	1.E-06S/	-	/St/
Am-241	-	2.E-12S/	-	/BS/
Am-242m	-	2.E-12S/	-	/BS/
Am-242	-	3.E-08S/	-	/BS/
Am-243	-	2.E-12S/	-	/BS/
Am-244m	-	2.E-06S/	-	/BS/
Am-244	-	7.E-08S/	-	/BS/
Am-245	-	3.E-05S/	-	/St/
Am-246m	-	7.E-05S/	-	/St/
Am-246	-	4.E-05S/	-	/St/
Cm-238	-	4.E-07S/	-	/St/
Cm-240	-	2.E-10S/	-	/BS/
Cm-241	-	9.E-09S/	-	/BS/
Cm-242	-	1.E-10S/	-	/BS/
Cm-243	-	3.E-12S/	-	/BS/
Cm-244	-	4.E-12S/	-	/BS/
Cm-245	-	2.E-12S/	-	/BS/
Cm-246	-	2.E-12S/	-	/BS/
Cm-247	-	2.E-12S/	-	/BS/
Cm-248	-	6.E-13S/	-	/BS/
Cm-249	-	6.E-06S/	-	/BS/
Bk-245	-	5.E-07	-	/St/
Bk-246	-	1.E-06	-	/St/
Bk-247	-	2.E-12	-	/BS/
Bk-249	-	9.E-10	-	/BS/
Bk-250	-	2.E-07	-	/BS/
Cf-244	-	2.E-07S/	2.E-07S/	/St/St
Cf-246	-	4.E-09S/	4.E-09S/	/St/St
Cf-248	-	4.E-11S/	5.E-11S/	/BS/St
Cf-249	-	2.E-12S/	6.E-12S/	/BS/BS
Cf-250	-	5.E-12S/	1.E-11S/	/BS/St

DOE 5480.11

3288

Radionuclide	Inhaled Air - Lung Retention Class D (µCi/mL)	W (µCi/mL)	Y (µCi/mL)	Stochastic or Organ1/ (D / W / Y)
Cf-251	-	2.E-12[3]/	5.E-12[3]/	/BS/BS
Cf-252	-	1.E-11[3]/	2.E-11[3]/	/BS/St
Cf-253	-	8.E-10[3]/	7.E-10[3]/	/St/St
Cf-254	-	9.E-12[3]/	7.E-12[3]/	/St/St
Es-250	-	3.E-07	-	/BS/
Es-251	-	4.E-07	-	/BS/
Es-253	-	6.E-10	-	/St/
Es-254m	-	4.E-09	-	/St/
Es-254	-	4.E-11	-	/BS/
Fm-252	-	6.E-09	-	/St/
Fm-253	-	4.E-09	-	/St/
Fm-254	-	4.E-08	-	/St/
Fm-255	-	9.E-09	-	/St/
Fm-257	-	1.E-10	-	/E /
Md-257	-	4.E-08	-	/St/
Md-258	-	1.E-10	-	/BS/

1/ A determination of whether the DACs are controlled by stochastic (St) or nonstochastic (organ) dose, or if they both give the same result (E) for each lung retention class is given in this column. The key to the organ notation for nonstochastic dose is: BS = Bone surface, K = Kidney, L = Liver, SW = Stomach wall, and T = Thyroid. A blank indicates that no calculations are performed for the lung retention class shown.

2/ The ICRP identifies tritiated water and carbon as having immediate uptake and distribution; therefore no solubility classes are designated. For purposes of this table, the DAC values are shown as being constant, independent of solubility class. For tritiated water, the inhalation DAC values allow for an additional 50% absorption through the skin, as described in ICRP Publication No. 30: Limits for Intakes of Radionuclides by Workers. For elemental tritium, the DAC values are based solely on consideration of the dose-equivalent rate to the tissues of the lung from inhaled tritium gas contained within the lung, without absorption in the tissues.

3/ A dash indicates no values given for this data category.

312

4/ These values are appropriate for protection from radon combined with its short-lived daughters and are based on information given in ICRP Publication 32: Limits for Inhalation of Radon Daughters by Workers and Federal Guidance Report No. 11: Limiting Values of Radionuclide Intake and Air Concentrations, and Dose Conversion Factors for Inhalation, Submersion, and Ingestion (EPA 520/1-88-020). The values given are for 100% equilibrium concentration conditions of the radon daughters with the parent. To allow for an actual measured equilibrium concentration or a demonstrated equilibrium concentration, the values given in this table should be multiplied by the ratio (100%/actual %) or (100%/demonstrated %), respectively. Alternatively, the DAC values for Rn-220 and Rn-222 may be replaced by 1 WL[a] and 1/3 WL,[a] respectively, for appropriate limiting of daughter concentrations. Because of the dosimetric considerations for radon, no f_1 or lung clearance values are listed.

[a] A "Working Level" (WL) is any combination of short-lived radon daughters, in one liter of air without regard to the degree of equilibrium, that will result in the ultimate emission of 1.3 E+05 MeV of alpha energy.

5/ For the calculations, f_1 values were obtained from ICRP Publication 48: The Metabolism of Plutonium and Related Elements. It is assumed that the effective dose equivalents for inhalation are unchanged even though the f_1 values have changed. This is because the contribution to organ dose from inhalation is dependent mainly on transfer from lung to blood when f_1 values are small. Also, the gastrointestinal tract dose would be unchanged because the fraction of activity passing through the tract is $(1.0 - f_1)$.

313

APPENDIX C

CONCERNING RISKS FROM OCCUPATIONAL RADIATION EXPOSURE

(From NUREG 8.29, Instruction Concerning Risks From Occupational Radiation Exposure, July 1981. U.S. Nuclear Regulatory Commission.)

APPENDIX C

CONCERNING RISKS FROM OCCUPATIONAL RADIATION EXPOSURE

This instructional material is intended to provide the best available information concerning what is currently known about the health risks from exposure to ionizing radiation. A question and answer format has been used. The questions were developed by the NRC staff in consultation with workers, union representatives, and licensee representatives experienced in radiation protection training. Risk estimates have been compiled from numerous sources generally recognized as reliable. A bibliography is included for the user interested in further study.

The biological effects that are known to occur after exposure to high doses (hundreds of rems[2]) of radiation are discussed early in the document; discussions of the estimated risks from the low occupational dose (<5 rems per year) follow. It is intended that this information will help develop an attitude of healthy respect for the risks associated with radiation, rather than unnecessary fear or lack of concern. Additional guidance is being or will be developed concerning other topics in radiation protection training.

1. What is meant by risk?

Risk can be defined in general as the probability (chance) of injury, illness, or death resulting from some activity. However, the perception of risk is affected by how the individual views its probability and its severity. The intent of this document is to provide estimates of and explain the basis for possible risk of injury, illness, or death resulting from occupational radiation exposure. (See Questions 9 and 10 for estimates of radiation risk and comparisons with other types of risk.)

2. What are the possible health effects of exposure to radiation?

Some of the health effects that exposure to radiation may cause are cancer (including leukemia), birth defects in the future children of exposed parents, and cataracts.[3] These effects (with the exception of genetic effects) have been observed in studies of medical radiologists, uranium miners, radium workers, and radiotherapy patients who have received large doses of radiation. Studies of people exposed to radiation from atomic weapons have also provided data on radiation effects. In addition, radiation effects studies with laboratory animals have provided a large body of data on radiation-induced health effects, including genetic effects.

The observations and studies mentioned above, however, involve levels of radiation exposure that are much higher (hundreds of rems) than those permitted occupationally today (<5 rems per year). Although studies have not shown a cause-effect relationship between health effects and current levels of occupational radiation exposure, it is prudent to assume that some health effects do occur at the lower exposure levels.

2. What is meant by prompt effects, delayed effects, and genetic effects?

a. Prompt effects are observable shortly after receiving a very large dose in a short period of time. For example, a whole-body[4] dose of 450 rems (90 times the annual dose limit for routine occupational exposure) in an hour to an average adult will cause vomiting and diarrhea within a few hours; loss of hair, fever, and weight loss within a few weeks; and about a 50 percent chance of death within 60 days without medical treatment.

b. Delayed effects such as cancer may occur years after exposure to radiation.

c. Genetic effects can occur when there is radiation damage to the genetic material. These effects may show up as birth defects or other conditions in the future children of the exposed individual and succeeding generations, as demonstrated in animal experiments. However, excess genetic effects clearly caused by radiation have not been observed in human populations exposed to radiation. It has been observed, however, that radiation can change the genes in cells of the human body. Thus, the possibility exists that genetic effects can be caused in humans by low doses even though no direct evidence exists as yet.

4. In worker protection, which effects are of most concern to the NRC?

The main concern to the NRC is the delayed incidence of cancer. The chance of delayed cancer is believed to depend

[1] Ionizing radiation consists of energy or small particles such as gamma, beta, or alpha radiation emitted from radioactive materials which, when absorbed by living tissue, can cause chemical and physical damage.

[3] Cataracts differ from other radiation effects in that a certain level of dose to the lens of the eye (~200 rems) is required before they are observed.

on how much radiation exposure a person gets; therefore, every reasonable effort should be made to keep exposures low.

Immediate or prompt effects are very unlikely since large exposures would normally occur only if there were a serious radiation accident. Accident rates in the radiation industry have been low, and only a few accidents have resulted in exposures exceeding the legal limits. The probability of serious genetic effects in the future children of workers is estimated in the BEIR[5] report, based on animal studies, at less than one-third that of delayed cancer (5-65 genetic effects per million rems compared to 160-450 cancer cases). A clearer understanding of the cause-effect relationship between radiation and human genetic effects will not be possible until additional research studies are completed.

5. What is the difference between acute and chronic exposure?

Acute radiation exposure, which causes prompt effects and may also cause delayed effects, usually refers to a large dose of radiation received in a short period of time; for example, 450 rems received within a few hours or less. The effects of acute exposures are well known from studies of radiotherapy patients, some of whom received whole-body doses; atomic bomb victims; and the few accidents that have occurred in the early days of atomic weapons and reactor development, industrial radiography, and nuclear fuel processing. There have been few occupational incidents that have resulted in large exposures. NRC data indicate that, on the average, 1 accidental overexposure in which any acute symptoms are observed occurs each year. Most of these occur in industrial radiography and involve exposures of the hands rather than the whole body.

Chronic exposure, which may cause delayed effects but not prompt effects, refers to small doses received repeatedly over long time periods; for example, 20-100 mrem (a mrem is one-thousandth of a rem) per week every week for several years. Concern with occupational radiation risk is primarily focused on chronic exposure to low levels of radiation over long time periods.

6. How does radiation cause cancer?

How radiation causes cancer is not well understood. It is impossible to tell whether a given cancer was caused by radiation or by some other of the many apparent causes. However, most diseases are caused by the interaction of several factors. General physical condition, inherited traits, age, sex, and exposure to other cancer-causing agents such as cigarette smoke are a few possible contributing factors. One theory is that radiation can damage chromosomes in a cell, and the cell is then directed along abnormal growth patterns. Another is that radiation reduces the body's normal resistance to existing viruses which can then multiply and damage cells. A third is that radiation activates an existing virus in the body which then attacks normal cells causing them to grow rapidly.

What is known is that, in groups of highly exposed people, a higher than normal incidence of cancer is observed. Higher than normal rates of cancer can also be produced in laboratory animals by high levels of radiation. An increased incidence of cancer has not been demonstrated at radiation levels below the NRC limits.

7. If I receive a radiation dose, does that mean I am certain to get cancer?

Not at all. Everyone gets a radiation dose every day (see Question 25), but most people do not get cancer. Even with doses of radiation far above legal limits, most individuals will experience no delayed consequences. There is evidence that some radiation damage can be repaired. The danger from radiation is much like the danger from cigarette smoke. Only a fraction of the people who breathe cigarette smoke get lung cancer, but there is good evidence that smoking increases a person's chances of getting lung cancer. Similarly, there is evidence that the larger the radiation dose, the larger the increase in a person's chances of getting cancer.

Radiation is like most substances that cause cancer in that the effects can be seen clearly only at high doses. Estimates of the risks of cancer at low levels of exposure are derived from data available for exposures at high dose levels and high dose rates. Generally, for radiation protection purposes these estimates are made using the linear model (Curve 1 in Figure 1). We have data on health effects at high doses as shown by the solid line in Figure 1. Below about 100 rems, studies have not been able to accurately measure the risk, primarily because of the small numbers of exposed people and because the effect is small compared to differences in the normal incidence from year to year and place to place. Most scientists believe that there is some degree of risk no matter how small the dose (Curves 1 and 2). Some scientists believe that the risk drops off to zero at some low dose (Curve 3), the threshold effect. A few believe that risk levels off so that even very small doses imply a significant risk (Curve 4). The majority of scientists today endorse either the linear model (Curve 1) or the linear-quadratic model (Curve 2). The NRC endorses the linear model (Curve 1), which shows the number of effects decreasing as the dose decreases, for radiation protection purposes.

It is prudent to assume that smaller doses have some chance of causing cancer. This is as true for natural cancer-causers such as sunlight and natural radiation as it is for those that are man made such as cigarette smoke, smog, and man-made radiation. As even very small doses may entail some small risk, it follows that no dose should be taken without a reason. Thus, a principle of radiation protection is to do more than merely meet the allowed regulatory

[5] The National Academy of Sciences established a committee on the Biological Effects of Ionizing Radiation (BEIR) whose 1980 report on the effects on populations of exposure to low levels of ionizing radiation provides much of the background for this guide.

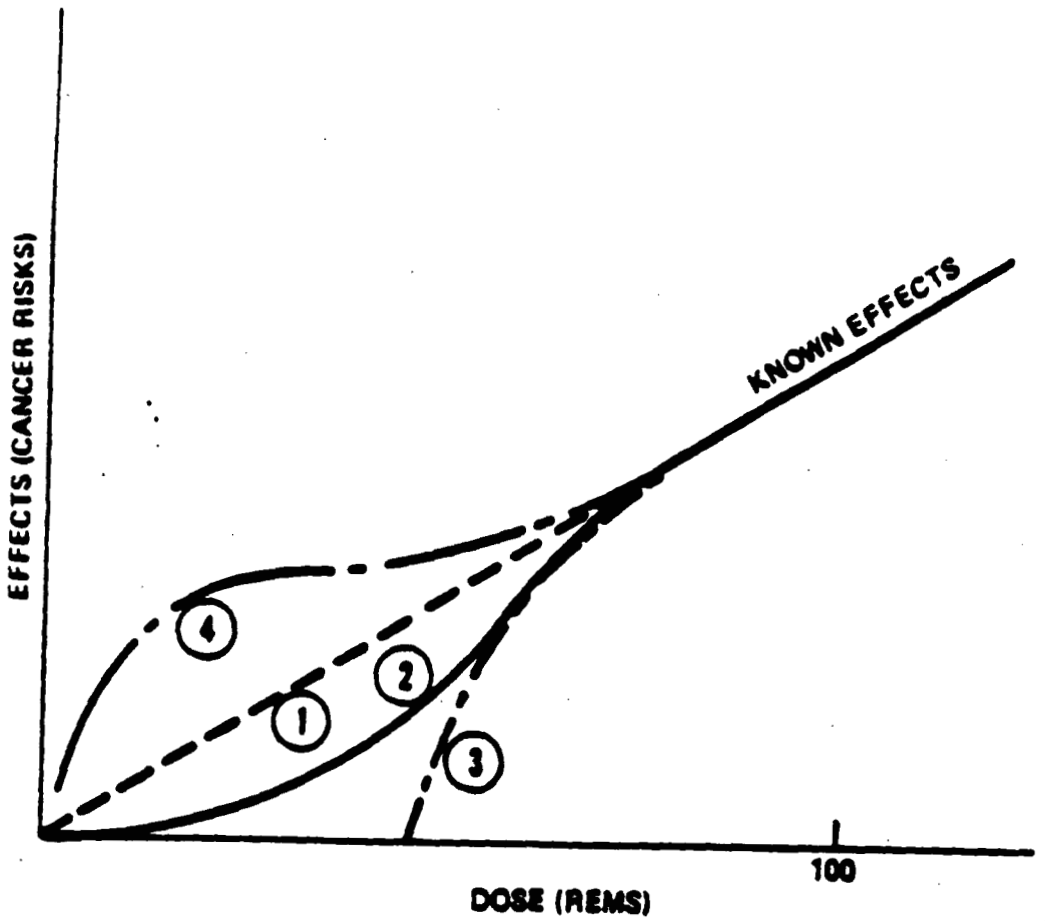


Figure 1. Some proposed models for how the effects of radiation vary with doses at low levels.

limits; doses should be kept as low as is reasonably achievable (ALARA).

We don't know exactly what the chances are of getting cancer from a low-level radiation dose, but we can make estimates based on extensive scientific knowledge. The estimates of radiation risks are at least as reliable as estimates for the effects from any chemical hazard. Being exposed to typical occupational radiation doses is taking a chance, but that chance is reasonably well understood.

It is important to understand the probability factors here. A similar question would be: If you select one card from a full deck, will you get the ace of spades? This question cannot be answered with a simple yes or no. The best answer is that your chances are 1 in 52. However, if 1000 people each select one card from full decks, we can predict that about 20 of them will get an ace of spades. Each person will have 1 chance in 52 of drawing the ace of spades, but there is no way that we can predict which persons will get the right card. The issue is further complicated by the fact that in 1 drawing by 1000 people, we might get only 15 successes and in another perhaps 25 correct cards in 1000 draws. We can say that if you receive a radiation dose, you will have increased your chances of eventually developing cancer. It is assumed that the more radiation exposure you get, the more you increase your chances of cancer.

Not all workers incur the same level of risk. The radiation risk incurred by a worker depends on the amount of dose received. Under the linear model explained above, a worker who receives 5 rems in a year incurs 10 times as much risk as another worker (the same age) who receives only 0.5 rem. The risk depends not only on the amount of dose, but also on the age of the worker at the time the dose is received. This age difference is due, in part, to the fact that a young worker has more time to live than an older worker, and the risk is believed to depend on the number of years of life following the dose. The more years left, the larger the risk. It should be clear that, even within the regulatory dose limits, the risk may vary a great deal from one worker to another. Fortunately, only a very few workers receive doses near 5 rems per year; as pointed out in the answer to Question 19, the average annual dose for all radiation workers is less than 0.5 rem.

3288

A reasonable comparison involves exposure to the sun's rays. Frequent short exposures provide time for the skin to repair. An acute exposure to the sun can result in painful burning, and excessive exposure has been shown to cause skin cancer. However, whether exposure to the sun's rays is short term or spread over time, some of the injury is not repaired and may eventually result in skin cancer.

The effect upon a group of workers occupationally exposed to radiation may be an increased incidence of cancer over and above the number of cancers that would normally be expected in that group. Each exposed individual has an increased probability of incurring subsequent cancer. We can say that if 10,000 workers each receive an additional 1 rem in a year, that group is more likely to have a larger incidence of cancer than 10,000 people who do not receive the additional radiation. An estimate of the increased probability of cancer from low radiation doses delivered to large groups is one measure of occupational risk and is discussed in Question 9.

8. What groups of expert scientists have studied the risk from exposure to radiation?

In 1956, the National Academy of Sciences established advisory committees to consider radiation risks. The first of these was the Advisory Committee on the Biological Effects of Atomic Radiations (BEAR) and more recently it was renamed the Advisory Committee on the Biological Effects of Ionizing Radiation (BEIR). These committees have periodically reviewed the extensive research being done on the health effects of ionizing radiation and have published estimates of the risk of cancer from exposure to radiation (1972 and 1980 BEIR reports). The International Commission on Radiological Protection (ICRP) and the National Council on Radiation Protection and Measurement (NCRP) are two other groups of scientists who have studied radiation effects and published risk estimates (ICRP Publication 26, 1977). These two groups have no government affiliation. In addition, the United Nations established an independent study group that published an extensive report in 1977, including estimates of cancer risk from ionizing radiation (UNSCEAR, 1977).

Several individual research groups or scientists such as Alice Stewart, E.S. Gilbert, T.F. Mancuso, T.W. Anderson, to name a few, have published studies concerning low-level radiation effects. The bibliography to this appendix includes several articles for the reader who wishes to do further study. The BEIR-80 report includes analysis of the work of many independent researchers.

9. What are the estimates of the risk of cancer from radiation exposure?

The cancer risk estimates (developed by the organizations identified in Question 8) are presented in Table 1.

In an effort to explain the significance of these estimates, we will use an approximate average of 300 excess cancer cases per million people, each exposed to 1 rem of ionizing radiation. If in a group of 10,000 workers each receives

TABLE 1

Estimates of Excess Cancer Incidence from Exposure to Low-Level Radiation

Source	Number of Additional[a] Cancers Estimated to Occur in 1 Million People After Exposure of Each to 1 Rem of Radiation
BEIR, 1980	160-450[b]
ICRP, 1977	200
UNSCEAR, 1977	150-350

[a] Additional means above the normal incidence of cancer.

[b] All three groups estimated premature deaths from radiation-induced cancers. The American Cancer Society has recently stated that only about one-half of all cancer cases are fatal. Thus, to estimate incidence of cancer, the published numbers were multiplied by 2. Note that the three groups are in close agreement on the risk of radiation-induced cancer.

1 rem, we could estimate that three would develop cancer because of that exposure, although the actual number could be more or less than three.

The American Cancer Society has reported that approximately 25 percent of all adults in the 20- to 65-year age bracket will develop cancer at some time from all possible causes such as smoking, food, alcohol, drugs, air pollutants, and natural background radiation. Thus in any group of 10,000 workers not exposed to radiation on the job, we can expect about 2,500 to develop cancer. If this entire group of 10,000 workers were to receive an occupational radiation dose of 1 rem each, we could estimate that three additional cases might occur which would give a total of about 2,503. This means that a 1-rem dose to each of 10,000 workers might increase the cancer rate from 25 percent to 25.03 percent, an increase of about 3 hundredths of one percent.

As an individual, if your cumulative occupational radiation dose is 1 rem, your chances of eventually developing cancer during your entire lifetime may have increased from 25 percent to 25.03 percent. If your lifetime occupational dose is 10 rems, we could estimate a 25.3 percent chance of developing cancer. Using a simple linear model, a lifetime dose of 100 rems may have increased your chances of cancer from 25 to 28 percent.

The normal chance of developing cancer if you receive no occupational radiation dose is about equal to your chance of getting any spade on a single draw from a full deck of playing cards, which is one chance out of four. The additional chance of developing cancer from an occupational exposure of 1 rem is less than your chances of drawing an ace from a full deck of cards three times in a row.

Since cancer resulting from exposure to radiation usually occurs 5 to 25 years after the exposure and since not all cancers are fatal, another useful measure of risk is years of

life expectancy lost on the average from a radiation-induced cancer. It has been estimated in several studies that the average loss of life expectancy from exposure to radiation is about 1 day per rem of exposure. In other words, a person exposed to 1 rem of radiation may, on the average, lose 1 day of life. The words "on the average" are important, however, because the person who gets cancer from radiation may lose several years of life expectancy while his coworkers suffer no loss. The ICRP estimated that the average number of years of life lost from fatal industrial accidents is 30 while the average number of years of life lost from a fatal radiation-induced cancer is 10. The shorter loss of life expectancy is due to the delayed onset of cancer.

It is important to realize that these risk numbers are only estimates. Many difficulties are involved in designing research studies that can accurately measure the small increases in cancer cases due to low exposures to radiation as compared to the normal rate of cancer. There is still uncertainty and a great deal of controversy with regard to estimates of radiation risk. The numbers used here result from studies involving high doses and high dose rates, and they may not apply to doses at the lower occupational levels of exposure. The NRC and other agencies both in the United States and abroad are continuing extensive long-range research programs on radiation risk.

Some members of the National Academy of Sciences BEIR Advisory Committee and others feel that risk estimates in Table 1 are higher than would actually occur and represent an upper limit on the risk. Other scientists believe that the estimates are low and that the risk could be higher. However, these estimates are considered by the NRC staff to be the best available that the worker can use to make an informed decision concerning acceptance of the risks associated with exposure to radiation. A worker who decides to accept this risk should make every effort to keep exposure to radiation ALARA to avoid unnecessary risk. The worker, after all, has the first line responsibility for protecting himself from radiation hazards.

10. How can we compare radiation risk to other kinds of health risks?

Perhaps the most useful unit for comparison among health risks is the average number of days of life expectancy lost per unit of exposure to each particular health risk. Estimates are calculated by looking at a large number of persons, recording the age when death occurs from apparent causes, and estimating the number of days of life lost as a result of these early deaths. The total number of days of life lost is then averaged over the total group observed.

Several studies have compared the projected loss of life expectancy resulting from exposure to radiation with other health risks. Some representative numbers are presented in Table 2.

These estimates indicate that the health risks from occupational radiation exposure are smaller than the risks associated with many other events or activities we encounter and accept in normal day-to-day activities.

TABLE 2

Estimated Loss of Life Expectancy from Health Risks[a]

Health Risk	Estimates of Days of Life Expectancy Lost, Average
Smoking 20 cigarettes/day	2370 (6.5 years)
Overweight (by 20%)	985 (2.7 years)
All accidents combined	435 (1.2 years)
Auto accidents	200
Alcohol consumption (U.S. average)	130
Home accidents	95
Drowning	41
Natural background radiation, calculated	8
Medical diagnostic x-rays (U.S. average), calculated	6
All catastrophes (earthquake, etc.)	3.5
1 rem occupational radiation dose, calculated (industry average for the higher-dose job categories is 0.65 rem/yr)	1
1 rem/yr for 30 years, calculated	30

[a] Adapted from Cohen and Lee, "A Catalogue of Risks," *Health Physics*, Vol. 36, June 1979.

A second useful comparison is to look at estimates of the average number of days of life expectancy lost from exposure to radiation and from common industrial accidents at radiation-related facilities and to compare this number with days lost from other occupational accidents. Table 3 shows average days of life expectancy lost as a result of fatal work-related accidents. Note that the data for occupations other than radiation related do not include death risks from other possible hazards such as exposure to toxic chemicals, dusts, or unusual temperatures. Note also that the unlikely occupational exposure at 5 rems per year for 50 years, the maximum allowable risk level, may result in a risk comparable to the average risks in mining and heavy construction.

Industrial accident rates in the nuclear industry and related occupational areas have been relatively low during the entire history of the industry (see Table 4). This is believed to be due to the early and continuing emphasis on tight safety controls. The relative safety of various occupational areas can be seen by comparing the probability of death by accident per 10,000 workers over a 40-year working lifetime. These figures do not include death from possible causes such as exposure to toxic chemicals or radiation.

11. Can a worker become sterile or impotent from occupational radiation exposure?

Observation of radiation therapy patients who receive localized exposures, usually spread over a few weeks, has

TABLE 3

Estimated Loss of Life Expectancy from Industrial Hazards[8]

Industry Type	Estimates of Days of Life Expectancy Lost, Average
All industry	74
Trade	30
Manufacturing	43
Service	47
Government	55
Transportation and utilities	164
Agriculture	277
Construction	302
Mining and quarrying	328
Radiation accidents, death from exposure	<1
Radiation dose of 0.65 rem/yr (industry average) for 30 years, calculated	20
Radiation dose of 5 rems/yr for 50 years	250
Industrial accidents at nuclear facilities (nonradiation)	58

[8]Adapted from Cohen and Lee, "A Catalogue of Risk," *Health Physics*, Vol. 36, June 1979; and World Health Organization, *Health Implications of Nuclear Power Production*, December 1978.

TABLE 4

Probability of Accidental Death by Type of Occupation[8]

Occupation	Number of Accidental Deaths for 10,000 Workers for 40 Years
Mining	252
Construction	228
Agriculture	216
Transportation and public utilities	116
All industries	56
Government	44
Nuclear industry (1975 data excluding construction)	40
Manufacturing	36
Services	28
Wholesale and trade	24

[8]Adapted from National Safety Council, *Accident Facts*, 1979; and Atomic Energy Commission, *Operational Accidents and Radiation Exposure Experience*, WASH-1192, 1970.

shown that a dose of 500-800 rems to the gonads can produce permanent sterility in males or females (an acute whole-body dose of this magnitude would probably result in death within 60 days). An acute dose of 20 rems to the testes can result in a measurable but temporary reduction in sperm count. Such high exposures on the job could result only from serious and unlikely radiation accidents. Although high doses of radiation can affect fertility, they have no effect on the ability to function sexually. Likewise, exposure to permitted occupational levels of radiation has no observed effect on fertility and also has no effect on the ability to function sexually.

12. What are the NRC external radiation dose limits?

Federal regulations currently limit occupational external whole-body radiation dose to 1¼ rems in any calendar quarter or specified 3-month period. However, when there is documented evidence that a worker's previous occupational dose is low enough, a license may permit a dose of up to 3 rems per quarter or 12 rems per year. The accumulated dose may not exceed 5(N - 18) rems[6] where N is the person's age in years, i.e., the lifetime occupational dose may not exceed an average of 5 rems for each year above the age of 18.

An additional whole-body dose of approximately 5 rems per year is permitted from internal exposure. (See Question 28.)

13. What is meant by ALARA?

In addition to providing an upper limit on a person's permissible radiation exposure, the NRC also requires that its licensees maintain occupational exposures as far below the limit as is reasonably achievable (ALARA). This means that every activity at a nuclear facility involving exposure to radiation should be planned so as to minimize unnecessary exposure to individual workers and also to the worker population. A job that involves exposure to radiation should be scheduled only when it is clear that the benefit justifies the risks assumed. All design, construction, and operating procedures should be reviewed with the objective of reducing unnecessary exposures.

14. Has the ALARA concept been applied if, instead of reaching dose limits during the first week of a quarter, the worker's dose is spread out over the whole quarter?

No. For radiation protection purposes, the risk of cancer from low doses is assumed to be proportional to the amount of exposure, not the rate at which it is received. Thus it is assumed that spreading the dose out over time or over larger numbers of people does not reduce the overall risk. The ALARA concept has been followed only when the individual and collective doses are reduced by reducing the time of exposure or decreasing radiation levels in the

[6]The NRC has published a proposed rule change for public comment that would eliminate the 5(N-18) formula. This proposal is currently under consideration by a task force reviewing all of 10 CFR Part 20. Recent EPA guidance recommends eliminating the 5(N-18) formula. If adopted, the maximum [illegible]

individual and collective doses are reduced by reducing the time of exposure or decreasing radiation levels in the working environment.

15. What is meant by collective dose and why should it be maintained ALARA?

Nuclear industry activities expose an increasing number of people to occupational radiation in addition to the radiation doses they receive from natural background radiation and medical radiation exposures. The collective occupational dose (person-rems) is the sum of all occupational radiation exposure received by all the workers in an entire worker population. For example, if 100 workers each receive 2 rems, the individual dose is 2 rems and the collective dose is 200 person-rems. The total additional risk of cancer and genetic effects in an exposed population is assumed to depend on the collective dose.

It should be noted that, from the viewpoint of risk to a total population, it is the collective dose that must be controlled. For a given collective dose, the number of health effects is assumed to be the same even if a larger number of people share the dose. Therefore, spreading the dose out may reduce the individual risk, but not that of the population.

Efforts should be made to maintain the collective dose ALARA so as not to unnecessarily increase the overall population incidence of cancer and genetic effects.

16. Is the use of extra workers a good way to reduce risks?

There is a "yes" answer to this question and a "no" answer. For a given job involving exposure to radiation, the more people who share the work, the lower the average dose to an individual. The lower the dose, the lower the risk. So, for you as an individual, the answer is "yes."

But how about the risk to the entire group of workers? Under assumptions used by the NRC for purposes of protection, the risk of cancer depends on the total amount of radiation energy absorbed by human tissue, not on the number of people to whom this tissue belongs. Therefore, if 30 workers are used to do a job instead of 10, and if both groups get the same collective dose (person-rems), the total cancer risk is the same, and nothing was gained for the group by using 30 workers. From this viewpoint the answer is "no." The risk was not reduced but simply spread around among a larger number of persons.

Unfortunately, spreading the risk around often results in a larger collective dose for the job. Workers are exposed as they approach a job, while they are getting oriented to do the job, and as they withdraw from the job. The dose received during these actions is called nonproductive. If several crew changes are required, the nonproductive dose can become very large. Thus it can be seen that the use of extra workers may actually increase the total occupational dose and the resulting collective risks.

The use of extra workers to comply with NRC dose limits is not the way to reduce the risk of radiation-induced cancer for the worker population. At best, the total risk remains the same, and it may even be increased. The only way to reduce the risk is to reduce the collective dose; this can be done only by reducing the radiation levels, the working times, or both.

17. Why doesn't the NRC impose collective dose limits?

Compliance with individual dose limits can be achieved simply by using extra workers. However, compliance with a collective dose limit (such as 100 person-rems per year for a licensee) would require reduction of radiation levels, working times, or both. But there are many problems associated with setting appropriate collective dose limits.

For example, we might consider applying a single collective dose limit to all licensees. The selection of such a collective dose limit would be almost impossible because of the wide variations in collective doses among licensees. A power reactor could reasonably be expected to have an average annual collective dose of several hundred person-rems. However, a small industrial radiography licensee could very well have a collective dose of only a few person-rems in a year.

Even choosing a collective dose limit for a group of similar licensees would be almost as difficult. Radiography licensees as a group had an average collective dose of 9 person-rems. However, the smallest collective dose for a radiography licensee was less than 1 person-rem, and the largest was 401 person-rems.

Setting a reasonable collective dose limit for each individual licensee would also be very difficult. It would require a record of all past collective doses on which to base such limits. Setting an annual collective dose limit would then amount to an attempt to predict a reasonable collective dose for each future year. In order to do this, it would be necessary to be able to predict changes in each licensee activity that would increase or decrease the collective dose. In addition, annual collective doses vary significantly from year to year according to the kind and amount of maintenance required, which cannot generally be predicted in advance. Following all such changes and revising limits up and down would be very difficult if not impossible. However, these efforts would be necessary if a collective dose limit were to be reasonable and help minimize doses and risks.

18. How are radiation dose limits established?

The NRC establishes occupational radiation dose limits based on guidance to Federal agencies from the Environmental Protection Agency (EPA) and, in addition, considers NCRP and ICRP recommendations. Scientific reviews of research data on biological effects such as the BEIR report are also considered.

For example, recent EPA guidance recommended that the annual whole-body dose limit be established at 5 rems per year and indicated that exposure, year after year, to 5 rems would involve a risk to a worker comparable to the average risks incurred by workers in the higher risk jobs

such as mining. In fact, few workers ever reach such a limit, much less year after year, and the risks associated with actual exposures are considered by the EPA to be comparable to the safer job categories. A 5-rem-per-year limit would allow occasional high dose jobs to be done without excessive risk.

19. What are the typical radiation doses received by workers?

The NRC requires that certain categories of licensees report data on annual worker doses and doses for all workers who leave employment with licensees. Data were received on the occupational doses in 1977 of approximately 100,000 workers in power reactors, industrial radiography, fuel processing and fabrication facilities, and manufacturing and distribution facilities. Of this total group, 85 percent received an annual dose of less than 1 rem; 95 percent received less than 2 rems; fewer than 1 percent exceeded 5 rems in 1 year. The average annual dose of those workers who were monitored and had measurable exposures was about 0.65 rem. A study completed by the EPA, using 1975 exposure data for 1,260,000 workers, indicated that the average annual dose for all workers who received a measurable dose was 0.34 rem.

Table 5 lists average occupational exposures for workers (persons who had measurable exposure above background levels) in various occupations, based on the 1975 data.

TABLE 5

U.S. Occupational Exposure Estimates[a]

Occupational Subgroup	Average Whole-Body Dose (millirems)	Collective Dose (person-rems)
Medicine	320	51,400
Industrial Radiography	580	5,700
Source Manufacturing	630	2,500
Power Reactors	760	21,400
Fuel Fabrication and Reprocessing	560	3,100
Uranium Enrichment	70	400
Nuclear Waste Disposal	920	100
Uranium Mills	380	760
Department of Energy Facilities	300	11,800
Department of Defense Facilities	180	10,100
Educational Institutions	206	1,500
Transportation	200	2,300

[a]Adapted from Cook and Nelson, *Occupational Exposures to Ionizing Radiation in the United States: A Comprehensive Summary for 1975*, Draft, Environmental Protection Agency.

20. What happens if a worker exceeds the quarterly exposure limit?

Radiation protection limits, such as 3 rems in 3 months, are not absolute limits below which it is safe and above which there is danger. Exceeding a limit does not imply that you have suffered an injury. A good comparison is with the highway speed limit, which is selected to limit accident risk and still allow you to get somewhere. If you drive at 75 mph, you increase your risk of an auto accident to levels that are not considered acceptable by the people who set speed limits, even though you may not actually have an accident. If a worker's radiation dose repeatedly exceeds 3 rems in a quarter, the risk of health effects could eventually increase to a level that is not considered acceptable to the NRC. Exceeding an NRC protection limit does not mean that any adverse health effects are going to occur. It does mean that a licensee's safety program has failed in some respect and that the NRC and the licensee should investigate to make sure the problems are corrected.

If an overexposure occurs, the regulations prohibit any additional occupational exposure to that person during the remainder of the calendar quarter in which the overexposure occurred. The licensee is required to file an overexposure report to the NRC and may possibly be subject to a fine, just as you are subject to a traffic fine for exceeding the speed limit. In both cases, the fines and, in some serious or repetitive cases, suspension of license are intended to encourage efforts to operate within the limits. The safest limits would be 0 mph and 0 rem per quarter. But then we wouldn't get anywhere.

21. Why do some facilities establish administrative limits that are below the NRC limits?

There are two reasons. First, the NRC regulations state that licensees should keep exposures to radiation ALARA. By requiring specific approval for worker doses in excess of set levels, more careful risk-benefit analysis can be made as each additional increment of dose is approved for a worker. Secondly, a facility administrative limit that is set lower than the quarterly NRC limit provides a safety margin designed to help the licensee avoid overexposures.

22. Several scientists have suggested that NRC limits are too high and should be lowered. What are the arguments for lowering the limits?

In general, those critical of present dose limits say that the individual risk is higher than is estimated by the BEIR Committee, the ICRP, and UNSCEAR. Based on studies of low-level exposures to large groups, some researchers have concluded that a given dose of radiation may be more likely to cause biological effects than previously thought. Some of these studies are listed in the bibliography (Mancuso, Archer) and the BEIR-80 report includes a section analyzing the findings of these and other studies. Scientific opinion differs on the validity of the research methods used and the methods of statistical analysis. The problem is that the expected additional incidence of radiation-caused effects such as cancer is difficult to detect in comparison with the much larger normal incidence. It cannot be shown without question that these effects were more frequent in the exposed study group than in the unexposed group used for comparison, or that the observed effects were caused

by radiation. The BEIR committee concluded that claims of higher risk had "no substance."

The NRC staff continually reviews the results of research on radiation risks. With respect to large-scale studies of radiation-induced health effects in human populations exposed to low-level ionizing radiation, the NRC and EPA have recently concluded that there is no one population group available for which such a study could be expected to provide a more meaningful estimate of the low-level radiation risk. This is due, in large part, to the observed and estimated low incidence of radiation health effects from low doses. However, the results of ongoing studies, such as that on nuclear shipyard workers, will be carefully reviewed and the development of a radiation-worker registry is being considered as a possible data base for future studies.

23. What are the reasons for not lowering the NRC dose limits?

Assuming that the 5-rem-per-year limit is adopted, there are three reasons:

a. Health risks are already low.

The estimated health risks associated with current average occupational radiation doses (e.g., 0.5 rem/yr for 50 years) are comparable to or less than risk levels in other occupational areas considered to be among the safest. If a person were exposed to the maximum of 5 rems per year for 50 years, which virtually never occurs, he or she might incur a risk comparable to the average risks in mining and heavy construction. An occasional 5-rem annual dose might be necessary to allow some jobs to be done without a significant increase in the collective dose. If the dose limits were lowered significantly, the number of people required to complete many jobs would increase. The collective dose would then increase since more individuals would be receiving nonproductive exposure while entering and leaving the work area and preparing for the job. The total number of health effects might go up as the collective dose increased.

b. The current regulations are considered sound.

The regulatory standards for dose limits are based on the recommendations of the Federal Radiation Council. At the time these standards were developed, about 1960, it was considered unlikely that exposure to these levels during a working lifetime would result in clinical evidence of injury or disease different from that occurring in the unexposed population. The scientific data base for the standards consisted primarily of human experience (x-ray exposures to medical practitioners and patients, ingestion of radium by watch dial painters, early effects observed in Japanese atomic bomb survivors, radon exposures of uranium miners, occupational radiation accidents) involving very large doses delivered at high dose rates. The data base also included the results of a large number of animal experiments involving high doses and dose rates. The animal experiments were particularly useful in the evaluation of genetic effects. The observed effects were related to low-level radiation according to the linear model explained in Question 7. Based on this approach, the regulations in 10 CFR Part 20, "Standards for Protection Against Radiation," also state that licensees should maintain all radiation exposures, and releases of radioactive materials in effluents, as low as is reasonably achievable. More recent scientific reviews of the large body of experimental data, such as the BEIR-80 and the recent EPA guidance, continue to support the view that use of a 5-rem-per-year limit is acceptable in practice. Experience has shown that, under this limit, the average dose to workers is near 0.5 rem/yr with very few workers consistently approaching the limit.

c. There is little to gain.

Reducing the dose limits, for example, to 0.5 rem/yr has been analyzed by the NRC staff. An estimated 2.6 million person-rems could be saved from 1980 through the year 2000 by nuclear power plant licensees if compliance with the new limit were achieved by lowering the radiation levels, working times, or both, rather than by using extra workers. It is estimated that something like $23 billion would be spent toward this purpose. Spending $23 billion to save 2.6 million person-rems would amount to spending $30 to $90 million to prevent each potential radiation-induced premature cancer death. Society considers this cost unacceptably high for individual protection.

24. Are there any areas of concern about radiation risks that might result in changing the NRC dose limits?

Yes. Three areas of concern to the NRC staff are specifically identified below:

a. An independent study by Rossi and Mays and other biological research have indicated that a given dose of neutron radiation may be more likely to cause biological effects than was previously thought. Other recent studies cast doubt on the issue. The NCRP is currently studying the data related to the neutron radiation question and is expected to make recommendations as to whether neutron dose limits should be changed. Although the scientific community has not yet come to agreement on this question, workers should be advised of the possibility of higher risk when entering areas where exposure to neutrons will occur.

b. It has been known for some time that rapidly growing living tissue is more sensitive to injury from radiation than tissue in which the cells are not reproducing rapidly. Thus the embryo or fetus is more sensitive to radiation injury than an adult. The NCRP recommended in Report No. 39 that special precautions be taken when an occupationally exposed woman could be pregnant in order to protect the embryo or fetus. In 1975, the NRC issued Regulatory Guide 8.13, "Instruction Concerning Prenatal Radiation Exposure," in which it is recommended that licensees instruct all workers concerning this special risk. The guide recommends that all workers be advised that the NCRP recommended that the maximum permissible dose to the embryo or fetus from occupational exposure of the mother should not exceed 0.5 rem for the full 9-month pregnancy period. In addition, the guide suggests options

available to the female employee who chooses not to expose her embryo or fetus to this additional risk.

The United States Department of Health and Human Services is similarly concerned about prenatal exposure from medical x-rays. In 1979 they published proposed guidelines for physicians concerning abdominal x-rays for possibly pregnant women. The guidelines in effect encourage the x-ray staff to make efforts to determine whether a female patient is pregnant and to defer x-rays if possible until after the child is born.

c. Also of special interest is the indication that female workers are subject to more risk of cancer incidence than male workers. In terms of all types of cancer except leukemia, the BEIR-80 analysis indicates that female workers have a risk of developing radiation-induced cancer that is approximately one and one-half times that for males. This increased risk is primarily due to the incidence of breast and thyroid cancer in women. These types of cancer, however, have a high cure rate. Thus the difference between men and women in cancer mortality is not great. Incidence of radiation-induced leukemia is about the same for both sexes. Female workers should be aware of this difference in the risks of radiation-induced cancer in deciding whether or not to seek work involving exposure to radiation.

25. How much radiation does the average person who does not work in the nuclear industry receive?

We are all exposed from the moment of conception to ionizing radiation from several sources. Our environment, and even the human body, contains naturally occurring radioactive materials that contribute some of the background radiation we receive. Cosmic radiation originating in space and in the sun contributes additional exposure. The use of x-rays and radioactive materials in medicine and dentistry adds considerably to our population exposure.

Table 6 shows estimated average individual exposure in millirems from natural background and other sources.

TABLE 6

U.S. General Population Exposure Estimates (1978)[6]

Source	Average Individual Dose (mrem/yr)
Natural background (average in U.S.)	100
Release of radioactive material in natural gas, mining, milling, etc.	5
Medical (whole-body equivalent)	90
Nuclear weapons (primarily fallout)	5-8
Nuclear energy	0.28
Consumer products	0.03
Total	~200 mrem/yr

[6] Adapted from a report by the Interagency Task Force on the Health Effects of Ionizing Radiation published by the Department of Health, Education, and Welfare.

Thus, the average individual in the general population receives about 0.2 rem of radiation exposure each year from sources that are a part of our natural and man-made environment. By the age of 20 years, an individual has accumulated about 4 rems. The most likely target for reduction of population exposure is medical uses.

26. Why aren't medical exposures considered as part of worker's allowed dose?

Equal doses of medical and occupational radiation have equal risks.[7] Medical exposure to radiation should be justified for reasons quite different, however, from those applicable to occupational exposure. A physician prescribing an x-ray should be convinced that the benefit to the patient of the resulting medical information justifies the risk associated with the radiation. Each worker must decide on the acceptance of occupational radiation risk just as each worker must decide on the acceptability of any other occupational hazard.

For another point of view, consider a worker who receives a dose of 2 rems from a series of x-rays or a radioactive medicine in connection with an injury or illness. This dose and the implied risk should be justified on medical grounds. If the worker had also received a dose of 2 rems on the job, the combined dose of 4 rems would not incapacitate the worker. A dose of 4 rems is not especially dangerous and is not large compared to the cumulative lifetime dose. Restricting the worker from additional job exposure during the remainder of the quarter would have no effect one way or the other on the risk from the 2 rems already received from medical exposure. If the individual worker accepts the risks associated with the x-rays on the basis of the medical benefits and the risks associated with job-related exposure on the basis of employment benefits, it would be unfair to restrict the individual from employment in radiation areas for the remainder of the quarter.

Some therapeutic medical doses such as those received from cobalt-60 treatment can range as high as 6000 rems to a small part of the body, spread over a period of several weeks or months.

27. What is meant by internal exposure?

The total radiation dose to the worker is the external dose (measured by the film badge and reported as "whole-body dose") plus the dose from internal emitters. The monitoring of the additional internal dose is difficult. Because there is the possibility of internal doses occurring, a good air-monitoring program should be established when warranted.

The uptake of radioactive materials by workers is generally due to breathing contaminated air. Radioactive materials may be present as fine dust or gases in the workplace atmosphere. The surfaces of equipment and workbenches

[7] It is likely that a significant portion of reported medical x-ray exposure is to parts of the body only. An exposure of [illegible]

may be contaminated. Radioactive materials may enter the body by being breathed in, taken in with food or drink, or being absorbed through the skin, particularly if the skin is broken.

After entering the body, the radioactive material will migrate to particular organs or particular parts of the body depending on the biochemistry of the material. For example, uranium will tend to deposit in the bones where it will remain for a long time. It is slowly eliminated from the body, mostly by way of the kidneys. Radium will also tend to deposit in the bones. Radioactive iodine will seek out the thyroid glands (located in the neck) and deposit there.

The dose from these internal emitters cannot be measured either by the film badge or by other ordinary dosimeters carried by the worker. This means that the internal radiation dose must be separately monitored using other detection methods.

Internal exposure can be estimated by measuring the radiation emitted from the body or by measuring the radioactive materials contained in biological samples such as urine or feces. Dose estimates can also be made if one knows how much radioactive material is in the air and the length of time during which the air was breathed.

28. How are the limits for internal exposure set?

Standards have been established for the maximum permissible amount of each radionuclide that may be accumulated in the critical organs[8] of the worker's body.

Calculations are made to determine the quantity of radioactive material that has been taken into the body and the total dose that would result. Then, based on limits established for particular body organs similar to 1¼ rems in a calendar quarter for whole-body exposure, the regulations specify maximum permissible concentrations of radioactive material in the air to which a worker can be exposed for 40 hours per week over 13 weeks or 1 calendar quarter. The regulations also require that efforts be made to keep internal exposure ALARA.

Internal exposure is controlled by limiting the release of radioactive material into the air and by carefully monitoring the work area for airborne radioactivity and surface contamination. Protective clothing and respiratory (breathing) protection should be used whenever the possibility of contact with loose radioactive material cannot be prevented.

29. Is the dose a person received from internal exposure added to that received from external exposure?

Exposure to radiation that results from radioactive materials taken into the body is measured, recorded, and reported to the worker separately from external dose. The internal dose to the whole body or to specific organs does not at this time count against the 3-rem-per-calendar-quarter limit. ICRP recommends that the internal and external doses should be appropriately added. This recommendation is currently under study by the staffs of the NRC, the EPA, and the Occupational Safety and Health Administration (OSHA).

30. How is a worker's external radiation dose determined?

A worker may wear three types of radiation-measuring devices. A self-reading pocket dosimeter records the exposure to incident radiation and can be read out immediately upon finishing a job involving external exposure to radiation. A film badge or TLD badge records radiation dose, either by the amount of darkening of the film or by storing energy in the TLD crystal. Both these devices require processing to determine the dose but are considered more reliable than the pocket dosimeter. A worker's official report of dose received is normally based on film or TLD badge readings, which provide a cumulative total and are more accurate.

31. What are my options if I decide not to accept the risks associated with occupational radiation exposure?

If the risks from exposure to radiation that may be expected to occur during your work are unacceptable to you, you could request a transfer to a job that does not involve exposure to radiation. However, the risks associated with exposure to radiation that workers, on the average, actually receive are considered acceptable, compared to other occupational risks, by virtually all the scientific groups that have studied them. Your employer is probably not obligated to guarantee you a transfer if you decide not to accept an assignment requiring exposure to radiation.

You also have the option of seeking other employment in a nonradiation occupation. However, the studies that have compared occupational risks in the nuclear industry to those in other job areas indicate that nuclear work is relatively safe. Thus, you will not necessarily find significantly lower risks in another job.

A third option would be to practice the most effective work procedures so as to keep your exposure ALARA. Be aware that reducing time of exposure, maintaining distance from radiation sources, and using shielding can all lower your exposure. Plan radiation jobs carefully to increase efficiency while in the radiation area. Learn the most effective methods of using protective clothing to avoid contamination. Discuss your job with the radiation protection personnel who can suggest additional ways to reduce your exposure.

32. Where can I get additional information on radiation risk?

The following list suggests sources of useful information on radiation risk:

a. Your Employer

The radiation protection or health physics office in the facility where you are employed.

[8] Critical organ refers to those parts of the body vulnerable to radiation damage such as bone, lungs, thyroid, and other systems where certain radioactive materials will concentrate if taken into the body.

b. *Nuclear Regulatory Commission*

Regional Offices

King of Prussia, PA 19406	215-337-5000
Atlanta, GA 30303	404-221-4503
Glen Ellyn, IL 60137	312-932-2500
Arlington, TX 76012	817-334-2841
Walnut Creek, CA 94596	415-943-3700

Headquarters

Occupational Radiation Protection Branch
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Telephone: 301-443-5970

c. *Department of Health and Human Services*

Office of the Director
Bureau of Radiological Health (HFX-1)
Department of Health and Human Services
5600 Fishers Lane
Rockville, MD 20857

Telephone: 301-443-4690

d. *Environmental Protection Agency*

Office of Radiation Programs
U.S. Environmental Protection Agency
401 M Street, SW
Washington, D.C. 20460

Telephone: 703-557-9710

BIBLIOGRAPHY

American Cancer Society, *1979 Cancer Facts and Figures*, 1978.

Anderson, T.W., "Radiation Exposure of Hanford Workers: A Critique of the Mancuso, Stewart, and Kneale Report," *Health Physics*, Vol. 35, December 1978.

Archer, V E., "Effects of Low-Level Radiation: A Critical Review," *Nuclear Safety*, Vol. 21, No. 1, January-February 1978.

Atomic Energy Commission, *Operational Accidents and Radiation Exposure Experience*, WASH-1192, Fall 1975.

Barnett, M.H., *The Biological Effects of Ionizing Radiation: An Overview*, Department of Health, Education, and Welfare Publication (FDA) 77-8004, October 1976.

Cohen, B.L., and Lee, I.S., "A Catalog of Risks," *Health Physics*, Vol. 36, June 1979.

Cook, J., and Nelson, D., *Occupational Exposures to Ionizing Radiation in the United States: A Comprehensive Summary for 1975*, EPA 520/4-80-001, Environmental Protection Agency.

Department of Health, Education, and Welfare, *Biologic Effects of Ionizing Radiation*, Report of the Science Work Group of the Interagency Task Force on Radiation, June 1979.

Dreyer, N.A., et al., *The Feasibility of Epidemiologic Investigations of the Health Effects of Low-Level Ionizing Radiation*, NUREG/CR-1728, Nuclear Regulatory Commission, November 1980.

Gilbert, E.S., "Assessment of Risks from Occupational Exposure to Ionizing Radiation," in *Energy and Health Proceedings of the Conference on Energy and Health*, June 26-30, 1978, SIAM Publication, Philadelphia, 1979.

Gofman, J.W., "The Question of Radiation Causation of Cancer in Hanford Workers," *Health Physics*, Vol. 37, November 1979.

Gotchy, R.L., "Estimation of Life Shortening Resulting from Radiogenic Cancer per Rem of Absorbed Dose," *Health Physics*, Vol. 35, October 1978.

Hall, E.J., *Radiation and Life*, Pergamon Press, 1976.

International Commission on Radiological Protection, *Problems Involved in Developing an Index of Harm, Annals of the ICRP*, ICRP Publication 27, Pergamon Press, May 1977.

International Commission on Radiological Protection, *Radiation Protection*, Recommendations of the International Commission on Radiological Protection, ICRP Publication 26, Pergamon Press, January 1977.

Kelsey, C.A., "Comparison of Relative Risk from Radiation Exposure and Other Common Hazards," *Health Physics*, Vol. 35, August 1978.

Lapp, R.E., *The Radiation Controversy*, Reddy Communications, Inc., Greenwich, Connecticut, 1979.

Lapp, R.E., *A Worker's Guide to Radiation*, Atomic Industrial Forum, August 1979.

Linos, A., et al., "Low Dose Radiation and Leukemia, Mayo Clinic and Foundation, Rochester, Minn.," *New England Journal of Medicine 1980*; Vol. 302, pp. 1101-1105.

Mancuso, T.F., Stewart, A., and Kneale, G., "Radiation Exposures of Hanford Workers Dying from Cancer and Other Causes," *Health Physics*, Vol. 33, November 1977.

Miller, R., "Natural Radiation Background vs. Radiation from Nuclear Power Plants," *Journal of Environmental Sciences*, August 1972.

Najarian, T., and Colton, T., "Mortality from Leukemia and Cancer in Shipyard Nuclear Workers," *Lancet*, I: May 1978.

National Academy of Sciences, *The Effects on Populations of Exposure to Low Levels of Ionizing Radiation*, Report of the Committee on the Biological Effects of Ionizing Radiation (BEIR), 1980.

Rossi and Mays, "Leukemia Risk from Neutrons," *Health Physics*, Vol. 34, pp. 353-360, 1978.

Schottenfeld, D., and Haas, J., "Carcinogens in the Workplace," *CA-A Cancer Journal for Clinicians*, Vol. 29, No. 3, May-June 1979.

United Nations Scientific Committee on the Effects of Atomic Radiation, 1977, *Sources and Effects of Ionizing Radiation*, Report to the General Assembly, UN Publication No. E.77.IX.1, 1977.

Upton, Arthur C., "Radiation from Nuclear Power Exaggerated," *New England Journal of Medicine*, Vol. 302, pp. 1205-1206, May 22, 1980.

World Health Organization, *Health Implications of Nuclear Power Production*, Report of a Working Group, December 1975.

APPENDIX D

SURFACE RADIOACTIVITY GUIDES

APPENDIX D

	NUCLIDE[1]	REMOVABLE[2,3]	TOTAL[2,3] (FIXED PLUS REMOVABLE)
(3)	U-nat, U-235, U-238,	1,000 dpm a/100 cm^2	5,000 dpm a/100 cm^2 and associated decay products
(1)	Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	20 dpm/100 cm^2	300 dpm/100 cm^2
(2)	Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	200 dpm/100 cm^2	1,000 dpm/100 cm^2
(3)	Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.[5]	1,000 dpm b-g/100 cm^2	5,000 dpm b-g/100 cm^2

NOTES

3288

1 Where surface contamination by both alpha-and beta-gamma-emitting nuclides exists, the limits established for alpha-and beta-gamma-emitting nuclides should apply independently.

2 As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

3 The levels may be averaged over one square meter provided the maximum surface activity in any area of 100 cm^2 is less than three times the guide values. For purposes of averaging, any square meter of surface shall be considered to be above the activity guide G if: (1) from measurements of a representative number n of sections it is determined that the sum of all contamination levels for each section divided by the number of sections is greater than or equal to G; or (2) it is determined that the sum of the activity of all isolated spots or particles in any 100 cm^2 area exceeds 3G.

4 The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. (Note - The use of dry material may not be appropriate for tritium.) When removable contamination on objects of surface area less than 100 cm^2 is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. Except for transuranics and Ra-226, Ra-228, Ac-227, Th-228, Th-230, and Pa-231 alpha emitters, it is not necessary to use wiping techniques to measure removable contamination levels if direct scan surveys indicate that the total residual surface contamination levels are within the limits for removable contamination levels are within the limits for removable contamination.

5 This category of radionuclides includes mixed fission products, including the SR-90 which is present in them. It does not apply to SR-90 which has been separated from the other fission products or mixtures where the SR-90 has been enriched.

APPENDIX E

3288

USE OF CONTAINMENTS

E.1 Use of Contamination Containment Areas

E.1.1 Discussion
E.1.2 Types of containments available at FEMP
E.1.3 Containment inspection criteria
E.1.4 General rules for installing containments
E.1.5 General rules for working in containments
E.1.6 General rules for removing containments
E.1.7 Emergency situations
E.1.8 Use of plastic bags as containments
E.1.9 Containment of mechanical joints

E.1. Use of Contamination Containment Areas

E.1.1 Discussion

The purpose of a contamination containment is to minimize radioactive contamination to the smallest possible area.

Before a contaminated system is opened, it is necessary to ensure that a non-contaminated protective barrier is placed surrounding the system.

Use of containment has the following advantages:

1) Contamination is confined to the radiological area.

2) Individuals performing work are less likely to be exposed to contamination deposited in clothing, on skin, or internally.

3) Discomfort and physical stress from anti-Contamination clothing is minimized.

4) Generation of radioactive waste is minimized by reducing the use of anti-contamination clothes.

It may not be practical and necessary to use a full tent containment for some operations, however, contamination containment should always be considered.

All affected employees must be trained on these containments prior to their work in a contaminated area. All cases of containment areas must be planned in advance and reviewed by Radiological Safety.

This appendix addresses containment use for radiological purposes only and does not consider any other contamination hazard (e.g. asbestos).

Use of containment should be considered when opening highly Radioactive Systems for repair (such as the Radon Treatment System or Process Ventilation Lines) or when performing highly Radioactive work outside (K65 sampling).

E.1.2 Types of containments Available at FEMP

All containments at the FEMP must be purchased from an outside vendor, or fabricated on site to fit the particular situation. All containments used for radiological purposes shall be approved by Radiological Engineering prior to use.

3288

E.1.3 Containment Inspection Criteria

Prior to use or re-use, the containment must be inspected for damage by Radiological Safety personnel. The minimum inspection shall include checking for pulls or tears at the corners, and full continuous seals on the seams. The containment inspection checklist (table 1) will be used for this inspection. While in use containments are to be inspected daily, and no containment is to be used if the inspection is over 48 hours old.

E.1.4 General Rules for Installing Containments

Pre-assemble the containment as much as possible before moving it into a Contamination Area or Radiation Area. It is necessary to check the location where it will be used and to:

a. Install rubber gloves in glove sleeves that are utilized. Blank off all other glove sleeves. Select the proper size for users. Install right and left handed gloves in their proper places.

b. Drain lines are only used if liquid is expected to drain into the containment area. If liquid is not expected, absorbent pads or paper will substitute for a drain. Drains are installed in the lowest part of the containment and drain either to a poly bottle or an approved floor drain. When working with enriched product, or unknown material, consult with Nuclear & System Safety for criticality concerns.

c. Attach support cords and rubber bands to tie-offs as necessary.

d. Install high efficiency filter. A 2 CFM filter is used when pneumatic tools are not used in the containment or it is at static pressure. A 40 CFM filter is used in highly contaminated systems, work requiring pneumatic tools, and in containments under high negative pressure. A high efficiency filter may not be required if a pneumatic tool is not used and a drain line is installed.

e. To prevent additional contamination cover any piping or components which may be exposed in the area with tape or sleeving.

f. In cases where the piping or components are at temperatures above 120°F and can come in contact with the containment, cover surfaces with thermal insulation material.

g. Place any required equipment too large for the containment opening inside the containment prior to sealing.

h. Seal the containment in place using closure zipper, hose clamps, and cloth backed tape as appropriate. Do not force zippers; they glide easily when properly lined up. After closing, seal zippers using cloth backed tape.

i. Install service leads or hoses through unused glove sleeves and seal.

j. Install drop lighting outside the containment area in such a manner as to prevent light reflection from interfering with the work area and heat from the lighting damaging the containment material. Drop lighting must be attached to ground fault interrupt circuit and meet 1910.120 Section M for lighting.

k. When installing a containment outside, expected temperatures should be considered. Work in containment should be suspended if outside temperature is below 32°F to prevent damage to the bag. On hot days, work will be governed by wet bulb glove temperature measured by Industrial Hygiene.

E.1.5 General Rules for Working in Containments

a. Wear cloth gloves inside the rubber gloves of the containment permitting the rubber gloves to slide on and off easily.

b. Take care to prevent puncturing the containment and filter. Tape over any punctures and immediately notify Radiological Safety personnel.

c. Adjust lighting to minimize glare.

d. Avoid spraying water inside the containment since vapor will collect on the inside surfaces and obstruct vision. Always blow water out of air lines before operating them inside the containment.

e. Tap water and soap are recommended for decontamination inside containments. Other cleaning agents used shall be approved by Industrial Hygiene.

f. Welding and burning is strictly forbidden inside containments made from combustible material without express written permission from the manager of WEMCO IRS&T.

g. Use only HEPA vacuums in containment areas. When vacuuming inside containment areas, use the brush attachment to prevent damage to the containment. A high efficiency filter shall be installed on air intake when using vacuum cleaners to prevent collapsing the bag. Use of a smoke tube is recommended to verify ventilation flow and negative pressure inside containment.

3288

E.1.6 General Rules for Removing Containments

a. Gently remove contaminated items from containment. Items should be cleaned or bagged for removal.

b. Vacuum or wipe clean interior surfaces of containment. Use only water and soap.

c. Remove tubing and wiring in protective sleeving by turning the sleeving inside out and twisting off.

d. Remove support cords.

e. Gently collapse containment. The vacuum cleaner may be used by sealing off the HEPA filter.

f. Carefully remove seals.

g. Gently push as much as possible of the containment into a large plastic bag and carefully cut the containment away from the component.

h. Carefully remove protective coverings and remaining tape from components which were inside the containment and place them in the plastic bag.

i. Carefully seal bag and remove from area.

E.1.7 Emergency Situations

Any breech of containment constitutes a spill and spill procedures should be initiated immediately. The containment should be patched as soon as possible and Radiological Safety and the AEDO notified immediately.

E.1.8 Use of Plastic Bags as Containments

Use of thin plastic bags such as trash bags shall not be used as permanent containers.

E.1.9 Containment of Mechanical Joints

When mechanical joints cannot be hydrostatically tested prior to use, these joints should be wrapped to contain any leakage. This can be with a poly bag sealed with absorbents. This containment should be inspected more frequently and the absorbent changed when it becomes saturated.

335

TABLE 1
CONTAINMENT AND TENT INSPECTION CHECKLIST

LOCATION _____

TECHNICIAN_____ DATE_____ TIME_____

CERTIFIED: YES___ NO___ DEFICIENCIES REPORTED TO USER YES__ NO__

ITEM	SATISFACTORY? YES	NO	N/A
1. CONTAINMENT ADEQUATELY SUPPORTED			
2. PROPER TOOLS INSTALLED FOR THE JOB. SHARP EDGES TAPED OVER, POWER TOOLS UNPLUGGED			
3. COMPONENTS AND TOOLS MASKED WITH TAPE OR SLEEVING TO MINIMIZE DECONTAMINATION			
4. MEANS OF SUPPORT PROVIDED FOR COMPONENTS BEING REMOVED			
5. HEAT SEALS INTACT			
6. GLOVES PROPERLY SEALED AND INTACT			
7. ZIPPERS ARE TAPED INSIDE AND OUT			
8. OTHER COMPONENTS PROPERLY INSTALLED (DRAIN LINE, VENT FILTER)			
9. HEPA VACUUM DOP TESTED (IF USED)			
TENTS			
10. ASSURE TENT IS FREE OF TEARS, RIPS, ETC			
11. VERIFY SOP AND ANTI-C REQUIREMENTS ARE POSTED AT ENTRANCE			
12. VERIFY PROPER AIR FLOW			
13. VERIFY AIR SAMPLER INSTALLATION			
14. CHECK FOR SATISFACTORY HOUSEKEEPING. TRIPPING HAZARDS MINIMIZED, UNNECESSARY MATERIALS REMOVED FROM TENT			
15. VERIFY LIGHTING IS ADEQUATE			
16. VERIFY CONTAMINATION LEVELS ARE ACCEPTABLE AS POSTED ___DPM BETA __DPM ALPHA			

Westinghouse
Materials Company
of Ohio — FMPC

NUMBER:	REVISION:	ISSUE DATE:
FMPC-505	0	12/02/88

TITLE: RADIATION CONTROL 3288

SITE POLICY AND PROCEDURE

APPROVED BY: M. B. BOSWELL, PRESIDENT

1.0 POLICY

The Westinghouse Materials Company of Ohio (WMCO) shall develop and implement protective controls, based on the requirements of the Department of Energy (DOE), for the handling and use of radioactive materials and equipment (including radiation sources) to keep radiation exposure and radioactive contamination as low as reasonably achievable.

2.0 SCOPE

This procedure identifies the safety requirements and assigns the responsibilities for the control of radioactive materials and personnel radiation exposure and contamination at the Feed Material Production Center (FMPC).

3.0 DEFINITIONS

3.1 Controlled Area - A defined area in which the occupational exposure of personnel to radiation or radioactive material is controlled.

3.2 Radiation - Energy emitted in the form of alpha, beta, gamma, neutron or X-rays during the process of radioactive decay of an unstable atom, or by the operation of a radiation generating device.

3.3 Radiation Worker - Any individual who in the course of his or her employment may receive 10% or more of the annual occupational radiation dose. Also any individual who works directly with radioactive material or radiation generating devices.

3.4 Radiation Source - Usually a manufactured, sealed source of radioactive material used in teletherapy, radiography, as in ionization source for smoke detectors or in various types of industrial gauges. Machines such as accelerators and radioisotope generators and naturally occurring radionuclides may also be considered sources.

3.5 Radiological Control Programs - Those programs that have been developed for the safe handling of radioactive material and control of personnel exposure to ionizing radiation.

3.6 Radioactive Contamination - A deposit of uncontained or unwanted radioactive material typically on the surface of structures, areas, objects or personnel. It may be carried in air or liquids.

3.0 DEFINITIONS (Continued)

3.7 Radiation Work Permit - A permit to administratively control routine, non-routine or periodic routine tasks which involve the potential for significant radiation exposures.

3.8 Site Source Permit - A permit authorizing possession and use of a radiation source at the FMPC. The permit specifies the source to be used, the person who may use the source, and the conditions under which it may be used.

4.0 RESPONSIBILITIES

4.1 Staff Managers - Responsible for implementing the applicable sections of the Radiation Control Manual, FMPC-2084, in their department and for appointing a Department Source Custodian when required.

4.2 Department Source Custodians - Responsible for the receipt, leak test, inventory, and disposal of sources controlled by the department. Also acts as the liaison between the user(s), the Site Source Custodian, and the Radiological Safety Technicians.

4.3 Site Source Custodian - Responsible for maintaining inventory, receipt, leak test, and disposal records for all radiation sources at the FMPC.

4.4 Employees - Responsible for working in a safe manner and identifying potential hazards to supervision.

4.5 Supervisors - Shall investigate potential hazards and recommend appropriate remedial actions.

4.6 Operations Health and Safety - Reponsible for the maintenance of the Radiation Control Manual. Sets contamination standards for the FMPC.

5.0 GENERAL

5.1 The Radiation Control Manual defines the radiation control policies, responsibilities and protective measures used by WMCO in the operation of the Feed Materials Production Center (FMPC). Radiological controls are invoked in areas where radioactive materials are handled and in areas where potentially contaminated materials may be stored.

5.2 In emergencies where personnel health and safety are involved, life saving actions of personnel take precedence over the radiological controls specified in FMPC-2084.

6.0 PROCEDURE

Radiation control shall be accomplished in accordance with the requirements and instuctions contained in Topical Manual FMPC-2084, Radiation Control Manual.

3288

7.0 APPLICABLE DOCUMENTS

DOE Order 5480.1B	Environmental Protection, Safety and Health Protection Program For DOE Operations
OR Order 5480.1A	Environmental Protection, Safety and Health Protection Program for Oak Ridge Operations
10 CFR 20	Standard Protection Against Radiation
10 CFR 71	Packaging and Transportation of Radioactive Material
49 CFR 100-199	Research and Special Programs Administration
FMPC-2084	Radiation Control Manual

8.0 FORMS USED

None

9.0 ATTACHMENTS

None

340

99-1059

PL-FMPC-3002

3288

ASBESTOS MANAGEMENT PLAN

FEED MATERIALS PRODUCTION CENTER

ISSUE DATE: September 28, 1990

AUTHORIZED BY

W. H. Britton

FEED MATERIALS PRODUCTION CENTER

Westinghouse Materials Company of Ohio

P. O. BOX 398704

CINCINNATI, OHIO 45239-8704

341

R.B. GRANT

CONTENTS

3288

ACRONYMS 4

1.0 EXECUTIVE SUMMARY 5
1.1 Current Status 5
1.2 Graphic Display 8

2.0 GENERAL 10
2.1 Introduction 10
2.2 Background 10

PART I - SITE SURVEY FOR ASBESTOS-CONTAINING MATERIALS 12

3.0 SITE INSPECTION 12
3.1 Scope 12
3.1.1 Definition 12
3.1.2 Previous Sampling 12
3.2 Inspection Schedule 13
3.3 Inspector Training 13
3.4 Inspection Procedures 14
3.4.1 Friable Surfacing Materials 15
3.4.2 Thermal System Insulation 15
3.4.3 Miscellaneous 16
3.4.4 Potentially Radioactive Materials 17
3.5 Sample Procedures 17
3.6 Friability 20

4.0 ANALYSIS OF BULK SAMPLES 21

5.0 DOCUMENTATION OF LOCATION OF ACM 22
5.1 CAD/CAM 22
5.2 Labeling 22
5.3 Notices 24

6.0 ESTIMATION OF MATERIAL QUANTITIES 25

7.0 PHYSICAL ASSESSMENT OF ACM 25
7.1 AHERA 25
7.1.1 Current Condition. 25
7.1.2 Potential for Disturbance 25
7.1.3 ERA Form 26

342

7.2 GRADE System 26
7.2.1 Exposure Factor 26
7.2.2 Damage 28
7.2.3 ERA Form 28

PART II - MANAGEMENT PLAN 31

8.0 HAZARD ASSESSMENT 31
8.1 Procedures 31
8.2 Results 34

9.0 RESPONSE ACTIONS 36
9.1 Prioritized List and Associated Costs 36
9.2 Schedule 37

10.0 WMCO RESPONSIBILITIES 37
10.1 Personnel Designated for ACM Involvement 37
10.2 Notification Procedures 38
10.2.1 Prior and Current Notification 38
10.2.2 Future notification 39
10.3 Training 40
10.3.1 Awareness Training 40
10.3.2 Worker Asbestos Training 40
10.3.3 Supervisor Asbestos Training 40

10.3.4 Industrial Hygiene Technician Asbestos Training 41
10.3.5 Subcontractor/Vendor Employee Asbestos Program 41
10.4 FMPC Asbestos Operation and Maintenance (O&M) Procedures .. 41
10.5 Recordkeeping 43

11. APPLICABLE DOCUMENTS 44

3288

LIST OF FIGURES

1. SAMPLE LOCATION TAG 6
2. GRAPHIC DISPLAY 9
3. CHAIN-OF-CUSTODY RECORD 19
4. BUILDING ACM NOTICE 24
5. CERTIFICATE OF CLEARANCE 24
6. EXPOSURE RISK ASSESSMENT/EVALUATION FORM 27
7. CLASSIFICATIONS FOR HAZARD POTENTIAL 32
8. RESPONSE ACTIONS BASED ON HAZARD RANKING 33

LIST OF TABLES

1. SURVEY TABULAR FORMAT 30
2. HAZARD PRIORITY TABLE 35

344

ACRONYMS

ACM - Asbestos Containing Material
AEDO - Assistant Emergency Duty Officer
AHERA - Asbestos Hazard Emergency Response Act
ALARA - As Low As Reasonably Achievable
DOE - Department of Energy
EPA - Environmental Protection Agency
FMPC - Feed Materials Production Center
HEPA - High Efficiency Particulate Air
IH - Industrial Hygiene
ODOH - Ohio Department Of Health
OSHA - Occupational Safety and Health Agency
PCM - Phase Contrast Microscopy
PLM - Polarized Light Microscopy
TEM - Transmission Electron Microscopy
TSI - Thermal System Insulation
WMCO - Westinghouse Materials Company of Ohio

1.0 EXECUTIVE SUMMARY

3288

1.1 Current Status

Since the intent is to keep this Asbestos Management Plan both current and accurate regarding the management of asbestos-containing materials (ACM), the following discusses the past accomplishments for ACM control; current policies and procedures; and those activities that are planned as of 9/1/90. Subsequent revisions to the Plan will change both this Current Status Section as well as the Sections that are affected by anticipated Regulation changes, the Site Survey, completed abatement projects, etc.

During the last several years, the following has either been completed or is in progress to achieve control of ACM:

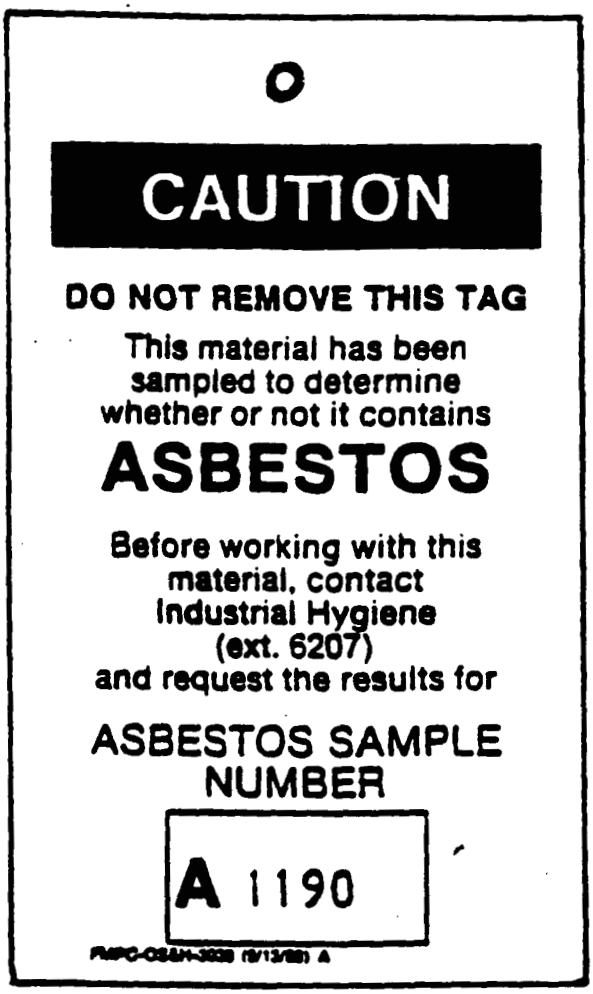
- Approximately 1,900 bulk samples were taken and analyzed from material that was suspected to be ACM. These sample locations were tagged (Figure #1) with a notice to call Industrial Hygiene (IH) regarding the results of the sample, if there was a possibility of disturbing the material.

- Over 100 air samples are now being taken on a monthly basis from various parts of the plant site, in order to ensure that the airborne fibers levels are kept within 0.01 fibers/cu. cm. on an 8-hour time weighted average. Area air samples are also taken of work projects, and personal air samples are taken for WMCO workers to comply with OSHA regulations.

- Any anticipated disturbance of ACM requires an Asbestos Work Permit, whereby IH reviews the work to be done and compiles a checklist of required activities before the project is begun.

346

346



SAMPLE LOCATION TAG

FIGURE 1

- Workers and Supervisors receive more than the OSHA designated training, in order to assure that the job is done properly.

3288

- The medical and respirator programs required by OSHA are in compliance for those involved with ACM abatement.

- There are policies developed for both routine and emergency situations regarding ACM.

- During the past few years, Stores' inventory of asbestos containing materials has been reviewed and these have been replaced with asbestos-free materials.

- Recently, nine Pipefitters who were previously laid off were re-hired and trained to perform small-scale abatement jobs, to successfully complete the work orders that have accrued which involve small amounts of asbestos repair or removal.

Presently there is a good degree of control; however, a total survey of the site is needed. The format of the Survey will be per AHERA, the Asbestos Hazard Emergency Response Act that was passed by Congress for identification and management of ACM in schools. AHERA is now considered to be the minimum standard for these activities, and both the Site Survey Specifications and this Management Plan go "beyond" AHERA where it is considered prudent to do so.

Six highly qualified companies have been invited to bid the Survey, which is now anticipated to start in the beginning of October and is scheduled to be completed by July of 1991. The results of the Survey have been designed to fit into this Management Plan and will define exactly where ACM is located, the condition of the ACM, recommended response actions, priority schedules, and anticipated costs for budgeting purposes.

348

While the Survey is being conducted, all existing policies and controls mentioned in this Plan will remain in effect.

Future asbestos program changes required due to new regulations, etc. will be discussed in revised Management Plans and implemented per Section 10.4.

1.2 Graphic Display

A unique feature of this Management Plan is the display of Survey results in a 3-axis Graphic format.

Along one axis, the Current Condition of the ACM will be assessed as either Good, Fair, or Poor. Along the second axis, the Potential for Disturbance of the ACM will be assessed as either Low, Moderate, or High. Section 7 describes how the ACM will be assessed into these various categories.

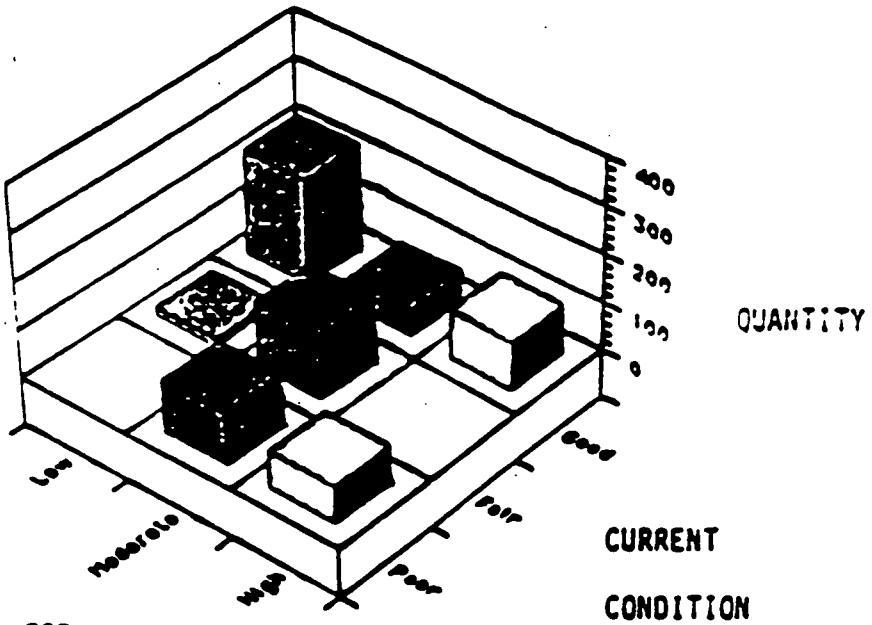
The third axis can represent the quantity of the ACM in terms of linear feet (such as pipe insulation), square feet (such as Transite siding), or numbers (such as pipe fittings). Instead of quantities, this third axis can be used to represent costs - such as abatement, replacement, maintenance, etc.

This distinctive type of display accomplishes the following:

- Allows for much easier comprehension of the Site Survey results.
- Over a period of time, clearly shows the progress that has been made due to abatement and other procedures (limiting access, etc.) It therefore provides an excellent communication vehicle to management, employees, Facility Owners, the DOE, and selected others for this information.
- Can be used as a simulation model for determining future ACM activities, including budgeting.

An illustration of the Graphic format is shown in Figure #2.

3288



GRAPHIC DISPLAY
FIGURE 2

When the Site Survey is completed, only the Summary Graphic Information will be presented in this Section of the Management Plan; the individual building Graphics will be discussed with the Facility Owners and kept on file by IH.

350

2.0 GENERAL

2.1 Introduction

The purpose of this Asbestos Management Plan is:

A. To describe the controls that are in place for the management of ACM at the Feed Materials Production Center (FMPC), and

B. To describe the reasons for the Site Survey, and how the results of the Site Survey will fit into this Asbestos Management Plan format. Updated Plans will be issued on a periodic basis.

This Plan addresses the procedures and controls necessary for the protection of employees, the environment and the public from ACM that exists at the FMPC. It has been reviewed by the Department of Energy (DOE), and includes their comments and concerns. Also, Employee Representatives will be provided an opportunity to review and comment on this Plan.

For a listing of the documents that apply to this Plan, see **11.0 APPLICABLE DOCUMENTS.**

2.2 Background

The FMPC is owned by the DOE, and Westinghouse Materials Company of Ohio (WMCO) is the prime contractor to the DOE. It is located in a rural area of southwestern Ohio on a 1,050 acre site near Fernald, about 20 miles northwest of Cincinnati and 8 miles southwest of Hamilton. The plant facility occupies about 136 acres in the center of the property. The site is bounded on the south by Willey Road, on the west by Paddy's Run Road, on the north by farmland and State Route 126, and on the east by a dairy farm.

3288

The FMPC became operational in 1954 and consists of nine separate production plants and numerous support buildings and facilities including utilities and administrative areas. The primary mission of the FMPC has been the production of purified uranium metal and uranium compounds for use at other DOE facilities. A small amount of thorium processing has also been conducted. The facility has the capability of converting a variety of feeds to pure uranium metal and compounds. Site remediation including the processing, management, storage and shipping of accumulated site wastes is the current principal activity at the FMPC.

The majority of the facilities were constructed prior to 1970 and asbestos containing materials were utilized in various building materials. Insulation materials containing asbestos were used for pipelines, ductwork and vessels requiring thermal insulation. Transite (asbestos-cement board) was widely used for inner and outer building sheathing for many process buildings, warehouses, and support buildings. Floor coverings containing asbestos were used in many office, laboratory and service areas. Asbestos was also used in miscellaneous materials such as gaskets, brake and clutch linings, lab oven linings, electrical conduit, and plant oven linings/seals.

The principal focus of asbestos controls at the FMPC is on insulation materials because of their potential for high fiber release when damaged. Insulation materials were used extensively at the FMPC since steam, produced by an onsite Boiler Plant, is used for provision of chemical process heat, office building heat, steam tracing of elevated outdoor pipelines, etc.

352

PART I - SITE SURVEY FOR ASBESTOS-CONTAINING MATERIALS

3.0 SITE INSPECTION

3.1 Scope

3.1.1 Definition. With the exception of those buildings listed in the following paragraph, all buildings will be inspected. There are 44 main buildings listed in Appendix C, consisting of approximately 1,358,900 square feet. In addition, there are many smaller buildings which would add perhaps another 10% of square footage.

The following buildings have been constructed recently of asbestos-free products, are assumed to be free of asbestos, and are not a part of the Asbestos Site Survey Project: Building #51, 79, 80, 81 and 82.

All outside areas will be inspected as well, including but not limited to the pipe insulation located on pipe racks. There is no information available as to the number of linear feet of outside piping. Note: any pipe insulation that has an embossed or "crinkled" metal cover has been installed recently, does not contain asbestos, and is not a part of the Site Survey (it is estimated that approximately 20% of all pipe insulation is new, and does not contain asbestos).

The Sewage Treatment Plant (#25 a through e) and the Clearwell Pump House (#18g) are included in the Site Survey.

3.1.2 Previous Sampling. It is noted in the Executive Summary that approximately 1,900 bulk samples have already been taken from suspect ACM over the past several years. It has been decided that all of the materials from which these bulk samples were taken will be re-sampled, for the following reasons:

1. The location from where these samples were taken was not always pinpointed exactly, which made sample location difficult. 3288
2. In many cases, the required number of samples per AHERA were not taken from the Homogeneous Areas, in order to correctly ascertain whether the material was ACM.
3. The percentage of asbestos contained in these samples was not always reported by the laboratory.

Therefore, in order to maintain continuity of bulk sampling throughout the Site. these Bulk samples will be used for reference purposes only. That is, for determining the number of bulk samples to be taken, it will be assumed that these previous samples do not exist; however, if the results of the Survey sampling for a Homogeneous Area differ from the results previously obtained, these differences will immediately be brought to the attention of the WMCO Industrial Hygiene Department.

3.2 Inspection Schedule

The inspection schedule will be planned and coordinated with appropriate WMCO personnel. As an example, most occupied buildings will probably have to be scheduled to be inspected during an off-shift.

3.3 Inspector Training

Personnel who collect bulk samples and perform assessments will be Certified in the State of Ohio as Asbestos Hazard Evaluation Specialists.

Before any inspection can begin, the personnel of the Site Survey Subcontractor must have the following training that will be provided by WMCO:

354

Site Orientation	- 10 minutes
Safety Rules	- 1.5 hours
Radiation Worker Safety	- 8 hours
Nuclear Criticality	- 3 hours
Thorium Introduction	- 1 hour

These classes may not be given sequentially, and the Subcontractor will be responsible for scheduling his personnel when the classes are given by WMCO.

In addition to the above, personnel performing the field work in certain areas will also provide evidence of having received 40 hours of Hazardous Waste Operations training to comply with OSHA 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response". This training will not be provided by WMCO.

3.4 Inspection Procedures

The building/area inspections will include:

A. A thorough visual inspection to identify the locations of any suspected ACM. Potential locations may also be identified from prints provided by WMCO.

B. Identification of the Homogeneous and Functional Areas for any suspected ACM.

C. An appropriate number of bulk samples will be taken of any suspected ACM. The sampling procedures will insure that all possible layers have been sampled, down to the subsurface (pipe, concrete, etc.)

Since a complete and thorough Site Survey is desired, it may be necessary in some instances to break through walls, false ceilings, etc. to obtain bulk samples of suspected ACM. This will only be done with the approval of the appropriate WMCO representative.

3288

If the WMCO representative agrees that it is impractical to obtain a bulk sample, the material may be assumed to be ACM. This material will then be treated as ACM for assessment, cost estimates, etc.

3.4.1 Friable Surfacing Materials. Bulk Samples shall be taken per the EPA document "Asbestos in Buildings - Simplified Sampling Scheme for Friable Materials", October, 1985, and the following number of samples shall be taken as a minimum:

Less than 3,000 square feet	- 3 Bulk Samples
Between 3,000 and 5,000 square feet	- 5 Bulk Samples
Greater than 5,000 square feet	- 7 Bulk Samples

3.4.2 Thermal System Insulation.

Fittings - For any homogeneous area that consists of:

Three (3) fittings or less	- One (1) Bulk Sample
Twenty (20) fittings or less	- Two (2) Bulk Samples
Greater than twenty (20) fittings	- Ten percent (10%), rounded up, of the total number of fittings

Piping - For any homogeneous area that consists of:

< 10 linear feet	- 1 Bulk Sample
10 - < 300 linear feet	- 2 Bulk Samples
300 - < 1,000 linear feet	- 3 Bulk Samples
1,000 linear feet or greater	- 5 Bulk Samples

356

3.4.3 Miscellaneous.

Transite - Many buildings at the FMPC Site are covered with Transite, including the roofing material. Transite contains 30-40% asbestos (which has been verified by IH testing), and therefore no bulk samples of the outside Transite material are required. The following information for outside Transite material, however, is required as part of this project:

Square Footage	- either from prints or direct take-off
Physical Assessment	- per Section 7.0
Hazard Assessment	- per Section 8.0
Response Actions	- per Section 9.0

Any Transite/wallboard material inside a building that is suspected to be ACM should be bulk sampled per the EPA "Simplified Sampling Scheme" format described above for Friable Surfacing Materials. Also a Transite type of material has been found inside of certain electrical switchboards, and therefore all of these shall be inspected.

Floor Tile - Bulk samples of floor tile and mastic in all buildings to be inspected shall be tested using conventional Polarized Light Microscopy (PLM) procedures. When the results are positive, they shall be listed as such on the bulk sample report; when the results are negative, they shall be listed as such but for all further purposes, they shall be treated as "Assumed to be Positive". This is due to the fact that PLM procedures can often report false negatives.

If the material will be disturbed in the future (renovation, demolition, etc.), any material tested negative by PLM shall be re-tested using Transmission Electron Microscopy (TEM). The reason that TEM is not used for original testing is that TEM samples cost approximately $200 each, whereas PLM samples cost approximately $20 each.

Other - The underbacking of sheet vinyl flooring shall require verification of asbestos content and friability. Inspection shall also include, but not be limited to, such items as refractory brick in boilers, suspect supply material, etc. 3288

3.4.4 Potentially Radioactive Materials. In certain areas of the Plant, a Radiological Safety Technician (Rad Tech) must test any material for radioactivity before it is sampled. This service will be provided by WMCO. To expedite inspections, at the end of the first shift the Inspector will indicate to the Rad Tech the areas that will be bulk sampled the next day. During the second shift, the Rad Techs will clear the areas for future sampling.

3.5 Sample Procedures

Those places where samples are collected will be sealed with an appropriate repair compound, and the spot from which the sample is taken will be identified by a green color, either as a visible property of the compound or by green paint. The sample location will be identified by the Sample Tag (Figure #1) described earlier.

Samples will be collected by use of either a coring device or a knife. The sampling procedure will consist of the following steps:

Step 1.	Put on respirator
Step 2.	Wet surface to be sampled
Step 3.	Remove sample
Step 4.	Immediately place in sample container
Step 5.	Seal disturbed area with compound - green color
Step 6.	Clean up any fallen debris
Step 7.	Attach sample label to container
Step 8.	Note sample on Asbestos Survey Data Form
Step 9.	Identify sample information on Chain-of-Custody Form
Step 10.	Attach yellow I.D. label to sample location

358

Each sample will be identified on the sample canister using a label which will read as follows:

xx-A3yyy, where:

xx - WMCO Building No. associated with sample, and

yyy - sequential number for each sample

This sample number will be used to identify each bulk sample throughout the survey, including the Final Report.

For purposes of identification, every effort will be made to keep sample numbers grouped by building. Outside piping will be identified by the building that the material inside the pipe originates from.

At the time of collection all samples will be placed in labeled and airtight canisters. At the completion of sampling all canisters will be placed inside appropriately-sized partitioned cardboard boxes.

The Chain-of-Custody Record (Figure 3) will be filled out by the Inspector, who will enter the following information: Sample Numbers, Contaminant (Asbestos), check the "Bulk" column, and place his/her initials in the appropriate column. The Inspector will also initial the "Released By" column, and deliver the samples and form to the IH representative who will initial the "Received By" column, noting the time and date. When the samples have been picked up and receipted for by the laboratory representative, this form will be returned to the Subcontractor for inclusion in the Final Report.

Each box will be sealed with packing tape. A piece of colored "security" tape will be placed around the entire box to ensure that the box has not been opened prior to being picked up at the WMCO site by a representative from the laboratory.

3288

INDUSTRIAL HYGIENE SAMPLE
CHAIN-OF-CUSTODY RECORD

SAMPLE NUMBER	CONTAMINANT	AIR	BULK	COLLECTORS INITIALS	NEEDED BY

RELEASED BY:	RECEIVED BY:	DATE	TIME

CHAIN-OF-CUSTODY RECORD

FIGURE 3

360

3.6 Friability

The friability of the suspected ACM will be determined as the bulk samples are taken. "Friable" is defined by the EPA as material that "hand pressure can crumble, pulverize, or reduce to powder when dry". The friability of the damaged material will be evaluated.

The degree of friability will be assessed as follows:

High - Material is fluffy and/or the slightest hand pressure can dislodge it. A slight breeze may disperse the material.

Medium - Material can be dislodged or scraped/crumbled by hand.

Low - Material is firmly bound, difficult to scrape off by hand.

Non-Friable - Cannot be reduced to powder by hand pressure.

4.0 ANALYSIS OF BULK SAMPLES

3288

The laboratory performing the analysis will be chosen by WMCO. The lab will be fully accredited by the American Industrial Hygiene Association, and will participate in the EPA's asbestos quality assurance program. The lab will analyze all bulk samples by polarized light microscopy and dispersion staining in accordance with the EPA reference method (40 CFR 763, volume 47, no. 103, May 27, 1988, pg. 23376), or by transmission electron microscopy.

The following is the minimum information that is necessary from the bulk sample analysis:

Sample Number
Date Sample was Analyzed
Typed Name and Signature of Analyst
If ACM is present:

Type of Asbestos
% of Asbestos

For Quality Assurance purposes, at least one sample out of every 20 will be split and also analyzed by the WMCO lab or an outside lab.

The laboratory results will be sent directly to the Subcontractor for the further assessment of ACM. A copy of the lab results from the Site Survey will be kept on file by IH.

362

363

5.0 DOCUMENTATION OF LOCATION OF ACM

5.1 CAD/CAM

The Site Survey Subcontractor will use one layer of the WMCO Intergraph CAD/CAM System to record the locations of the ACM Homogeneous Areas, and within these Areas, the locations where all Bulk Samples were taken. These locations will be shown on a plan view of the facility, and will be supplemented by sectional views if necessary to avoid confusion.

The CAD/CAM diagrams will be maintained by IH, and updated copies will be sent by IH to the Facility Owners. These CAD/CAM diagrams will also be used to show the location of ACM to contractors, subcontractors, and other building occupants.

5.2 Labeling

To provide information to occupants of the presence of ACM in buildings at the FMPC, a program based on previous sampling has been initiated by Industrial Hygiene to identify ACM by labeling. In locations where bulk samples have been collected, the sample location was tagged with a yellow and black sample tag (Figure #1) which indicates the material has been sampled to determine asbestos content. This label implies that the material may contain asbestos, and states that Industrial Hygiene should be contacted prior to working with the material. In locations where thermal insulation is known to contain asbestos, labels with a "Danger-Asbestos" wording have been applied which inform building occupants that asbestos is present.

As soon as the laboratory results of the Site Survey Bulk Samples are known, the Subcontractor will label the ACM. Per OSHA Regulation 1926.58(k), all ACM will have a permanent label affixed that will contain the following information, in black letters, on a yellow background:

saf

DANGER

3288

CONTAINS ASBESTOS FIBERS

AVOID CREATING DUST

CANCER AND LUNG DISEASE HAZARD

In addition, any pipe insulation containing ACM will have a yellow tape, at least 2" wide, applied around the circumference of the pipe as follows:

Less than 10 linear feet	- 1 band
Between 10 and 50 linear feet	- 2 bands
Greater than 50 linear feet	- at least 1 band every 50 linear feet at the beginning and end of each pipe run

Any Homogeneous Area that does not contain ACM will be labeled "Asbestos Free" in white letters on a blue background, and will have blue tape applied as above. An exception will be the "crinkled" metal pipe covering, which indicates that the insulation is not ACM and therefore does not have to be labeled.

To summarize and avoid any confusion on the use of colors, the following will apply:

Green Spot	- Identifies location from which bulk sample was taken
Yellow Tape	- ACM
Blue Tape	- Asbestos Free

364

5.3 Notices

If ACM is determined to be either a part of or within a building, a Building ACM Notice (Figure #4) will be posted near each entrance of the building. This Notice will be easily visible and very durable.

NOTICE
Building No._____ has been
determined to contain
ASBESTOS
materials. Before beginning work
in this area, contact
Industrial Hygiene (ext. 6207)
for location of material.

BUILDING ACM NOTICE
FIGURE 4

If no ACM is determined to be either a part of or within a building, a Certificate of Clearance (Figure #5) will be posted near each entrance of the building.

CERTIFICATE OF CLEARANCE
(name of Sub-Contractor)
has determined that this building is
FREE FROM ASBESTOS
containing materials
Building No._____

CERTIFICATE OF CLEARANCE
FIGURE 5

6.0 ESTIMATION OF MATERIAL QUANTITIES

3288

The method by which the quantities of ACM in each Homogeneous Area were estimated must be described. These methods include taking dimensions from prints, pacing off footage, multiplying the distance between columns by the number of column spaces, etc. This is important in order to resolve any future questions on how quantity estimates were developed.

The results of the quantity estimates from the Site Survey will be kept on file by IH.

7.0 PHYSICAL ASSESSMENT OF ACM

Physical assessments will be completed in two separate formats, as follows:

7.1 AHERA

Per AHERA, there are two separate factors to consider; the Current Condition of the ACM, and it's Potential for Disturbance. From the combination of these two factors, a Hazard Ranking can then be determined.

7.1.1 Current Condition. AHERA recommends assessing the existing condition of ACM as either GOOD, FAIR, or POOR. The determination of the Current Condition of ACM by the Subcontractor will accordingly be done as shown in Appendix C.

7.1.2 Potential for Disturbance. There are three factors that can influence the Potential for Disturbance; Accessibility, Influence of Vibration, and Potential for Air Erosion. Each is assessed separately and assigned a rating of HIGH, MODERATE, or LOW. The overall rating for the Potential for Disturbance is then the worst of these three assessments. This entire procedure is explained in detail in Appendix C also.

366

7.1.3 ERA Form. The above information will be entered into Sections (x) and (y) of the "Exposure Risk Assessment/Evaluation Form" (ERA Form - Figure #6) for each Homogeneous Area, and in addition where conditions may change within a Functional Area. This is necessary per AHERA because, as an example, a homogeneous pipe insulation may pass through several Functional Areas that have completely different Potentials for Disturbance.

7.2 GRADE System

The GRADE System evaluates ACM in terms of Exposure and Damage. From the numerical values of these two categories, a Harm Score is calculated. The Harm Score can then be used to prioritize Response Actions.

7.2.1 Exposure Factor. The GRADE System assigns a numerical value, according to the severity of existing conditions, to these variables:

Friability
Amount of Visible Surface Area
Wall Texture
Ventilation
Air Movement
Activity
Floor Texture
Barriers
Population

To these, WMCO has added an Outside / Inside variable. The procedure for evaluating these conditions is outlined in Appendix E.

3288

PROJECT NO. _____ BUILDING _____ LOCATION _____ HOM AREA # _____

EVALUATOR _____ SAMPLE NO. _____ DATE _____

AREA: [ ] Admins. [ ] Metals [ ] Chemists [ ] Warehouse [ ] Miscellaneous

MATERIAL: [ ] Surfaces [ ] T.S.I. [ ] Misc. DESCRIPTION _____

a. ____ Friable: H=6: M=3: L=1

b. ____ Amount of Visible Surface Area (ft²):
<10=0: 10 to <100=1:
100 to <1,000=2: ≥1,000=3

c. ____ Walls: Rough=4: Pitted=3:
Moderate=2: Smooth=1

d. ____ Ventilation: maximum of 7l relative to friable material. Int. Supply=6: Int. Ret.=2: Friable Supply=1: None=0

e. ____ Air Movement: H=6: M=2: L=0

f. ____ Activity: H=6: M=2: L=0

g. ____ Floor: Carpet=4: Tile=2:
Concrete=1: Other=0

h. ____ Barriers:
A.* Spray/Trowel:
Susp.=1: Encap.=2:
Rating=3: None=4
B.* Other: material exposed
≤25%=1: 25 to 50%=2:
50 to 75%=3: 75 to 100%=4

i. ____ Location: Outside=1: Inside=2

j. ____ Population:
1 to 9 or Not=1: 10 to 200=2:
201 to 500=3: 501 to 1,000=4:
≥1,000=6

____ Exposure Factor Total (E)
Max = 46: Min = 6

k. ____ Physical: H=6: M=4: Min=1:
L=2: N=0

l. ____ Water: Yes=3: No=0

m. ____ Proximity to Same Room:
A.* Spray/Trowel:
<1' or ceiling panel=3:
1' to <5'=2: ≥5' & No More=0
B.* Floor/Soiled/Dust: No=0
Yes=1: Ceiling Panel=3

n. ____ Type of Material:
Pipe or Boiler=1: HVAC=3:
Ceilings/Walls=4: Other=0 to 4

o. ____ Potential for Contact:
<10': H=6: M=4: L=2
≥10': H=4: M=2: L=0

p. ____ Asbestos Content (%):
≤1=No Material: >1 to ≤30=1: >30 to ≤60=2: >60=6

____ Damage Total (D) Max=20: Min=1

____ Hazard Score (H)

H = 12.0324 - (0.1653 x D) - (0.1653 x E)

* If both A and B apply in (h) and (m), use the higher of the two

QUANTITY _____ [ ] S.F. [ ] L.F. [ ] EACH

COMMENTS (REFER BY LETTER)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

q. Condition

% Damage: _____ %. _____ Localized. _____ Distributed

Type Damage: _____ Deterioration. _____ Water. _____ Physical

Overall Rating: _____ Good. _____ Fair. _____ Poor

r. Potential for Disturbance

Accessibility: _____ Accessible. _____ Not Accessible

Potential for Contact: _____ High. _____ Moderate. _____ Low

Influence of Vibration: _____ High. _____ Moderate. _____ Low

Potential for Air Erosion: _____ High. _____ Moderate. _____ Low

Overall Rating: _____ High. _____ Moderate. _____ Low

AHERA CLASSIFICATION (40 CFR 763.88) _____

ASSESSOR: _____
(Signature)

OHO CERTIFICATION NO.: _____

EXPOSURE RISK ASSESSMENT/EVALUATION FORM

FIGURE 6

7.2.2 Damage. The variables that determine Damage are:

Physical Damage
Water Damage
Proximity to Items for Repair
Type of Material
Potential for Contact
Asbestos Content

The method for assessing these conditions is also outlined in Appendix E.

7.2.3 ERA Form. The above information will be entered into Sections (a) through (p) of the ERA Form, Figure #6. The forms will be kept by IH.

The data from the "Overall Ratings" of Items x. and y. from the ERA Forms will then be inputed to a WINGZ relational database program, as shown in Table #1, "Survey Tabular Format". This information will then be presented in the Graphic Format (Figure #2) for the following:

- Each Building/Area:

  (1) diagram showing Friable Surfacing Material (s.f.)
  (1) diagram showing Thermal System Insulation (s.f. or l.f.)
  (1) diagram showing Miscellaneous Materials (s.f. or units)

The above graphics will be kept on file by IH, with a copy sent to the Facility Owner.

- A summary graph of the above categories for the following Areas:

3288

  Administration
  Metals Plant
  Chemical Plant
  Warehouses
  Miscellaneous

The above graphics will be placed in Appendix B.

- A summary graph of the above categories for the entire Site, which will be placed in the Executive Summary.

Building No.:____

Building/Area:_____

Description:_____

Type of ACM: ___Surfacing ___TSI ___Miscellaneous

___Friable ___Non-Friable with potential to become Friable

Quantity Units: ___Square Feet ___Linear Feet ___Each (Fittings, etc.)

	Current Condition			
Potential for Disturbance		Good	Fair	Poor
	Low	XXX	XXX	XXX
	Moderate	XXX	XXX	XXX
	High	XXX	XXX	XXX

SURVEY TABULAR FORMAT

TABLE 1

PART II - MANAGEMENT PLAN

3288

8.0 HAZARD ASSESSMENT

8.1 Procedures

The first step in determining the Hazard Assessment will be to classify all ACM into one of the seven different AHERA Hazard Rank categories. This will be done from items (x) and (y) of the Exposure Risk Assessment (ERA) Form, according to the format shown in Figure #7 (AHERA "Classifications for Hazard Potential").

The Hazard Rankings will then be converted to AHERA Damage Categories per the format shown in Figure #8 (AHERA "Response Actions Based on Hazard Ranking"). These Damage Categories are:

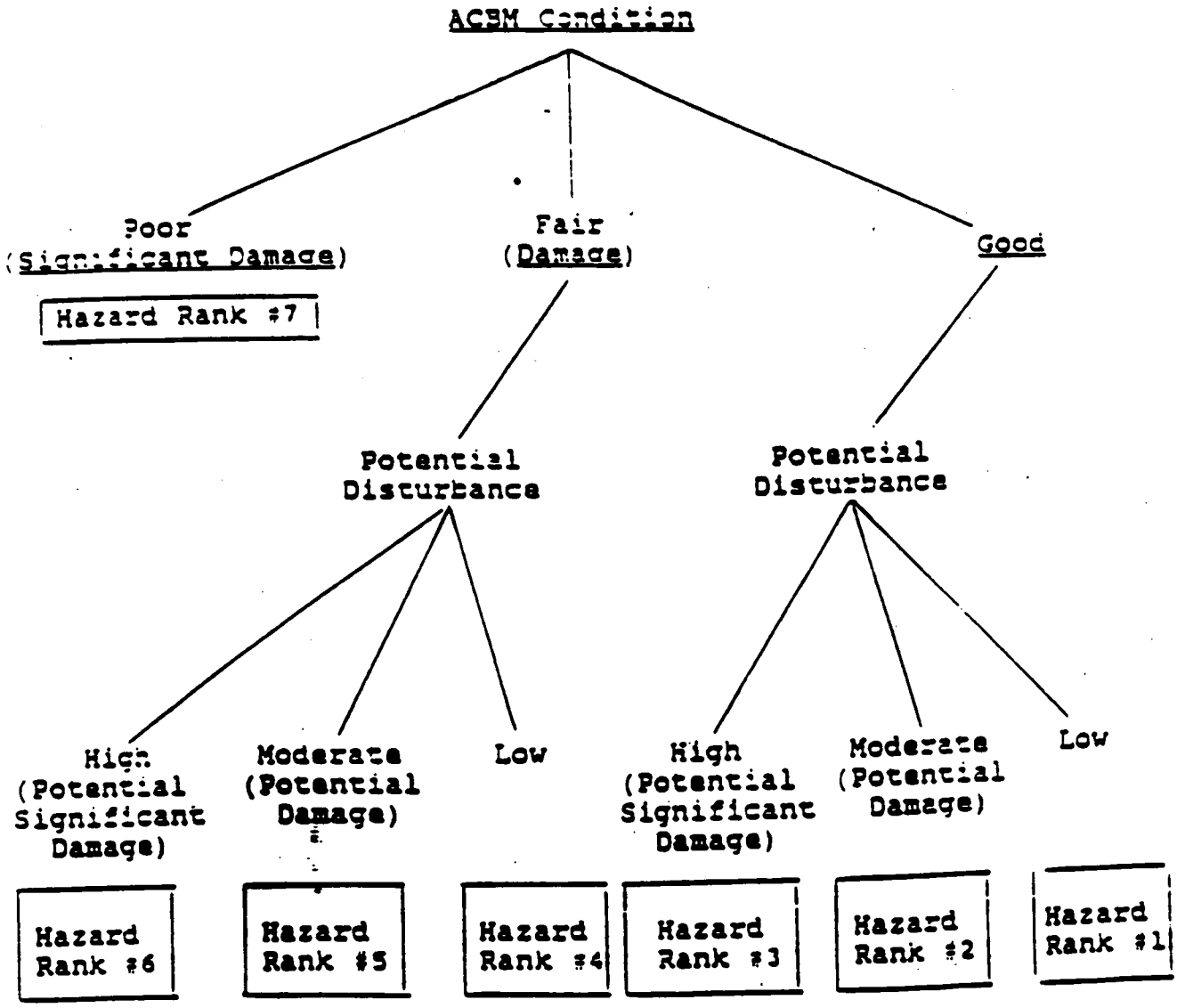
Significantly Damaged
Damaged + Potential for Significant Damage
Damaged + Potential for Damage
Damaged
Potential for Significant Damage
Potential for Damage
No Problem

It is the intent of WMCO to have the Response Actions for the first five categories above prioritized according to the Harm Scores of the Grade System. ("Potential for Damage" and "No Problem" categories do not require Response Actions other than Operations and Maintenance). Therefore, the Subcontractor will then calculate the Harm Scores from the ERA Forms as follows:

Add Items (a) through (j). Enter this sum as the Exposure Factor Total (E).

372

378



CLASSIFICATIONS FOR HAZARD POTENTIAL

FIGURE 7

3288

Hazard Rank	Removal Priority	AHERA Categories	Response Actions Required by AHERA
7	1	Significantly Damaged	Evacuate or isolate the area if needed. Remove the ACBM (or enclose or encapsulate if sufficient to contain fibers). Repair of thermal system insulation is allowed if feasible and safe. O&M required for all friable ACBM.
6	2	Damaged + Potential for Significant Damage	Evacuate or isolate the area if needed. Remove, enclose, encapsulate, or repair to correct damage. Take steps to reduce potential for disturbance. O&M required for all friable ACBM.
5	3	Damaged + Potential for Damage	Remove, enclose, encapsulate, or repair to correct damage. O&M required for all friable ACBM.
4	4	Damaged	Same as hazard rank 5
3	5	Potential for Significant Damage	Evacuate or isolate the area if needed. Take steps to reduce potential for disturbance. O&M required for all friable ACBM.
2	6	Potential for Damage	O&M required for all friable ACBM.
1	7	No Problem	O&M required for all friable ACBM, but measures need not be as extensive as above.

RESPONSE ACTIONS BASED ON HAZARD RANKING

FIGURE 8

374

374

Add Items (k) through (p). Enter this total as the Damage Total (D). Calculate the Harm Score (H) as follows:

$$(H) = 12.0324 - (0.1683 \times D) - (0.1693 \times E)$$

This will be entered as the Harm Score (H) on the EPA Form.

Using these Harm Scores, the Subcontractor will prioritize the response actions for all ACM within the first five AHERA Damage categories mentioned above. If the Harm Scores are the same for different ACM Homogeneous Areas, the Subcontractor will nevertheless assign a unique Hazard Priority Number to each material according to the criteria that is judged to be most appropriate.

8.2 Results

The intention is for the Subcontractor to develop the following format as a Section of the Final Report:

3288

HAZARD PRIORITIES				
AHERA Category	Hazard Priority Number	Location of ACM	Description of ACM	Response Action
Significantly Damaged	1	Bldg. 69 - North Area	Pipe Insulation on skid	Removal
	•			
	•			
	r			
Damaged and Potential for Significant Damage	s			
	•			
	•			
	t			
Damaged and Potential for Damage	u			
	•			
	•			
	v			
Damaged	w			
	•			
	•			
	x			
Potential for Significant Damage	y			
	•			
	•			
	z			

HAZARD PRIORITY TABLE

TABLE 2

The above procedure will comply with the AHERA format, and will prioritize the necessary response actions.

378

9.0 RESPONSE ACTIONS

9.1 Prioritized List and Associated Costs

As a part of this Contract, the Subcontractor will estimate as accurately as possible the costs associated with each Prioritized Response Action. Costs will be based on average costs (1990 Dollars) commonly experienced for similar work in the recent past.

The costs will not be based on detailed engineering analysis of individual buildings. No engineering design of the facilities or utilities will be undertaken during the survey phase. Consequently, the accuracy generally associated with cost estimates resulting from a detailed engineering design cannot be ascribed to the estimates presented at this time.

The costs for "put back" materials will be calculated separately, and will be based on normal materials and normal replacement procedures.

The Subcontractor will also develop the most reasonable costs for managing ACM in place. This will consist of estimated costs for:

- Point type repairs to ACM.
- Training of Maintenance Staff.
- Medical surveillance of Maintenance Staff.
- Air Monitoring of areas which contain ACM.
- Ongoing inspections of areas which contain ACM.
- Updating data base for changes to ACM.
- Response equipment start-up, maintenance, and replacement.

The Prioritized List of Response Actions and Associated Costs for all ACM Homogeneous Areas will be maintained by IH.

9.2 Schedule

3288

The Subcontractor will develop a Proposed Schedule for removing all "Significantly Damaged" ACM, since removal is the only response action recommended by AHERA for ACM that is significantly damaged. This Proposed Schedule will be maintained by IH.

WMCO will schedule all other response actions based on budgets, planned operations, etc.

10.0 WMCO RESPONSIBILITIES

10.1 Personnel Designated for ACM Involvement

The responsibilities for implementation of the Management Plan within WMCO are listed in the "Control of Work Involving Asbestos" Document (IH&S-IH-03), and are broadly defined as follows:

IRS&T - Technologist

- Development and updates to the Plan
- Asbestos Permit System
- Monitoring asbestos abatement projects
- OSHA Compliance - 29 CFR 1910.1001 and 29 CFR 1926.58

Environmental Compliance - Engineer

- EPA Compliance - NESHAP (Subpart M) and Ohio Asbestos Code

378

Maintenance - Manager

- Asbestos Repair

Waste Management - Engineer

- Disposal of ACM

Monthly meetings will be held with the above personnel and any others that may be involved with coordinating asbestos activities. These meetings will be chaired by the IH representative, and minutes will be sent to all interested parties.

10.2 Notification Procedures

10.2.1 Prior and Current Notification. All WMCO employees have been notified of the presence of asbestos in building materials at the FMPC as part of employee reindoctrination training presented during late 1988 and early 1989. Additional information to Building Occupants of the presence of ACM is provided by the Labeling Procedures described in Section 5.2.

Prior to any large asbestos removal project, an employee update is prepared and distributed to inform all employees that an asbestos removal project will occur in a specified area and protective measures will be taken to protect all building occupants from exposure to airborne asbestos fibers.

All Operations employees who have the potential to work with or disturb ACM as part of their normal job duties have attended on-site asbestos training sessions which instruct them on what materials contain asbestos and where ACM is likely to be found at the FMPC. These employees are instructed that ACM should be maintained in good condition and if ACM in their work area is

found to be in poor condition, their supervisor or the building facility owner should be contacted to ensure corrective actions are taken. 3288

10.2.2 Future notification. As soon as the results of the Site Survey become known, building occupants will be provided with a document that lists the following information at a minimum:

1. What asbestos is and how it is typically used;
2. Health effects associated with exposure;
3. What type(s) of ACM are present in the facility;
4. The exact location(s) of these materials;
5. How individuals can avoid disturbing ACM;
6. How to recognize and report damage;
7. How maintenance personnel are dealing with these materials to prevent fiber release;
8. What will be done periodically and over the long run to protect the health and safety of the building occupant;
9. Name and telephone number of the person responsible for asbestos-related activities in the facility.

The above information will be given to the Facility Owners, and will be posted on the billboards of each building. It will be the Facility Owner's responsibility to ensure that building occupants are aware of the above information, as well as contractors and vendors for specifically assigned work functions which may expose them to asbestos fibers.

380

10.3 Training

10.3.1 Awareness Training. All employees whose work may involve the disturbing of asbestos-containing materials must receive asbestos awareness training of at least one hour, whether or not they are required to work with ACM. This training alone DOES NOT qualify any person to disturb ACM.

10.3.2 Worker Asbestos Training. All WMCO Operations personnel who work with asbestos as a part of their normal job duties must receive knowledge level asbestos worker training prior to performing any asbestos work. This classroom training is three hours in length and informs the worker of the requirements for handling asbestos and of the hazards associated with asbestos exposure. This training is required on an annual basis.

All WMCO Operations personnel assigned to remove asbestos materials by glove bags must have attended hands-on glove bag training. This eight hour hands-on training class is required to be attended once and no refresher training is required.

10.3.3 Supervisor Asbestos Training. Any WMCO supervisor assigned to supervise a small-scale asbestos job must have training equivalent to the training requirements of the workers doing the job.

Any WMCO supervisor assigned to supervise a large scale asbestos work project must have completed the required training to qualify as an OSHA "competent person". This training course consists of 32 hours of classroom and hands-on training and must be approved by the EPA and the State of Ohio. An eight hour refresher training course approved by the State of Ohio is required on an annual basis.

088

3288

10.3.4 Industrial Hygiene Technician Asbestos Training. Industrial Hygiene Technicians are responsible for issuing FMPC Asbestos Work Permits as part of the FMPC asbestos Operations and Maintenance program to control asbestos work onsite. For this reason they are required to attend training which qualifies them as an OSHA "competent person". This training consists of 32 hours of classroom and hands-on training and must be approved by the EPA and the State of Ohio. An eight hour refresher course approved by the State of Ohio is required on an annual basis.

10.3.5 Subcontractor/Vendor Employee Asbestos Program.

Subcontractor/vendor personnel who work with asbestos containing materials are required to meet the training requirements for asbestos workers and supervisory personnel as specified by the laws of the State of Ohio. Personnel responsible for supervising asbestos work projects will have successfully completed a 32 hour training class certified by the EPA and the State of Ohio which qualifies them as an Asbestos Hazard Abatement Specialist. Non-supervisory level asbestos workers will have attended a 24 hour asbestos worker training course certified by the State of Ohio.

For minor asbestos work projects, such as drilling holes in Transite or floor tile, subcontractor/vendor personnel will have attended knowledge level asbestos worker training as specified by OSHA.

10.4 FMPC Asbestos Operation and Maintenance (O&M) Procedures

The Operations and Maintenance Procedures are designed to structure a program for handling specific types of ACM and activity areas, in order to reduce the likelihood of asbestos exposure, until all ACM has been appropriately removed. The purpose of the program is to minimize the exposure potentials of ACM by addressing and organizing special procedures to:

- Cleanup and properly dispose of asbestos fibers previously released;

3827

- Repair damaged ACM;
- Prevent further disturbance or damage of ACM through controlling access and by temporary wrapping; and
- Monitor and maintain ACM until removal of the ACM.

To accomplish these goals, the procedures outlined in the "Control of Work Involving Asbestos" document (IH&S-IH-03) have been developed to serve as the O&M Program. These procedures include the following:

- Personnel Responsibilities
- Periodic Inspections
- Planning for Work/Projects Which May Involve Asbestos
- Proper Asbestos Work Practices
- Work Practices Involving Transite
- Air Monitoring Requirements
- Handling Spills or Incidents Involving Asbestos

To summarize, the O&M Program is intended for small scale or minor abatement, emergency clean-up, temporary repair, and preventative control measures in order to insure that (1) any existing ACM contamination is cleaned up; (2) future fiber release is minimized by controlling access to ACM; and (3) that ACM is maintained in a safe manner until it is eventually removed.

10.5 Recordkeeping

All written records discussed in the Management Plan should be maintained as part of a thorough recordkeeping process. To review, these include:

1. Building plans and drawings.
2. Data from previous bulk sampling.
3. Data from the Asbestos Site Survey, including the Chain-of-Custody Records for bulk samples.
4. Copies of notification and warning programs.
5. Descriptions, times, dates, and attendants of training programs.
6. Written Respiratory Protection Program.
7. Medical surveillance records, for the duration of employment plus thirty years.
8. Copies of all notifications to regulatory agencies.
9. Copies of all Asbestos Work Permits; these will be maintained in files in the IH Technician office for at least one year after issuance, and then will be maintained in the record storage area in the Administration Building.
10. Documentation of custodial, maintenance, renovation, and emergency response actions performed.
11. Employee exposure measurement records, including names and social security numbers of the employees to which they apply. These records will be maintained in both the employee's medical file and in Industrial Hygiene's air sampling files for at least thirty years.
12. Periodic ACM surveillance records.

11. APPLICABLE DOCUMENTS

11.1 29 CFR 1910.1001, "Asbestos Guidelines for General Industry".

11.2 29 CFR 1926.58, "Asbestos Guidelines for the Construction Industry".

11.3 40 CFR 61, subpart M, "USEPA National Emissions Standards for Hazardous Air Pollutants (NESHAPS) Asbestos Regulations".

11.4 Regulatory Compliance Guide "AW:10 Asbestos Removal Notification".

11.5 Ohio Administrative Code 3701-34, "Asbestos Hazard Abatement Activities".

11.6 Ohio Administrative Code 3745-20, "Asbestos Emission Control from Renovation, Demolition, and Disposal Operations".

11.7 DOE Order 5480.4, "Environmental Protection, Safety, and Health Protection Standards".

11.8 FMPC-516, "Control of Permits for Accomplishing Hazardous Work".

11.9 FMPC-719, "Lock and Tag Procedure".

11.10 IH&S-IH-03, "Control of Work Involving Asbestos".

APPENDIX A

GLOSSARY

"Accessible" is a location such that personnel can be exposed to ACM and/or located so that an individual can obtain a bulk sample without having to remove solid structures which completely prevent the release of asbestos fibers. This does not include encapsulants, aluminum jackets, canvas jackets, etc.

"Asbestos" means the asbestiform varieties of: chrysotile (serpentine); crocidolite (riebeckite); amosite (cummingtonite, grunerite); anthophylite; tremolite; and actinolite.

"Asbestos-Containing Material" (ACM) means any material or product which contains more than one percent asbestos.

"Assessment" - evaluation of the overall condition of asbestos-containing materials.

"Chain-of-Custody" refers to a control system whereby an Inspector takes samples of suspected asbestos-containing material, and then documents to whom the samples are given (including the time and date). The person receiving the samples must sign for them. This process is repeated as samples are transferred to the lab and back to Westinghouse. There is always an "audit trail" for the samples. The control document is the Industrial Hygiene Sample Chain-of-Custody Record.

"FMPC" means the Feed Material Production Center at 7400 Willey Road in Fernald, Ohio.

"Friable" means that the material, when dry, may be crumbled, pulverized, or reduced to powder by hand pressure; also includes previously non-friable material after such previously non-friable material becomes damaged to the extent that when dry it may be crumbled, pulverized, or reduced to powder by hand pressure.

"Functional Space" means a room, group of rooms, or homogeneous area (including crawl spaces or the space between a dropped ceiling and the floor or deck above) such as a cafeteria, hallway, etc.

"Homogeneous Areas" are areas which are uniform by color, texture, construction/application date, general appearance, and purpose.

"Management Plan" - assessment of asbestos-containing materials and a list of prioritized actions to be taken.

"Miscellaneous material" means building material or structural components, structural members of fixtures, floor and ceiling tiles, flashings, cement-asbestos sheeting, but does not include thermal system insulation or surfacing material.

"Surfacing material" means material in a building that is sprayed-on, troweled-on, or otherwise applied to surfaces such as acoustical plaster on ceilings and fireproofing materials on structural members, or other material on surfaces for acoustical, fireproofing, or other purposes.

"Thermal system insulation" (TSI) means material in a building applied to pipes, fittings, boilers, breeching, tanks, ducts, or other interior structural components to prevent heat loss or gain, or water condensation, or for other purposes.

"WMCO" means the Westinghouse Materials Company of Ohio.

3288

APPENDIX B

FUTURE GRAPHIC DISPLAYS FROM SITE SURVEY, BY AREA

388

APPENDIX C

BUILDING IDENTIFICATION

	Building I.D. No.	Grid Co-ordinates	Building Name	Gross Floor Area sq.ft.
Adminis-tration:	14	A-4	Administration Building	54,200
	28a,b	A-4	Security & Human Resources Building	14,700
	53a	A-4	Health, Safety Building	24,700
	53b	A-4	In-Vivo Building	2,200
			Subtotal -	95,800
Foundry:	5	B-4	Metals Production Plant	123,200
	6	B-5	Metals Fabricating Plant	226,000
	9	C-5	Special Products Plant	47,500
	55a	B-4	Slag Recycling Plant	1,800
			Subtotal -	398,500
Chemical:	1a,b	C-3 B-3	Preparation Plant Storage Building	87,000
	2a-e	C-3 B-3	Ore Refinery Plant Misc. Buildings	57,700
	3a-g	B-3	Maintenance Building Misc. Buildings	4,000
	4a	B-4	Green Salt Plant	98,600
	4c	B-4	Plant 4 Maint. Bldg.	3,000
	7	B-4	Plant 7	39,300
	8a	B-3	Recovery Plant	58,500
	13a	A-3	Pilot Plant	36,200

3288

	54a	A-3	UF Reduction Fac.	110,400
	66	C-3	Drum Recond. Bldg.	1,300
	67	C-3	Plant 1 Stg. Bldg.	5,300
			Subtotal -	401,300
Warehouses:	4b	B-4	Plant 4 Warehouse	12,000
	30a	C-3	Chemical Warehouse	25,900
	54b	A-3	Weather Shelter	3,600
	56	D-3	CP Storage	8,600
	63	D-4	KC-2	26,200
	64	D-5	Plant 9 Warehouse	15,500
	65	D-5	Plant 5 Warehouse	10,500
	68	A-3	Pilot Plant Warehouse	5,000
	71	C-3	General In-Process	24,000
			Subtotal -	131,300
Miscellaneous:	10a	D-4	Boiler Plant	31,000
	10b	D-4	Boiler Plant Maint. Building	2,400
	11	A-4	Service Building	84,400
	12a-c	C-4	Main Maint. Bldg. other Storage Bldgs.	72,700
	15	A-3	Laboratories	78,900
	20a	C-4	Valve/Control Bldg.	5,600
	24b	C-4	Railroad Eng. Bldg.	1,200
	31	A-5	Engine House Garage	8,300
	45	A-3	Building 45	21,400
	46	A-5	Heavy Equip. Garage	13,300
	60	D-3	Quonset Number	14,800
	61	D-3	Quonset Number	22,400
	62	D-3	Quonset Number	32,400
	69	D-5	Decontamination Bldg.	3,200
			Subtotal -	332,000
			Grand Total -	1,358,900

390

APPENDIX D

PHYSICAL ASSESSMENT OF ACM PER AHERA

D.1 Assessment of CURRENT CONDITION of ACM:

D.1.1 General Description.

Good. ACM is considered to be in Good condition if it is better than the description of "damaged" for Surfacing, Thermal System Insulation, and Miscellaneous ACM.

Fair. Any ACM that is in Fair condition has been "damaged".

Poor. Any ACM that is in Poor condition has been "significantly damaged".

D.1.2 Friable Surfacing ACM.

- To distinguish between Good and Fair friable surfacing ACM, the following applies:

  Damaged friable surfacing ACM means friable surfacing ACM which has deteriorated or sustained physical injury such that the internal structure (cohesion) of the material is inadequate or which has delaminated such that its bond to the substrate (adhesion) is inadequate, or which, for any other reason, lacks fiber cohesion or adhesion qualities. Such damage or deterioration may be illustrated by the separation of ACM into layers; separation of the ACM from the substrate; flaking, blistering, or crumbling of the ACM surface; water damage; significant or repeated water stains, scrapes, gouges, mars or other signs of physical injury on ACM. Asbestos debris originating from the ACM in question may also indicate damage."

3288

It should be clear from the above definition that there is a broad span of condition between Good and Fair. It is the spirit of AHERA that there are degrees of minor disturbance that fall short of the "damage" criteria. The material does not have to be in perfect condition to be rated Good.

- To distinguish between Fair and Poor friable surfacing ACM, the Inspector has to understand that the definition of significant damage (Poor) is restrictive. Only the truly poor condition situations are to be so rated. The official definition is:

"Significantly damaged friable surfacing ACM means damaged friable surfacing ACM where the damage is extensive and severe."

To be "extensively" damaged, the ACM must have either 10% distributed or 25% localized damage. However, "significantly" damaged ACM must also be "severely" damaged, which can involve delamination or other factors that in the Inspector's opinion means there is no way of restoring it to an undamaged condition.

"Significantly damaged friable surfacing ACM must refer to the most severely damaged areas where the damage is also widespread.

Damage that is widespread or only severe is of concern, but should not necessarily require a response action of the same magnitude as those situations where both are present."

D.1.3 Friable Miscellaneous ACM. This is treated in exactly the same manner as above.

392

D.1.4 Thermal System Insulation. TSI is assessed somewhat differently:

"Damaged or significantly damaged thermal system ACM means thermal system ACM on pipes, boilers, tanks, ducts, and other thermal insulation equipment where the insulation has lost its structural integrity, or its covering, in whole or in part, is crushed, waterstained, gouged, punctured, missing or not intact such that it is not able to contain fibers. Damage may be further illustrated by occasional punctures, gouges, or other signs of physical injury to ACM; occasional water damage on the protective coverings/jackets; or exposed ACM ends or joints.

Asbestos debris originating from the ACM in question may also indicate damage."

Note that there is only one category which includes both significant damage (Poor) and damage (Fair). The same discrimination between significantly damaged and damaged applies here as it did to the surfacing materials. The damage must be both extensive and severe, and generally not practical to repair, to justify a significantly damaged assessment.

As with surfacing materials and miscellaneous materials, there is some forgiveness for a less-than-perfect condition for thermal system insulation before it is assessed as damaged. The factor which should be used by the Inspector to distinguish between Good and Fair is whether or not fibers have been released.

"This definition allows that, even though the insulation is marred, scratched, or otherwise marked, it may not be, in the judgement of the Inspector, damaged so as to release fibers."

sec

393

3288

D.2 Assessment of POTENTIAL FOR DISTURBANCE of ACM

D.2.1 Low. Low means that the ACM does not qualify for the "Potential for Damage" category. Being just slightly above a zero chance of damage would not qualify for "Potential for Damage".

D.2.2 Medium. Medium means that there is a "Potential for Damage". This means circumstances in which:

A. Friable ACM is in an area regularly used by building occupants, including maintenance personnel, in the course of their normal activities.

B. There are indications that there is a reasonable likelihood that the material or its covering will become damaged, deteriorated, or delaminated due to factors such as changes in building use, changes in operations and maintenance practices, changes in occupancy, or recurrent damage."

The Medium rating should only be given after careful consideration of the circumstances, such as future use of the facility.

D.2.3 High. High means that there is a "Potential for Significant Damage". The definition for "Potential for Significant Damage" contains items A. and B. above, and adds:

C. The material is subject to major or continuing disturbance, due to factors including, but not limited to, accessibility or, under certain circumstances, vibration or air erosion."

394

D.2.4 Method of Assssment. To determine the Potential for Disturbance, assess the accessibility, influence of vibration, and potential for air erosion using the above criteria. The resulting Potential for Disturbance will be the worst of the three assessments.

Using the following as an example:

Accessibility -Low
Influence of Vibration -High
Potential for Air Erosion -Medium

The overall Potential for Disturbance would be High, since this is the worst rating of the three factors.

3288

APPENDIX E

PHYSICAL ASSESSMENT OF ACM PER GRADE SYSTEM

E.1 Assessment of EXPOSURE FACTOR of ACM

The following is a description of the manner in which the numerical values are determined for Sections a through j of the Exposure Risk Assessment/Evaluation Form, Figure #6:

a. **Friable:**

High - Material is fluffy and/or the slightest hand pressure can dislodge it. A slight breeze may disperse the material.
Medium - Material can be dislodged or scraped/crumbled by hand.
Low - Material is firmly bound, difficult to scrape off by hand.
Non-Friable - Cannot be reduced to powder by hand pressure.

b. **Area:** Amount of visible surface area of damaged or friable material, measured in square feet.

< 10	= 0
10 to < 100	= 1
100 to < 1,000	= 2
> or equal to 1,000	= 3

c. **Walls:** Includes ceiling and refers to the ability of the walls to hold fibers for re-entrainment. If more than one type, score the roughest. If

396

If the wall material is exposed friable asbestos, score as rough.

(4) Rough - Difficult to clean with a HEPA vacuum.

(3) Pitted - Difficult to clean with a damp cloth but cleanable with a HEPA vacuum.

(2) Moderate - Can be cleaned with a damp cloth.

(1) Smooth - Easily cleaned with a damp cloth.

d. **Ventilation:**

(5) The interior of the supply duct or plenum is coated or littered with friable material or is within 5 feet of a supply diffuser or fan and the condition of the material may result in fibers being entrained into the airflow.

(2) The interior of the return air duct or plenum is coated or littered with friable material and is part of a recirculating system.

(1) Air being supplied to the room or cell is (1) drawn from an area where the potential for asbestos fiber release is possible, or (2) part of a recirculating system where fibers may be drawn into the system.

(0) None of the above applies.

e. **Air Movement:** This refers to the general air movement in the room or area that may affect the friable surface or damaged material.

(5) Material is subjected to routine turbulent or abrupt air movement.

(2) Material is exposed to perceptible or occasional air streams.

(0) No perceptible air flow in the room or area.

3288

f. **Activity:** Refers to forces acting on the surface covered; i.e. vibrational, water or steam, etc.

(5) High - Friable surface or damaged material is subject to constant vibration (Mechanical Rooms).

(2) Medium - Occasional vibration. Ex. - a warehouse where forklifts are used, kitchen, etc.

(0) Low - Administrative office, library, classroom, storage stairway or corridor, waiting room, etc.

g. **Floor:**

(4) Carpet or extremely rough surface difficult to clean by HEPA vacuum or by a damp cloth.

(2) Seamed or rough surface. Ex. - uncoated concrete.

(1) Smooth continuous surface. Ex. - finished or coated concrete, smoothly jointed tile, etc.

h. **Barriers:** If both A and B apply, score the one with the highest rating. Check all that apply. (Maximum of 4 points)

A. Refers to sprayed-on or trowelled-on material on ceiling or walls.

(1) Suspended ceiling or accessible secondary wall.

(2) Encapsulation or covered with non-asbestos material.

(3) Railing or chicken wire.

(4) None.

398

008

B. Pipe, Boiler, Duct, or Other surface or damaged materials. Percent of total exposed and visible to the occupants.

(1) < 25%
(2) > 25%, < 50%
(3) >50%, <75%
(4) >75%

i. **Location:**

(1) Outside surface of a building, outside pipe insulation, etc.
(2) Any ACM located inside a building.

j. **Population:** This involves defining the average occupancy and outside visitor traffic of a room or area based on an 8 hour per day exposure.

(1) < 9 or for corridors
(2) 10 < Pop. < 200
(3) 201 < Pop. < 500
(4) 501 < Pop. < 1,000
(5) > 1,000 (includes medical facility and food preparation areas, regardless of population.

E.2 Assessment of DAMAGE of ACM

The following is a description of the manner in which the numerical values are determined for Sections k through p of the Exposure Risk Assessment/Evaluation Form, Figure #6:

3288

k. **Physical:** Assess damage based on visible evidence of work surface accumulation or the condition of the sprayed-on or trowelled-on surface materials.

(5) High - Dislodged pieces are evident on work surfaces.
(4) Moderate - There is evidence of visible material fallout.
(2) Low - There is some evidence of material fallout.
(1) Minimal - There are isolated and very small areas of material damage or fallout.

l. **Water:**

(3) Yes - Visible water damage.
(0) No - No water damage.

m. **Proximity to items for repair:** If both A and B apply, score the one with the highest rating. (Check all that apply. Maximum of three points.) How far is the material from routine maintenance areas?

A. Sprayed-on or trowelled-on. Could the material be damaged by routine maintenance?

(3) < 1 foot or a ceiling panel contaminated with ACM must be removed.
(2) 1 foot or >, < 5 feet
(1) 5 feet or >
(0) 5 feet or >, and no routine maintenance.

400

B. Pipe, Boiler, or Duct Insulation. Could damage occur as a result of routine maintenance.

(3) A ceiling panel contaminated with ACM must be removed.
(1) Yes
(0) No

n. **Type of Material:** If area or room contains numerous categories of material, score the friable material with the largest area. Check all other categories that are found.

(0-4) Other material, i.e. wallboard, ceiling tile or floor tile with exposed friable ends, abrasions, etc.
(1) Boiler and/or pipe.
(3) HVAC - Suspected ACM on exterior of ducts.
(4) Ceilings or walls.

o. **Potential for Contact by Occupants:** How far is the friable sprayed-on, trowelled-on, or damaged material from the heads of the room or area occupants? Regardless of whether there is a barrier. High, medium, and low refer to the chance of the room or area personnel actually disturbing the ACM.

≤ 10 feet	10 feet or >
(8) High	(5) High
(5) Medium	(3) Medium
(2) Low	(0) Low

3288

p. **Asbestos Content:** Use the percentage for the material that has the highest probability of becoming airborne.

(0) < 1%

(1) Equal to or > 1%, < or = to 30%

(3) > 30%, < or = to 50%

(5) > 50%

402

ASBESTOS SURVEY & ASSESSMENT FOR THE FEMP

AVAILABLE UPON REQUEST

Westinghouse Materials Company of Ohio

INDUSTRIAL HYGIENE AND SAFETY MANUAL

CONTROL OF WORK INVOLVING ASBESTOS

IH&S-IH-03	Date: 03-20-89	Rev: 0	

Industrial Hygiene

1.0 PURPOSE

To describe the requirements and methods to be used to ensure that exposures of employees to asbestos are within applicable limits and are controlled to levels which are As Low As Reasonably Achievable (ALARA).

2.0 SCOPE

This procedure establishes responsibilities regarding work involving asbestos, and provides information on asbestos hazard awareness, and requirements covering how asbestos work is to be controlled. This procedure applies to all WMCO personnel, subcontractors and/or others at the FMPC.

3.0 DEFINITIONS

3.1 Asbestos - a fibrous material suitable for use as an incombustible, non-conducting, or chemically resistant material; includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.

3.2 Asbestos Fiber - a particulate form of asbestos, 5 micrometers or more in length, with a length-to-diameter ratio of at least 3 to 1.

3.3 Asbestos Work Area - any area in which asbestos work is being done.

3.4 Asbestos Worker - personnel who may be exposed to airborne asbestos fibers as a part of their defined or assigned job.

3.5 Assistant Emergency Duty Officer (AEDO) - the AEDO is the onsite management authority for all shifts and for all abnormal events. This position is filled by a Utilities Engineer.

3.6 Demolition - the wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations.

3.0 DEFINITIONS (continued)

3.7 Demolition/Renovation Project Asbestos Removal Form - a form provided by Environmental Compliance which is completed by a Planner of Asbestos Work, Supervisor-In-Charge of Asbestos Workers, or a Project Engineer providing information to Environmental Compliance in advance of any asbestos removal or demolition job. The form is sent to the EPA as notification per

3.8 Emergency Renovation - a renovation operation that was not planned but results from a sudden, unexpected event. This term includes operations necessitated by non-routine failures of equipment which must be addressed to minimize downtime on essential process equipment and those operations necessary to mitigate potential human health risk. How Form Rec'd out?

3.9 Friable Asbestos Material - any material containing more than one percent asbestos by weight, that hand pressure can crumble, pulverize, or reduce to powder when dry.

3.10 Glove Bag - a polyethylene plastic bag fitted with arms through which work can be performed, and which allows workers to remain completely isolated from the asbestos material being removed.

3.11 HEPA Vacuum - a portable vacuum cleaner equipped with a high efficiency particulate air (HEPA) filter designed to be 99.97% efficient at collecting $\geq$ 0.3 micron size particles.

3.12 Incidental (Demolition and/or Renovation) - extremely small, minor removals which are necessary to facilitate normal conduct of business. These projects could not have reasonably been foreseen or planned, and do not constitute classification as emergency removals.

3.13 Planned Major (Demolition and/or Renovation) - non-emergency removals involving the removal of friable asbestos materials from at least 260 linear feet of pipes or at least 160 square feet of other facility components such as transite.

3.14 Planned Minor (Demolition and/or Renovation) - non-emergency removals involving the removal of friable asbestos materials from less than 260 linear feet of pipes or 160 square feet of other facility components such as transite.

3.15 Planner of Asbestos Work - person responsible for planning jobs involving work with asbestos (e.g., job planner - estimator, project engineer, maintenance supervisor).

3.16 Renovation - altering in any way one or more facility components. Operations in which load-supporting structural members are wrecked or taken out are specifically excluded.

3.17 Small-scale, short duration operations - work activities which have a reduced potential for elevated levels of asbestos fibers being generated due to the small scale or short duration of the operation (See Section 5.2.4.5 for criteria).

405

3.0 DEFINITIONS (continued)

3.18 Supervisor-In-Charge - the person(s) supervising the employee(s) performing the work required.

4.0 RESPONSIBILITIES

4.1 Facility Owner

4.1.1 Ensures prompt maintenance/repair of deteriorated or damaged insulation or other asbestos containing material.

4.1.2 Contacts Industrial Hygiene for regulation of areas containing deteriorated or damaged insulation until repairs can be made.

4.1.3 Contacts Industrial Hygiene for sampling of insulation or other material to determine asbestos content.

NOTE: Asbestos cannot be identified by the human eye. All existing insulation shall be considered as containing asbestos unless identified by labeling or analysis as non-asbestos.

4.2 Planner of Asbestos Work

4.2.1 Minimizes use of asbestos-containing materials by ordering asbestos-free substitutes whenever possible.

4.2.2 Notifies Environmental Compliance of each asbestos-related or suspected asbestos-related operation to be performed, by completing and forwarding the Demolition/Renovation Project Asbestos Removal Form (Attachment B) as required by Environmental Compliance.

4.2.3 The initiator of emergency or unplanned jobs involving asbestos work shall notify Environmental Compliance and the Industrial Hygiene Technician prior to the start of the job.

NOTE: If the work does not involve a job planner-estimator, it is the responsibility of the supervisor-in-charge of the work force to complete and forward the Demolition/Renovation Project Asbestos Removal Form to Environmental Compliance.

4.3 Supervisor-In-Charge of Asbestos Workers

4.3.1 Submits names of asbestos workers to the Medical Service Section and the Industrial Hygiene Subsection of the OS&H Department.

4.3.2 Assures a minimum use of asbestos-containing material, by using asbestos-free substitutes.

4.0 RESPONSIBILITIES (continued)

4.3.3 Verifies that all personnel working with asbestos have completed the appropriate asbestos worker training programs.

4.3.4 Verifies that all personnel identified as asbestos workers are respirator fit-tested once every six months.

4.3.5 Instructs personnel in proper methods of working and handling asbestos-containing materials and ensures compliance.

4.3.6 Initiates a FMPC Work Permit Form (OS&H form 2939) per Site Procedure FMPC-516 for any work resulting in the handling of any asbestos-containing material. Contacts Industrial Hygiene Technician to issue FMPC Asbestos Work Permit (OS&H form 2940, Attachment C). Verifies that the completed Work Permit and Asbestos Work Permit is posted at the asbestos work site.

4.3.7 Shall attend the appropriate asbestos training courses before supervising any asbestos work permit job.

4.3.8 Verifies the asbestos work site is posted with asbestos warning signs, and that the area is segregated from other work areas by rope, barrier tape or plastic sheeting. Verifies compliance with the Asbestos Work Permit requirements.

4.3.9 Assures use of proper personal protective equipment and the proper disposal of bagged clothing, bagged scrap, and labeling of such materials.

4.3.10 Ensures that no free standing liquid is contained in the bagged asbestos waste.

4.4 Asbestos Worker

4.4.1 Performs jobs in accordance with requirements set forth on the Asbestos Work Permit.

4.4.2 Shall not perform any work with asbestos until successfully completing the asbestos worker training program.

4.4.3 Shall report any situation to their immediate supervisor regarding potential exposure to friable asbestos material.

4.4.4 Shall immediately report any signs of heat stress from co-workers or themselves to the supervisor-in-charge.

4.4.5 Wears personal air sampling equipment when directed by supervision or Industrial Hygiene.

407

4.0 RESPONSIBILITIES (continued)

4.5 Industrial Hygiene

4.5.1 Reviews and concurs with specifications for subcontract/vendor work involving asbestos and with selected bid package.

4.5.2 Verifies, through contact with Environmental Compliance for each asbestos job, that regulatory notification has been completed and that approval to begin work has been granted before issuing Asbestos Work Permit.

4.5.3 Authorizes and provides special precautions and work practices for each asbestos job by completing and returning the Asbestos Work Permit to the supervisor-in-charge of asbestos workers (job supervisor).

4.5.4 Specifies the use of proper personal protective equipment required for each asbestos job.

4.5.5 Ensures adequate monitoring by sampling selected job operations based on duration and degree of potential exposure and provides notification of air sampling results as required.

4.5.6 Evaluates effectiveness of control measures and/or engineering controls in maintaining the required asbestos TLV.

4.5.7 Notifies supervision when personnel identified as asbestos workers are due for six month fit-testing and conducts the fit-testing.

4.5.8 Provides training and instruction to personnel in the proper methods of working with, and handling asbestos-containing materials.

4.5.9 Performs periodic inspections of asbestos work-sites to ensure compliance with acceptable asbestos work practices.

4.5.10 Reviews the use of asbestos-containing materials and recommends asbestos-free replacements whenever possible.

4.5.11 Regulates areas when asbestos containing materials are found in extremely poor condition to reduce the potential for exposure to individuals working in the immediate area of the damaged materials.

4.5.12 Performs inspections of buildings and surrounding areas to identify areas where asbestos containing materials are present.

4.5.13 Conducts routine air monitoring to ensure that airborne levels are within acceptable levels.

4.0 RESPONSIBILITIES (continued)

4.5.14 Collects samples of suspect asbestos materials for positive identification by laboratory analysis and tags sampled areas for future reference.

4.6 Medical Services

4.6.1 Performs annual physical examination on all personnel identified as asbestos workers, provides medical guidance concerning these employees, and makes recommendations based on medical condition and medical history.

4.6.2 Retains asbestos workers' medical files for the duration of their employment, plus thirty years.

4.7 Procurement

4.7.1 Verifies Industrial Hygiene concurrence prior to award of subcontracts for construction/engineering projects involving work with asbestos and prior to issuance of Purchase Orders to vendors involving work with asbestos.

4.7.2 Procures or modifies procurement specifications as directed by the requisitioner and/or OS&H to ensure use of asbestos-free materials whenever possible.

4.8 Project Engineer

4.8.1 Reviews all construction/engineering projects to identify as early as possible if any asbestos will be involved in the project.

4.8.2 Includes requirements for compliance with all asbestos regulatory requirements in project specifications for jobs involving work with asbestos and provides specifications to Industrial Hygiene for review.

4.8.3 Includes requirement for submittal of an acceptable Asbestos Work Plan in project specifications involving work with asbestos.

4.8.4 Specifies asbestos-free substitutes whenever possible.

4.8.5 Notes on drawings when asbestos is required or removed.

4.8.6 Completes a Demolition/Renovation Project Asbestos Removal Form (Attachment B) and submits to Environmental Compliance whenever construction projects involve the demolition and/or removal of asbestos containing materials.

4.8.7 Ensures proper FMPC Asbestos Work Permits are obtained during the course of the work.

4.0 RESPONSIBILITIES (continued)

4.9 Waste Operations

4.9.1 Provides interim storage, transport and disposal of asbestos waste material.

4.9.2 Recommends and provides approved containers for disposal of asbestos waste material.

4.10 Waste Technology

Establishes guidelines for interim storage, transport and disposal of asbestos waste material.

4.11 Environmental Compliance

4.11.1 Reviews, recommends and approves, in cooperation with responsible organizations, control and disposal methods for compliance with EPA regulations.

4.11.2 Provides notification to Industrial Hygiene when regulatory approval has been granted for an asbestos demolition or renovation project to commence.

4.11.3 Provides direction and any required training to all personnel required to complete the Demolition/Renovation Project Asbestos Removal Form.

4.12 Assistant Emergency Duty Officer (AEDO)

4.12.1 Classifies an event and determines if it is reportable to DOE as an emergency or non-routine event.

4.12.2 May direct OS&H personnel to perform analysis and monitoring efforts.

4.12.3 Logs all events and ensures that all original reports, forms, and logs are placed in Emergency Preparedness files.

4.12.4 Ensures that areas of damaged asbestos are regulated, repaired and cleaned up in an expeditious manner after an asbestos related event.

5.0 GENERAL

5.1 Asbestos Awareness and Hazard Control

5.1.1 Asbestos refers to a group of fibrous silicate minerals which are valued for their ability to withstand heat, insulate, and to reinforce other materials. When the FMPC was built, and in later years, asbestos was widely used in steam pipe insulation, asbestos-cement pipes, corrugated asbestos-cement board (transite) and furnace insulation.

5.0 GENERAL (continued)

Asbestos dust may be generated when such equipment is damaged, repaired or replaced. Asbestos may also be present in floor tile/sheeting, valve packing, gaskets, brake linings, and other materials.

5.1.2 Asbestos cannot be identified by the human eye. All existing insulation and other items listed in Section 5.1.1 shall be considered as containing asbestos unless identified by labeling or analysis as non-asbestos.

5.1.3 To identify the presence or absence of asbestos, contact the Industrial Hygiene Technician for sample collection or for results of prior analysis. Previously sampled locations are marked with an identification tag and analytical results are available from Industrial Hygiene for these samples. An example of the sample location identification tag is shown in Attachment A.

NOTE: Use of this asbestos sample tag was initiated in October 1988. Before this tag was used, asbestos bulk sample locations were identified using plastic tape with a six digit number indicating the sample number.

5.1.4 Airborne asbestos dust, consisting of microscopic fibers, constitutes a known respiratory hazard, because asbestosis, mesothelioma, and cancer of the lungs or other body organs may result from inhalation of asbestos fibers after a latency period. Therefore asbestos dust exposures and releases to the environment must be minimized even though extra time and effort are required.

5.1.5 Since airborne asbestos fibers are a known respiratory hazard, it is important to maintain asbestos containing materials (specifically pipe insulation) in good condition in order to reduce the potential for employee exposure to airborne asbestos fibers.

5.1.6 All personnel must be alert for the presence of damaged asbestos containing materials and notify the Facility Owner who shall ensure proper repairs are made and shall contact Industrial Hygiene for posting of hazard warnings if appropriate.

NOTE: If insulation or other asbestos containing material has been seriously damaged creating a potential for exposure to dust contact the AEDO and Industrial Hygiene immediately for proper regulating of the area, clean-up, and repair. (See Section 5.7).

5.1.7 Industrial Hygiene performs periodic inspections of buildings to identify areas where pipe insulation or other suspect asbestos containing structures are damaged and in a

411

5.0 GENERAL (continued)

friable condition. The Facility Owner is informed of the findings for corrective action and the area may be identified with hazard warnings if necessary.

5.1.8 An FMPC Asbestos Work Permit must be obtained and its requirements followed, for any work with asbestos-containing materials at the FMPC.

5.2 Planning for Work/Projects Which May Involve Asbestos

5.2.1 General

Asbestos is present in many building materials found at the FMPC. Many construction and maintenance activities involve the disturbance of asbestos containing materials. For this reason, all construction/maintenance activities should be evaluated as early as possible to determine if any suspect asbestos containing materials are present and may be disturbed during the course of the work activity.

5.2.1.1 If materials suspected of containing asbestos are present, Industrial Hygiene shall be contacted to collect samples to determine if the suspect materials contain asbestos or are asbestos-free.

NOTE: If suspect asbestos containing materials are to be disturbed as part of construction/maintenance activities, and time does not allow for sampling of the suspect materials, the materials shall be handled as asbestos.

5.2.1.2 For work to be performed by a subcontractor or vendor, requirements for compliance with FMPC controls for work with asbestos shall be included in procurement documents and an Asbestos Work Plan shall be submitted by the subcontractor/vendor for any work which involves asbestos and shall be provided to Industrial Hygiene for review and concurrence. (See Section 5.2.2)

NOTE: For minor asbestos work such as drilling holes in floor tile or transite, an Asbestos Work Plan is not required. (See Section 5.2.2.3 Note)

5.2.1.3 For all asbestos work the need for a Demolition/Renovation Project Asbestos Removal Form (Attachment B) shall be evaluated and the form filed if required. (See Section 5.2.3)

412

5.0 GENERAL (continued)

5.2.1.4 An OSHA "competent person" shall be assigned to supervise the asbestos work project, except small-scale, short-duration work. (See Section 5.2.4)

5.2.1.5 For all asbestos work an FMPC Asbestos Work Permit shall be obtained. (See Section 5.2.5)

5.2.2 Subcontract/Vendor Specifications and Work Plan:

For any project/construction activity which involves work with asbestos the procurement documents shall include the following:

5.2.2.1 Requirements for compliance with all applicable regulatory requirements involving work with asbestos including those of OSHA, EPA and the State of Ohio.

5.2.2.2 The requirement that subcontractor/vendor shall submit documentation of proper respirator fit-testing, medical certification and training in the use of respirators for all involved workers to Industrial Hygiene prior to the start of work.

5.2.2.3 The requirement for submittal of an Asbestos Work Plan as part of the bid.

NOTE: For minor asbestos work such as drilling holes in transite or floor tile, an Asbestos Work Plan is not required. However, before the start of these minor asbestos work activities, Industrial Hygiene shall be presented documentation as specified in Section 5.2.2.2 and documentation that all workers have attended knowledge level asbestos worker training as specified by OSHA.

5.2.2.3.1 This Work Plan shall be submitted to and approved by WMCO Industrial Hygiene prior to the start of work and shall include the scope of the proposed asbestos work, the proposed asbestos abatement methods to be used during the asbestos work, engineering controls that will be used to control the release of asbestos fibers, personnel and clearance air monitoring procedures, protective equipment to be used including respiratory protection and protective clothing, and the employee training program.

413

5.0 GENERAL (continued)

5.2.2.3.2 All subcontractor/vendor employees required to supervise or perform asbestos removal work shall be licensed for asbestos removal in accordance with the laws of the State of Ohio. Records of this licensing shall be submitted with the Asbestos Work Plan.

5.2.2.3.3 The subcontractor/vendor must submit with the Work Plan evidence that the company is certified by the State of Ohio as an Asbestos Hazard Abatement Contractor.

5.2.3 Required Notifications:

Before any asbestos demolition or renovation may commence, certain regulatory requirements must be met. (Contact Environmental Compliance for additional information.) Written notification shall be provided to Environmental Compliance well in advance of commencing work (30 to 40 days prior to the start of planned demolition or renovation). The written notification shall be in the form of a Demolition/Renovation Project Asbestos Removal Form (see Attachment B).

5.2.3.1 For a Planned Major Demolition or Renovation project involving friable asbestos, a minimum of 30 days written notification must be given to Environmental Compliance prior to commencing work.

5.2.3.2 For a Planned Minor Demolition project, a minimum of 40 days written notification must be given to Environmental Compliance prior to commencing work.

5.2.3.3 For a Planned Minor Renovation project, the Asbestos Removal Form is to be completed and forwarded to Environmental Compliance prior to commencing work.

5.2.3.4 Emergency and Incidental Demolitions are not recognized by the regulators. All demolition activities are to be reported in accordance with sections 5.2.3.1 and 5.2.3.2.

NOTE: If a situation arises where such a removal is necessary to mitigate potential human health risks, the project manager or supervisor shall immediately contact Environmental Compliance.

414

5.0 GENERAL (continued)

5.2.3.5 Emergency Renovation removals must be orally reported directly to Environmental Compliance prior to the removal, if practical, or immediately thereafter.

NOTE: When an Emergency Renovation must be accomplished on an off-shift or weekend, notification to Environmental Compliance must occur as soon as practical afterwards.

5.2.3.6 Incidental Renovation removals must be orally reported directly to Environmental Compliance prior to the removal.

5.2.3.7 When completing the Asbestos Removal Form, it is necessary to be as accurate as possible with the starting date of an asbestos removal project since it is the most likely date of an inspection by an off site regulatory agency. When the proposed starting date must be changed, immediate oral notification shall be made to Environmental Compliance.

NOTE: Any questions or concerns regarding EPA regulations and reporting requirements shall be addressed to the Environmental Compliance Subsection of the OS&H Department.

5.2.4 Supervision of Asbestos Work:

The supervisor of an asbestos work project (except small-scale, short duration work) shall be qualified as a "competent person" as defined in the OSHA Asbestos Standard. The term "competent person" as defined by OSHA means one who has passed an OSHA approved training course, is capable of identifying existing asbestos hazards in the workplace and who has the authority to take prompt corrective measures to eliminate them. See Section 5.6.1.5 for the training requirements for the assigned "competent person".

5.2.4.1 The assigned "competent person" for an asbestos work activity must be a supervisory level individual and must be physically present at the work site as long as workers are inside the asbestos work area.

5.2.4.2 The duties of the "competent person" include at least the following: establishing the asbestos work area, ensuring its integrity (when an enclosure is constructed), and controlling entry and exit from the asbestos work area.

5.0 GENERAL (continued)

5.2.4.3 The "competent person" is responsible for supervising any employee air sampling, ensuring that all employees working inside the asbestos work area wear the appropriate personal protective equipment, ensuring that these employees are trained in the use of appropriate methods of exposure control, and ensuring that these workers use the proper decontamination procedures when exiting the asbestos work area.

5.2.4.4 The "competent person" is also responsible for ensuring that engineering controls in use during the asbestos work are in proper operating condition and are functioning properly.

5.2.4.5 For small-scale, short-duration operations, a trained "competent person" is not required to supervise the asbestos work because there is a reduced potential for elevated levels of asbestos fibers being generated. See Section 5.6.1.4 for the training requirements for the supervisor of a small-scale, short-duration asbestos work activity.

5.2.4.5.1 Small-scale, short-duration operations are maintenance or renovation tasks, where the removal of asbestos containing materials is not the primary goal of the job (e.g., pipe insulation repair, valve replacement, drilling holes in transite to mount conduit, installing electrical conduits or piping through transite, etc.).

5.2.4.5.2 A small-scale, short-duration operation is any activity where employees' exposures to asbestos can be kept below the OSHA action level via worker isolation techniques, such as glove bags, mini-enclosures, or the removal of an entire asbestos-covered pipe or structure. Activities such as the removal of up to 160 square feet of transite or the removal of up to 30 feet of pipe insulation by glove bag are known to result in employee exposures less than the OSHA action level. Removals which exceed these size limits shall not be classified as small-scale, short-duration.

5.0 GENERAL (continued)

5.2.4.5.3 Asbestos work not fitting the small-scale, short-duration criteria of 5.2.4.5.2 cannot be reduced in size by creating two or more small scale operations.

5.2.4.5.4 All of the requirements of 5.2.4.5.1 through 5.2.4.5.3 must be met for a maintenance or renovation task requiring the removal of asbestos to be classified as a small-scale, short-duration operation.

5.2.5 Authorization to Perform Work - Asbestos Work Permit:

After all regulatory requirements have been met, Industrial Hygiene shall be contacted to issue an FMPC Asbestos Work Permit (Attachment C). An Asbestos Work Permit is required for all activities involving work with asbestos, and shall be posted at the perimeter of the asbestos work area prior to the start of work.

NOTE: The permit shall be posted outside the actual work area so it can be viewed without entering the asbestos work area.

5.3 Proper Asbestos Work Practices

5.3.1 When working with asbestos, certain precautions are required to ensure the health and safety of the asbestos workers and building occupants.

NOTE: A stock of safety supplies required to perform asbestos abatement activities are available through Inventory Control & Warehousing. See Attachment D.

5.3.2 Before start of asbestos work activity, the supervisor-in-charge shall identify the proper disposal methods for asbestos waste, and the final on-site destination of the containerized waste (contact Waste Operations).

5.3.2.1 Waste containers from Waste Operations shall be available at the asbestos work site before the start of work.

5.3.2.2 All material removed during asbestos work, shall be wetted, double bagged in plastic (at least 12 mil total plastic), sealed, placed in white 55 gallon drums or wooden boxes supplied by Waste Operations, suitably labeled, and disposed of in accordance with disposal requirements of Waste Technology.

417

5.0 GENERAL (continued)

NOTE: All waste shall have sufficient absorbent material added to it in order to be able to absorb two (2) times the volume of liquid in the container.

5.3.2.3 The final on-site destination of the containerized waste shall be determined by Waste Operations.

5.3.3 The asbestos work area shall be segregated such that other personnel will not be subjected to asbestos. This shall be accomplished by roping-off the area, using banner-guard tape, or by using plastic sheeting to totally enclose the work area. The manner of segregating the work area shall be approved by Industrial Hygiene and will depend on the size of the job and exposure potential. When total enclosure of the work area is required the need for use of a HEPA filtered negative pressure ventilation system and for special clearance air sampling shall be evaluated and approved by Industrial Hygiene.

NOTE: When a HEPA filtered negative pressure ventilation system is used as part of a total enclosure job, the system shall be operated continuously in order to constantly clean the air inside the enclosure of asbestos fibers. The HEPA ventilation shall continue to operate until clearance air sampling shows acceptable results.

NOTE: Nearby building occupants shall be notified before asbestos work begins to prevent unauthorized access to the work area.

5.3.4 All asbestos work areas shall be posted with asbestos warning signs. See Attachment E for required wording.

NOTE: After completion of the job the work area shall remain segregated and warning signs posted until approval is obtained from Industrial Hygiene indicating that final inspection of work area is completed.

5.3.5 Requirements of the Asbestos Work Permit for clearing the work area of extraneous items, and use of plastic sheeting to prevent contamination of equipment and surfaces shall be complied with.

5.0 GENERAL (continued)

5.3.6 Any local ventilation systems which have the potential to spread asbestos fibers in the immediate work area or throughout the building shall be tagged and locked out of service, or otherwise protected, until the asbestos removal and clean-up is completed. After the ventilation system has been shut down, ventilation duct openings shall be sealed with plastic when there is the potential for asbestos contamination to get into the building ventilation system.

5.3.7 Smoking, chewing tobacco/gum, eating or drinking shall not be permitted in the asbestos work area.

5.3.8 Personnel working in asbestos work areas shall use approved respiratory protection.

5.3.8.1 Only the same brand and size of respirator with which the person was fitted shall be worn.

5.3.8.2 The respirator requirements specified for each asbestos job by Industrial Hygiene on the Asbestos Work Permit shall be complied with.

5.3.9 All personnel inside the asbestos work area shall comply with protective clothing requirements and respirator requirements as posted and as stated on the Asbestos Work Permit and the FMPC Work Permit.

5.3.9.1 At the completion of the asbestos work or whenever exiting the asbestos work area, any visible asbestos shall be vacuumed from disposable clothing using a HEPA-filtered vacuum cleaner (approved for asbestos use) before removal of disposable clothing.

NOTE: HEPA vacuums used for asbestos work must be labeled for use with asbestos only. When a HEPA vacuum previously used for asbestos work is to be used for clean-up of non-asbestos materials, the paper disposal bag and cloth main filter must be removed and disposed of as asbestos waste and refitted with clean replacements.

5.3.9.2 Disposable protective clothing shall be removed upon leaving the asbestos work area, placed in 12-mil plastic bags, labeled as asbestos waste, sealed, and placed with other asbestos waste in white 55 gallon drums marked with proper asbestos identification labels.

5.0 GENERAL (continued)

5.3.9.3 When removing disposable protective clothing, continue using respiratory protection until all disposable protective clothing has been sealed in plastic bags.

5.3.9.4 Personnel working inside the asbestos work area shall decontaminate as per steps 5.3.9.1 through 5.3.9.3 at each departure from the work area and shall shower before lunch and at the end of their shift.

5.3.10 Friable asbestos scrap material is not allowed to be handled in a dry condition. All asbestos containing materials shall be adequately wetted before removal (i.e., thoroughly soaked before removal is attempted). Use of surfactants to improve the wetting properties of water is recommended. The water or wetting agent shall be applied by a gentle spray or mist so as not to disturb the asbestos and generate airborne fibers. It may be necessary to continue the wetting process until the asbestos material is bagged and sealed.

5.3.11 During demolition of items insulated with or otherwise containing friable asbestos, items shall be removed so as to minimize stripping of insulation, i.e., insulated piping can be removed in sections by removing small areas of insulation at set intervals, sealing exposed insulation, wrapping piping in plastic, cutting through piping where asbestos has been removed, and placing cut sections of insulated piping into waste containers. Items (pipes, ducts, structural members, etc.) that are covered with materials containing asbestos, shall not be dropped or thrown to the ground, but shall be carefully lowered to the ground.

5.3.12 When removing asbestos pipe insulation, plastic glove bags shall be used whenever feasible during the removal to minimize the escape of asbestos fibers. The glove bag allows for total enclosure of the asbestos removal while isolating the worker from any significant exposure to the asbestos being removed.

NOTE: Glove bags cannot be used on pipes at temperatures above 130 degrees Fahrenheit because the plastic will melt. Every effort should be made to cool the piping before removing the insulation. When this is not practical, wet methods shall be used to remove the insulation.

5.3.13 After completion of all stripping/removal work, surfaces from which asbestos containing materials have been removed shall be cleaned to remove all visible residue. After cleaning, a sealant shall be used on the cleaned surface to lock down any remaining fibers.

5.0 GENERAL (continued)

5.3.14 Any asbestos debris on the floor or other surfaces in the work area shall be immediately removed by a HEPA vacuum (approved for asbestos use) or wetted and removed by wet wiping to avoid suspension.

NOTE: Sweeping, be it wet or dry, with or without sweeping compound, is not allowed.

5.3.15 When the asbestos work is completed, the work area shall be thoroughly cleaned to remove any visible asbestos debris. Clean-up should be accomplished using either a HEPA vacuum (approved for asbestos use) or wet methods for clean-up.

5.3.16 After clean-up of the work area is completed, the Industrial Hygiene Technician shall be contacted to conduct a visual inspection of the work area to verify that no visible asbestos debris is present. The Technician shall inform the supervisor or workers of any deficiencies found and then reinspect the area after recleaning. This process shall be repeated until acceptable clean-up conditions are obtained. The work area shall remain segregated and warning signs posted until the results of visual inspection are acceptable.

5.3.17 For total enclosure jobs only, general area air samples are required after final clean-up of the work site to determine that airborne asbestos levels inside the enclosure are at acceptable levels. (See paragraph 5.5.3). Clearance air samples will be collected only after a visual inspection of the enclosure is acceptable.

5.3.18 The Industrial Hygiene Technician shall notify the Supervisor-In-Charge or his designee when the final clean-up is acceptable (visual inspection and clearance sampling, if required), and that all remaining barriers and signs can be removed.

5.3.19 Deviations in the requirements of this section may be approved by the Industrial Hygiene Technician issuing the specific permit for the job with prior authorization from the Manager, Industrial Hygiene.

5.4 Work Practices for Work Involving Transite

5.4.1 Specific procedures are required when working with transite due to its unique characteristics. Transite is not as difficult to work with because the asbestos fibers are bonded in concrete until damaged, cut, etc.

5.4.2 The work area shall be isolated and defined by posting warning signs and securing warning tape. Additional isolation may be specified on the Asbestos Work Permit.

421

5.0 GENERAL (continued)

5.4.3 All personnel inside the asbestos work area shall comply with protective clothing requirements and respirator requirements as posted and as stated on the Asbestos Work Permit and the FMPC Work Permit.

5.4.4 Transite panels shall be removed whole whenever feasible and handled with care to avoid breakage.

5.4.5 As bolts are removed from each panel, they should be wet down to minimize any dust which may be generated.

5.4.6 Once removed, panels shall be wrapped with two layers of plastic and then placed in labeled wood or metal boxes (supplied by Waste Operations) for storage and shipment. When panels are larger than the container they are placed in, they shall be loosely double-wrapped in plastic, sealed, then broken in half and folded over. The broken panels shall then be wrapped with one more layer of plastic and sealed before they are placed into containers. Contact Waste Operations for additional information regarding waste handling.

NOTE: All waste containers shall have sufficient absorbent material added to absorb two times the volume of liquid present.

5.4.7 When cutting or drilling through transite the use of a HEPA filtered vacuum at the location of the penetration is required. This may be achieved by the use of a HEPA-filtered vacuum cleaner or power tools fitted with "point-of-cut" HEPA exhaust ventilation. The use of amended water shall also be employed at the penetration to minimize dusting. Deviations from these requirements must be approved by the Industrial Hygiene Technician.

NOTE: When cutting or drilling through transite the opposite side of the transite wall shall be sealed with plastic if there is a potential for generation of dust on the other side of the wall.

5.4.8 After removal of transite all surfaces adjacent to or in contact with the transite shall be thoroughly cleaned by wiping down with a wet rag or by vacuuming with a HEPA filtered vacuum approved for use with asbestos.

NOTE: If the surfaces appear to be contaminated with asbestos, they should be thoroughly cleaned before working with the transite.

5.4.9 After all asbestos jobs, the Industrial Hygiene Technician shall be contacted to perform a visual inspection of the work site to determine if the area has been cleaned up properly. (See paragraph 5.3.17)

422

5.0 GENERAL (continued)

5.4.10 For total enclosure jobs only, general area air samples are required after final clean-up of the work site to determine that airborne asbestos levels inside the enclosure are at acceptable levels. (See paragraph 5.5.3)

5.4.11 Approval shall be obtained from the Industrial Hygiene Technician before barriers and warning signs can be removed at the work site. (See paragraph 5.3.19)

5.4.12 Deviations in the requirements of this section may be approved by the Industrial Hygiene Technician issuing the specific permit for the job with prior authorization from the Manager, Industrial Hygiene.

5.5 Air Monitoring Requirements for Asbestos Work Activities

5.5.1 Determination of employee exposure to asbestos shall be made from breathing zone air samples collected during asbestos work activities as required by OSHA regulations. This air sampling shall be used to evaluate the effectiveness of control measures and/or engineering controls in maintaining the required asbestos exposure levels inside the segregated work area. The determination of whether such air sampling is required for a particular job shall be made by Industrial Hygiene.

5.5.1.1 Employees shall be notified of results of personal air samples collected on them during asbestos work activities.

5.5.2 General area air samples shall be collected as necessary outside the segregated work area during asbestos work activities to evaluate the effectiveness of the control measures in maintaining asbestos exposure levels outside the segregated work area to below the OSHA action level of 0.1 fibers per cubic centimeter. The determination of whether such air sampling is required for a particular job shall be made by Industrial Hygiene.

5.5.3 When total enclosure of the work area is required general area clearance air samples shall be collected. Results of asbestos clearance sampling shall be less than the EPA recommended 0.01 fibers per cubic centimeter (considering background).

5.6 Training and Qualification of Workers

NOTE: The training requirements covered in this section apply only to WMCO personnel. Subcontractor/vendor personnel shall meet the training requirements for asbestos workers and supervisory personnel as specified by the laws of the State of Ohio and shall provide documentation of such to WMCO.

423

5.0 GENERAL (continued)

NOTE: For minor asbestos work, such as drilling holes in transite or floor tile, subcontractor/vendor personnel shall have attended knowledge level asbestos worker training as specified by OSHA and shall provide documentation of such training to WMCO.

5.6.1 When working with asbestos, the asbestos workers and their supervisors are required to have completed specific training classes designed to meet regulatory requirements.

5.6.1.1 All individuals working with asbestos shall have completed a knowledge level asbestos worker training program prior to performing the work. This classroom training informs the worker of the requirements for handling asbestos and of the hazards associated with asbestos exposure.

5.6.1.2 All employees assigned to remove asbestos materials by glove bags must have attended hands-on glove bag training.

5.6.1.3 All employees assigned to work with asbestos materials that are required to wear negative pressure air-purifying respirators must have been respirator fit-tested in the last six (6) months and must have proper respirator training.

5.6.1.4 Supervisors assigned to supervise small-scale, short-duration asbestos work must have training equivalent to the training requirements for the workers doing the job. If the job is a glove bag removal of pipe insulation, the supervisor must have attended hands-on glove bag training.

5.6.1.5 Any supervisor assigned to supervise an asbestos work project (except small-scale, short duration work) must have completed the required training to qualify as an OSHA "competent person". This training consists of 32 hours of classroom and hands-on training and must be approved by the State of Ohio.

5.7 Handling Spills or Incidents Involving Asbestos

5.7.1 Any spill or incident which results in the potential for release of asbestos fibers shall be reported immediately to the Facility Owner, the AEDO, and to Industrial Hygiene. The affected area shall be evacuated immediately if airborne asbestos fibers are likely to be present.

5.7.2 The requirements of FMPC-503, "FMPC Spill Incident Reporting and Cleanup", shall be complied with as appropriate.

424

5.0 GENERAL (continued)

5.7.3 The AEDO and Industrial Hygiene shall evaluate the damaged asbestos and determine the appropriate corrective action which must be taken. When damaged asbestos is friable and could result in exposures to personnel (e.g., is in an occupied area, in a traffic area, or in the vicinity of a building ventilation system) immediate corrective actions are required, and the following steps must be followed.

5.7.3.1 The area shall be regulated using asbestos warning tape or other barriers to control access into the area in order to prevent exposure to, and the spread of asbestos contamination. Any person requiring entry into the regulated area must comply with respirator and protective clothing requirements specified by the Industrial Hygiene Technician.

5.7.3.2 All building ventilation systems in the immediate area shall be turned off or sealed off to prevent the spread of asbestos contamination.

5.7.3.3 The Facility Owner or the AEDO shall ensure that the area of damaged asbestos is repaired and clean-up is completed in an expeditious manner.

5.7.3.4 After repairs and clean-up of the area have been completed, Industrial Hygiene shall perform a visual inspection of the area to ensure that clean-up has been completed.

NOTE: As part of this inspection, general area air samples may be collected to measure levels of airborne fibers.

5.7.3.5 After the Industrial Hygiene inspection has determined the area to be properly cleaned, the warning barriers may be removed and the area reoccupied.

6.0 PROCEDURE

None

7.0 APPLICABLE DOCUMENTS

7.1 29 CFR 1910.1001, "Asbestos Guidelines for General Industry".

7.2 29 CFR 1926.58, "Asbestos Guidelines for the Construction Industry".

425

7.0 APPLICABLE DOCUMENTS (continued)

7.3 40 CFR 61, subpart M, "USEPA National Emission Standards for Hazardous Air Pollutants (NESHAPS) Asbestos Regulations".

7.4 Regulatory Compliance Guide SW:2, "Asbestos Removal Notification".

7.5 Ohio Department of Health "Asbestos Hazard Abatement Rules", Chapter 3701-34, Ohio Administrative Code, (effective July 20, 1987).

7.6 FMPC-503, "FMPC Spill Incident Reporting and Cleanup".

7.7 FMPC-516, "Control of Permits for Hazardous Work".

7.8 OS&H SOP OSH-P-41-006, "Issuing Permits for Asbestos Work".

8.0 FORMS USED

8.1 Demolition/Renovation Project Asbestos Removal Form, Form #(To be determined).

8.2 FMPC Work Permit, Form #FMPC-OS&H-2939

8.3 FMPC Asbestos Work Permit, Form # FMPC-OS&H-2940.

9.0 ATTACHMENTS

9.1 Attachment A, Asbestos Bulk Sampling Identification Tag

9.2 Attachment B, Demolition/Renovation Project Asbestos Removal Form.

9.3 Attachment C, FMPC Asbestos Work Permit.

9.4 Attachment D, Asbestos Safety Supplies Available Through Stores.

9.5 Attachment E, Asbestos Warning Sign

ATTACHMENT A

ASBESTOS BULK SAMPLING IDENTIFICATION TAG

CAUTION

DO NOT REMOVE THIS TAG

This material has been sampled to determine whether or not it contains

ASBESTOS

Before working with this material, contact Industrial Hygiene (ext. 6207) and request the results for

ASBESTOS SAMPLE NUMBER

A 1009

FMPC-OS&H-3030 (9/13/88) A

IH&S-IH-03	Date: 03-20-89	Rev: 0

ATTACHMENT B

DEMOLITION/RENOVATION PROJECT ASBESTOS REMOVAL FORM

DEMOLITION/RENOVATION PROJECT
ASBESTOS REMOVAL FORM
FEED MATERIALS PRODUCTION CENTER

Owner: U.S. Department of Energy

Operator: Westinghouse Materials Company of Ohio

2908 Willey Road

Fernald, Ohio 45030

Description of Facility (Item) Being Demolished/Renovated: _____ Size: _____ Age: _____ Prior Use: _____

Estimated Quantity of Asbestos to Remove[1]: Linear feet[2]: _____ Square feet[3]: _____

* NOTE: Quantities > 260 L.F. of pipe or > 160 S.F. of surface area require notification of regulatory authorities prior to commencing work. Do not begin work unless written notification from Environmental Compliance is received.

Location of Facility (Item): (include Room # or physical location with BLD/PLANT #) _____

Demolition/Renovation (circle one) Schedule: Start Date: _____ Completion Date: _____

Does this include the wrecking or taking out of any load supporting structural member of a facility with any related handling operations? (circle one) yes / no If yes, explain.

_____

_____

Nature of Planned Demolition/Renovation Methods to be Used: _____

_____

Removal Procedures (Wetting, Ventilation, etc.): _____

_____

Name and Location of Storage/Disposal Sites: _____

_____

Authority Requiring Removal: _____

_____

WMCO Project Number: _____

Project Contact: _____ Ext. _____

* NOTE: Quantities > 260 L.F. and > 160 S.F. of surface area require notification of regulatory authorities prior to commencing work. Do not begin work unless written notification from Regulatory Compliance is received.

Completed by: _____ Name (Typed) _____ Title

Date of form Completion: _____ Ext. _____

Signature: _____ Date _____

Additional Information (if applicable):

Footnotes:

1 If quantity to be removed is less than 260 linear feet on pipes or 160 square feet on surface area, please indicate techniques of estimation.

2 Estimate for linear feet based on length of pipe insulation being removed.

3 Estimate for square feet based on surface area of asbestos being removed.

cc: Waste Management
Industrial Hygiene

Any questions, please contact S. G. Schneider at extension 6672.

428

IH&S-IH-03	Date: 03-20-89	Rev: 0

ATTACHMENT C

FMPC ASBESTOS WORK PERMIT

This permit is only valid when it is attached to the FMPC Work Permit Form which has Section A through D completed.

FMPC WORK PERMIT NO.

Sections A & B contain descriptive information about the job and the qualifications of personnel. This information should be obtained from the supervisor-in-charge.

SECTION A - BACKGROUND AND REGULATORY INFORMATION (To be supplied by supervisor-in-charge)

1. Exact location:
2. Exact description of work to be conducted:
3. Amount of asbestos to be removed (in linear or/square feet):
4. Regulatory approval received to begin work. ☐ YES ☐ DNA
   (For information, supervisor should contact Environmental Compliance)
5. Supervisor(s):

SECTION B - EMPLOYEE INFORMATION

1. Employee(s) assigned to job. NAME / BADGE NO.

	YES	NO
2. Employee(s) assigned to job have attended asbestos worker training in past twelve (12) months.		
3. Employee(s) assigned to job have attended glovebag training (applicable to glovebag removal only).		
4. Employee(s) assigned to job have been respirator fit-tested in last six(6) months.		
5. Employee(s) have been instructed by supervision of proper disposal methods		

Section C contains items which shall be complied with on this job as indicated.

SECTION C - PRE-JOB REQUIREMENTS SPECIFIED BY: (IH TECHNICIAN INITIALS) DATE TIME

PREPARATION OF WORK SITE (An Asbestos Job)

	REQ'D	DNA
1. Work area barricaded and/or roped off		
2. Asbestos warning signs posted at work site		
3. All small items removed from designated work area		
4. Large equipment secured and covered with plastic		
5. Floor and ledges covered with plastic		
6. Area ventilation systems locked and tagged out		
7. Nearby occupants shall be notified of asbestos work to prevent unauthorized access to work area		
8. Contact IH Technician to inspect work area preparation before asbestos removal begins		

PREPARATION OF WORK SITE (For Total Enclosure Jobs Only)

	REQ'D	DNA
1. Floor and wall penetrations covered and sealed		
2. Negative air enclosure set-up around work area		
3. Negative air machine operating continuously		
4. General area air samples taken before work begins		

RESPIRATORY PROTECTION REQUIRED

☐ HALF-MASK ☐ FULL-FACE ☐ AIRLINE
☐ OTHER:

FILTER TYPE REQUIRED:
☐ HIGH EFFICIENCY DUST (PURPLE)
☐ OTHER:

WORK PRACTICES

	REQ'D	DNA
1. Personal air samples required (samples collected for entire shift when possible)		
2. No smoking, eating or drinking permitted in work area		
3. HEPA-filtered vacuum required for clean-up		
4. HEPA vacuum required at point of cut/drilling		
5. Glove bag removal of pipe insulation required		
6. Transite panels shall be removed whole		
7. Asbestos material shall not be allowed to drop		
8. Disposable clothing shall be periodically inspected for rips and tears		
9. Amended water shall be used to wet down material		
10. Asbestos material thoroughly wet down before removal		
11. Removed material promptly bagged (not allowed to dry out)		
12. Surfaces shall be cleaned with a sealant to encapsulate any remaining fibers		
13. Work area cleaned after completion of work each day		
14. Tools and equipment shall be cleaned of all residual dust before removal from work area.		
15. Personnel to decontaminate at each departure from work area		
16. Bag contaminated clothing and waste promptly		
17. Bagged waste material shall be placed in white drums or wooden boxes and labeled as asbestos waste (exterior of containers shall be clean and asbestos-free)		
18. Shower before lunch and at end of shift		

APPROVAL TO BEGIN WORK

IH TECHNICIAN SIGNATURE:	DATE: / TIME:	SUPERVISOR-IN-CHARGE SIGNATURE:	BADGE NUMBER: / DATE:

SECTION D - FINAL INSPECTION REQUIREMENTS SPECIFIED BY: (IH TECHNICIAN INITIALS) DATE TIME

	REQ'D	DNA
1. Visual inspection of work area for residual dust required after completion of job (contact IH Technician)		
2. General area air samples required after completion of job (contact IH Technician)		
3. Obtain IH Technician approval before removal of barriers & warning signs		

NO.	DISTRIBUTION OF COPIES
1	POST AT JOB SITE
2	IH&S (RECORD COPY)
3	IH&S (FIELD COPY)

APPROVAL TO REMOVE BARRIERS AND WARNING SIGNS

IH TECHNICIAN SIGNATURE:	DATE: / TIME:

FMPC-OSAH-2040 (REV 3/15/89)

429

ATTACHMENT D

ASBESTOS SAFETY SUPPLIES AVAILABLE THROUGH INVENTORY CONTROL & WAREHOUSING

Stores #	Item Description
S-00222	Label, "Danger-Asbestos", for placement on disposal packages containing asbestos materials.
S-00225	Sign, "Danger-Asbestos", for posting at asbestos work areas.
S-00258	Barrier tape, with "Danger-Asbestos" wording, red 3"x 1000' roll.
S-00051	Polyethylene sheeting, 6 mil thickness, 12'x100' long, for placement on the ground and to cover items in an asbestos work area. Can be used for construction of a mini-enclosure.
S-00219	Polyethylene, 30 gallon drum liners (6 mil), can be used for disposal of asbestos waste.*
S-00234	Polyethylene, 55 gallon drum liners (6 mil), can be used for disposal of asbestos waste.*
	* Asbestos waste must be disposed of in 12 mil thickness of plastic, then placed in plastic lined white drums or wood boxes for shipment to NTS. White drums and wood boxes are supplied by Waste Operations.
M-00639	Medium size, Disposable coveralls, white, KleenGuard
M-00640	Large size, Disposable coveralls, white, KleenGuard
M-00641	X-Large size, Disposable coveralls, white, KleenGuard
M-00642	XX-Large size, Disposable coveralls, white, KleenGuard
M-00653	Shoe covers, white paper booties, KleenGuard
M-00485	Size 12, T-cut white plastic shoe covers, can be worn over white paper booties.
M-00486	Size 13, T-cut white plastic shoe covers, can be worn over white paper booties.
M-00487	Size 14, T-cut white plastic shoe covers, can be worn over white paper booties.
M-00488	Size 15, T-cut white plastic shoe covers, can be worn over white paper booties.
M-00643	Disposable hood, white, KleenGuard

ATTACHMENT D (continued)

ASBESTOS SAFETY SUPPLIED AVAILABLE THROUGH INVENTORY CONTROL & WAREHOUSING (continued)

Stores #	Item Description
G-01366	Plastic tape, 2"x100' long roll
G-04459	Duct tape, 2"x60 yard long roll
M-00781	Glove bag (vertical), for removal of pipe insulation from vertical piping up to 10" diameter.
M-00785	Glove bag (horizontal), for removal of pipe insulation from horizontal piping up to 8" diameter.
G-04486	Asbestos encapsulant, BWE-3000 penetrating blue solution, 24 ounce spray bottle, for sealing damaged areas of pipe insulation until permanent repairs can be made.
G-04487	Asbestos surfactant, BWE-5000 penetrating pink solution, 24 ounce spray bottle, for use in wetting down asbestos containing materials prior to removal.
G-04488	Asbestos surfactant, Asbesto-Wet wetting solution, to be mixed 1/2 ounce per gallon of water. Place mixture in garden sprayer, use for wetting down insulation prior to removal.
GZ-16733	Paper disposal bags for Nilfisk GS-80 vacuum cleaner
GZ-19090	Paper disposal bags for Nilfisk GS-81 vacuum cleaner
GZ-16735	Paper disposal bags for Nilfisk GS-82 vacuum cleaner
GZ-16738	Cloth microfilter to cover motor unit on all models of Nilfisk vacuum cleaners.

Garden sprayers (3) for use during glove bag removal and other removal projects are available through the Pipe Shop.

Nilfisk HEPA vacuums for asbestos work are available through the Pipe Shop (extension 6436 or radio 219), Waste Operations (extension 6708 or radio 708) or through Industrial Hygiene (extension 6207 or radio 357).

ATTACHMENT E

ASBESTOS WARNING SIGN

ASBESTOS

CANCER & LUNG DISEASE HAZARD

AUTHORIZED PERSONNEL ONLY

RESPIRATORS & PROTECTIVE CLOTHING

ARE REQUIRED IN THIS AREA

WARNING DO NOT BREATH ASBESTOS FIBERS

434

ISSUE AND REVISION RECORD

DATE OF ISSUE	REVISION NUMBER	EFFECTED PAGES	REASON FOR CHANGE
	0		Original issue of the procedure

ASBESTOS MANAGEMENT PLAN, PL-FMPC-3002

SEE STEP 1

ASBESTOS SURVEY & ASSESSMENT FOR THE FEMP

AVAILABLE UPON REQUEST

Westinghouse
Materials Company
of Ohio — FMPC

SITE POLICY AND PROCEDURE

NUMBER:	REVISION:	ISSUE DATE:
FMPC-518	1	5/7/90

TITLE: COMPLETION OF NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) DOCUMENTATION

APPROVED BY: M. B. Boswell, President

1.0 POLICY

Westinghouse Materials Company of Ohio (WMCO) shall assure that procedures, programs, plans, new or existing operations and facilities and modifications thereto, are properly reviewed and documented with respect to their potential environmental impacts. The implementation of this policy will help to protect the environment and ensure the health and safety of FMPC employees and the surrounding community.

2.0 SCOPE

This policy describes WMCO's formal environmental review and documentation program which is implemented to meet the requirements of the National Environmental Policy Act (NEPA), the regulations of the Council on Environmental Quality (CEQ), and the guidelines and orders of the DOE and the Oak Ridge Operations office. This program covers all NEPA activities and their integration with: the Resource Conservation & Recovery Act (RCRA) activities; the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and other applicable environmental protection statutes. The projects for which NEPA compliance shall be assessed include: renovation, remediation, removal, and other actions such as General Plant Projects (GPPs) and Capital Equipment Projects (CEPs). A "NEPA Document Flow Diagram", Attachment A, is included in this site policy and procedure.

3.0 DEFINITIONS

3.1 Action - A new or continuing activity which involves facility construction, operation, decontamination, or other modifications to the project facilities or site. Actions also include the adoption of the plans, policies, and decisions which define programmatic direction and objectives of WMCO.

3.2 Action Description Memorandum (ADM) - An ADM is not a NEPA document but is used in the NEPA process to facilitate a determination of the level of NEPA documentation required for a proposed action. An ADM is prepared if the proposed action does not fit clearly into one of the classes of action listed in NEPA guidelines, and if it fails the Memo-to-File (MTF) test of "clearly insignificant". An ADM contains, as appropriate, a concise description of the proposed action (including purpose, class, type of energy technology, and size of the proposed action); the location of the proposed action (including environmental setting and economic conditions); and any known or potential issues or problems, particularly environmental issues.

3.0 DEFINITIONS (continued)

3.3 Action Plan - A document prepared by the DOE Secretarial Officer following the completion of an EIS (see Section 3.8), which implements any commitment(s) made in the EIS/Record of Decision for mitigation of environmental impacts. This also applies to an EA/FONSI (see Section 3.7 and 3.9) where the FONSI is based on mitigation.

3.4 Categorical Exclusion (Cat. Ex.) - A category of actions which normally do not individually or cumulatively have a significant effect on the quality of the human environment and which require neither an Environmental Impact Statement (EIS) nor an Environmental Assessment (EA). The list of actions for which categorical exclusions apply is published in the Federal Register and is available from the NEPA Coordinator.

3.5 Coversheet - Either form FMPC-3123, "NEPA Documentation Coversheet" or form FMPC-3124, "NEPA Categorical Exclusion," as appropriate.

3.6 Cumulative Impact - The impact on the environment which results from the incremental impact of an action when added to other past, present, and reasonable foreseeable future actions regardless of their sponsor. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

3.7 Environmental Assessment (EA) - A concise but flexible NEPA document which has three defined functions: (1) to determine whether a proposed action requires the preparation of an EIS; (2) to facilitate NEPA compliance when no EIS is necessary; and (3) to facilitate the preparation of an EIS when one is necessary. If it is determined, on the basis of an EA, not to prepare an EIS, a Finding of No Significant Impact (FONSI) is issued. EAs are forwarded to DOE Headquarters for approval. All new EAs shall be sent by DOE to the State of Ohio and, as appropriate, adjacent states for a 14-30 day comment period prior to DOE approval.

3.8 Environmental Impact Statement (EIS) - An analytical and concise document, prepared in accordance with the requirements of 40 CFR Part 1502, which provides a full and fair discussion of significant environmental impacts of a project/program under consideration and informs decision makers and the public of reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. This document requires public review and comment. EISs are forwarded to DOE Headquarters for approval. Scoping meetings are required for all EISs, as are public hearings on all draft EISs. The minimum scoping period for all EISs shall be 30 days.

3.9 Finding of No Significant Impact (FONSI) - A DOE document which provides a statement indicating why an action to be taken (which is not categorically excluded), will not have a significant effect on the hu environment and therefore will not require an Environmental Impact Statement.

BED

3.0 DEFINITIONS (continued)

3.10 Impacts - Impacts, as used in this procedure include:

- o Direct impacts, which are caused by the action and occur at the same time and place.
- o Indirect impacts, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.
- o Ecological, natural resource (including air and water), aesthetic, historic, cultural, economic, social or health, whether adverse, beneficial, direct, indirect, or cumulative.

3.11 Implementation Plan - A written plan, prepared by DOE, that records the results of the scoping process and outlines the procedure by which an environmental impact statement is to be prepared. The implementation plan should be prepared in accordance with DOE guidelines (45 FR 20694), paragraph A4(e).

3.12 Memo to File (MTF) - A DOE document, approved by DOE Headquarters (HQ), resulting from the approval of an ADM, when it is immediately clear from the ADM that the environmental impacts from a proposed action will be insignificant. The MTF briefly summarizes the proposed action and states the basis for the conclusion that a proposed action will clearly not have significant environmental impacts. If a proposed action requires environmental data gathering or analysis to reach a conclusion, then it fails the MTF test of "clearly insignificant" and an EA or EIS is necessary. The use of MTFs will terminate as of September 30, 1990. All new MTFs, prepared for the remainder of FY90, will be sent by DOE to the State of Ohio, and adjacent states as appropriate, for information purposes.

3.13 Mitigation - As used in this procedure, mitigation involves action that:

- o Minimizes impacts by limiting the degree or magnitude of the action and its implementation.
- o Rectifies the impact by repairing, rehabilitating, or restoring the affected environment.
- o Reduces or eliminates the impact over time by preservation and maintenance operations during the life of the action.
- o Compensates for the impact by replacing or providing substitute resources or environments.

3.14 Record of Decision - A concise public record of DOE's decision on a proposed action for which an environmental impact statement was prepared which includes the alternatives considered, the environmentally preferable alternatives, factors balanced in the decision, and mitigation measures and monitoring to minimize harm.

440

3.0 DEFINITIONS (continued)

3.15 Risk Analysis - A quantitative description of potential accident scenarios and the likelihood of releases of materials to the environment and the resulting impact.

4.0 RESPONSIBILITIES

4.1 Cognizant Project Engineer (CPE)/Project Manager (PM) - Responsible for assuring preparation of the required NEPA documentation during the preliminary engineering phase of any project which requires NEPA compliance. In addition, CPE/PMs are responsible for reviewing and approving the technical content of the NEPA documents associated with the project, for assuring an accurate technical description and analyses of project activities, and for assuring that NEPA documents are revised as required.

Where mitigation measures are indicated, CPE/PMs are responsible to assure that mitigating measures are fully implemented.

4.2 Quality Department; Industrial, Radiological Safety and Training (IRS&T); Environmental Engineering; Environmental Compliance; and Operations and Engineering Services - Conduct technical reviews of NEPA documentation as requested by the NEPA Coordinator.

4.3 Public Affairs and Communication Department - Coordinates public notification for a project or program that requires an Environmental Assessment, a Finding of No Significant Impact, or an Environmental Impact Statement.

4.4 NEPA Manager - The NEPA Manager is responsible for developing and managing the NEPA program for the FMPC and for coordinating the NEPA program consistent with DOE guidance. The NEPA Manager is also responsible for approving the "NEPA Compliance Plan for the FMPC" which provides a specific strategy by which the FMPC maintains full compliance with NEPA and associated DOE guidance.

4.5 NEPA Coordinator - The WMCO NEPA Coordinator is responsible for providing direction to the CPE/PM, for interfacing with DOE, and for approval of NEPA documents for submittal to the WMCO NEPA Manager. Sources of NEPA documents at the FMPC are from engineers responsible to provide environmental permits for construction projects. These construction projects are from, but not limited to, the following sections: General Plant Projects (GPP), Capital Equipment Projects (CE), Environmental Project Engineering (EPE), Restoration Engineering, Facilities Engineering, Productivity Retention Program/ Productivity and Radiological Improvement projects (PRP/PRI), and Remedial Investigation/Feasibility Study projects (RI/FS or EIS), which may include removal actions and Engineering Evaluation/Cost Analysis (EE/CA) documents.

4.0 RESPONSIBILITIES (continued)

4.6 NEPA Group - The NEPA Group is responsible for implementing and maintaining the NEPA program at the FMPC. Activities of the group include: (1) assisting appropriate project personnel in the preparation of NEPA documents, (2) maintaining a filing system for NEPA documents prepared at the FMPC, (3) preparing and maintaining procedures required for NEPA compliance at the FMPC, (4) preparing and implementing an approved NEPA training program for appropriate FMPC employees, (5) resolving DOE comments on FMPC NEPA documents, (6) maintaining the current status of all Federal Regulations, DOE Orders, and procedures concerning NEPA, (7) assisting in the integration of NEPA requirements with CERCLA, RCRA, and other regulations and laws, (8) supporting other NEPA associated assignments that may be directed by the NEPA Manager, and (9) tracking NEPA documentation from initial preparation through the DOE approval cycle.

5.0 GENERAL

5.1 The National Environmental Policy Act (42 U.S.C. 4321 et. seq.) requires that DOE, as a Federal agency, prepare Environmental Impact Statements for actions it proposes to undertake which have the potential to significantly affect the human environment. The Council on Environmental Quality (CEQ) has regulations which implement NEPA Policies. These regulations require Federal agencies, including the DOE, to adopt procedures for determining what type of environmental reports (Cat.Ex., EIS or EA) are required. They establish the content for these reports, and identify the review and approval process. DOE has adopted such regulations and has published supplemental guidance for fulfilling these requirements.

5.2 DOE Order OR 5440.1C requires contractors to adopt internal procedures to initiate and participate in the NEPA process. In order to comply with this requirement, and yet avoid unnecessary paperwork, a screening system has been established, which, by means of increasing levels of analytical detail and comprehensiveness, evaluates the potential of the proposed action for producing significant environmental impacts. These increasingly detailed analyses are:

- o Categorical Exclusion
- o Action Description Memorandum
- o Environmental Assessment
- o Environmental Impact Statement

5.0 GENERAL (continued)

5.3 The responsibility for deciding whether an EA or EIS is required for a given action rests with DOE. DOE determines whether or not an EIS will be written for certain FMPC actions. All other actions require EAs or interim NEPA documents, pending the completion of the Renovation EIS. This policy and procedure will not address the writing and approval of EISs, as these actions are well-documented and prescribed in the Federal Register. The NEPA documents addressed by this policy and procedure are the EA, Categorical Exclusion, ADM, Interim NF, Interim NC, NTF, and MTF. Upon completion of the Renovation EIS, the interim NEPA documents will no longer be used.

5.4 WMCO's NEPA Group is responsible for screening actions under consideration for NEPA compliance, for providing the DOE with sufficient project and environmental information to enable DOE to make NEPA compliance decisions, and for forwarding technically complete and accurate documents to DOE for those actions which require NEPA documentation or interim NEPA documentation. DOE evaluates the initial document presented and, if the analysis is adequate, will use this information for making a decision as to the type of NEPA document required to satisfy compliance with NEPA.

5.5 Cognizant Project Engineers and/or their managers should initiate the preparation and review of NEPA documents as early as possible in the conceptual stage of project development and well in advance of the desired date for action implementation.

5.6 The preparation of the Renovation EIS draft began in September 1986. Between September 1986 and October 1989, WMCO implemented an Interim NEPA system with the approval of DOE FMPC, DOE OR, and DOE HQ, by which renovation of the facility proceeded. This interim system consisted of:

- o NEPA Checklist (NC) - An interim NEPA document used to briefly describe a project, the alternatives considered to the project, and the impacts of the actions to be taken during the course of the Renovation EIS. An NC was used for other than Line Item-funded projects. A risk analysis was not required for a NEPA Checklist; however, a NEPA Questionnaire was attached to NCs.

- o NEPA Factsheet (NF) - An interim NEPA document used to briefly describe a Line Item-funded project, the alternatives considered to the project, and the impacts of the actions to be taken during the course of the Renovation EIS. A risk analysis was not required for a NEPA Factsheet; however, a NEPA Questionnaire was attached to NFs.

- o NEPA Questionnaire - An interim NEPA document used to list the presence, absence, or lack of knowledge of impacts of actions which will be taken during the course of the Renovation EIS. NEPA Questionnaires were attached to NEPA Checklists and NEPA Factsheets.

NOTE: This Interim NEPA system was discontinued in October 1989. The documents, currently on file, address the environmental impact of individual projects. The cumulative impact is being addressed in the Renovation EIS.

6.0 PROCEDURE

NOTE: All NEPA documentation must be approved by the WMCO NEPA manager and/or DOE prior to the beginning of project construction or procurement.

6.1 Preparation of NEPA Documentation

RESPONSIBILITY		ACTION
COGNIZANT PROJECT ENGINEER/ PROJECT MANAGER	A.	Consult with the NEPA Coordinator, if necessary, to determine the type and level of NEPA documentation required for the project.
	B.	Based on the appropriate volume of the Federal Register, regarding DOE compliance with the National Environmental Policy Act (see 7.0 Applicable Documents), determine if the project being planned is an action that can be Categorically Excluded. If the project cannot be Categorically Excluded, advance to Step E of section 6.2 in this procedure.

NOTE: Based on regulatory changes, the catch-all exclusion "Actions that are substantially the same as other actions for which the environmental impacts have already been assessed in a NEPA Document and determined by DOE to be clearly insignificant and where such assessment is still valid" is no longer valid.

COGNIZANT PROJECT ENGINEER/ PROJECT MANAGER	C.	For Categorically Excluded activities, complete Form FMPC-3124 in accordance with the direction provided (See Attachment B). A NEPA document number for the "Categorical Exclusion" form is obtained from the NEPA Coordinator.
	D.	Advance to Step A of Section 6.2 of this procedure.
	E.	If the planned project cannot be Categorically Excluded, complete the "NEPA Documentation" cover sheet in accordance with the direction provided (See Attachment C).

444

6.0 PROCEDURE

6.1 Preparation of NEPA Documentation (continued)

RESPONSIBILITY		ACTION
	F.	Attach a NEPA document to the "NEPA Documentation" cover sheet. The NEPA document may be a Action Description Memorandum (ADM) with associated Risk Analysis, or an Environmental Assessment (EA).
	G.	Consult with the NEPA Coordinator and other WMCO organizations, as necessary, to ensure complete and correct information is incorporated in the attached NEPA document.
NEPA COORDINATOR	H.	Assist the Cognizant Project Engineer/Project Manager in scoping and preparing NEPA documents to comply with NEPA requirements.
COGNIZANT PROJECT ENGINEER/ PROJECT MANAGER	I.	Obtain the NEPA document number from the NEPA Coordinator and place this number in all appropriate locations on the "NEPA Documentation" cover sheet and the attached NEPA document.
NEPA COORDINATOR	J.	Assign the NEPA document number when requested by the CPE/PM, set up the NEPA file for that document, and place the document on the NEPA document tracking system.

6.2 Review of NEPA Documentation

COGNIZANT PROJECT ENGINEER/ PROJECT MANAGER	A.	Transmit the completed "NEPA Categorical Exclusion" form or the "NEPA Documentation" cover sheet and attached NEPA document to the NEPA Coordinator.
NEPA COORDINATOR	B.	Review the NEPA document for completeness and correctness and assure NEPA requirements are adequately addressed in the document.

6.0 PROCEDURE (continued)

6.2 Review of NEPA Documentation (continued)

RESPONSIBILITY		ACTION
	C.	If the document is complete, correct, and does not require further review, advance to Step I of Section 6.2 of this procedure.
	D.	If the document is not complete or correct, coordinate the revision with the CPE/PM before processing.
	E.	If the document requires a review, obtain technical reviews by Quality Department; Industrial, Radiological Safety and Training; Environmental Engineering; Environmental Compliance; and Operations & Engineering Services, as needed.
QUALITY DEPARTMENT, IRS&T, ENVIRONMENTAL ENGINEERING, ENVIRONMENTAL COMPLIANCE, and OPERATIONS & ENGINEERING SERVICES	F.	Provide technical reviews of NEPA documentation as requested and return to the NEPA Coordinator, within 2 weeks.
NEPA COORDINATOR	G.	Transmit all technical comments on the NEPA document to the CPE/PM.
COGNIZANT PROJECT ENGINEER/ PROJECT MANAGER	H.	Revise the NEPA document, as necessary, to address technical comments and deficiencies and return the document to the NEPA Coordinator at Step A of section 6.2 in this procedure.
NEPA COORDINATOR	I.	Once the NEPA document is judged to be complete and correct, sign the appropriate block on the "NEPA Categorical Exclusion" form or the "NEPA Documentation" cover sheet and forward it, with any required NEPA documentation attached, to the NEPA Manager.
NEPA MANAGER	J.	Review the NEPA document for correctness and completeness.
	K.	If the NEPA document is judged to require more information, return it to the NEPA Coordinator at Step G of section 6.2 of this procedure.

6.0 PROCEDURE (continued)

6.2 Review of NEPA Documentation (continued)

RESPONSIBILITY	ACTION
NEPA MANAGER	L. If the NEPA document is judged to be correct and complete, proceed to Step A of section 6.3 of this procedure.

6.3 Approval of NEPA Documentation

NEPA MANAGER	A. Approve the completed "NEPA Categorical Exclusion" form or the "NEPA Documentation" cover sheet by signature in the appropriate block, date it for submittal to DOE, obtain internal WMCO approval, and forward both the coversheet and any attached document to the DOE.
	B. If disapproved by DOE, transmit the document to the NEPA Coordinator for revision at Step G of section 6.2 of this procedure.
	C. If approved by DOE, assure that appropriate DOE documents have been attached and transmit the signed document(s) to the NEPA Coordinator.

NOTE: (1) A DOE issued "Memo to File" (MTF) is attached to approved Action Description Memorandum (ADM). (2) A DOE issued "Finding of No Significant Impact" (FONSI) is attached to an approved Environmental Assessment (EA).

NEPA COORDINATOR	D. Place the approved DOE signed document(s) in the appropriate NEPA file and forward a copy of the document(s) to the CPE/PM.
NEPA COORDINATOR	E. If the NEPA document is an Environmental Assessment, contact Public Affairs and Communication Department and cooperate in the issuance of a public notification in accordance with Public Affairs Department Procedures.
COGNIZANT PROJECT ENGINEER/ PROJECT MANAGER	F. Place the approved document(s) in the appropriate project file.

6.0 PROCEDURE (continued)

6.4 NEPA Document Revision resulting from a Project Scope Change

RESPONSIBILITY	ACTION
COGNIZANT PROJECT ENGINEER/ PROJECT MANAGER	A. Prepare a memorandum, if after NEPA document approval by DOE, the scope of the project changes.
	B. Describe in memorandum format, the action that was to be taken (brief project description), and changes to the scope.
	C. In the case of scope changes, make the statement that, "These changes will not result in a net increase in adverse environmental impacts, and will not limit the choice of reasonable alternatives."

NOTE: Scope changes which occur after DOE approval and result in a net increase in adverse environmental impact shall be processed and approved in accordance with the requirements of this procedure.

	D. Transmit the memorandum to the NEPA Coordinator.
NEPA COORDINATOR	E. Process the documents per Step B of Section 6.2 of this procedure.

7.0 APPLICABLE DOCUMENTS

National Environmental Policy Act, 42 U.S.C. 4321 et. seq.

Comprehensive Environmental Response, Compensation, and Liability Act et. seq.

Council On Environmental Quality Regulations, 40 CFR 1500 et. seq.

Resource Conservation and Recovery Act of 1976 et. seq.

DOE Environmental Compliance Guide, DOE/EV-0132, Vols. 1 and 2, Draft, Oct 88

DOE Order 5000.3, Unusual Occurrence Reporting System

DOE Order 5400.xx, Radiation Protection of the Public and the Environment

DOE Order 5400.1, General Environmental Protection Program

DOE Order 5400.4, Integration of Environmental Compliance Processes

DOE Order 5440.1C, Implementation of the National Environmental Policy Act.

DOE Order 5480.1B, Environment, Safety, and Health Program for Department of Energy Operations

DOE Order 5481.1B, Safety Analysis and Review System.

DOE Order 5480.14, Comprehensive Environmental Response, Compensation, and Liability Act Program

DOE Order 5480.4, Environmental Protection, Safety, and Health Protection Standards

DOE Order 5482.1B, Environmental Protection, Safety, and Health Protection Appraisal System

DOE Order 5483.1A, Occupational Safety and Health Program for Government-Owned Contractor-Operated Facilities

DOE Order 5484.1, Environmental Protection, Safety, and Health Protection Information Reporting Requirements

DOE Order 5820.2, Radioactive Waste Management

DOE Compliance with the National Environmental Policy Act; Final Guidelines; 45 FR 20694 et. seq.

DOE Compliance with the National Environmental Policy Act; Amendments to the DOE NEPA Guidelines; 47 FR 7976 et. seq.

DOE Compliance with the National Environmental Policy Act; Amendments to the DOE NEPA Guidelines; 48 FR 685 et. seq.

DOE Compliance with the National Environmental Policy Act; Amendments to the DOE NEPA Guidelines; 50 FR 7629 et. seq.

7.0 APPLICABLE DOCUMENTS (continued)

DOE Compliance with the National Environmental Policy Act; Amendments to the DOE NEPA Guidelines; 51 FR 18867 et. seq.

| Ohio Administrative Code

| State of Ohio Consent Decree, signed December 2, 1988

| Ohio Environmental Protection Agency Director's Findings and Orders, signed June 26, 1987

| Ohio State Implementation Plans

8.0 FORMS USED

FMPC-3123 - NEPA Documentation Coversheet

FMPC-3124 - NEPA Categorical Exclusion

9.0 ATTACHMENTS

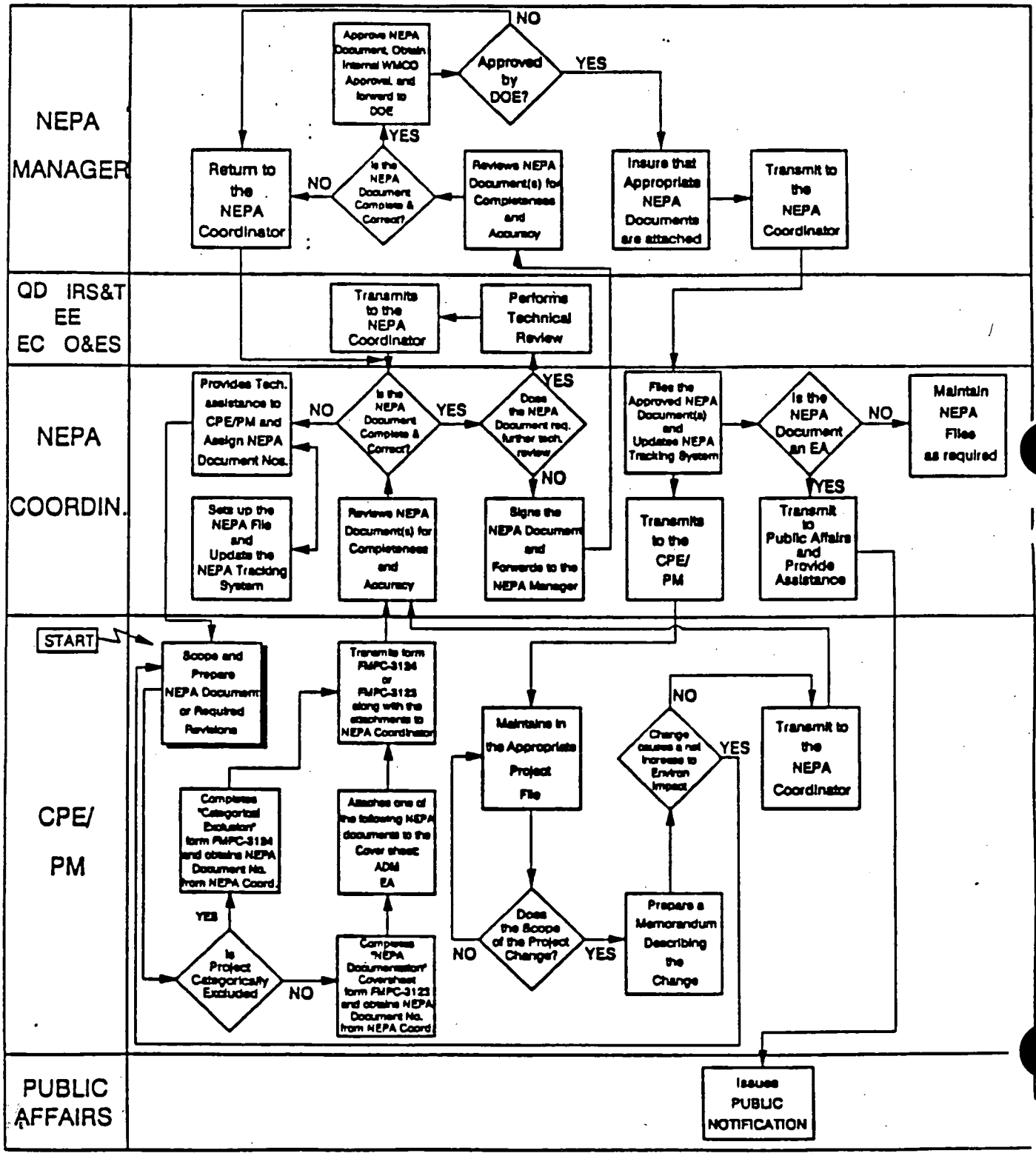
Attachment A NEPA Document Flow Diagram.

Attachment B FMPC-3124 - NEPA Categorical Exclusion.

Attachment C FMPC-3123 - NEPA Documentation Coversheet.

Attachment A

NEPA Document Flow Diagram



FMPC

NEPA DOCUMENTATION - CATEGORICAL EXCLUSION

PROJECT/PROGRAM TITLE:	COGNIZANT PROJECT ENGINEER: / EXT.:
PROJECT/PROGRAM NUMBER: / NEPA DOCUMENT NUMBER:	PROJECT LOCATION:
DOE BUDGET NUMBER:	PROJECT COST:
	CONSTRUCTION START DATE:
	NEPA PREPARATION DATE:
	NEPA SUBMITTAL DATE TO DOE:

CATEGORICAL EXCLUSION

This project has been reviewed persuant to DOE regulations and WMCO directives, and the project is deemed to be of a nature described as Categorically Excluded under current DOE guidelines. Additional NEPA documentation is not required for this project.

The basis for the Categorical Exclusion is as follows:

COGNIZANT PROJECT ENGINEER:	DATE:
WMCO NEPA COORDINATOR:	DATE:
WMCO NEPA MANAGER:	DATE:
DOE/FMPC OFFICER:	DATE:

DIRECTIONS FOR COMPLETING FORM FMPC-3124
NEPA DOCUMENTATION - CATEGORICAL EXCLUSION

1. The COGNIZANT PROJECT ENGINEER will complete the following blocks at the top of FMPC-3124 during preparation of the NEPA document:

   - COGNIZANT PROJECT ENGINEER - Insert name.
   - EXT. - Insert Cognizant Project Engineer's telephone extension number.
   - PROJECT LOCATION - Insert the identifying number of the building or plant in which the project will take place entirely or partially, or the nearest adjacent building where a project will be implemented entirely outdoors. In the case of outdoor projects, provide a short direction descriptor such as "North of Plant 1," or "NE of Building 55". If the project involves more than one building or plant, list all. Use the designation "Plant Wide" when a project encompasses multiple buildings and plants too numerous to list singly in the space provided.
   - PROJECT/PROGRAM TITLE - Insert the title that the project will be known by.
   - PROJECT COST - Insert the current Total Estimated Cost of the project/program.
   - PROJECT/PROGRAM NUMBER - Insert the WMCO project/program number.
   - NEPA DOCUMENT NUMBER - Insert NEPA Document Number, if known. Otherwise, leave blank.
   - CONSTRUCTION START DATE - Insert the scheduled construction start date.
   - DOE BUDGET NUMBER - Insert the DOE Budget and Reporting category from which the project is funded.
   - NEPA PREPARATION DATE - Insert the date the initial or revised NEPA document is sent to the NEPA Coordinator for review.

2. The COGNIZANT PROJECT ENGINEER will complete the BASIS statement by typing the exact words from the Federal Register which qualify the project/program as categorically excluded in the space provided.

3. The COGNIZANT PROJECT ENGINEER will attach a project description of no more than one short paragraph to the form.

FMPC
NEPA DOCUMENTATION

COGNIZANT PROJECT ENGINEER:	EXT.:
PROJECT LOCATION:	
PROJECT/PROGRAM TITLE:	PROJECT COST:
PROJECT/PROGRAM NUMBER: / NEPA DOCUMENT NUMBER:	CONSTRUCTION START DATE:
DOE BUDGET NUMBER:	NEPA PREPARATION DATE:
	NEPA SUBMITTAL DATE TO DOE:

PROJECT EXECUTIVE SUMMARY AND JUSTIFICATION:

The cumulative impacts of this project have been assessed, and it has been determined that this action will not result in net adverse environmental impacts. Other options have not been precluded by this action.

THIS NEPA DOCUMENT

NF/NC	ADM	EA

DOE APPROVAL REQUESTED

☐ DOE/FMPC

☐ DOE/HQ

COGNIZANT PROJECT ENGINEER:	DATE:
WMCO NEPA COORDINATOR:	DATE:
WMCO NEPA MANAGER:	DATE:
DOE/FMPC OFFICER:	DATE:
ADDITIONAL DOE APPROVAL (IF NEEDED):	DATE:

(FMPC-3123 (5/29/90))

DIRECTIONS FOR COMPLETING FORM FMPC-3123
NEPA DOCUMENTATION

1. The COGNIZANT PROJECT ENGINEER will complete the following blocks at the top of FMPC-3123 during preparation of the NEPA document:

   - COGNIZANT PROJECT ENGINEER - Insert name.
   - EXT. - Insert Cognizant Project Engineer's telephone extension number.
   - PROJECT LOCATION - Insert the identifying number of the building or plant in which the project will take place entirely or partially, or the nearest adjacent building where a project will be implemented entirely outdoors. In the case of outdoor projects, provide a short direction descriptor such as "North of Plant 1," or "NE of Building 55". If the project involves more than one building or plant, list all. Use the designation "Plant Wide" when a project encompasses multiple buildings and plants too numerous to list singly in the space provided.
   - PROJECT/PROGRAM TITLE - Insert the title that the project will be known by.
   - PROJECT COST - Insert the current Total Estimated Cost of the project/program.
   - PROJECT/PROGRAM NUMBER - Insert the WMCO project/program number.
   - NEPA DOCUMENT NUMBER - Insert NEPA Document Number, if known. Otherwise, leave blank.
   - CONSTRUCTION START DATE - Insert the scheduled construction start date.
   - DOE BUDGET NUMBER - Insert the DOE Budget and Reporting category from which the project is funded.
   - NEPA PREPARATION DATE - Insert the date the initial or revised NEPA document is sent to the NEPA Coordinator for review.

2. The COGNIZANT PROJECT ENGINEER will attach the NEPA document to the form. The NEPA document may be a NEPA Factsheet, Action Description Memorandum or Environmental Assessment.

FMPC-3123 (5/26/89)

453

ASBESTOS MANAGEMENT PLAN, PL-FMPC-3002

SEE STEP 1

OU3 RI/FS WORK PLAN ADDENDUM

TO BE TRANSMITTED TO USEPA 6/2/92

ASBESTOS SURVEY & ASSESSMENT FOR THE FEMP

AVAILABLE UPON REQUEST

TABLE OF CONTENTS

ASBESTOS REMOVAL NOTIFICATION 2
Purpose 2
Scope 2
Applicability 2
Requirement Documents 2

DEFINITIONS 3

APPLICABILITY AND REQUIREMENTS FOR NOTIFICATION OF DEMOLITIONS AND RENOVATIONS 7
Demolitions 7
Renovations 8
  Planned renovation 8
  Emergency renovations 9
Incidental Renovations 9

REQUIRED INFORMATION FOR THE "NOTICE OF INTENT (NOI) TO REMOVE ASBESTOS" 10

RESPONSIBILITIES INVOLVED IN ASBESTOS RENOVATIONS AND DEMOLITIONS 12
Planner 12
POC 12
Industrial Hygiene 12
Environmental Compliance & Quality Assurance 12

PROCEDURES FOR SUBMITTING NOI'S 14

EMISSION CONTROL REQUIREMENTS FOR DEMOLITIONS AND RENOVATIONS 15

ASBESTOS WASTE HANDLING 18

RECORD OF ORAL REGULATORY COMMUNICATION 19

ASBESTOS 20

REPORTS 21
Weekly Status Report 21
Quarterly Report 21
Annual Estimate for Individual Nonscheduled Operations 22

APPENDIX

A: Demolition/Renovation Asbestos Removal Notification Form
B: Ohio EPA Asbestos Demolition or Renovation Notice
C: Example of an Asbestos Waste Shipment Record Form
D: Weekly Status Report of Asbestos Notification Forms
E: Asbestos Notification Quarterly Report
F: Annual Projection of Asbestos Removals for Individual Nonscheduled Operations

Document # 90 - 100 Issue Date 11/07/90 Section N-5
DRAFT Revision Date 09/05/91

ENVIRONMENTAL COMPLIANCE

REGULATORY COMPLIANCE GUIDE

ASBESTOS REMOVAL NOTIFICATION

Purpose: To ensure that all removals of asbestos at the Fernald Environmental Management Project (FEMP) are conducted with proper regulatory notification and use correct removal procedures.

Scope: All renovations involving asbestos removals and any demolition on FEMP property.

Applicability: This Regulatory Compliance Guide shall be considered whenever asbestos is removed.

Requirement Documents:

- National Emission Standards for Hazardous Air Pollution (NESHAP), Code of Federal Regulations 40, Part 61, Subpart M.
- Ohio Administrative Code Chapter 3745-20, "Asbestos Emission Control from Renovation, Demolition and Disposal Operations."
- Ohio Administrative Code Chapter 3701-34, "Ohio Department of Health: Asbestos Hazard Abatement Rules."
- * Industrial Hygiene and Safety Manual (Topical Manual #2128), Section IH-03, "Control of Work Involving Asbestos".

I. DEFINITIONS

A. Adequately Wet: To sufficiently mix or penetrate or coat with liquid to prevent dust emissions.

B. Asbestos: The asbestiform varieties of serpentinite (chrysotile), riebeckite (crodidolite), cummintonite-grunerite, anthophyllite, and actinolite-tremolite.

C. Asbestos Containing Material (ACM): Includes asbestos or any material containing asbestos. See RACM.

D. Asbestos-Containing Waste Material (ACWM): Any waste that contains asbestos. This includes, but is not limited to; waste from control devices, filters from control devices, friable asbestos-containing material and bags or containers that previously contained asbestos. As applied to demolition and renovation operations this term includes regulated asbestos waste and materials contaminated with asbestos including equipment and clothing.

E. Asbestos hazard abatement activity: Any activity involving the removal, renovation, enclosure, repair, or encapsulation of friable asbestos-containing materials in an amount greater than fifty linear feet or fifty square feet. This definition is used primarily to set a "trigger" limit for removals performed by outside contractors or non-WEMCO personnel. Once a removal exceeds this limit a number of additional requirements are imposed by the Ohio Department of Health: Asbestos Hazard Abatement Rules. Examples of these restriction/requirements are; the removal contractor must be a "Licensed Asbestos Hazard Abatement Contractor", notifications must be made to the Ohio Department of Health. These requirements will normally not affect WEMCO personnel.

F. Asbestos Hazard Abatement Contractor: A business that is licensed by the Ohio Department of Health to engage in asbestos hazard abatement activities. Any business that engages in or intends to engage in abatement activities in the state of Ohio is required to be licensed, except for an entity that engages in abatement activities solely at its own place or places of business. By this definition WEMCO and its personnel are exempt from obtaining a license to perform asbestos abatement activities.

G. Asbestos Notification Tracking System (ANTS): a computerized data base tracking system developed by WEMCO's Environmental Compliance & Quality Assurance Department used for the tracking, management and reporting of all site asbestos removal activities.

H. Asbestos Removal Notification Form (ARNF): Form utilized within the FEMP to initiate submissions of Notice of Intent (NOI) to demolish or perform renovations involving asbestos. These forms are submitted to EC&QA by maintenance supervisors, project engineers or any person responsible for the anticipated removal. A copy of this form is attached as Appendix A.

I. Category I nonfriable asbestos-containing material: Any asbestos-containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than one percent asbestos.

J. Category II nonfriable asbestos-containing material: Any asbestos material other than Category I nonfriable ACM containing more than one percent asbestos that when dry cannot be crumbled, pulverized, or reduced to powder by hand pressure.

K. Demolition: The wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations.

L. Emergency Demolition: Any demolition conducted under a written order issued by a state or local governmental agency because a facility is structurally unsound and in danger of imminent collapse.

M. Emergency Renovation: A renovation operation that was not planned but results from a sudden, unexpected event that creates an unsafe condition. Including operations necessitated by non-routine failures of equipment.

N. Encapsulate: To coat, bind or resurface walls, ceilings, pipes or other structures or ACM with suitable products to prevent friable asbestos from becoming airborne.

O. Environmental Compliance and Quality Assurance (EC&QA): The department/group responsible for insuring compliance with the U.S. EPA NESHAP requirements for asbestos renovations or demolitions.

P. Facility: Any institutional, commercial, public, or industrial structure, installation, or building. For the FEMP the term "facility" refers to the entire installation and not to individual buildings or plants.

Q. Facility component: Any pipe, duct, boiler, tank, reactor, turbine or furnace at or in a facility; any structural member of a facility.

R. Friable Asbestos Material: Any material containing more than one percent asbestos by area, that hand pressure can break, crumble, pulverize, or reduce to powder when dry. Note: This could include normally non-friable materials such as transite and vinyl floor tile if it is in a deteriorated and friable condition or is converted to friable asbestos material during removal. Friability determinations are made by Certified Hazard Evaluation Specialists in the Industrial Hygiene Section.

S. Glove bag: A sealed compartment with attached inner gloves used for the handling of ACM. When properly installed and used it provides a small work area enclosure typically used for small-scale asbestos stripping operations.

T. HEPA FILTER: A High Efficiency Particulate Air filter certified by the manufacture to have a collection efficiency of not less than 99.97 per cent as determined by ASTM Method D-2986-71.

U. Incidental renovations: Also called "Individual nonscheduled operations", these are small removals necessary to facilitate the normal conduct of business where the asbestos is "incidentally" disturbed by the maintenance activity. These projects could not have reasonably been foreseen or planned, but do not constitute classification as emergency removals. Repairs on necessary equipment or active piping and drilling holes in transite are examples of what could be considered incidental renovations.

V. Industrial Hygiene: The section/group responsible for issuing asbestos work permits and for ensuring compliance with OSHA worker protection regulations.

W. Inactive waste disposal site: Any disposal site or portion of it where additional ACWM has not been deposited for one year and where the surface is not disturbed by vehicular traffic.

X. National Emission Standards for Hazardous Air Pollutants (NESHAP): 40 CFR Part 61, Subpart M: National Emission Standard for Asbestos.

Y. Notice of Intent (NOI) to remove asbestos: The NOI is the written notification provided to the Ohio EPA (SWOAPCA) of our intent to renovate or demolish.

Z. Ohio EPA (OEPA): The Ohio Environmental Protection Agency. For the purpose of notifications and other asbestos related matters the Southwest Ohio Air Pollution Control Agency (SWOAPCA) is the Ohio EPA's agent for Hamilton County and is FEMP's contact point.

AA. Owner or Operator: Any person or entity who owns, leases, operates, controls, or supervises a facility, or any waste disposal, demolition or renovation operation. For the FEMP the DOE is "Owner" and WEMCO is the "Operator". For removal operations that are done by an outside contractor the contractor is considered to be the "Operator."

AB. Point of Contact (POC): The POC is the WEMCO employee responsible for the overall asbestos abatement operation. This person can be the On-site Supervisor, the Competent person, the Planner/Estimator, Facility Owner or any other person who can be used to coordinate the scheduling of the project. The POC will be the person used by EC&QA to update the progress of the project, verify the start/completion dates and discuss any other pertinent information concerning the project.

AC. Planned renovation operation: Any renovation operation, or number of operations, in which the amount of friable asbestos material that will be removed or stripped within a given period of time can be predicted. Incidental removals (individual nonscheduled operations) are included if a number of such operations can be predicted to occur during a given period of time, not to exceed one year, based on operating experience. These operations are locally broken down into three categories:

1. Planned Minor renovations: Non-emergency removals involving the removal of less than 80 linear meters (260 linear feet) or less than 15 square meters (160 square feet) of friable asbestos materials from facility components.

2. Planned Major renovations: Non-emergency removals involving the removal of equal to or greater than 80 linear meters (260 linear feet) on pipes or at least 15 square meters (160 square feet) of friable asbestos materials from facility components.

AD. Planner: WEMCO employee responsible for planning jobs/projects involving work with asbestos or demolition projects (e.g., job planner - estimator, project engineer, maintenance supervisor).

AE. Regulated Asbestos-Containing Material (RACM): Means (a) any friable asbestos material, (b) any Category I non-friable asbestos which has become friable or that will be subject to sanding, grinding, cutting or abrading, or (c) Category II non-friable asbestos that can be expected to break, crumble, be pulverized, or reduce to powder during expected renovation or demolition activities.

AF. Renovation: The altering in any way of one or more facility components. Operations in which load-supporting structural members are wrecked or taken out are specifically excluded, these operations are defined as demolitions.

AG. Structural member: Any load-supporting member of a facility, such as beams and load supporting walls; or any nonload-supporting member such as ceilings and nonload-supporting walls.

AH. Waste Shipment Record: The shipping document required to be originated and signed by FEMP that will be used to track and substantiate the disposition of ACWM.

4. For emergency demolitions involving any amount of friable asbestos, including where none is present, the following applies:

   a. A demolition can be declared an emergency only when there is a written order to demolish issued by a state or local governmental agency.

   b. The NOI must be postmarked or delivered to the Ohio EPA as early as possible before any emergency demolition operation begins.

   c. Submission of the NOI will be coordinated through EC&QA.

   d. In addition to the above required information the following additional information is required:

      (1) The name, title and authority of the state or local government authority who has ordered the demolition.

      (2) The date that the order was issued.

      (3) The date on which the demolition is ordered to begin.

B. Renovations

1. Interpretations of the NESHAP regulations indicate that if a facility (the entire FEMP) is removing or plans to remove 260 linear feet or 160 square feet of friable asbestos, then all planned renovations, regardless of removal amounts, must follow the notification procedures. To avoid the potential of non-notification it is WEMCO's policy to submit a notification for every planned renovation, regardless of the size of the removal.

2. Planned renovation:

   a. The NOI must be postmarked or delivered to the Ohio EPA at least ten (10) working days before any planned renovation operation begins. If it has not been confirmed that the NOI was submitted in time to allow for the appropriate delay, the renovation operation is not authorized to proceed. Confirmation of postmark/delivery can be obtained from either EC&QA or from the Weekly Status Report of Asbestos Notification Forms.

   b. To ensure the NOI is delivered or postmarked within the required time limit the ARNF must be submitted to EC&QA at least fifteen (15) working days prior to the anticipated start of the planned renovation operation.

II. APPLICABILITY AND REQUIREMENTS FOR NOTIFICATION OF DEMOLITIONS AND RENOVATIONS

A. Demolitions

1. All demolitions require notification to the Ohio EPA, even if there is no friable asbestos involved in the actual demolition.

2. For demolitions involving less than 260 linear feet on pipes, or 160 square feet of friable asbestos, or less than 35 cubic feet of asbestos material that could not be measured previously, or projects involving no friable asbestos, the following applies:

   a. The NOI must be postmarked or delivered to the Ohio EPA at least twenty (20) working days before any demolition operation begins. If it has not been confirmed that the NOI was submitted allowing for the appropriate delay the demolition operation is not authorized to proceed. Conformation of postmark/delivery can be obtained by phone from EC&QA or through the Weekly Report of Asbestos Notification Forms.

   b. To ensure the NOI is delivered or postmarked within the required time limit the ARNF must be submitted to EC&QA at least twenty-five (25) working days prior to the anticipated start of the demolition operation.

   c. The NOI must supply the information outlined in section III(A).

3. For demolitions involving at least 260 linear feet on pipes or 160 square feet of friable asbestos, the following applies:

   a. The NOI must be postmarked or delivered to the Ohio EPA at least ten (10) working days before any demolition operation begins. If it has not been confirmed that the NOI was submitted allowing for the appropriate delay the demolition operation is not authorized to proceed. Confirmation of postmark/delivery can be obtained by phone from EC&QA or through the Weekly Report of Asbestos Notification Forms.

   b. To ensure the NOI is delivered or postmarked within the required time limit the ARNF must be submitted to EC&QA at least fifteen (15) working days prior to the anticipated start of the demolition operation.

   c. The NOI must supply the information outlined in section III(A).

c. The NOI must supply the information outlined in section III(A). Completion of the ARNF will supply the required information.

3. For emergency renovations involving greater than 260 linear feet or 160 square feet of friable asbestos the following applies:

a. The NOI must be postmarked or delivered to the Ohio EPA as early as possible before any emergency renovation operation begins.

b. Submission of the NOI will be coordinated through EC&QA.

c. The NOI must supply the information outlined in section III(B).

d. In addition to the above information the following information is required:

(1) The date and hour of the sudden unexpected event.

(2) A description of the sudden unexpected event.

(3) An explanation of how the event relates to the need to restor equipment vital to safety or health.

4. For emergency renovations involving less than 260 linear feet or 160 square feet of friable asbestos no prior notification is required. A determination that the required renovation is an "Emergency" must be obtained from IH. An ARNF must be submitted to EC&QA as soon as possible after the renovation has been completed.

C. Incidental renovations

1. Those asbestos renovations that are of short duration involving small quantities of asbestos that could not be scheduled may be handled as Incidentals. An example of this type of renovation is the removal of pipe insulation to repair a leaking pipe.

2. If the total quantity of friable asbestos removed due to incidental renovations, annually, exceeds or is expected to exceed, based on historical performance, 260 linear feet or 160 square feet of friable asbestos, an NOI must be submitted covering a period not to exceed one year. WEMCO bases this annual estimate on a calendar year. See Section IX(C).

III. REQUIRED INFORMATION FOR THE "NOTICE OF INTENT (NOI) TO REMOVE ASBESTOS"

A. The following information is required for each NOI:

1. Name, address and telephone number of owner.

2. Name, address and telephone number, and Ohio Asbestos Hazard Abatement contractor License number (if applicable) of the removal contractor.

3. Location and street address of the facility being demolished or renovated. Attach any site plans, floor plans or any other information that may be necessary to facilitate the locating of the removal project for inspection.

4. Indication of whether the notice is an original or a revised notification.

5. Type of Operation: renovation or demolition.

6. Description of the facility (size, age, present and prior use):

   The following standard phrase is to be used for this requirement.

   "Site remediation /6 million square feet/39 years/prior use: uranium products manufacturing facility"

7. Description of the procedures employed to detect the presence, and to estimate the quantity of friable asbestos materials to be removed during the operation.

8. Estimate of the amount (length, area, or volume) of friable asbestos material to be removed during the operation. For demolitions estimate the amount of Category I and II material not removed prior to demolition.

9. The start and completion dates of the renovation or demolition project. The start and completion dates of asbestos removal work in the demolition or renovation project.

10. Description of planned demolition or renovation work to be performed and the method(s) to be employed including demolition or renovation techniques to be used and description of affected facility components.

11. Description of work practices and engineering controls to be used to comply with the requirements of OAC 3745-20-04 "Demolition and Renovation Procedures for Asbestos Emission Control."

12. The name, address and telephone no. of the waste transporter(s).

13. Name and location of the waste disposal site where the asbestos containing waste material will be deposited.

14. As of November 20, 1991, it will be required that at least one person trained in the provisions of NESHAP be present on site during the removal operation. Proof of this training must be readily available during normal business hours.

15. The information required in this NOI must be provided using a form similar to that shown in Appendix B.

B. If there are any changes to the information provided in the NOI the Ohio EPA must be immediately informed (by phone) of the change(s). An amended written notification must be submitted to that office within two working days following the change. The changes requiring amended written notification are:

1. Any friable asbestos materials to be removed during the demolition or renovation that exceeds the amounts identified in the original notice, including non-friable asbestos which unexpectedly becomes friable during those operations;

2. Any deviation in the demolition or renovation schedule or in the methods to be used for asbestos removal or disposal;

3. Any change in the name and location of the selected waste disposal site.

C. All notifications submitted to the Ohio EPA shall identify the name and title of the person submitting the notification. The notification must be signed and dated by the person submitting the notification.

D. All notifications and amended notifications will be submitted using the Ohio EPA recommended form "Form Ohio EPA 3742-20", or its equivalent, an example of which is given in Appendix B.

IV. RESPONSIBILITIES INVOLVED IN ASBESTOS RENOVATIONS AND DEMOLITIONS

A. The planner is responsible for the initial notification to EC&QA when any asbestos-related or suspected asbestos-related operation is to be performed. This includes all renovation involving ACM and any demolition activities. The planner is also responsible for insuring the notification to EC&QA is as complete and accurate as possible and is timely enough to allow for the processing and mandated notification delays. The notification to EC&QA shall be done using the standard ARNF, Appendix A.

B. The POC is responsible for immediately notifying EC&QA of any change to the project (e.g., start/completion dates, amounts/type of asbestos involved, change in removal contractor or change in POC).

C. Industrial Hygiene shall ensure that:

1. No Asbestos Work Permit is issued without proper notification having been made to EC&QA;

2. All applicable OSHA worker protection and work practice regulations are observed;

3. All friable asbestos materials are removed in accordance with OAC 3745-20, OSHA 1926.58, and 40 CFR Part 61, Subpart M;

4. All ACM involved in a project is properly identified with respect to its friability, and;

5. As required, a project is declared to be an emergency renovation when an unexpected event has created an unsafe condition.

D. Environmental Compliance & Quality Assurance is responsible for:

1. Reviewing ARNF's for completeness and accuracy. Return deficient ARNF's for correction;

2. Determining appropriateness of classifying a renovation as "incidental" and therefore exempt from full notification requirements;

3. Entering project information into the ANTS;

4. Generating and submitting initial and amended NOI's and appropriate transmittal letters to OEPA;

5. Ensuring all interested parties are properly informed of problems and/or changes to projects, and;

6. Ensuring required reports are issued or submitted in an accurate and timely manner.

V. PROCEDURES FOR SUBMITTING NOI'S

A. The steps involved in the submission process are as follows, ( ) indicate responsible person/department:

1. (Planner) Determine if the project is renovation or demolition.

2. (Planner) If the project is demolition an NOI must be submitted regardless of the amount, or absence, of friable asbestos involved in the project. Time limits concerning the lead time required from submission of the ARNF and the start of the demolition are dependent on the amount of friable asbestos involved and are found in Section II(A). Continue with notification procedures in step 4.

3. If project is determined to be a renovation involving ACM complete the following:

   a. (IH) Determine friability of ACM.

   b. (Planner) Determine if renovation is a "planned renovation" or an "incidental renovation." A determination that a renovation can be classified as "incidental" must be confirmed by EC&QA. This should be done by phone prior to the submission of the ARNF.

4. (Planner) Complete and submit an ARNF to EC&QA.

5. (EC&QA) Receive, review and process the ARNF's.

6. (EC&QA) Complete and submit an NOI and appropriate transmittal letter to OEPA.

7. (POC) Prior to starting removal operation confirm that the NOI has been submitted to OEPA with enough lead time to met the mandatory waiting period.

VI. EMISSION CONTROL REQUIREMENTS FOR DEMOLITIONS AND RENOVATIONS

For each renovation or demolition involving asbestos containing materials the following apply:

A. All friable or potentially friable ACM must be removed from a structure being demolished or renovated before any wrecking or dismantling that would break up friable asbestos or restrict access for future removal of ACM. Friable asbestos materials need not be removed prior to demolition if:

1. They are on a facility component that is encased in concrete or other similar material; and

2. These materials are adequately wetted whenever exposed during demolition.

The above described exception to the total removal requirement is subject to the concurrence of EC&QA and IH.

B. When components which are covered, coated, or containing friable asbestos are removed as whole units or sections, as opposed to the prior stripping, then:

1. All exposed friable asbestos must be kept adequately wet during the cutting or disjointing operation; and

2. The units or sections must be carefully lowered to the ground without being dropped, thrown, slid or otherwise damaged; and

3. The friable ACM must be removed from the units or sections; or

4. The friable ACM on the unit or section must be encased with a suitable leak-tight container. See asbestos waste handling Section VII.

C. All friable asbestos materials being stripped during renovations and demolitions must be adequately wet before removal.

D. Dry removal:

If, in renovation operations, wetting would unavoidably damage equipment or cause an unreasonable safety hazard, dry removal is allowed under the following conditions:

1. A written request is submitted to the OEPA at least thirty (30) days prior to the starting date of such operation, asking for a determination whether wetting to comply with OAC 3745-20-04 would unavoidably damage equipment or present an unreasonable safety hazard. This request must included adequate information to facilitate this determination.

2. The OEPA issues a written determination that equipment damage or an unreasonable safety hazard would be unavoidable; and

3. An alternative emission control is utilized in accordance with the terms of the determination. At a minimum, local exhaust ventilation and HEPA filtration must be used. In any event, the control system can exhibit no visible emissions.

E. Friable ACM that has been removed or stripped must:

1. Remain adequately wet until collected for disposal;

2. Be carefully lowered to ground level or a lower floor without being dropped, thrown, slid or otherwise damaged;

3. If the materials have been removed or stripped more than fifty (50) feet above ground level and are not removed as units or in sections, these materials must be transported to the ground using leak-tight chutes, HEPA equipped vacuum transport system, or in leak-tight containers. Note: This means friable asbestos material cannot be dropped from a height greater than 50 feet even if; the material is adequately wetted, the removal is conducted within a full enclosure or there are no visible emissions created.

F. If the ambient temperature at the location is below zero degrees Centigrade or thirty-two degrees Fahrenheit then adequate wetting is not required if:

1. When components which are covered, coated, or containing friable asbestos have been removed in whole units or sections, as opposed to the prior stripping, and:

a. The friable ACM is adequately wetted while being removed from the unit or section; or

b. The friable ACM on the unit or section is encased with a suitable leak-tight container. See asbestos waste handling Section VII; or

c. Friable ACM that has been removed or stripped must:

(1) Remain adequately wet until collected for disposal;

(2) Be carefully lowered to ground level or a lower floor without being dropped, thrown, slid or otherwise damaged; or

(3) If the materials have been removed or stripped more than fifty (50) feet above ground level and are not removed as units or in sections, these materials are transported to the ground using leak-tight chutes, HEPA equipped vacuum transport system, or in leak-tight containers.

2. A local exhaust ventilation and collection system designed and operated to capture the particulate asbestos materials produced by the stripping and removal of friable asbestos material is used. The control system can exhibit no visible emissions.

3. Remove components coated or covered with friable asbestos materials as units or sections to the maximum extent possible.

G. All ACM which has been damaged, exposed or made friable by demolition, renovation or adjacent stripping operations must be repaired, encapsulated, or removed.

VII. ASBESTOS WASTE HANDLING

A. All ACWM from any demolition or renovation operation must be disposed of in an EPA approved disposal site. If the disposal site is in the state of Ohio then the disposal site must be a "permitted" asbestos landfill. If the ACWM is to be transported to another state, all applicable DOT and receiving state regulations as well as the Ohio regulations must be followed.

B. Visible emissions are prohibited during the collection, processing, packaging, transportation or deposition of any ACWM.

C. One of the following methods shall be used:

1. ACWM shall be kept adequately wet and sealed into durable leak-tight disposal containers or enclosure system; or

2. For demolitions where asbestos was not removed prior to the demolition, the ACWM must be kept adequately wet or encapsulated until collected for disposal utilizing an alternative waste disposal system approved by the OEPA, (procedure for obtaining OEPA approval for using an alternate disposal system is contained in OAC 3745-20-05(C)(5), contact EC&QA for assistance in submitting a request); or

3. Process friable ACWM into non-friable forms.

D. Containers:

All friable ACWM residue of a renovation or demolition operation shall be sealed into durable, leak-tight disposal containers or use an approved alternative disposal system. The following provisions are applicable:

1. All containers of ACWM must be labeled using letters of sufficient size and contrast so as to be readily visible and legible with the following information:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

R.Q. Hazardous Substance
N.O.S. Asbestos
ORM-E 9188

2. The ACWM to be transported off the facility site must be labeled with the site name and location on each container or wrapped material.

3. ACWM shall be sealed in at least two plastic bags each having a thickness of at least 0.006 inches (6 mil). The second plastic bag must be clean, leak-tight and must fully enclose the first bag when sealed; or

4. ACWM shall be sealed in a combination of a 6 mil plastic bag and another leak-tight container; or

5. Components coated with, covered with or containing friable asbestos materials which are removed as a unit or section, must be sealed with at least 0.012 inch (twelve mils) of leak-tight plastic or at least 0.010 inch (ten mils) of leak-tight polypropylene woven fabric; or

6. Dispose of ACWM, facility components and contaminated debris using an alternative disposal system. Any alternative disposal system must receive written approval of the OEPA.

   To pursue an alternative disposal system contact EC&QA for assistance is obtaining the required permission.

E. Removing or transporting ACWM:

1. Each load must be prepared and secured to insure there are no visible emissions, load losses, spillage or leakage of liquids.

2. Each vehicle used to transport ACWM during the loading and unloading of the waste must be marked with signs that are clearly visible and easily read. The following legend is required:

DANGER
ASBESTOS DUST HAZARD
CANCER AND LUNG DISEASE HAZARD
Authorized Personnel Only

F. Record of Oral Regulatory Communication

All oral communications between WEMCO personnel and non-WEMCO entities will be documented and copies provided to the appropriate parties. Any appropriate format may be used to record these contacts.

VIII. ASBESTOS MANIFESTING

All ACWM that is to be shipped off site must be manifested. This will allow for the tracking of the waste to its final disposition. The manifesting shall be by the use of waste shipment records. An example of this record is located in Appendix C.

A. All waste shipment records must be maintained for at least two (2) years. These forms should have as a minimum the following information.

1. The name, address and telephone number of the waste generator.

2. The name and address of the agency administering the asbestos NESHAP program (SWOAPCA).

3. The approximate quantity of asbestos in cubic meters (yards).

4. The name and telephone number of the disposal site operator and the name and physical site location of the disposal site.

5. The date transported and the name, address and telephone number of the transporter(s).

6. A certification that the shipment is fully and accurately described by proper shipping name and is classified, packed, marked and labeled, and is in all respects in proper condition for transport by highway accordance to applicable international and government regulations.

B. A copy of the waste shipment record with the transporter signature showing receipt must be kept on file until the signed copy is returned showing receipt by the disposal site. A copy of the waste shipment record must be provided to the disposal operator when the waste is delivered to the disposal site. This waste shipment record must be signed by the disposal site owner or operator and a copy returned to the FEMP within 35 days of the date of shipment from the FEMP.

1. If a copy is not received within 35 days, then the FEMP is required to contact the disposal site to determine the status of the shipment.

2. If the notification is not received within 45 days, then SWOAPCA must be notified in writing of the delay. This notification must include a copy of the waste shipment record that accompanied the shipment, a cover letter explaining the efforts taken to locate the shipment and the results of those efforts.

3. All records must be made available for inspection by SWOAPCA upon request.

IX. REPORTS

All reports required herein shall be generated by the EC&QA Department:

A. Weekly status report of ARNF's on file with EC&QA:

This report is to be generated and distributed every Monday. This report details all current projects, future projects and projects that have been completed within a two week period prior to the report issue date. This report is generated through the ANTS program.

An example of this report and an explanation of the information it contains is located in Appendix D.

In addition to the weekly status report the ANTS generates an individual status report for each POC. These individualized reports detail all current and proposed projects for each POC. These reports are distributed to the POC's each Monday. An example of this report is in Appendix D.

B. Quarterly Report

By January 20, April 20, July 20, and October 20 of each year EC&QA will submit a report of friable asbestos removals performed during the previous quarter or removals which are currently scheduled. This report is generated through the ANTS program. An example is located in Appendix E. The following categories are to be included in this report:

1. Planned Renovation Projects (Equal to or Greater than 160 square feet or 260 Linear feet).
2. Planned Renovation Projects (Less than 160 square feet or 260 Linear feet).
3. Emergency Renovation Projects.
4. Unforeseen, Nonscheduled Projects.
5. Demolition (Negative Declaration) Projects.
6. Emergency Demolition Projects.
7. A list of all empty categories.

The date the removal is started determines in which quarter it is reported. Some removals may begin in one quarter and be completed in another. They will always be reported in the quarter in which they began.

C. Annual Estimate for Individual Nonscheduled Operations

By November 15 of each year, EC&QA will submit to the OEPA, predictions of the quantity of friable asbestos to be removed in the following year for individual nonscheduled operations (incidental) if the estimate of these removals is equal to or greater than 160 square feet or 260 linear feet.

If the annual estimate of incidental removals is less than 160 square feet or 260 linear feet then the result of this estimate shall be reported to DOE. A report of this estimate to the OEPA is not required.

An example of this report is given in Appendix F.

If at any time during the year the total quantity of asbestos to be removed as "incidental" exceeds or is expected to exceed the annual estimate, a revised estimate is to be submitted. This is applicable where removals of less than 160 square feet or 260 linear feet are estimated for the year and it becomes evident this amount will be exceeded.

APPENDIX A: DEMOLITION/RENOVATION ASBESTOS REMOVAL NOTIFICATION FORM (ARNF)

For Envir. Compliance

FEMP 91-____ Rev.___
Date Ent: ___/___/___

Revision #6
9/91

3288

DEMOLITION/RENOVATION PROJECT
ASBESTOS REMOVAL NOTIFICATION FORM
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

Class of removal: [ ] Demolition [ ] Renovation

Type of removal: [ ] Planned [ ] Incidental* [ ] Emergency**

Class of asbestos: [ ] Friable [ ] Class I Non-friable [ ] Class II Non-friable [ ] Potentially friable

Type of asbestos [ ] Pipe Insulation [ ] Duct Insulation [ ] Transite [ ] Floor Tile

[ ] Other:_____

Estimated Quantity of Removal: Square feet: _____ Linear feet: _____

Procedure used to detect asbestos: [ ] Samples tested [ ] Asbestos content assumed based on prior testing of similar material, the age, usage or location of the materials, or knowledge of the material constituents.

Method of quantity determination: [ ] Direct measure [ ] Visual estimate [ ] Other _____

Removal Schedule: Start Date: ___/___/___ Completion Date: ___/___/___ ***

WEMCO Project Contact: Name: _____ Extension: _____ Mail Stop: _____

WEMCO Project Number: _____ RUST/Subcontractor WO #: _____

Actual Removal Contractor : [ ] WEMCO [ ] Rust Eng. [ ] Insul Craft/Kramig [ ] Other

On-site removal supervisor: _____ Phone #: _____

if other, submit copy of Ohio Department of Health "Asbestos Hazard Abatement Contractor" License

Building Information: Plant/Building #: _____ Name: _____

Size (total Sq. ft): _____ Age (years): _____ Use: Present _____ Prior _____

Description of Specific Project, Room #, location, or area of removal:

_____

General method and purpose of demolition or renovation: _____

_____

Removal Procedures (check as appropriate):
[ ] adequate wetting, [ ] amended water, [ ] keep material wet until collected,
[ ] glove-bag, [ ] full enclosure with negative air, [ ] other (explain on back)
[ ] HEPA vacuum required, [ ] carefully lower materials, [ ] complete cleaning and lockdown,
[ ] seal materials into leak-tight container, [ ] exposed surface encapsulated
[ ] dry removal (contact Environmental Compliance)

Completed by: _____ _____
Name (Printed or Typed) Title

_____ _____
Signature Date

Submit completed form to ENVIRONMENTAL COMPLIANCE, Sitewide Compliance. If there are any questions, please contact EC at extension 6679.

Please complete all blocks, incomplete notification forms will be returned which could result in project delays.

* Incidental removals are defined in Regulatory Guidance, final determination will be made by EC.

** Emergency removals can be authorized only by Industrial Hygiene or EC.

*** Any modification to the start or completion date must be reported to EC as soon as possible.

APPENDIX B: OHIO EPA ASBESTOS DEMOLITION OR RENOVATION NOTICE

3288

OHIO ENVIRONMENTAL PROTECTION AGENCY
NOTIFICATION OF DEMOLITION AND RENOVATION

Operator Project #	Postmark	Date received	Notification #
FEMP-91-XXX			

I. TYPE OF NOTIFICATION: | Original X | Revised | Canceled

II. FACILITY INFORMATION:

Owner Name: U. S. Department of Energy
Address: Fernald Office, Post Office Box 398705
City: Cincinnati State: OH Zip-code: 45239

Removal Contractor: Westinghouse Envir. Mgmt Co. License #:
Address: FEMP, P.O. Box 398704
City: Cincinnati State: OH Zip-code: 45239
Contact: Ervin Fisher Telephone: (513) 738-6053

Other Operator: (demolition/general) Westinghouse Envir. Mgmt Co. of Ohio
Address: FEMP, P.O. Box 398704
City: Cincinnati State OH Zip-code 45239
Contact: Ervin Fisher Telephone: (513) 738-6053

III. TYPE OF OPERATION: (D= Demo O=Ordered Demo R= Renovation E=Emer. Reno) R

IV. IS ASBESTOS PRESENT? (check one) YES X NO

V. FACILITY DESCRIPTION (Include building name, number and floor number)

Building Name: Fernald Environmental Management Project
Address: 7400 Willey Rd.
City: Fernald State: OHIO County: Hamilton
Site Location (specific):
Facility Size (Square feet) 6 Million # of Floors: Age in years: 39
Present Use: Site Remediation Prior Use: Uranium Products Mfg.

VI. PROCEDURE, AND ANALYTICAL METHOD, IF APPROPRIATE, USED TO DETECT THE PRESENCE OF ASBESTOS MATERIAL:

Material assumed to be asbestos based on prior testing of similar material.

VII. APPROXIMATE AMOUNT OF ASBESTOS MATERIALS

	RACM To Be Removed	Nonfriable ACM Not to be Removed Cat I	Cat II	Unit of measure Feet	Meters
Pipe				Linear	
Surface Area				Square	
Volume RACM off Facility Components				Cubic	

VIII. DATES FOR ASBESTOS REMOVAL (MM/DD/YY) Start: End:
Hours of Operation: Shift work, (24 hours)
Days of the Week: Mon. Tue. Wed. Thur. Fri. Sat. Sun.

IX. SCHEDULE DATES DEMOLITION OR RENOVATION: Start: End:

OHIO ENVIRONMENTAL PROTECTION AGENCY

Asbestos Demolition and Renovation Notification Form Page 2

FEMP-91-XXX

X. DESCRIPTION OF PLANNED DEMOLITION OR RENOVATION WORK, AND METHODS(S) TO BE USED:

Remove damaged pipe insulation. Manual removal.

XI. DESCRIPTION OF WORK PRACTICES AND ENGINEERING CONTROLS TO BE USED TO PREVENT EMISSIONS OF ASBESTOS AT THE DEMOLITION AND RENOVATION SITE:
Glove-bag, adequate wetting with amended water, material kept wet until collected complete cleaning and lockdown, leak-tight containers.

XII. WASTE TRANSPORTER #1

Name: Not presently contracted
Address: _____
City: _____ State: _____ Zip-code: _____
Contact Person: _____ Telephone: _____

WASTE TRANSPORTER #2

Name: _____
Address: _____
City: _____ State: _____ Zip-code: _____
Contact Person: _____ Telephone: _____

XIII. WASTE DISPOSAL

Name: Nevada Test Site
Address: P.O. Box 98518
City: Las Vegas State: _____ Zip-code: _____
Contact Person: _____ Telephone: _____

XIV. EMERGENCY DEMOLITION
Not applicable

XV. EMERGENCY RENOVATION
Not applicable

XVI. DESCRIPTION OF PROCEDURES TO BE FOLLOWED IN THE EVENT THAT UNEXPECTED ASBESTOS IS FOUND OR PREVIOUSLY NONFRIABLE ASBESTOS MATERIAL BECOMES CRUMBLED, PULVERIZED OR REDUCED TO POWDER.

All asbestos related work will stop until proper notification and controls are in place.

XVII. I CERTIFY THAT AN INDIVIDUAL TRAINED IN THE PROVISIONS OF NESHAP (40 CFR PART 61, SUBPART M) WILL BE ON-SITE DURING THE DEMOLITION OR RENOVATION AND EVIDENCE THAT THE REQUIRED TRAINING HAS BEEN ACCOMPLISHED BY THIS PERSON WILL BE AVAILABLE DURING NORMAL BUSINESS HOURS.
Not applicable until 11/20/91

_____ / / _____
Owner/Operator Date Title

XVIII. I CERTIFY THAT THE ABOVE INFORMATION IS TRUE, ACCURATE AND COMPLETE:

_____ / / Ervin Fisher, Jr. Sr. Engineer
Signature Date Type Name and Title

APPENDIX C: EXAMPLE OF AN ASBESTOS WASTE SHIPMENT RECORD FORM

3288

REGULATED ASBESTOS MATERIAL
WASTE SHIPMENT RECORD

GENERATOR

1. Work site name and mailing address	Owner's name	Owner's telephone number

2. Operator's name and address	Operator's telephone number

3. Waste disposal site (WDS) name, mailing address, and physical site location	WDS phone number

4. Name, and address of responsible agency (Local, District or EPA Office where notification was sent)

5. Description of materials	6. Containers		7. Total quantity cubic meters or cubic yards
	Number	Type	

8. Special handling instructions and additional information

9. OPERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled, and are in all respects in proper condition for transport by highway according to applicable international and government regulations

Printed/typed Name	Title	Signature	Date (M/DD/YY)

TRANSPORTER

10. Transporter 1 (Acknowledgement of receipt of materials)
Address and telephone no

Printed/typed Name	Title	Signature	Date (MM/DD/YY)

11. Transporter 2 (Acknowledgement of receipt of materials)
Address and telephone No:

Printed/typed Name	Title	Signature	Date (M/DD/YY)

WASTE SITE

12. Discrepancy indication space

13. Waste disposal site owner or operator: Certification of receipt of asbestos materials covered by this manifest except as noted in item

Printed/typed Name	Title	Signature	Date (MM/DD/YY)

APPENDIX D: WEEKLY STATUS REPORT OF ASBESTOS NOTIFICATION FORMS ON FILE WITH ENVIRONMENTAL COMPLIANCE

 Dist: M.Davis, J.Sefton(6 copies), R.Grant, L.Bunk, R.McCullough, M.Townsend, J.Williams, P.Williams, T.Voelkerding, B.DeAngelis, Asbestos File

WEEKLY REPORT OF

10/15/91

ASBESTOS NOTIFICATION FORMS ON FILE
WITH ENVIRONMENTAL COMPLIANCE

Bld/ Plant ID	Project Name/ Location	Project Number	Amount Linear Feet	Amount Square Feet	Type of Removal	Material	Start Date	Comp. Date	WEMCO Contact	Phone	WEMCO NOI Returned Complete	NOI	FEMP SERIAL NUMBER FEMP-	R E V #	NOI To OEPA
1	RPR HIGHLINE SOUTH PLT 1	0040-015167	4	-	IN	PI	10/07/91	10/08/91	WILLIAMS, P	6427	10/14/91	NO	-		/ /
11	RMV FLR TILE ON 2ND FLR SERVICE BLDG	0030-011418	-	24	NF	FLOOR TILE	10/09/91	10/09/91	VOELKERDING, T	8408	10/10/91	NO	-		/ /
2/3	RMV INSUL PLT 2/3 DENIT, N SIDE 2ND FLR	0010-006103	102	-	PI	PI	09/16/91	10/11/91	WILLIAMS, J	8928	08/21/91	YES	91-030	A	08/22/91
10	RMV INSUL BOILER WTR-WALLCOVER & TURBINE	0040-014827	-	12	PI	BOILER INSUL	10/15/91	10/16/91	WILLIAMS, J	8928	09/25/91	YES	91-036		09/25/91
10	RMV INSUL MULTICYCLONE DOOR #3 BOILER	0040-014799	-	48	PI	BOILER INSUL	10/14/91	10/18/91	WILLIAMS, J	8928	09/18/91	YES	91-034		09/19/91
1/ 2D	RPR LKS 2" TRTD WTR LN PLT 1 & BLDG 2D	0040-013578	235	-	PI	PI	09/09/91	10/18/91	WILLIAMS, J	8928	10/04/91	YES	91-027	B	10/04/91
15	LAB BUILD 15: ALL OF BUILDING	RUST 1261	4000	8334	PM	PIPING DUCT	10/16/89	10/21/91	APPLE, J	8993	07/18/89	YES	89-006	B	10/13/89
1	RPR STM & CONDENSATE LN @ STM REDUC. STA	0040-014967	50	-	PI	PI	10/21/91	11/01/91	WILLIAMS, J	8928	09/30/91	YES	91-038		09/30/91
1	RPR LKS STM REDUCING STATION	0040-014966	35	-	PI	PI	10/28/91	11/08/91	WILLIAMS, J	8928	09/30/91	YES	91-039		09/30/91
SS	CLEAN STORM SEWERS OF ASB CONTAIM. WASTE	RUST 1345	-	20	PI	DIRT 20 C. FT.	10/18/91	11/15/91	SCHWING, J	9023	10/03/91	YES	91-035	A	10/03/91
15	RMV DUCT INSUL N HALL LAB	RUST 1261	2664	8325	PI	DUCT INSUL	10/21/91	01/07/92	APPLE, J	8993	09/25/91	YES	91-037		09/25/91

For distribution to WEMCO Contact points
Please inform Environmental Compliance, X6053, of any changes to schedule, removal amounts or removal contractor.

492

3288 10/15/91

WEEKLY REPORT OF

ASBESTOS NOTIFICATION FORMS ON FILE
WITH ENVIRONMENTAL COMPLIANCE

Bld/ Plant ID	Project Name/ Location	Project Number	Amount Linear Feet	Amount Square Feet	T Y P E	Material	Start Date	Comp. Date	WEMCO NOI Returned Complete	NOI	FEMP SERIAL NUMBER FEMP-	R E V #	NOI To OEPA	Percent Complete
** WEMCO Contact: APPLE, J		Mail Stop: 16												
15	LAB BUILD 15: ALL OF BUILDING	RUST 1261	4000	8334	F	PIPING DUCT	10/16/89	10/21/91	07/18/89	YES	89-006	B	10/13/89	100
15	RMV DUCT INSUL N HALL LAB	RUST 1261	2664	8325		DUCT INSUL	10/21/91	01/07/92	09/25/91	YES	91-037		09/25/91	0

For distribution to WEMCO Contact points

Please inform Environmental Compliance, X6053, of any changes to schedule, removal amounts or removal contractor.

3298

10/15/91

WEEKLY REPORT OF

ASBESTOS NOTIFICATION FORMS ON FILE
WITH ENVIRONMENTAL COMPLIANCE

Bld/ Plant ID	Project Name/ Location	Project Number	Amount Linear Feet	Amount Square Feet	TYPE	Material	Start Date	Comp. Date	WEMCO NOI Returned Complete	NOI	FEMP SERIAL NUMBER FEMP-	REV #	NOI To OEPA	Percent Complete
** WEMCO Contact: SCHWING, J		Mail Stop: 16												
SS	CLEAN STORM SEWERS OF ASB CONTAIM. WASTE	RUST 1345	0	20		DIRT 20 C. FT.	10/18/91	11/15/91	10/03/91	YES	91-035	A	10/03/91	0

For distribution to WEMCO Contact points
Please inform Environmental Compliance, X6053, of any changes to schedule, removal amounts or removal contractor.

10/15/91

WEEKLY REPORT OF

ASBESTOS NOTIFICATION FORMS ON FILE
WITH ENVIRONMENTAL COMPLIANCE

Bld/ Plant ID	Project Name/ Location	Project Number	Amount Linear Feet	Amount Square Feet	T Y P E	Material	Start Date	Comp. Date	WEMCO NOI Returned Complete	NOI	FEMP SERIAL NUMBER FEMP-	R E V #	NOI To OEPA	Percent Complete
** WEMCO Contact: VOELKERDING, T		Mail Stop: 59												
11	RMV FLR TILE ON 2ND FLR SERVICE BLDG	0030-011418	0	24		FLOOR TILE	10/09/91	10/09/91	10/10/91	NO	-		/ /	100

For distribution to WEMCO Contact points
Please inform Environmental Compliance, X6053, of any changes to schedule, removal amounts or removal contractor.

3288

10/15/91

WEEKLY REPORT OF

ASBESTOS NOTIFICATION FORMS ON FILE
WITH ENVIRONMENTAL COMPLIANCE

Bld/ Plant ID	Project Name/ Location	Project Number	Amount Linear Feet	Amount Square Feet	TYPE	Material	Start Date	Comp. Date	WEMCO NOI Returned Complete	NOI	FEMP SERIAL NUMBER FEMP-	REV #	NOI To OEPA	Percent Complete
** WEMCO Contact: WILLIAMS, J		Mail Stop: 56												
2/3	RMV INSUL PLT 2/3 DENIT, N SIDE 2ND FLR	0010-006103	102	0		PI	09/16/91	10/11/91	08/21/91	YES	91-030	A	08/22/91	100
1/ 2D	RPR LKS 2" TRTD WTR LN PLT 1 & BLDG 2D	0040-013578	235	0		PI	09/09/91	10/18/91	10/04/91	YES	91-027	B	10/04/91	90
10	RMV INSUL MULTICYCLONE DOOR #3 BOILER	0040-014799	0	48		BOILER INSUL	10/14/91	10/18/91	09/18/91	YES	91-034		09/19/91	30
10	RMV INSUL BOILER WTR-WALLCOVER & TURBINE	0040-014827	0	12		BOILER INSUL	10/15/91	10/16/91	09/25/91	YES	91-036		09/25/91	0
1	RPR LKS STM REDUCING STATION	0040-014966	35	0		PI	10/28/91	11/08/91	09/30/91	YES	91-039		09/30/91	0
1	RPR STM & CONDENSATE LN @ STM REDUC. STA	0040-014967	50	0		PI	10/21/91	11/01/91	09/30/91	YES	91-038		09/30/91	0

For distribution to WEMCO Contact points
Please inform Environmental Compliance, X6053, of any changes to schedule, removal amounts or removal contractor.

10/15/91

WEEKLY REPORT OF

ASBESTOS NOTIFICATION FORMS ON FILE
WITH ENVIRONMENTAL COMPLIANCE

Bld/ Plant ID	Project Name/ Location	Project Number	Amount Linear Feet	Amount Square Feet	T Y P E	Material	Start Date	Comp. Date	WEMCO NOI Returned Complete	NOI	FEMP SERIAL NUMBER FEMP-	R E V #	NOI To OEPA	Percent Complete
** WEMCO Contact: WILLIAMS, P		Mail Stop: 56												
1	RPR HIGHLINE SOUTH PLT 1	0040-015167	4	0		PI	10/07/91	10/08/91	10/14/91	NO	-		/ /	100

APPENDIX E: ASBESTOS NOTIFICATION QUARTERLY REPORT

y.txt already exists, overwrite it? (Y/N) Yes

3288

Planned Renovation Projects
(=> 160 square or 260 linear feet)

Third Quarter (Jul - Sept) 1990

09/30/90

Asbestos Notification Quarterly Report
Fernald Environmental Management Project
Westinghouse Environmental Management Company of Ohio

NOI Number	Building	Quantity Square Feet	Quantity Linear feet	Date to State	Projected Date Start	Projected Date Stop	Revised Date Start	Revised Date Stop	Actual Date Start	Actual Date Stop	Percent Completion
FMPC-89-006 B	15	8334	4000	10/13/89	10/16/89	09/30/91	10/16/89	10/21/91	10/16/89	/ /	50
FMPC-90-047	5	390	-	07/23/90	08/01/90	08/10/90	08/01/90	08/10/90	08/01/90	08/10/90	100

3288

Planned Renovation Projects
(Less than 160 Square Feet or 260 Linear Feet)

Third Quarter (Jul - Sept) 1990

09/30/90

Asbestos Notification Quarterly Report
Fernald Environmental Management Project
Westinghouse Environmental Management Company of Ohio

NOI Number	Building	Quantity Square Feet	Quantity Linear feet	Date to State	Projected Date Start	Projected Date Stop	Revised Date Start	Revised Date Stop	Actual Date Start	Actual Date Stop	Percent Completion
FMPC-90-044 A	9	-	40	06/20/90	06/11/90	06/15/90	06/25/90	07/05/90	06/25/90	07/05/90	100
FMPC-90-046	1	-	40	07/23/90	07/31/90	08/03/90	07/31/90	08/03/90	07/31/90	08/03/90	100
FMPC-90-048	9	-	60	07/30/90	08/09/90	08/17/90	08/09/90	08/17/90	08/09/90	08/17/90	100
FMPC-90-049	10	-	70	07/30/90	08/13/90	08/21/90	08/13/90	08/21/90	08/13/90	08/21/90	100
FMPC-90-050	69	-	10	08/02/90	08/13/90	08/16/90	08/13/90	08/16/90	08/13/90	08/16/90	100
FMPC-90-051	1	32	-	08/03/90	09/17/90	09/24/90	09/17/90	09/24/90	09/17/90	09/24/90	100
FMPC-90-052	10	-	20	08/24/90	08/31/90	09/07/90	08/31/90	09/07/90	08/31/90	09/07/90	100
FMPC-90-053	10	-	40	08/24/90	08/31/90	09/07/90	08/31/90	09/07/90	08/31/90	09/07/90	100
FMPC-90-054	15	-	40	09/07/90	09/12/90	09/14/90	09/12/90	09/14/90	09/12/90	09/14/90	100
FMPC-90-057	39	-	40	09/18/90	09/27/90	09/28/90	09/27/90	10/04/90	09/27/90	/ /	40
FMPC-90-060	18D	-	24	09/18/90	09/24/90	09/28/90	09/24/90	09/28/90	09/24/90	09/28/90	100

Unforeseen, Nonscheduled Projects

3288

Third Quarter (Jul - Sept) 1990

09/30/90

Asbestos Notification Quarterly Report
Fernald Environmental Management Project
Westinghouse Environmental Management Company of Ohio

NOI Number	Building	Quantity Square Feet	Quantity Linear feet	Date to State	Projected Date Start	Projected Date Stop	Revised Date Start	Revised Date Stop	Actual Date Start	Actual Date Stop	Percent Completion
FMPC- -	5	-	8	/ /	07/16/90	07/16/90	07/16/90	07/16/90	07/16/90	07/16/90	100
FMPC- -	6	-	3	/ /	07/17/90	07/17/90	07/17/90	07/17/90	07/17/90	07/17/90	100
FMPC- -	5	1	-	/ /	07/18/90	07/18/90	07/18/90	07/18/90	07/18/90	07/18/90	100
FMPC- -	10	1	-	/ /	07/23/90	07/23/90	07/23/90	07/23/90	07/23/90	07/23/90	100
FMPC- -	8	-	30	/ /	07/24/90	07/27/90	07/24/90	07/27/90	07/24/90	07/27/90	100
FMPC- -	4	-	3	/ /	08/02/90	08/02/90	08/02/90	08/02/90	08/02/90	08/02/90	100
FMPC- -	15	1	-	/ /	08/02/90	08/02/90	08/02/90	08/02/90	08/02/90	08/02/90	100
FMPC- -	2/3	-	3	/ /	08/08/90	08/08/90	08/08/90	08/08/90	08/08/90	08/08/90	100
FMPC- -	14	-	3	/ /	08/08/90	08/08/90	08/08/90	08/08/90	08/08/90	08/08/90	100
FMPC- -	2/3	-	3	/ /	08/22/90	08/22/90	08/22/90	08/22/90	08/22/90	08/22/90	100
FMPC- -	10	-	3	/ /	08/25/90	08/26/90	08/25/90	08/26/90	08/25/90	08/26/90	100
FMPC- -	10	-	1	/ /	08/26/90	08/26/90	08/26/90	08/26/90	08/26/90	08/26/90	100
FMPC- -	6	-	3	/ /	08/30/90	08/31/90	08/30/90	08/31/90	08/30/90	08/31/90	100
FMPC- -	6	-	10	/ /	08/31/90	08/31/90	08/31/90	08/31/90	08/31/90	08/31/90	100
FMPC- -	8	-	3	/ /	09/04/90	09/04/90	09/04/90	09/04/90	09/04/90	09/04/90	100
FMPC- -	8	-	5	/ /	09/04/90	09/05/90	09/04/90	09/05/90	09/04/90	09/05/90	100
FMPC- -	20	-	2	/ /	09/11/90	09/11/90	09/11/90	09/11/90	09/11/90	09/11/90	100
FMPC- -	13	-	9	/ /	09/11/90	09/11/90	09/11/90	09/11/90	09/11/90	09/11/90	100
FMPC- -	14	-	8	/ /	09/10/90	09/17/90	09/10/90	09/17/90	09/10/90	09/17/90	100
FMPC- -	3	-	10	/ /	09/25/90	09/26/90	09/25/90	09/26/90	09/25/90	09/26/90	100
FMPC- -	1	-	20	/ /	09/29/90	10/04/90	09/29/90	10/04/90	09/29/90	/ /	20

3288

Demolition (Friable Asbestos) Projects

Third Quarter (Jul - Sept) 1990

09/30/90

Asbestos Notification Quarterly Report
Fernald Environmental Management Project
Westinghouse Environmental Management Company of Ohio

NOI Number	Building Quantity		Date to State	Projected Date		Revised Date		Actual Date		Percent Completion
	Square Feet	Linear feet		Start	Stop	Start	Stop	Start	Stop	

Demolition (Negative Declaration) Projects

Third Quarter (Jul - Sept) 1990

3288

09/30/90

Asbestos Notification Quarterly Report
Fernald Environmental Management Project
Westinghouse Environmental Management Company of Ohio

NOI Number	Building Quantity Square Feet	Linear feet	Date to State	Projected Date Start	Projected Date Stop	Revised Date Start	Revised Date Stop	Actual Date Start	Actual Date Stop	Percent Completion

Emergency Demolition Projects

3288

Third Quarter (Jul - Sept) 1990

09/30/90

Asbestos Notification Quarterly Report
Fernald Environmental Management Project
Westinghouse Environmental Management Company of Ohio

NOI Number	Building Quantity		Date to State	Projected Date		Revised Date		Actual Date		Percent Completion
	Square Feet	Linear feet		Start	Stop	Start	Stop	Start	Stop	

Emergency Renovation Projects

3288

Third Quarter (Jul - Sept) 1990

09/30/90

Asbestos Notification Quarterly Report
Fernald Environmental Management Project
Westinghouse Environmental Management Company of Ohio

NOI Number	Building	Quantity		Date to State	Projected Date		Revised Date		Actual Date		Percent Completion
		Square Feet	Linear feet		Start	Stop	Start	Stop	Start	Stop	

APPENDIX F: ANNUAL PROJECTION OF ASBESTOS REMOVALS FOR INDIVIDUAL NONSCHEDULED OPERATIONS

WMCO:EC:90-440

November 7, 1990

Mr. Gerald W. Westerbeck
FMPC Site Manager
U.S. Department of Energy
P.O. Box 398705
Cincinnati, Ohio 45239-8705

Dear Mr. Westerbeck:

ANNUAL PROJECTION OF ASBESTOS REMOVALS DUE TO INDIVIDUAL NONSCHEDULED OPERATIONS FOR CY 1991

Reference: 1) 40 CFR Part 61, Subpart M - National Emission Standard for Asbestos.

2) Ohio Administrative Code Section 3745-20, "Asbestos Emission Control from Renovation, Demolition and Disposal Operations."

Enclosed is our 1991 notification and recommended transmittal letter for projected asbestos removals due to individual nonscheduled operations. This projection is based on 1990 removals and our projected increase in this type of removals for the upcoming year.

This notification is required to be submitted to SWOAPCA by Section 61.145(d)(1) of Reference 1. It must be postmarked by at least December 27, 1990 to be in compliance with Reference 2.

The WMCO personnel responsible for preparing this notification have reviewed it for completeness and accuracy. To the best of my knowledge, the notification in its current form, is complete and accurate. Any changes to this notification made by your staff, should be reviewed with the appropriate WMCO personnel before submittal of the notification.

If you have any questions concerning this notification, please contact Phillip Spotts of my staff at X6932.

Very truly yours,

Ellery D. Savage, Manager
Environmental Compliance

PBS

Enclosure

Mr. J. Kessel
Environmental Scientist
Southwestern Ohio Air Pollution
Control Agency
1632 Central Parkway
Cincinnati, Ohio 45210

Dear Mr. Kessel:

ANNUAL PROJECTION OF ASBESTOS REMOVALS DUE TO INDIVIDUAL NONSCHEDULED OPERATIONS FOR CY 1991

Reference: 1) 40 CFR Part 61, Subpart M - National Emission Standard for Asbestos.

2) Ohio Administrative Code section 3745-20, "Asbestos Emission Control from Renovation, Demolition and Disposal Operations."

In accordance with the provisions of References (1) and (2) enclosed is our 1991 notification for projected asbestos removals due to individual nonscheduled operations. This projection is based on 1990 removals and our projected increase in this type of removals for the upcoming year.

If you have any questions concerning this projection, please contact Behram Shroff at 738-6003.

Sincerely,

Gerald W. Westerbeck
FMPC Site Manager

DP-84:Shroff

Enclosure: As stated

cc: B. L. Queener, SE-31, ORO
E. D. Savage, WMCO
S. M. Beckman, WMCO
P. B. Spotts, WMCO

c: S. M. Beckman
P. B. Spotts
B. L. Queener, SE-31, ORO

Central Files
AW Files

COMPLETION OF NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) DOCUMENTATION, FMPC-518

INCLUDED AS AN INSERT IN STEP 3

3288

ASBESTOS OPERATIONS

AND MAINTENANCE MANUAL

IN-6029

INTERIM OPERATING MANUAL

Issue Date: 12-12-91

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
Westinghouse Environmental Management Company of Ohio
P.O. Box 398704
Cincinnati, Ohio 45239-8704

510

LIST OF EFFECTIVE PAGES

SECTION	PAGE	ISSUE DATE
	ii	12-12-91
	iii	12-12-91
	iv	12-12-91
	v	12-12-91
	vi	12-12-91
	vii	12-12-91
1.0	1	12-12-91
2.0	1 thru 2	12-12-91
3.0	2 thru 4	12-12-91
4.0	4 thru 7	12-12-91
5.0	8	12-12-91
6.0	8 thru 32	12-12-91
7.0	32 thru 70	12-12-91
8.0	70 thru 73	12-12-91
9.0	74	12-12-91
10.0	75 thru 78	12-12-91
11.0	78 thru 82	12-12-91
12.0	82 thru 83	12-12-91
13.0	83 thru 85	12-12-91
14.0	86	12-12-91

RECORD OF ISSUE/REVISIONS

3288

DATE	REV. NO	DESCRIPTION AND AUTHORITY
12-12-91	Interim	Interim document on asbestos handling required by Environmental Management, Clean Air Program per Request No. P91-655 by R. P. McCullough.

TABLE OF CONTENTS

SECTION	DESCRIPTION	PAGE
	LIST OF EFFECTIVE PAGES	ii
	RECORD OF ISSUE/REVISIONS	iii
	PART I - INTRODUCTION	
1.0	PURPOSE	1
2.0	REQUIREMENTS	1
	2.1 ACM Inventory	1
	2.2 Periodic Reinspections	2
	2.3 Documented Abatement Procedures	2
	2.4 Documented Disposal Procedures	2
	2.5 Documented Emergency Procedures	2
	2.6 Training	2
3.0	RESPONSIBILITIES	2
	3.1 Asbestos Program Coordinator	2
	3.2 Industrial Hygiene (IH)	2
	3.3 Environmental Compliance & Quality Assurance (EC&QA)	3
	3.4 Maintenance Scheduler	3
	3.5 Asbestos Team	4
4.0	DEFINITIONS	4
	PART II - SPECIFIC WORK PRACTICES	
5.0	OBJECTIVE	8
	5.1 Surfacing Materials	8
	5.2 Thermal System Insulation	8
	5.3 Miscellaneous	8

TABLE OF CONTENTS (cont.)

SECTION	DESCRIPTION	PAGE
6.0	THERMAL SYSTEM INSULATION	8
6.1	TSI-1	8
6.2	TSI-2	11
6.3	TSI-3	14
6.4	TSI-4	17
6.5	TSI-5	20
6.6	TSI-6	23
6.7	TSI-7	26
6.8	TSI-8	29
7.0	MISCELLANEOUS MATERIALS	32
7.1	M-1	32
7.2	M-2	35
7.3	M-3	39
7.4	M-4	42
7.5	M-5	44
7.6	M-6	47
7.7	M-7	50
7.8	M-8	53
7.9	M-9	56
7.10	M-10	59
7.11	M-11	62
7.12	M-12	65
7.13	M-13	67

TABLE OF CONTENTS (cont.)

SECTION	DESCRIPTION	PAGE
	PART III - COMMON WORK PRACTICES	
8.0	PRE-WORK ACTIVITIES	70
	8.1 Asbestos Work Permit	70
	8.2 Notifications	70
	8.3 Work Scheduling	71
	8.4 Communication	71
	8.5 Training	72
	FIGURE #1	73
9.0	RESPIRATORS	74
	9.1 Qualifications	74
	9.2 Selection	74
	9.3 Respirator Fit Checks	74
10.0	SET-UP	75
	10.1 Securing/Denoting Work Area	75
	10.2 HVAC System Shut-off	75
	10.3 Protective Clothing	75
	10.4 Starting Air Monitoring	76
	10.5 Precleaning Work Areas and Wet Wiping	76
	10.6 Preparing Work Area	76
11.0	ACM WORK	78
	11.1 Normal Removal	78
	11.2 Dry Removal	78
	11.3 Glovebag Removal	79

TABLE OF CONTENTS (cont.)

SECTION	DESCRIPTION	PAGE
	11.4 Wet Wrap	80
	11.5 Encapsulation	81
	11.6 Lock-down	81
	11.7 Packaging Waste	82
12.0	TEAR DOWN	82
	12.1 Clearing Work Area	82
	12.2 Stopping Air Monitoring	83
	12.3 Removing Protective Clothing	83
	12.4 Removing & Cleaning Respirators	83
13.0	CLOSEOUT	83
	13.1 Evaluation of Work Form	83
	13.2 Recordkeeping	84
	FIGURE #2	85
14.0	APPLICABLE DOCUMENTS	86
	14.1 Resources	86
	14.2 Adjuncts	86

PART I - INTRODUCTION

1.0 PURPOSE

The Federal OSHA Regulation regarding asbestos activities in the construction industry, 29 CFR 1926.58, contains detailed and specific work practice requirements. These include establishing a negative pressure enclosure with an attached decontamination setup, which includes shower facilities, for work that involves disturbing asbestos-containing materials (ACM).

Under some circumstances it is not necessary to establish the negative pressure enclosure and use the decontamination setup. The specifics are listed in:

> "Appendix G to 29 CFR 1926.58 - Work Practices and Engineering Controls for Small-Scale, Short-Duration Asbestos Renovation and Maintenance Activities - Non-Mandatory."

This Appendix is not mandatory because employers may choose instead to comply with all of the negative pressure, etc. work practice requirements.

The opportunity to be relieved of the full requirements applies to an Asbestos Operations and Maintenance (O&M) program. O&M activities are, by OSHA definition, only Small-Scale, Short-Duration (SS/SD) asbestos activities. Anything exceeding this scale of work is subject to the full requirements.

The intent of this document is to define the specific procedures, and the responsibility for these procedures, so that the WEMCO Asbestos Team can properly perform SS/SD asbestos abatement activities as defined by OSHA.

2.0 REQUIREMENTS

Appendix G (mentioned in 1.0 above) is specific in the definition of the elements of the maintenance program which must be in effect at any facility which elects to use asbestos O&M procedures. The elements of such a program are:

2.1 ACM Inventory - An inventory must be taken for all Asbestos-Containing Materials (ACM) in each facility. A Site Survey for ACM, conducted by Diagnostic Engineering, Inc., has been defined in the Asbestos Management Plan, PL-FMPC-3002. This inventory of the FEMP site is essential for the protection of employees and the environment because many of the facilities were constructed before 1970 and used various building materials that contained asbestos (e.g., building sheathing, pipe insulation, floor covering, etc.).

The Site Survey was performed in accordance with the Asbestos Hazard Emergency Response Act (AHERA). While AHERA was legislated by Congress as the protocol to be used for identifying and assessing asbestos in schools, it has become the "de facto" standard to be used in commercial and industrial facilities as well. For this reason, the AHERA protocol - as described in the Asbestos Management Plan - was used for the Site Survey.

2.0 **REQUIREMENTS** (cont.)

2.2 Periodic Reinspections - In order to maintain the integrity of the Site Survey, all facilities must be reinspected on a periodic basis. The frequency and implementation of reinspection will be a joint effort of Program Management and Industrial Hygiene.

2.3 Documented Abatement Procedures - The procedures for abating ACM are contained in Sections 6.0, 7.0, and 8.0.

2.4 Documented Disposal Procedures - The procedures for asbestos disposal are contained in WEMCO Document 00024, "Packaging of Low-Level Waste for Outside Shipment".

2.5 Documented Emergency Procedures - The specific written procedures for coping with asbestos-related emergencies are found in Section 5.7 ("Handling Spills or Incidents Involving Asbestos") of IH&S-IH-03, " Control of Work Involving Asbestos".

2.6 Training - The training requirements for personnel involved with the Asbestos O&M Program are outlined in Section 8.5.

3.0 **RESPONSIBILITIES**

3.1 Asbestos Program Coordinator - By monitoring the completed asbestos abatement jobs and periodically reinspecting the ACM, the Asbestos Program Coordinator insures that any changes are identified. The changes resultant from any ACM abatement shall be documented and recorded in the data base and in the CAD diagrams of the Facility Owners Reports.

3.2 Industrial Hygiene (IH)

3.2.1 Verifies through contact with Environmental Compliance for each asbestos job that regulatory notification has been completed and that approval to begin work has been granted.

3.2.2 Authorizes and identifies special precautions and work practices for each asbestos job by completing and returning the Asbestos Work Permit to the supervisor-in-charge of the Asbestos Team when approved by Environmental Compliance.

3.2.3 Prioritizes asbestos abatement work orders, and gives this information to the Maintenance Scheduler. This allows the jobs to be scheduled based on the health hazards as perceived by IH.

3.2.4 Identifies the type of personal protective equipment required for each asbestos job.

3.2.5 Ensures adequate monitoring by sampling selected job operations based on duration and degree of potential exposure and provides notification of air sampling results as required. This helps to ensure that all OSHA worker protection and work practice regulations are observed.

3.0 **RESPONSIBILITIES** (cont.)

3.2.6 Evaluates effectiveness of control measures and/or engineering controls in maintaining the required asbestos Threshold Limit Value.

3.2.7 Performs periodic inspections of asbestos work-sites to ensure compliance with work permit requirements and acceptable asbestos work practices.

3.2.8 The requirements regarding the environment, safety, and health of the O&M activities are found in the "Control of Work Involving Asbestos" document, IH&S-IH-03.

3.3 Environmental Compliance & Quality Assurance (EC&QA)

3.3.1 Receives, reviews, and processes the Asbestos Removal Notification Forms - see Section 8.4.1.

3.3.2 Completes and submits a Notice of Intent and appropriate transmittal letter to the Ohio Environmental Protection Agency, as described in WEMCO Document #90-100.

3.3.3 Provides notification to Industrial Hygiene when regulatory approval has been granted for an asbestos demolition or renovation project to commence.

3.3.4 Ensures that required reports are issued or submitted in an accurate and timely manner.

3.4 Maintenance Scheduler

3.3.1 Receives a copy of the Asbestos Work Permit from IH. Based upon the information listed in the Permit, completes and submits an Asbestos Removal Notification Form to EC&QA, per WEMCO Document #90-100.

3.3.2 Submits information to the WEMCO Davis-Bacon Review Committee, which makes the initial decision as to whether the work in question can be done by the Asbestos Team, or whether it must be sub-contracted.

3.3.3 Develops the work schedule for the Asbestos Team, based on the priority health data provided by IH.

3.3.4 Generates the "Asbestos Work Order Schedules" (Section 8.4.2), and distributes them to interested parties on a weekly basis.

3.0 **RESPONSIBILITIES** (cont.)

3.5 Asbestos Team

Abates asbestos jobs that are typically Small Scale/Short Duration (SS/SD) in nature. The Asbestos Team consists of a dedicated group of Pipe-fitters. Since each member of this Team has received the four-day "Certified Person" training, as defined by OSHA, they are qualified to perform larger tasks than SS/SD. In doing so, however, they must be supervised by a person who is certified by the Ohio Department of Health as an Asbestos Hazard Abatement Specialist.

4.0 **DEFINITIONS**

4.1 Adequately Wet - To sufficiently mix or penetrate or coat with liquid to prevent dust emissions.

4.2 Amended Water - Water to which a surfactant has been added.

4.3 Asbestos - A fibrous material suitable for use as an incombustible, non-conducting, or chemically resistant material; includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.

4.4 Asbestos-Containing Material (ACM) - Includes asbestos or any material containing asbestos. See RACM.

4.5 Asbestos-Containing Waste Material (ACWM) - Any waste that contains asbestos. This includes, but is not limited to; waste from control devices, filters from control devices, friable asbestos-containing material and bags or containers that previously contained asbestos. As applied to demolition and renovation operations this term includes regulated asbestos waste and materials contaminated with asbestos including equipment and clothing.

4.6 Asbestos hazard abatement activity - Any activity involving the removal, renovation, enclosure, repair, or encapsulation of friable asbestos-containing materials in an amount greater than fifty linear feet or fifty square feet. This definition is used primarily to set a "trigger" limit for removals performed by outside contractors or non-WEMCO personnel. Once a removal exceeds this limit a number of additional requirements are imposed. Examples of these restriction/requirements are; the removal contractor must be a "Licensed Asbestos Hazard Abatement Contractor", and notifications must be made to the Ohio Department of Health. These requirements will normally not affect WEMCO personnel.

4.7 Asbestos Removal Notification Form (ARNF) - Form utilized within the FEMP to initiate submissions of Notice of Intent (NOI) to demolish or renovations involving asbestos. These forms are submitted to EC&QA by maintenance supervisors, project engineers or any person responsible for the anticipated removal.

4.0 **DEFINITIONS** (cont.)

4.8 Category I nonfriable asbestos-containing material - Any asbestos-containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than one percent asbestos.

4.9 Category II nonfriable asbestos-containing material - Any asbestos material other than Category I nonfriable ACM containing more than one percent asbestos that when dry cannot be crumbled, pulverized, or reduced to powder by hand pressure.

4.10 Demolition - The wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations.

4.11 Diagnostic Engineering, Inc. (DEI) - Contractor performing the FEMP asbestos site survey.

4.12 Department of Energy (DOE) - Owner of the FEMP site.

4.13 Emergency Renovation - Any demolition conducted under a written order issued by a state or local government agency because a facility is structurally unsound and in danger of imminent collapse.

4.14 Emergency Renovation - A renovation operation that was not planned but results from a sudden, unexpected event that creates an unsafe condition. Including operations necessitated by non-routine failures of equipment.

4.15 Encapsulate - To coat, bind or resurface walls, ceilings, pipes or other structures or ACM with suitable products to prevent friable asbestos from becoming airborne.

4.16 Environmental Compliance and Quality Assurance (EC&QA) - The department/group responsible for insuring compliance with the U.S. EPA NESHAP requirements for asbestos renovations or demolitions.

4.17 Facility - Any institutional, commercial, public, or industrial structure, ~~installation, or~~ building. ~~For the FEMP~~ the term "facility" refers to the entire installation and not to individual buildings or plants.

4.18 Facility component - Any pipe, duct, boiler, tank, reactor, turbine or furnace at or in a facility; any structural member of a facility.

4.19 Friable Asbestos Material - Any material containing more than one percent asbestos by area, that hand pressure can break, crumble, pulverize, or reduce to powder when dry.

NOTE: This could include normally non-friable materials such as transite and vinyl floor tile if it is in a deteriorated and friable condition or is converted to friable asbestos material during removal. Friability determinations are made by the Industrial Hygiene Department.

521

4.0 **DEFINITIONS** (cont.)

4.20 Glove bag - A sealed compartment with attached inner gloves used for the handling of ACM. When properly installed and used it provides a small work area enclosure typically used for small-scale asbestos stripping operations.

4.21 HEPA FILTER - A High Energy Particulate Air filter certified by the manufacturers to have a collection efficiency of not less than 99.97 percent as determined by ASTM Method D-2986-71.

4.22 Incidental renovations - Also called "Individual nonscheduled operations" these are small removals necessary to facilitate the normal conduct of business where the asbestos is "incidentally" disturbed by the maintenance activity. These projects could not have reasonably been foreseen or planned, but do not constitute classification as emergency removals. Repairs on necessary equipment or active piping and drilling holes in transite are examples of what could be considered incidental renovations.

4.23 Industrial Hygiene - The department/group responsible for issuing asbestos work permits and for ensuring compliance with OSHA worker protection regulations.

4.24 National Emission Standards for Hazardous Air Pollutants (NESHAP) - 40 CFR Part 61, Subpart M: National Emission Standard for Asbestos.

4.25 Notice of Intent (NOI) to remove asbestos - The NOI is the written notification provided to the Ohio EPA (SWOAPCA) of our intent to renovate or demolish.

4.26 Ohio EPA (OEPA) - The Ohio Environmental Protection Agency. For the purpose of notifications and other asbestos related matters the Southwest Ohio Air Pollution Control Agency (SWOAPCA) is the Ohio EPA's agent for Hamilton County and is FEMP's contact point.

4.27 Owner or Operator - Any person or entity who owns, leases, operates, controls, or supervises a facility, or any waste disposal, demolition or renovation operation. For the FEMP the DOE is "Owner" and WEMCO is the "Operator". For removal operations that are done by an outside contractor the contractor is considered to be the "Operator".

4.28 Point of Contact (POC) - The POC is the WEMCO employee responsible for the overall asbestos abatement operation. This person can be the On-site Supervisor, the Competent person, Facility Owner or any other person who can be used to coordinate the scheduling of the project. The POC will be the person used by EC&QA to update the progress of the project, verify the start/completion dates and discuss any other pertinent information concerning the project.

4.0 **DEFINITIONS** (cont.)

4.29 Planned renovation operation - Any renovation operation, or number of operations, in which the amount of friable asbestos material that will be removed or stripped within a given period of time can be predicted. Incidental removals (individual nonscheduled operations) are included if a number of such operations can be predicted to occur during a given period of time, not to exceed one year, based on operating experience. These operations are locally broken down into two categories:

4.29.1 Planned renovation operation - Non-emergency removals involving the removal of less than 80 linear meters (260 linear feet) or less than 15 square meters (160 square feet) of friable asbestos materials from facility components.

4.29.2 Planned Major renovations - Non-emergency removals involving the removal of equal to or greater than 80 linear meters (260 linear feet) on pipes or at least 15 square meters (160 square feet) of friable asbestos materials from facility components.

4.30 Planner - WEMCO employee responsible for planning jobs/projects involving work with asbestos or demolition projects (e.g., job planner - estimator, project engineer, maintenance supervisor).

4.31 Program Management - The department/group responsible for defining asbestos program activities, and monitoring program results.

4.32 Regulated Asbestos-Containing Material (RACM) - Means (a) any friable asbestos material, (b) any Category I non-friable asbestos which has become friable or that will be subject to sanding, grinding, cutting or abrading, or (c) Category II non-friable asbestos that can be expected to break, crumble, be pulverized, or reduce to powder during expected renovation or demolition activities.

4.33 Renovation - The altering in any way of one or more facility components. Operations in which load-supporting structural members are wrecked or taken out are specifically excluded; these operations are defined as demolitions.

4.34 Structural member - Any load-supporting member of a facility, such as beams and load supporting walls; or any nonload-supporting member such as ceilings and nonload-supporting walls.

4.35 Surfactant - A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

PART II - SPECIFIC WORK PRACTICES

5.0 OBJECTIVE

The objective in Part II is to define certain work practices that are specific to certain jobs. This is done per the Asbestos Hazard Emergency Response Act format, which was enacted by Congress for schools, and which has since become the "de facto" standard used for commercial and industrial asbestos abatement.

The AHERA format requires that any asbestos-containing materials be placed into Surfacing Materials, Thermal System Insulation, or Miscellaneous categories.

5.1 Surfacing Materials - Material that is sprayed-on, troweled-on, or otherwise applied to surfaces, such as acoustical plaster on ceilings and fireproofing materials.

There are no asbestos-containing materials at the FEMP that are in this category.

5.2 Thermal System Insulation - Material that is applied to pipes, fittings, boilers, breeching, tanks, duct, or other interior structural components to prevent heat loss or heat gain, or water condensation, or for other purposes.

The Work Practices that apply to Thermal System Insulation ACM are described in Section 6.0.

5.3 Miscellaneous - Material such as floor and ceiling tiles, transite, etc.

The Work Practices that apply to Miscellaneous ACM are described in Section 7.0.

6.0 THERMAL SYSTEM INSULATION

6.1 TSI-1 Removing insulation on non-concealed pipe for maintenance work using glove bags.

6.1.1 Summary:

This work practice covers the procedures for removing insulation on an exposed pipe in an unoccupied area such as a boiler or mechanical room. The procedure assumes that the pipe insulation can be removed using a glovebag and is accessible from a ladder or scaffold under approximately 10 feet in height.

Examples of this procedure are: removal of up to three feet of insulation to make a new connection to an existing pipe; or removal required to replace a valve.

6.0 THERMAL SYSTEM INSULATION (cont.)

6.1.2 Requirements:

6.1.2.1 Workers - Two members of the Asbestos Team are required. Worker 1 performs the work; Worker 2 provides tools, equipment, and materials to Worker 1 and supervises work area safety.

An IH Technician is required to insure proper personnel air monitoring, and to perform area air monitoring as required.

6.1.2.2 Type of Work Area Protection - Drop cloth.

6.1.2.3 Tools and Equipment

Razor knife/Bone Saw
Putty knife
Ladder
Extension cords with GFCI adapters
Bucket with water for wet wiping
Lock out tags
Stiff nylon bristle brushes
Wire snippers

6.1.2.4 Abatement Equipment and materials

6 mil polyethylene - 200 sq. ft.
Duct tape - 5 rolls
Disposal bags with labels - 12
Garden Sprayer with amended water
Garden Sprayer with lockdown encapsulant
HEPA vacuum and Hose - 1
Disposal coveralls - 6 sets
Disposable towels - 50
Asbestos barrier tape - 100 ft.
Warning signs
Personal air monitoring pump and cassettes
High volume air monitoring pump and cassettes
Glove bag(s)

6.1.3 Planning/Responsibilities

6.1.3.1 The Supervisor-in-charge of the Asbestos Team shall initiate a FEMP Work Permit when any activity involves work with asbestos, in accordance with Section 8.1.

6.1.3.2 The Supervisor shall schedule a time when the area is not in use or shall develop a plan to isolate the work area from occupied spaces, in accordance with Section 8.3.

6.0 THERMAL SYSTEM INSULATION (cont.)

6.1.3.3 The Supervisor shall assign workers with the proper training for the planned work, in accordance with Section 8.5.

6.1.3.4 Appropriate respirators shall be obtained in accordance with Section 9.2.

6.1.4 Procedure

6.1.4.1 Move all tools, equipment and materials to work area and secure area by locking doors or installing barrier tape to denote work area. Post warning signs. See Section 10.1.

6.1.4.2 Shut off and lock out HVAC system(s) serving work area in accordance with Section 10.2.

6.1.4.3 Put on respirators and perform fit checks in accordance with Section 9.3.

6.1.4.4 Put on protective clothing in accordance with Section 10.3.

6.1.4.5 Begin personal and area air monitoring in accordance with Section 10.4.

6.1.4.6 Preclean work area in accordance with Section 10.5.

6.1.4.7 Prepare area with drop cloth in accordance with Section 10.6.1.

6.1.4.8 Perform the necessary removal using the Glove Bag Method in accordance with Section 11.3.

6.1.4.9 Encapsulate area where ACM was removed in accordance with Section 11.5.

6.1.4.10 Package waste for disposal, wet wipe bags and move to outside of work area in accordance with Section 11.7.

6.1.4.11 Perform any required maintenance work.

6.1.4.12 Clean work area, tools and equipment using wet wiping and HEPA vacuuming. Move clean tools and equipment outside of work area.

6.1.4.13 Stop air sampling work in accordance with Section 12.2.

6.1.4.14 Remove suits and place into disposal bags in accordance with Section 12.3.

6.0 THERMAL SYSTEM INSULATION (cont.)

6.1.4.15 Remove work area protection.

6.1.4.16 Remove and clean respirators in accordance with Section 12.4.

6.1.4.17 Transport labeled disposal bags to waste storage area. Return tools, equipment, and remaining materials to storage area. Remove lock outs and turn on HVAC system(s).

6.1.4.18 Complete "Evaluation of Work Affecting ACM" form and other recordkeeping requirements in accordance with Section 13.1.

6.2 TSI-2 Remove insulation on non-concealed pipe for maintenance work when glove bags cannot be used.

6.2.1 Summary:

This work practice covers the procedures for removing insulation on an exposed pipe in an unoccupied area such as a boiler or mechanical room. The procedure assumes that the pipe insulation cannot be removed using a glovebag and is accessible from a ladder or scaffold under approximately 10 feet in height.

Examples of this procedure are: removing up to three feet of insulation to make a new connection to an existing pipe; removing insulation to replace a valve.

6.2.2 Requirements:

6.2.2.1 Workers - Two members of the Asbestos Team are required. Worker 1 performs the work; Worker 2 provides tools, equipment, and materials to Worker 1 and supervises work area safety.

An IH Technician is required to insure proper personnel air monitoring, and to perform area air monitoring as required.

6.2.2.2 Type of Work Area Protection - Drop cloth and mini-enclosure with negative air.

6.0 **THERMAL SYSTEM INSULATION** (cont.)

6.2.2.3 Tools and Equipment

Razor knife/Bone Saw
Putty knife
Ladder
Extension cords with GFCI adapters
Bucket with water for wet wiping
Lock out tags
Stiff nylon bristle brushes
Wire snippers

6.2.2.4 Abatement Equipment and materials

6 mil polyethylene - 200 sq. ft.
Duct tape - 5 rolls
Disposal bags with labels - 12
Garden Sprayer with amended water
Garden Sprayer with lockdown encapsulant
HEPA vacuum and Hose - 1
Disposal coveralls - 6 sets
Disposable towels - 50
Asbestos barrier tape - 100 ft.
Warning signs
Personal air monitoring pump and cassettes
High volume air monitoring pump and cassettes
Frame for mini-enclosures

6.2.3 Planning/Responsibilities

6.2.3.1 The Supervisor-in-charge of the Asbestos Team shall initiate a FEMP Work Permit when any activity involves work with asbestos, in accordance with Section 8.1.

6.2.3.2 The Supervisor shall schedule a time when the area is not in use or shall develop a plan to isolate the work area from occupied spaces, in accordance with Section 8.3.

6.2.3.3 The Supervisor shall assign workers with the proper training for the planned work, in accordance with Section 8.5.

6.2.3.4 Appropriate respirators shall be obtained in accordance with Section 9.2.

6.0 THERMAL SYSTEM INSULATION (cont.)

6.2.4 Procedure

6.2.4.1 Move all tools, equipment and materials to work area and secure area by locking doors or installing barrier tape to denote work area. Post warning signs. See Section 10.1.

6.2.4.2 Shut off and lock out HVAC system(s) serving work area in accordance with Section 10.2.

6.2.4.3 Put on respirators and perform fit checks in accordance with Section 9.3.

6.2.4.4 Put on protective clothing in accordance with Section 10.3.

6.2.4.5 Begin personal and area air monitoring in accordance with Section 10.4.

6.2.4.6 Preclean work area in accordance with Section 10.5.

6.2.4.7 Prepare area with drop cloth in accordance with Section 10.6.1, then erect mini-enclosure below ceiling and set up negative air using variable volume HEPA filtered exhaust fan. Enclosure shall enclose an area at least two feet beyond the ceiling area to be opened, in accordance with Section 10.6.2.

6.2.4.8 Place tools, equipment and materials needed into the enclosure.

6.2.4.9 Extend the mini-enclosure to the piping using polyethylene and framing taped together to provide an enclosure around the work area.

6.2.4.10 Mist the are of surfacing to be removed using the garden sprayer containing amended water and allow the water to soak in for several minutes. When the bulk material is removed, use the scraper and nylon brush to remove any remaining visible ACM. Mist the removal area during the removal of bulk material and residual material.

6.2.4.11 Wet wipe the enclosure after all visible residual material is removed.

6.2.4.12 Encapsulate the area where ACM was removed in accordance with Section 11.5.

6.2.4.13 Package waste for disposal, wet wipe bags and move to outside of work area in accordance with Section 11.7.

6.0 THERMAL SYSTEM INSULATION (cont.)

6.2.4.14 Perform any required maintenance work.

6.2.4.15 Clean work area, tools and equipment using wet wiping and HEPA vacuuming. Move clean tools and equipment outside of work area.

6.2.4.16 Stop air sampling work in accordance with Section 12.2.

6.2.4.17 Remove suits and place into disposal bags in accordance with Section 12.3.

6.2.4.18 Remove work area protection.

6.2.4.19 Remove and clean respirators in accordance with Section 12.4.

6.2.4.20 Transport labeled disposal bags to waste storage area. Return tools, equipment, and remaining materials to storage area. Remove lock outs and turn on HVAC system(s).

6.2.4.21 Complete "Evaluation of Work Affecting ACM" form and other recordkeeping requirements in accordance with Section 13.1.

6.3 TSI-3 Remove insulation on pipe above lay-in panel ceiling for maintenance work.

6.3.1 Summary:
This work practice covers the procedures for removing insulation on a pipe located above a lay-in panel ceiling. An example of this procedure is repairing a pipe leak above a lay-in panel ceiling.

6.3.2 Requirements:

6.3.2.1 Workers - Two members of the Asbestos Team are required. Worker 1 performs the work; Worker 2 provides tools, equipment, and materials to Worker 1 and supervises work area safety.

An IH Technician is required to insure proper personnel air monitoring, and to perform area air monitoring as required.

6.3.2.2 Type of Work Area Protection - Drop cloth and mini-enclosure with negative air.

530

6.0 THERMAL SYSTEM INSULATION (cont.)

6.3.2.3 Tools and Equipment

Razor knife/Bone Saw
Putty knife
Ladder or scaffold
Extension cords with GFCI adapters
Bucket with water for wet wiping
Lock out tags
Stiff nylon bristle brushes
Wire snippers

6.3.2.4 Abatement Equipment and materials

6 mil polyethylene - 200 sq. ft.
Duct tape - 6 rolls
Disposal bags with labels - 12
Garden Sprayer with amended water
Garden Sprayer with lockdown encapsulant
HEPA vacuums and Hoses - 2
Disposal coveralls - 6 sets
Disposable towels - 50
Asbestos barrier tape - 100 ft.
Warning signs
Personal air monitoring pump and cassettes
High volume air monitoring pump and cassettes
Frame for mini-enclosures
Thick viscosity bridging encapsulant
Glove bag

6.3.3 Planning/Responsibilities

6.3.3.1 The Supervisor-in-charge of the Asbestos Team shall initiate a FEMP Work Permit when any activity involves work with asbestos, in accordance with Section 8.1.

6.3.3.2 The Supervisor shall schedule a time when the area is not in use or shall develop a plan to isolate the work area from occupied spaces, in accordance with Section 8.3.

6.3.3.3 The Supervisor shall assign workers with the proper training for the planned work, in accordance with Section 8.5.

6.3.3.4 Appropriate respirators shall be obtained in accordance with Section 9.2.

6.0 THERMAL SYSTEM INSULATION (cont.)

6.3.4 Procedure

6.3.4.1 Move all tools, equipment and materials to work area and secure area by locking doors or installing barrier tape to denote work area. Post warning signs. See Section 10.1.

6.3.4.2 Shut off and lock out HVAC system(s) serving work area in accordance with Section 10.2.

6.3.4.3 Put on respirators and perform fit checks in accordance with Section 9.3.

6.3.4.4 Put on protective clothing in accordance with Section 10.3.

6.3.4.5 Begin personal and area air monitoring in accordance with Section 10.4.

6.3.4.6 Preclean work area in accordance with Section 10.5.

6.3.4.7 Prepare area with drop cloth in accordance with Section 10.6.1. Erect mini-enclosure directly below where the repair work will occur and set up negative air using the HEPA vacuum, in accordance with Section 10.6.2.

6.3.4.8 Place tools, equipment and materials needed into the enclosure. Include a HEPA vacuum for vacuuming areas above the ceiling.

6.3.4.9 Obtain access through ceiling using proper work practice for type of ceiling present.

6.3.4.10 Clean up any bulk debris on ceiling panels and place into ACM disposable bags.

6.3.4.11 HEPA vacuum all ceiling panels within four feet of area to be repaired.

6.3.4.12 Attach an appropriately configured glovebag to the pipe where removal is required.

6.3.4.13 Perform necessary removal work within the glovebag in accordance with Section 11.3.

6.3.4.14 Perform required maintenance work.

6.3.4.15 Reinstall any ceiling panel that was moved to perform work.

6.0 THERMAL SYSTEM INSULATION (cont.)

6.3.4.16 Clean work area, tools, and equipment using wet wiping and HEPA vacuuming. Move clean tools and equipment outside of work area.

6.3.4.17 Stop air sampling work in accordance with Section 12.2.

6.3.4.18 Remove suits and place into disposal bags in accordance with Section 12.3.

6.3.4.19 Remove work area protection.

6.3.4.20 Remove and clean respirators in accordance with Section 12.4.

6.3.4.21 Transport labeled disposal bags to waste storage area. Return tools, equipment, and remaining materials to storage area. Remove lock outs and turn on HVAC system(s).

6.3.4.22 Complete "Evaluation of Work Affecting ACM" form and other recordkeeping requirements in accordance with Section 13.1

6.4 TSI-4 Remove insulation on non-concealed pipe in elevated location for maintenance work.

6.4.1 Summary:

This work practice covers the procedures for removing insulation on exposed piping in elevated locations (approximately 10' or more above floor level). This procedure uses scaffold as a work platform to reduce the safety hazards from working from a tall ladder.

Examples of this procedure would be repairing a pipe leak in a boiler room, or installing a new ceiling hung heating unit in a warehouse space.

6.4.2 Requirements:

6.4.2.1 Workers - Three members of the Asbestos Team are required. Workers 1 and 2 perform the work; Worker 3 provides tools, equipment, and materials to Workers 1 and 2, and supervises work area safety.

An IH Technician is required to insure proper personnel air monitoring, and to perform area air monitoring as required.

6.4.2.2 Type of Work Area Protection - Regulated work area.

6.0 THERMAL SYSTEM INSULATION (cont.)

6.4.2.3 Tools and Equipment

Razor knife/Bone Saw
Putty knife
Ladder or scaffold
Extension cords with GFCI adapters
Bucket with water for wet wiping
Lock out tags
Stiff nylon bristle brushes
Wire snippers

6.4.2.4 Abatement Equipment and materials

6 mil polyethylene - 200 sq. ft.
Duct tape - 6 rolls
Disposal bags with labels - 12
Garden Sprayer with amended water
Garden Sprayer with lockdown encapsulant
HEPA vacuums and Hoses - 2
Disposal coveralls - 6 sets
Disposable towels - 50
Asbestos barrier tape - 100 ft.
Warning signs
Personal air monitoring pump and cassettes
High volume air monitoring pump and cassettes
Frame for mini-enclosures
Glove bag(s)

6.4.3 Planning/Responsibilities

6.4.3.1 The Supervisor-in-charge of the Asbestos Team shall initiate a FEMP Work Permit when any activity involves work with asbestos, in accordance with Section 8.1.

6.4.3.2 The Supervisor shall schedule a time when the area is not in use or shall develop a plan to isolate the work area from occupied spaces, in accordance with Section 8.3.

6.4.3.3 The Supervisor shall assign workers with the proper training for the planned work, in accordance with Section 8.5.

6.4.3.4 Appropriate respirators shall be obtained in accordance with Section 9.2.

534

6.0 THERMAL SYSTEM INSULATION (cont.)

6.4.4 Procedure

6.4.4.1 Move all tools, equipment and materials to work area and secure area by locking doors or installing barrier tape to denote work area. Post warning signs. See Section 10.1.

6.4.4.2 Shut off and lock out HVAC system(s) serving work area in accordance with Section 10.2.

6.4.4.3 Put on respirators and perform fit checks in accordance with Section 9.3.

6.4.4.4 Put on protective clothing in accordance with Section 10.3.

6.4.4.5 Begin personal and area air monitoring in accordance with Section 10.4.

6.4.4.6 Preclean work area in accordance with Section 10.5.

6.4.4.7 Prepare area with drop cloth in accordance with Section 8.3.6.1, and establish a regulated area.

6.4.4.8 Place tools, equipment and materials adjacent to work area.

6.4.4.9 Erect scaffold system (if required) using proper OSHA regulated procedures. Care should be taken not to disturb the ACM.

6.4.4.10 Place all needed tools onto the working platform level and perform the necessary remedial action using the glovebag method in accordance with Section 11.3.

6.4.4.11 Encapsulate the area where ACM was removed, in accordance with Section 11.5

6.4.4.12 Package waste for disposal, wet wipe bags and move to outside of the work area in accordance with Section 11.7.

6.4.4.13 Perform any required maintenance work.

6.4.4.14 Clean work area, tools, and equipment using wet wiping and HEPA vacuuming. Move clean tools and equipment outside of work area.

6.4.4.15 HEPA vacuum the floor.

6.4.4.16 Stop air sampling work in accordance with Section 12.2.

6.0 THERMAL SYSTEM INSULATION (cont.)

6.4.4.17 Remove suits and place into disposal bags in accordance with Section 12.3.

6.4.4.18 Remove work area protection.

6.4.4.19 Remove and clean respirators in accordance with Section 12.4.

6.4.4.20 Transport labeled disposal bags to waste storage area. Return tools, equipment, and remaining materials to storage area. Remove lock outs and turn on HVAC system(s).

6.4.4.21 Complete "Evaluation of Work Affecting ACM" form and other recordkeeping requirements in accordance with Section 13.1

6.5 TSI-5 Remove insulation on pipe in occupied area for maintenance work.

6.5.1 Summary:

This work practice covers the procedures for removing pipe insulation in an occupied area. This procedure assumes that maintenance work must occur immediately or work area must be occupied.

Examples of this procedure are repairing a leak in a critical piping system, or replacing a pipe riser in an occupied area.

6.5.2 Requirements:

6.5.2.1 Workers - Two members of the Asbestos Team are required. Worker 1 performs the work; Worker 2 provides tools, equipment, and materials to Worker 1 and supervises work area safety.

An IH Technician is required to insure proper personnel air monitoring, and to perform area air monitoring as required.

6.5.2.2 Type of Work Area Protection - Drop cloth and mini-enclosure with negative air.

6.5.2.3 Tools and Equipment

Razor knife/Bone Saw
Ladder or scaffold
Extension cords with GFCI adapters
Bucket with water for wet wiping
Lock out tags
Scraper (2-3" wide stiff blade)
Wire snippers

6.0 THERMAL SYSTEM INSULATION (cont.)

6.5.2.4 Abatement Equipment and materials

6 mil polyethylene - 200 sq. ft.
Duct tape - 8 rolls
Disposal bags with labels - 12
Garden Sprayer with amended water
Garden Sprayer with lockdown encapsulant
HEPA vacuums and Hoses - 2
Disposal coveralls - 6 sets
Disposable towels - 50
Asbestos barrier tape - 100 ft.
Warning signs
Personal air monitoring pump and cassettes
High volume air monitoring pump and cassettes
Frame for mini-enclosures
Glove bag(s)

6.5.3 Planning/Responsibilities

6.5.3.1 The Supervisor-in-charge of the Asbestos Team shall initiate a FEMP Work Permit when any activity involves work with asbestos, in accordance with Section 8.1.

6.5.3.2 The Supervisor shall schedule a time when the area is not in use or shall develop a plan to isolate the work area from occupied spaces, in accordance with Section 8.3.

6.5.3.3 The Supervisor shall assign workers with the proper training for the planned work, in accordance with Section 8.5.

6.5.3.4 Appropriate respirators shall be obtained in accordance with Section 9.2.

6.5.4 Procedure

6.5.4.1 Move all tools, equipment and materials to work area and secure area by locking doors or installing barrier tape to denote work area. Post warning signs. See Section 10.1.

6.5.4.2 Shut off and lock out HVAC system(s) serving work area in accordance with Section 10.2.

6.5.4.3 Put on respirators and perform fit checks in accordance with Section 9.3.

6.5.4.4 Put on protective clothing in accordance with Section 10.3.

6.0 THERMAL SYSTEM INSULATION (cont.)

6.5.4.5 Begin personal and area air monitoring in accordance with Section 10.4.

6.5.4.6 Preclean work area in accordance with Section 10.5.

6.5.4.7 Prepare area with drop cloth in accordance with Section 10.6.1, then erect mini-enclosure and set up negative air in accordance with Section 10.6.2.

6.5.4.8 Obtain access to concealed piping (if necessary).

6.5.4.9 Place tools, equipment and materials needed into the enclosure.

6.5.4.10 Extend the mini-enclosure to the piping using polyethylene and framing taped together to provide an enclosure around the work area.

6.5.4.11 Remove ACM using glove bag procedures in accordance with Section 11.3.

6.5.4.12 Package waste for disposal, wet wipe bags and move to outside of work area in accordance with Section 11.7.

6.5.4.13 Perform any required maintenance work.

6.5.4.14 Clean work area, tools and equipment using wet wiping and HEPA vacuuming. Move clean tools and equipment outside of work area.

6.5.4.15 Stop air sampling work in accordance with Section 12.2.

6.5.4.16 Remove suits and place into disposal bags in accordance with Section 12.3.

6.5.4.17 Remove work area protection.

6.5.4.18 Remove and clean respirators in accordance with Section 12.4.

6.5.4.19 Transport labeled disposal bags to waste storage area. Return tools, equipment, and remaining materials to storage area. Remove lock outs and turn on HVAC system(s).

6.5.4.20 Complete "Evaluation of Work Affecting ACM" form and other recordkeeping requirements in accordance with Section 13.1.

538

6.0 THERMAL SYSTEM INSULATION (cont.)

6.6 TSI-6 Repair damaged Thermal System Insulation on a pipe, boiler, duct, or flue.

6.6.1 Summary:

This work practice covers the procedures for repairing damaged thermal systems insulation. The procedures assume that the repair location can be isolated from occupied areas, and that the area to be repaired is less than 160 square feet in size.

Examples of this procedures includes repairing delaminated boiler insulation, repairing pipe insulation damaged by a water leak, and repairing impact damaged duct insulation.

6.6.2 Requirements:

6.6.2.1 Workers - Two members of the Asbestos Team are required. Worker 1 performs the work; Worker 2 provides tools, equipment, and materials to Worker 1 and supervises work area safety.

An IH Technician is required to insure proper personnel air monitoring, and to perform area air monitoring as required.

6.6.2.2 Type of Work Area Protection - Drop cloth and mini-enclosure with negative air.

6.6.2.3 Tools and Equipment

Razor knife/Bone Saw
Ladder or scaffold
Extension cords with GFCI adapters
Bucket with water for wet wiping
Lock out tags

6.0 THERMAL SYSTEM INSULATION (cont.)

6.6.2.4 Abatement Equipment and materials

6 mil polyethylene - 200 sq. ft.
Duct tape - 4 rolls
Disposal bags with labels - 8
Garden Sprayer with amended water
HEPA vacuums and Hoses - 2
Disposal coveralls - 4 sets
Disposable towels - 50
Asbestos barrier tape - 100 ft.
Warning signs
Personal air monitoring pump and cassettes
High volume air monitoring pump and cassettes
Frame for mini-enclosures
Appropriately configured glove bag
(except for large application)
Thick viscosity, hand applied bridging
encapsulant
Patching materials and/or new insulation

6.6.3 Planning/Responsibilities

6.6.3.1 The Supervisor-in-charge of the Asbestos Team shall initiate a FEMP Work Permit when any activity involves work with asbestos, in accordance with Section 8.1.

6.6.3.2 The Supervisor shall schedule a time when the area is not in use or shall develop a plan to isolate the work area from occupied spaces, in accordance with Section 8.3.

6.6.3.3 The Supervisor shall assign workers with the proper training for the planned work, in accordance with Section 8.5.

6.6.3.4 Appropriate respirators shall be obtained in accordance with Section 9.2.

6.6.4 Procedure

6.6.4.1 Move all tools, equipment and materials to work area and secure area by locking doors or installing barrier tape to denote work area. Post warning signs. See Section 10.1.

6.6.4.2 Shut off and lock out HVAC system(s) serving work area in accordance with Section 10.2.

6.6.4.3 Put on respirators and perform fit checks in accordance with Section 9.3.

6.0 THERMAL SYSTEM INSULATION (cont.)

6.6.4.4 Put on protective clothing in accordance with Section 10.3.

6.6.4.5 Begin personal and area air monitoring in accordance with Section 10.4.

6.6.4.6 Preclean work area in accordance with Section 10.5.

6.6.4.7 Prepare area with drop cloth in accordance with Section 10.6.1, then erect mini-enclosure and set up negative air in accordance with Section 10.6.2.

6.6.4.8 Place tools, equipment and materials needed into enclosure.

6.6.4.9 Remove ACM using glove bag in accordance with Section 11.3. If damage is severe, remove entire area of insulation inside glovebag. Remove all loose or damaged insulation while vacuuming debris and wetting surface throughout removal process. Trim edges of remaining insulation so straight, square and clean edges remain. Hand apply bridging encapsulant to exposed ACM edges. Reinsulate with non-asbestos material.

6.6.4.10 Clean work area, tools and equipment using wet wiping and HEPA vacuuming. Move clean tools and equipment outside of work area.

6.6.4.11 Stop air sampling work in accordance with Section 12.2.

6.6.4.12 Remove suits and place into disposal bags in accordance with Section 12.3.

6.6.4.13 Remove work area protection.

6.6.4.14 Remove and clean respirators in accordance with Section 12.4.

6.6.4.15 Transport labeled disposal bags to waste storage area. Return tools, equipment, and remaining materials to storage area. Remove lock outs and turn on HVAC system(s).

6.6.4.16 Complete "Evaluation of Work Affecting ACM" form and other recordkeeping requirements in accordance with Section 13.1.

6.0 THERMAL SYSTEM INSULATION (cont.)

6.7 TSI-7 Remove duct insulation above plaster or drywall ceiling.

6.7.1 Summary:

This work practice covers the procedures for removing duct insulation above a plaster or drywall ceiling.

Examples of this procedure include attaching new duct to existing duct, and replacing a mixing box above a ceiling.

6.7.2 Requirements:

6.7.2.1 Workers - Two members of the Asbestos Team are required. Worker 1 performs the work; Worker 2 provides tools, equipment, and materials to Worker 1 and supervises work area safety.

An IH Technician is required to insure proper personnel air monitoring, and to perform area air monitoring as required.

6.7.2.2 Type of Work Area Protection - Drop cloth and mini-enclosure with negative air.

6.7.2.3 Tools and Equipment

Razor knife
Ladder or scaffold
Extension cords and GFCI adapters
Bucket with water for wet wiping
Lock out tags
Scraper (2-3" wide stiff blade)
Wire cutters

6.0 THERMAL SYSTEM INSULATION (cont.)

6.7.2.4 Abatement Equipment and materials

Reciprocating saw with plaster and metal cutting blades

6 mil polyethylene - 100 sq. ft.
Duct tape - 4 rolls
Disposal bags with labels - 7
Garden Sprayer with amended water
HEPA vacuum and hose - 1
Disposal coveralls - 4 sets
Disposal towels - 50
Asbestos barrier tape - 100 ft
Warning signs
Personal air monitoring pump and cassettes
Frame for mini-enclosure
Thick viscosity bridging encapsulant
Variable volume HEPA filtered fan unit (approximately 500 CFM)

Replacement duct insulation and other maintenance materials for required work.

Access door or ceiling repair materials.

6.7.3 Planning/Responsibilities

6.7.3.1 The Supervisor-in-charge of the Asbestos Team shall initiate a FEMP Work Permit when any activity involves work with asbestos, in accordance with Section 8.1.

6.7.3.2 The Supervisor shall schedule a time when the area is not in use or shall develop a plan to isolate the work area from occupied spaces, in accordance with Section 8.3.

6.7.3.3 The Supervisor shall assign workers with the proper training for the planned work, in accordance with Section 8.5.

6.7.3.4 Appropriate respirators shall be obtained in accordance with Section 9.2.

6.7.4 Procedure

6.7.4.1 Move all tools, equipment and materials to work area and secure area by locking doors or installing barrier tape to denote work area. Post warning signs. See Section 10.1.

6.7.4.2 Shut off and lock out HVAC system(s) serving work area in accordance with Section 10.2.

6.0 THERMAL SYSTEM INSULATION (cont.)

6.7.4.3 Put on respirators and perform fit checks in accordance with Section 9.3.

6.7.4.4 Put on protective clothing in accordance with Section 10.3.

6.7.4.5 Begin personal and area air monitoring in accordance with Section 10.4.

6.7.4.6 Preclean work area in accordance with Section 10.5.

6.7.4.7 Prepare area with drop cloth in accordance with Section 10.6.1, then erect mini-enclosure and set up negative air in accordance with Section 10.6.2. Enclosure shall enclose an area at least two feet beyond ceiling area to be opened.

6.7.4.8 Place tools, equipment and materials needed into enclosure. Include a HEPA vacuum for vacuuming areas above ceiling.

6.7.4.9 Wet area to be cut for access, if access panel is not available. Mark a 2'x 2' square for access opening. Locate opening between joists or black iron if possible. Use reciprocating saw all for plaster and utility knife for gypsum board. Insure that a clean straight, square opening is provided. Keep all materials wet and promptly clean any dust using HEPA vacuum. HEPA vacuum area within reach above ceiling.

6.7.4.10 Install drop cloth above ceiling (approximately 10'x10' area) and extend mini-enclosure above ceiling (if feasible) using polyethylene and framing taped together around work area.

6.7.4.11 Mist work area, ductwork, and enclosure with garden sprayer. Mark area to be removed for removal operation. Cut insulation and remove to at least 8" beyond where maintenance work must occur. Cut all insulation so that clean, square and straight edges remain. If wire type mesh is used, use wire cutters to trim. Keep area wet and HEPA vacuum all debris throughout removal.

6.7.4.12 Wet wipe ceiling enclosure after all visible residual material is removed.

6.7.4.13 Hand apply thick viscosity bridging encapsulant to exposed edges of insulation.

6.7.4.14 Package waste for disposal in accordance with Section 11.7.

6.0 THERMAL SYSTEM INSULATION (cont.)

6.7.4.15 Conduct maintenance operation.

6.7.4.16 Reinsulate area using non-ACM material.

6.7.4.17 Install prefabricated access door or repair gypsum/plaster ceiling.

6.7.4.18 Clean work area, tools and equipment using wet wiping and HEPA vacuuming. Move clean tools and equipment outside of work area.

6.7.4.19 Stop air sampling work in accordance with Section 12.2.

6.7.4.20 Remove suits and place into disposal bags in accordance with Section 12.3.

6.7.4.21 Remove work area protection.

6.7.4.22 Remove and clean respirators in accordance with Section 12.4.

6.7.4.23 Transport labeled disposal bags to waste storage area. Return tools, equipment, and remaining materials to storage area. Remove lock outs and turn on HVAC system(s).

6.7.4.24 Complete "Evaluation of Work Affecting ACM" form and other recordkeeping requirements in accordance with Section 13.1.

6.8 TSI-8 Install item in ACM insulated pipe, boiler, duct, or flue.

6.8.1 Summary:

This summary covers the installation of an item (such as a temperature sensor or damper control) on ACM insulated pipe, boiler, duct or flue.

Examples of this procedure include installing energy management system sensors & controls, and installing a pressure gauge on a steam line.

6.8.2 Requirements:

6.8.2.1 Workers - Two members of the Asbestos Team are required. Worker 1 performs the work; Worker 2 provides tools, equipment, and materials to Worker 1 and supervises work area safety.

An IH Technician is required to insure proper personnel air monitoring, and to perform area air monitoring as required.

6.0 THERMAL SYSTEM INSULATION (cont.)

6.8.2.2 Type of Work Area Protection - Drop cloth and mini-enclosure with negative air.

6.8.2.3 Tools and Equipment

Razor knife
Ladder or scaffold
Extension cords and GFCI adapters
Bucket with water for wet wiping
Lock out tags
Scraper (2-3" wide stiff blade)
Wire cutters
Hole saw (drywall type)

6.8.2.4 Abatement Equipment and materials

6 mil polyethylene - 100 sq. ft.
Duct tape - 2 rolls
Garden Sprayer with amended water
HEPA vacuum and hose - 1
Disposal coveralls - 4 sets
Disposal towels - 50
Asbestos barrier tape - 100 ft
Warning signs
Personal air monitoring pump and cassettes
Thick viscosity, hand applied bridging encapsulant
Glovebag configured for work location
Item to be installed.

6.8.3 Planning/Responsibilities

6.8.3.1 The Supervisor-in-charge of the Asbestos Team shall initiate a FEMP Work Permit when any activity involves work with asbestos, in accordance with Section 8.1.

6.8.3.2 The Supervisor shall schedule a time when the area is not in use or shall develop a plan to isolate the work area from occupied spaces, in accordance with Section 8.3.

6.8.3.3 The Supervisor shall assign workers with the proper training for the planned work, in accordance with Section 8.5.

6.8.3.4 Appropriate respirators shall be obtained in accordance with Section 9.2.

6.0 THERMAL SYSTEM INSULATION (cont.)

6.8.4 Procedure

6.8.4.1 Move all tools, equipment and materials to work area and secure area by locking doors or installing barrier tape to denote work area. Post warning signs. See Section 10.1.

6.8.4.2 Shut off and lock out HVAC system(s) serving work area in accordance with Section 10.2.

6.8.4.3 Put on respirators and perform fit checks in accordance with Section 9.3.

6.8.4.4 Put on protective clothing in accordance with Section 10.3.

6.8.4.5 Begin personal and area air monitoring in accordance with Section 10.4.

6.8.4.6 Preclean work area in accordance with Section 10.5.

6.8.4.7 Prepare area with drop cloth in accordance with Section 10.6.1, then erect mini-enclosure and set up negative air in accordance with Section 10.6.2.

6.8.4.8 Place tools, equipment and materials needed in mini-enclosure.

6.8.4.9 Remove insulation as needed using glovebag procedures if object receiving item can be contained in a glovebag, in accordance with Section 11.3. On large items such as ducts and boilers, thoroughly wet area to receive sensor. Cut approximately a 12"x12" section with a razor knife. Worker No. 2 operates HEPA vacuum with hose positioned within 6" of cutting operation. Use wire cutters or hole saw for wire mesh insulation or block type insulation respectively. Worker No. 2 holds disposal bag directly below area to be removed while Worker No. 1 cleans area to receive item. Constantly wet area and vacuum debris during removal operations. Minimize debris falling to floor during removal. After surface is thoroughly cleaned, hand apply thick viscosity bridging encapsulant to removal surface and exposed edges of remaining insulation.

6.8.4.10 Install maintenance item.

6.8.4.11 Reinsulate around items with non-asbestos material.

6.0 THERMAL SYSTEM INSULATION (cont.)

6.8.4.12 Clean work area, tools and equipment using wet wiping and HEPA vacuuming. Move clean tools and equipment outside of work area.

6.8.4.13 Stop air sampling work in accordance with Section 12.2.

6.8.4.14 Remove suits and place into disposal bags in accordance with Section 12.3.

6.8.4.15 Remove work area protection.

6.8.4.16 Remove and clean respirators in accordance with Section 12.4.

6.8.4.17 Transport labeled disposal bags to waste storage area. Return tools, equipment, and remaining materials to storage area. Remove lock outs and turn on HVAC system(s).

6.8.4.18 Complete "Evaluation of Work Affecting ACM" form and other recordkeeping requirements in accordance with Section 13.1.

7.0 MISCELLANEOUS MATERIALS

7.1 M-1 Replacement of single vinyl asbestos floor tiles.

7.1.1 Summary:

This work practice covers the procedures for removing a single vinyl asbestos floor tile. Mastic removal is also included in this procedure.

An example of this procedure is attaching equipment to a floor.

7.1.2 Requirements:

7.1.2.1 Workers - Two members of the Asbestos Team are required. Worker 1 performs the work; Worker 2 provides tools, equipment, and materials to Worker 1 and supervises work area safety.

An IH Technician is required to insure proper personnel air monitoring, and to perform area air monitoring as required.

7.1.2.2 Type of Work Area Protection - Drop cloths.

7.0 MISCELLANEOUS MATERIALS (cont.)

7.1.2.3 Tools and Equipment

Razor knife
Extension cords and GFCI adapters
Bucket with water for wet wiping
Lock out tags
Scraper (2-3" wide stiff blade)
Rubber or wooden mallet

7.1.2.4 Abatement Equipment and materials

6 mil polyethylene - 100 sq. ft.
Duct tape - 4 rolls
Disposal bags with labels - 8
Garden Sprayer with amended water
Garden Sprayer with lockdown encapsulant
HEPA vacuum and hose - 1
Disposal coveralls - 6 sets
Disposal towels - 50
Asbestos barrier tape - 100 ft
Warning signs
Personal air monitoring pump and cassettes
High volume air monitoring pump and cassettes
Mastic removal solvent - 1 gallon

Replacement non-ACM floor tile and non-ACM mastic

Adhesive trowel and clean up supplies

7.1.3 Planning/Responsibilities

7.1.3.1 The Supervisor-in-charge of the Asbestos Team shall initiate a FEMP Work Permit when any activity involves work with asbestos, in accordance with Section 8.1.

7.1.3.2 The Supervisor shall schedule a time when the area is not in use or shall develop a plan to isolate the work area from occupied spaces, in accordance with Section 8.3.

7.1.3.3 The Supervisor shall assign workers with the proper training for the planned work, in accordance with Section 8.5.

7.1.3.4 Appropriate respirators shall be obtained in accordance with Section 9.2.

7.0 MISCELLANEOUS MATERIALS (cont.)

7.1.4 Procedure

7.1.4.1 Move all tools, equipment and materials to work area and secure area by locking doors or installing barrier tape to denote work area. Post warning signs. See Section 10.1.

7.1.4.2 Shut off and lock out HVAC system(s) serving work area in accordance with Section 10.2.

7.1.4.3 Put on respirators and perform fit checks in accordance with Section 9.3.

7.1.4.4 Put on protective clothing in accordance with Section 10.3.

7.1.4.5 Begin personal and area air monitoring in accordance with Section 10.4.

7.1.4.6 Preclean work area in accordance with Section 10.5.

7.1.4.7 Place one layer of polyethylene sheet over all floor tiles within 4' of the tile to be replaced. Duct tape the sheet to the floor.

7.1.4.8 Any fixed items within 4 feet of the work shall be covered with 1 layer of polyethylene.

7.1.4.9 Place tools, equipment and materials needed onto polyethylene sheet.

7.1.4.10 The vinyl asbestos floor tile to be removed shall be sprayed with amended water from the garden sprayer before beginning removal.

7.1.4.11 Remove floor tile by wedging blade of scraper into seam between tiles. Remove entire tile in one piece if possible by sliding blade under and twisting to release bond. Spray amended water under the tile as the work progresses. Keep tile pieces continuously wet during removal. Worker No. 2 shall hold the hose from the HEPA vacuum close to the removal location to catch any fibers being generated. Use mallet on scraper handle if required to break tile loose from floor. Place tile or tile pieces in a disposal bag.

7.0 MISCELLANEOUS MATERIALS (cont.)

7.1.4.12 Scrape mastic from floor while keeping mastic wet. A mastic removal solvent in small quantities may be used if mastic is difficult to remove. Prevent mastic solvent from getting on or under tiles to remain. Use disposable cloths to mop up solvent at edges of tile removal area. Remove mastic from scraper using disposable cloths and place cloths into disposal bag.

7.1.4.13 After completing the tile removal, polyethylene, tools, and equipment are to be HEPA vacuumed and then wiped with wet toweling and moved off the poly sheet to Worker No. 2. The toweling is to be placed in an ACM disposal bag.

7.1.4.14 Install new non-ACM tile using non-ACM mastic.

7.1.4.15 Stop air sampling work in accordance with Section 12.2.

7.1.4.16 Remove suits and place into disposal bags in accordance with Section 12.3.

7.1.4.17 If plastic sheeting was used to drape immovable object, remove by folding the exposed surface to the inside. Place in an ACM disposal bag.

7.1.4.18 Package waste for disposal in accordance with Section 11.7.

7.1.4.19 Remove and clean respirators in accordance with Section 12.4.

7.1.4.20 Transport labeled disposal bags to waste storage area. Return tools, equipment, and remaining materials to storage area. Remove lock outs and turn on HVAC system(s).

7.1.4.21 Complete "Evaluation of Work Affecting ACM" form and other recordkeeping requirements in accordance with Section 13.1.

7.2 M-2 Replacement of vinyl asbestos floor tiles in areas up to 160 sq. ft.

7.2.1 Summary:

This work practice covers the procedures for removing vinyl asbestos floor tiles in one area up to 160 square feet in size. Mastic removal is included in this work practice.

Examples of this procedure include replacing damaged or broken floor tiles, and removing floor tiles to install new equipment.

7.0 MISCELLANEOUS MATERIALS (cont.)

7.2.2 Requirements:

7.2.2.1 Workers - Two members of the Asbestos Team are required. Worker 1 performs the work; Worker 2 provides tools, equipment, and materials to Worker 1 and supervises work area safety.

An IH Technician is required to insure proper personnel air monitoring, and to perform area air monitoring as required.

7.2.2.2 Type of Work Area Protection - Mini-enclosure with negative air.

7.2.2:3 Tools and Equipment

Razor knife
Extension cords and GFCI adapters
Bucket with water for wet wiping
Lock out tags
Scraper (2-3" wide stiff blade)
Rubber or wooden mallet

7.2.2.4 Abatement Equipment and materials

6 mil polyethylene - 1000 sq. ft.
Duct tape - 8 rolls
Disposal bags with labels - 10
Garden Sprayer with amended water
Garden Sprayer with lockdown encapsulant
HEPA vacuums and hoses - 2
Disposal coveralls - 6 sets
Disposal towels - 50
Asbestos barrier tape - 100 ft
Warning signs
Personal air monitoring pump and cassettes
High volume air monitoring pump and cassettes HEPA filtered fan unit - 500 CFM

Replacement non-ACM floor tile and non-ACM mastic

Adhesive trowel and clean up supplies

7.2.3 Planning/Responsibilities

7.2.3.1 The Supervisor-in-charge of the Asbestos Team shall initiate a FEMP Work Permit when any activity involves work with asbestos, in accordance with Section 8.1.

7.2.3.2 The Supervisor shall schedule a time when the area is not in use or shall develop a plan to isolate the work area from occupied spaces, in accordance with Section 8.3.

7.0 **MISCELLANEOUS MATERIALS** (cont.)

7.2.3.3 The Supervisor shall assign workers with the proper training for the planned work, in accordance with Section 8.5.

7.2.3.4 Appropriate respirators shall be obtained in accordance with Section 9.2.

7.2.4 Procedure

7.2.4.1 Move all tools, equipment and materials to work area and secure area by locking doors or installing barrier tape to denote work area. Post warning signs. See Section 10.1.

7.2.4.2 Shut off and lock out HVAC system(s) serving work area in accordance with Section 10.2.

7.2.4.3 Put on respirators and perform fit checks in accordance with Section 9.3.

7.2.4.4 Put on protective clothing in accordance with Section 10.3.

7.2.4.5 Begin personal and area air monitoring in accordance with Section 10.4.

7.2.4.6 Preclean work area in accordance with Section 10.5.

7.2.4.7 Erect enclosure around work area or enclose room with 1 layer of polyethylene and set up negative air system using HEPA fan unit, in accordance with Section 10.6.2.

7.2.4.8 Place one layer of 6 mil polyethylene sheet over all floor files to remain inside the enclosure. Extend polyethylene sheet in all directions to walls of enclosure. Duct tape the sheet to the enclosure walls. Any fixed items inside the work area shall be covered with 2 layers of polyethylene.

7.2.4.9 Place tools, equipment and materials needed into enclosure.

7.2.4.10 The vinyl asbestos floor tile to be removed shall be sprayed with amended water from the garden sprayer before beginning removal.

7.0 **MISCELLANEOUS MATERIALS** (cont.)

7.2.4.11 Remove floor tile by wedging blade of scraper into seam between tiles. Remove entire tile in one piece if possible by sliding blade under and twisting to release bond. Spray amended water under the tile as the work progresses. Keep tile or pieces continuously wet during removal. Worker No. 2 shall hold the hose from the HEPA vacuum close to the removal location to catch any fibers being generated. Use mallet on scraper handle if required to break tile loose from floor. Place tile or tile pieces in a disposal bag.

7.2.4.12 Scrape mastic from floor while keeping mastic wet. A mastic removal solvent in small quantities may be used if mastic is difficult to remove. Prevent mastic solvent from getting on or under tiles to remain. Use disposable cloths to mop up solvent at edges of tile removal area. Remove mastic from scraper using disposable cloths and place cloths into disposal bag.

7.2.4.13 After completing the tile removal - enclosure, tools and equipment are to be HEPA vacuumed and then wiped with wet toweling and moved out of enclosure to Worker No. 2. The toweling is to be placed in an ACM disposal bag.

7.2.4.14 Encapsulate area where ACM was removed, in accordance with Section 11.5.

7.2.4.15 Install new non-ACM tile using non-ACM mastic.

7.2.4.16 If plastic sheeting was used to drape immovable objects, remove by folding the exposed surface to the inside. Place an ACM disposal bag.

7.2.4.17 Stop air sampling work in accordance with Section 12.2.

7.2.4.18 Remove suits and place into disposal bags in accordance with Section 12.3.

7.2.4.19 If plastic sheeting was used to drape immovable object, remove by folding the exposed surface to the inside. Place in an ACM disposal bag.

7.2.4.20 Package waste for disposal in accordance with Section 11.7.

7.2.4.21 Remove and clean respirators in accordance with Section 12.4.

554

7.0 **MISCELLANEOUS MATERIALS** (cont.)

7.2.4.22 Transport labeled disposal bags to waste storage area. Return tools, equipment, and remaining materials to storage area. Remove lock outs and turn on HVAC system(s).

7.2.4.23 Complete "Evaluation of Work Affecting ACM" form and other recordkeeping requirements in accordance with Section 13.1.

7.3 M-3 Penetrate through vinyl asbestos floor tiles.

7.3.1 Summary:

This work practice covers the procedures for making a penetration(s) through a vinyl asbestos floor tile.

An example of this procedure is making a penetration in a floor for a pipe/conduit.

7.3.2 Requirements:

7.3.2.1 Workers - Two members of the Asbestos Team are required. Worker 1 performs the work; Worker 2 provides tools, equipment, and materials to Worker 1 and supervises work area safety.

An IH Technician is required to insure proper personnel air monitoring, and to perform area air monitoring as required.

7.3.2.2 Type of Work Area Protection - Mini-enclosure with negative air.

7.3.2.3 Tools and Equipment

Razor knife
Extension cords and GFCI adapters
Bucket with water for wet wiping
Lock out tags
Drill or saw as needed for operation

7.0 MISCELLANEOUS MATERIALS (cont.)

7.3.2.4 Abatement Equipment and Materials:

6 mil polyethylene - 200 sq. ft.
Duct tape - 4 rolls
Disposal bags with labels - 8
Garden Sprayer with amended water
Garden Sprayer with lockdown encapsulant
HEPA vacuums and hoses - 2
Disposal coveralls - 6 sets
Disposal towels - 50
Asbestos barrier tape - 100 ft
Warning signs
Personal air monitoring pump and cassettes
High volume air monitoring pump and cassettes
Frame for mini-enclosure

7.3.3 Planning/Responsibilities

7.3.3.1 The Supervisor-in-charge of the Asbestos Team shall initiate a FEMP Work Permit when any activity involves work with asbestos, in accordance with Section 8.1.

7.3.3.2 The Supervisor shall schedule a time when the area is not in use or shall develop a plan to isolate the work area from occupied spaces, in accordance with Section 8.3.

7.3.3.3 The Supervisor shall assign workers with the proper training for the planned work, in accordance with Section 8.5.

7.3.3.4 Appropriate respirators shall be obtained in accordance with Section 9.2.

7.3.4 Procedure

7.3.4.1 Move all tools, equipment and materials to work area and secure area by locking doors or installing barrier tape to denote work area. Post warning signs. See Section 10.1.

7.3.4.2 Shut off and lock out HVAC system(s) serving work area in accordance with Section 10.2.

7.3.4.3 Put on respirators and perform fit checks in accordance with Section 9.3.

7.3.4.4 Put on protective clothing in accordance with Section 10.3.

7.3.4.5 Begin personal and area air monitoring in accordance with Section 10.4.

556

7.0 MISCELLANEOUS MATERIALS (cont.)

7.3.4.6 Preclean work area in accordance with Section 10.5.

7.3.4.7 Prepare area with drop cloth, erect mini-enclosure and set up negative air using HEPA vacuum in accordance with Section 10.6.

7.3.4.8 Place tools, equipment and materials needed into the enclosure. Include a second HEPA vacuum for vacuuming, drilling, or cutting operations.

7.3.4.9 Mist area of floor tile to be cut or drilled using garden sprayer containing amended water and allow water to soak in for several minutes. Using razor knife, drill or saw with HEPA vacuum nozzle within several inches of blade, perform cutting or drilling while keeping area wet. When chips or bulk materials are removed, place in disposal bags. Mist removal area during removal of bulk material and residual material.

7.3.4.10 Wet wipe enclosure and all equipment after all visible residual material is removed.

7.3.4.11 Encapsulate area where floor tile was cut in accordance with Section 11.5.

7.3.4.12 Package waste for disposal in accordance with Section 11.7.

7.3.4.13 Clean work area, tools, and equipment using wet wiping and HEPA vacuuming. Move clean tools and equipment outside of work area.

7.3.4.14 Stop air sampling work in accordance with Section 12.2.

7.3.4.15 Remove suits and place into disposal bags in accordance with Section 12.3.

7.3.4.16 Remove and clean respirators in accordance with Section 12.4.

7.3.4.17 Transport labeled disposal bags to waste storage area. Return tools, equipment, and remaining materials to storage area. Remove lock outs and turn on HVAC system(s).

7.3.4.18 Complete "Evaluation of Work Affecting ACM" form and other recordkeeping requirements in accordance with Section 13.1.

7.0 MISCELLANEOUS MATERIALS (cont.)

7.4 M-4 Install new wall over vinyl asbestos floor tile.

7.4.1 Summary:

This work practice covers the procedures for installing a wall over a vinyl asbestos tile floor that will remain in place.

Examples of this procedure include remodeling an office, and building a partition wall.

7.4.2 Requirements:

7.4.2.1 Workers - Two members of the Asbestos Team are required. Worker 1 performs the work; Worker 2 provides tools, equipment, and materials to Worker 1 and supervises work area safety.

An IH Technician is required to insure proper personnel air monitoring, and to perform area air monitoring as required.

7.4.2.2 Type of Work Area Protection - Drop cloth.

7.4.2.3 Tools and Equipment:

Razor knife
Extension cords and GFCI adapters
Bucket with water for wet wiping
Lock out tags
Powder actuated fasteners and fastening tool

7.4.2.4 Abatement Equipment and Materials:

6 mil polyethylene - 400 sq. ft.
Duct tape - 4 rolls
Disposal bags with labels - 8
Garden Sprayer with amended water
Garden Sprayer with lockdown encapsulant
HEPA vacuum and hose - 1
Disposal coveralls - 6 sets
Disposal towels - 50
Asbestos barrier tape - 100 ft
Warning signs
Personal air monitoring pump and cassettes
High volume air monitoring pump and cassettes

Stud tracks for new wall
Construction adhesive in caulking gun

7.0 **MISCELLANEOUS MATERIALS** (cont.)

7.4.3 Planning/Responsibilities

7.4.3.1 The Supervisor-in-charge of the Asbestos Team shall initiate a FEMP Work Permit when any activity involves work with asbestos, in accordance with Section 8.1.

7.4.3.2 The Supervisor shall schedule a time when the area is not in use or shall develop a plan to isolate the work area from occupied spaces, in accordance with Section 8.3.

7.4.3.3 The Supervisor shall assign workers with the proper training for the planned work, in accordance with Section 8.5.

7.4.3.4 Appropriate respirators shall be obtained in accordance with Section 9.2.

7.4.4 Procedure

7.4.4.1 Move all tools, equipment and materials to work area and secure area by locking doors or installing barrier tape to denote work area. Post warning signs. See Section 10.1.

7.4.4.2 Shut off and lock out HVAC system(s) serving work area in accordance with Section 10.2.

7.4.4.3 Put on respirators and perform fit checks in accordance with Section 9.3.

7.4.4.4 Put on protective clothing in accordance with Section 10.3.

7.4.4.5 Begin personal and area air monitoring in accordance with Section 10.4.

7.4.4.6 Preclean work area in accordance with Section 10.5.

7.4.4.7 Place one layer of 6 mil polyethylene sheet over all floor files within 3 feet of the new wall location. Duct tape the sheet to the floor.

7.4.4.8 Any fixed items within 3 feet of the work shall be covered with 1 layer of 6 mil polyethylene.

7.4.4.9 Place tools, equipment and materials needed onto the polyethylene sheet.

7.0 MISCELLANEOUS MATERIALS (cont.)

7.4.4.10 Coat the stud tracks with a continuous, full-width application of construction adhesive on the bottom surface. Fasten the stud track to the floor using powder actuated fasteners. HEPA vacuum the chips or dust generated during the fastening operation.

7.4.4.11 After completing the stud wall track installation, the polyethylene, tools and equipment are to be HEPA vacuumed and then wiped with wet toweling and moved off the poly sheet to Worker No. 2. The toweling is to be placed in an ACM disposal bag.

7.4.4.12 Stop air sampling work in accordance with Section 12.2.

7.4.4.13 Remove suits and place into disposal bags in accordance with Section 12.3.

7.4.4.14 If plastic sheeting was used to drape immovable objects, remove folding the exposed surface to the inside. Place in an ACM disposal bag.

7.4.4.15 Remove and clean respirators in accordance with Section 12.4.

7.4.4.16 Transport labeled disposal bags to waste storage area. Return tools, equipment, and remaining materials to storage area. Remove lock outs and turn on HVAC system(s).

7.4.4.17 Complete "Evaluation of Work Affecting ACM" form and other recordkeeping requirements in accordance with Section 13.1.

7.5 M-5 Strip floor wax from vinyl asbestos tile.

7.5.1 Summary:

This work practice covers the procedures for stripping floor wax from vinyl asbestos floor tiles.

Examples of this procedure include stripping wax from a floor, and any stripping required to adhere new tile or carpet over VAT.

560

7.0 **MISCELLANEOUS MATERIALS** (cont.)

7.5.2 Requirements:

7.5.2.1 Workers - Two members of the Asbestos Team are required. Worker 1 performs the work; Worker 2 provides tools, equipment, and materials to Worker 1 and supervises work area safety.

An IH Technician is required to insure proper personnel air monitoring, and to perform area air monitoring as required.

7.5.2.2 Type of Work Area Protection - Critical barriers on openings.

7.5.2.3 Tools and Equipment:

Floor stripping machine
Least abrasive pads
Extension cords and GFCI adapters
Bucket with water for wet wiping
Lock out tags

7.5.2.4 Abatement Equipment and Materials:

Disposal bags with labels - 8
Water
Garden Sprayer with amended water
Chemical stripper - recommended amounts for area to be stripped
Floor cleaner
Disposal towels - 50
Asbestos barrier tape - 100 ft
Warning signs
Personal air monitoring pump and cassettes
High volume air monitoring pump and cassettes
Liquid floor cleaner
Floor wax

7.5.3 Planning/Responsibilities

7.5.3.1 The Supervisor-in-charge of the Asbestos Team shall initiate a FEMP Work Permit when any activity involves work with asbestos, in accordance with Section 8.1.

7.5.3.2 The Supervisor shall schedule a time when the area is not in use or shall develop a plan to isolate the work area from occupied spaces, in accordance with Section 8.3.

7.5.3.3 The Supervisor shall assign workers with the proper training for the planned work, in accordance with Section 8.5.

7.0 **MISCELLANEOUS MATERIALS** (cont.)

7.5.3.4 Appropriate respirators shall be obtained in accordance with Section 9.2.

7.5.4 Procedure

7.5.4.1 Move all tools, equipment and materials to work area and secure area by locking doors or installing barrier tape to denote work area. Post warning signs. See Section 10.1.

7.5.4.2 Shut off and lock out HVAC system(s) serving work area in accordance with Section 10.2.

7.5.4.3 Put on respirators and perform fit checks in accordance with Section 9.3.

7.5.4.4 Put on protective clothing in accordance with Section 10.3.

7.5.4.5 Begin personal and area air monitoring in accordance with Section 10.4.

7.5.4.6 Preclean work area in accordance with Section 10.5.

7.5.4.7 Any fixed items within 3 feet of the work shall be covered with 1 layer of 6 mil polyethylene.

7.5.4.8 The vinyl asbestos floor tile to be stripped shall be sprayed with amended water from the garden sprayer before beginning stripping.

7.5.4.9 Mop chemical stripper onto floor and keep wet. After wax has softened, strip floor using low speed on stripper (175-170 rpm maximum). Keep floor wet during operation. Do not overstrip floors. Do not strip dry, unwaxed or unfinished floors.

7.5.4.10 Clean floor with liquid cleaner after stripping and before new wax is installed.

7.5.4.11 Remove stripping pads while wet and place in disposal bags. HEPA vacuum and wet wipe tools and equipment and move to outside of stripping area. The toweling is to be placed in an ACM disposal bag.

7.5.4.12 Install new wax according to manufacturers directions.

7.5.4.13 Stop air sampling work in accordance with Section 12.2.

7.5.4.14 Remove suits and place into disposal bags in accordance with Section 12.3.

7.0 **MISCELLANEOUS MATERIALS** (cont.)

7.5.4.15 If plastic sheeting was used to drape immovable objects, remove folding the exposed surface to the inside. Place in an ACM disposal bag.

7.5.4.16 Remove and clean respirators in accordance with Section 12.4.

7.5.4.17 Transport labeled disposal bags to waste storage area. Return tools, equipment, and remaining materials to storage area. Remove lock outs and turn on HVAC system(s).

7.5.4.18 Complete "Evaluation of Work Affecting ACM" form and other recordkeeping requirements in accordance with Section 13.1.

7.6 M-6 Replace ceiling panel area up to 160 sq. ft.

7.6.1 Summary:

This work practice covers the procedures for replacing an asbestos - containing ceiling panel area up to 160 sq. feet in size.

Examples of this procedure include replacing damaged or broken ceiling tiles, and obtaining access through ceiling panels.

7.6.2 Requirements:

7.6.2.1 Workers - Three members of the Asbestos Team are required. Workers 1 and 2 perform the work; Worker 3 provides tools, equipment, and materials to Workers 1 and 2, and supervises work area safety.

An IH Technician is required to insure proper personnel air monitoring, and to perform area air monitoring as required.

7.6.2.2 Type of Work Area Protection - Mini-enclosure with negative air.

7.6.2.3 Tools and Equipment:

Razor knife
Ladder or scaffold
Extension cords and GFCI adapters
Bucket with water for wet wiping
Lock out tags

7.0 MISCELLANEOUS MATERIALS (cont.)

7.6.2.4 Abatement Equipment and materials

6 mil polyethylene - 1000 sq. ft.
Duct tape - 8 rolls
Disposal bags with labels - 15
Garden Sprayer with amended water
Garden Sprayer with lockdown encapsulant
HEPA vacuums and hoses - 2
Disposal coveralls - 6 sets
Disposal towels - 50
Asbestos barrier tape - 200 ft
Warning signs
Personal air monitoring pump and cassettes
High volume air monitoring pump and cassettes Frame for enclosure
HEPA filtered fan unit
New ceiling panels and suspension system (if needed)

7.6.3 Planning/Responsibilities

7.6.3.1 The Supervisor-in-charge of the Asbestos Team shall initiate a FEMP Work Permit when any activity involves work with asbestos, in accordance with Section 8.1.

7.6.3.2 The Supervisor shall schedule a time when the area is not in use or shall develop a plan to isolate the work area from occupied spaces, in accordance with Section 8.3.

7.6.3.3 The Supervisor shall assign workers with the proper training for the planned work, in accordance with Section 8.5.

7.6.3.4 Appropriate respirators shall be obtained in accordance with Section 9.2.

7.6.4 Procedure

7.6.4.1 Move all tools, equipment and materials to work area and secure area by locking doors or installing barrier tape to denote work area. Post warning signs. See Section 10.1.

7.6.4.2 Shut off and lock out HVAC system(s) serving work area in accordance with Section 10.2.

7.6.4.3 Put on respirators and perform fit checks in accordance with Section 9.3.

7.6.4.4 Put on protective clothing in accordance with Section 10.3.

7.0 **MISCELLANEOUS MATERIALS** (cont.)

7.6.4.5 Begin personal and area air monitoring in accordance with Section 10.4.

7.6.4.6 Preclean work area in accordance with Section 10.5.

7.6.4.7 Install the framework to enclose the work area of the entire room where the panels will be removed. Install 2 layers of polyethylene on the floor of the work area. Place a ladder or scaffold inside the work area below the panel(s) to be removed. Install one layer of polyethylene sheeting over the walls of the work area or enclose the framing. Seal the polyethylene to the sheet poly on the floor and to the top of the work area walls. Do not tape the polyethylene to the ceiling panels. Provide a 3' wide curtain doorway made of three overlapping sheets of polyethylene on one side of the enclosure. A minimum 10'x10' polyethylene sheet shall be located outside this curtain doorway.

7.6.4.8 Attach a HEPA fan unit to the enclosure to provide negative pressure inside the enclosure. Exhaust the HEPA unit to the outside of the building. The curtain doorway flaps should be drawn slightly inward when the HEPA unit is operating.

7.6.4.9 Place the tools, equipment, and materials needed into the enclosure.

7.6.4.10 Mist the areas of the ceiling tiles to be removed using the garden sprayer containing amended water and allow the water to soak in for several minutes. Worker No. 1 carefully lifts the first tile up and over onto the top of another ACM ceiling tile. Worker No. 2 hands Worker No. 1 a HEPA vacuum hose. Worker No. 1 HEPA vacuums the top of all ceiling tiles to be removed. Worker No. 1 thoroughly mists the tops of all tiles to be removed. Worker No. 1 carefully hands down all tiles one at a time to Worker No. 2, who places them directly into ACM disposal bags. When one bag is full, Worker No. 2 complies with Section 11.7 for handling asbestos containing waste.

7.6.4.11 If the ceiling grid is to be removed, remove and dispose of all ACM.

7.6.4.12 Wet wipe the enclosure after all visible debris is removed.

7.6.4.13 If the ceiling grid is to remain, encapsulate all sides of the grid area where the tile was removed, in accordance with Section 11.5.

7.0 **MISCELLANEOUS MATERIALS** (cont.)

7.6.4.14 Package waste for disposal, wet wipe bags and move to outside of work area.

7.6.4.15 Clean work area, tools and equipment using wet wiping and HEPA vacuuming. Move clean tools and equipment outside of work area.

7.6.4.16 Stop air sampling work in accordance with Section 12.2.

7.6.4.17 Remove suits and place into disposal bags in accordance with Section 12.3.

7.6.4.18 If plastic sheeting was used to drape immovable objects, remove folding the exposed surface to the inside. Place in an ACM disposal bag.

7.6.4.19 Remove and clean respirators in accordance with Section 12.4.

7.6.4.20 Transport labeled disposal bags to waste storage area. Return tools, equipment, and remaining materials to storage area. Remove lock outs and turn on HVAC system(s).

7.6.4.21 Complete "Evaluation of Work Affecting ACM" form and other recordkeeping requirements in accordance with Section 13.1.

7.7 M-7 Cut or drill cement asbestos panels.

7.7.1 Summary:

This work practice covers the procedures cutting or drilling cement asbestos panels.

Examples of this procedure include installing a vent through a cement asbestos panel, and installing a new electrical panel on a cement asbestos panel.

7.7.2 Requirements:

7.7.2.1 Workers - Two members of the Asbestos Team are required. Worker 1 performs the work; Worker 2 provides tools, equipment, and materials to Worker 1 and supervises work area safety.

An IH Technician is required to insure proper personnel air monitoring, and to perform area air monitoring as required.

566

7.0 MISCELLANEOUS MATERIALS (cont.)

7.7.2.2 Type of Work Area Protection - Drop cloth and mini-enclosure with negative air.

7.7.2.3 Tools and Equipment:

Razor knife
Ladder or scaffold
Extension cords and GFCI adapters
Bucket with water for wet wiping
Lock out tags
Drill or saw as needed for operation

7.7.2.4 Abatement Equipment and Materials:

6 mil polyethylene - 200 sq. ft.
Duct tape - 4 rolls
Disposal bags with labels - 8
Garden sprayer with amended water
Garden Sprayer with lockdown encapsulant
HEPA vacuums and hoses - 2
Disposable coveralls - 6 sets
Disposal towels - 50
Asbestos barrier tape - 100 ft
Warning signs
Personal air monitoring pump and cassettes
High volume air monitoring pump and cassettes
Frame for mini-enclosure

7.7.3 Planning/Responsibilities

7.7.3.1 The Supervisor-in-charge of the Asbestos Team shall initiate a FEMP Work Permit when any activity involves work with asbestos, in accordance with Section 8.1.

7.7.3.2 The Supervisor shall schedule a time when the area is not in use or shall develop a plan to isolate the work area from occupied spaces, in accordance with Section 8.3.

7.7.3.3 The Supervisor shall assign workers with the proper training for the planned work, in accordance with Section 8.5.

7.7.3.4 Appropriate respirators shall be obtained in accordance with Section 9.2.

7.0 MISCELLANEOUS MATERIALS (cont.)

7.7.4 Procedure

7.7.4.1 Move all tools, equipment and materials to work area and secure area by locking doors or installing barrier tape to denote work area. Post warning signs. See Section 10.1.

7.7.4.2 Shut off and lock out HVAC system(s) serving work area in accordance with Section 10.2.

7.7.4.3 Put on respirators and perform fit checks in accordance with Section 9.3.

7.7.4.4 Put on protective clothing in accordance with Section 10.3.

7.7.4.5 Begin personal and area air monitoring in accordance with Section 10.4.

7.7.4.6 Preclean work area in accordance with Section 10.5.

7.7.4.7 Prepare area with drop cloth, erect mini-enclosure and set up negative air using HEPA vacuum in accordance with Section 10.6. Provide enclosure on back side of area to be cut or drilled to catch debris.

7.7.4.8 Place tools, equipment and materials needed into enclosure. Include a second HEPA vacuum for vacuuming, drilling, or cutting operations.

7.7.4.9 Mist area of cement asbestos panels to be cut or drilled using garden sprayer containing amended water and allow water to soak in for several minutes. Using drill or saw with HEPA vacuum nozzle within several inches of blade, perform cutting or drilling while keeping area wet. When chips or bulk materials are removed, place in disposal bags. Mist removal area during removal of bulk material and residual material.

7.7.4.10 Wet wipe enclosure after all visible debris is removed.

7.7.4.11 Encapsulate area where ACM was cut or drilled in accordance with Section 11.5.

7.7.4.12 Package waste for disposal, wet wipe bags and move to outside of work area in accordance with Section 11.7.

7.7.4.13 Clean work area, tools and equipment using wet wiping and HEPA vacuuming. Move clean tools and equipment outside of work area.

7.0 **MISCELLANEOUS MATERIALS** (cont.)

7.7.4.14 Stop air sampling work in accordance with Section 12.2.

7.7.4.15 Remove suits and place into disposal bags in accordance with Section 12.3.

7.7.4.16 Remove work area protection and place waste into disposal bags. HEPA vacuum along bottom of back side enclosure when removing enclosure.

7.7.4.17 Remove and clean respirators in accordance with Section 12.4.

7.7.4.18 Transport labeled disposal bags to waste storage area. Return tools, equipment, and remaining materials to storage area. Remove lock outs and turn on HVAC system(s).

7.7.4.19 Complete "Evaluation of Work Affecting ACM" form and other recordkeeping requirements in accordance with Section 13.1.

7.8 M-8 Remove cement asbestos panels.

7.8.1 Summary:

This work practice covers the procedures for removing cement asbestos siding from the exterior of a building.

An example of this procedure would be removing transite panels.

7.8.2 Requirements:

7.8.2.1 Workers - Three members of the Asbestos Team are required. Workers 1 and 2 perform the work; Worker 3 provides tools, equipment, and materials to Workers 1 and 2, and supervises work area safety.

An IH Technician is required to insure proper personnel air monitoring, and to perform area air monitoring as required.

7.8.2.2 Type of Work Area Protection - Drop cloths.

7.8.2.3 Tools and Equipment:

Razor knife
Ladder or scaffold
Extension cords and GFCI adapters
Bucket with water for wet wiping
Lock out tags
Pry bar and chisels
Claw hammer

7.0 MISCELLANEOUS MATERIALS (cont.)

7.8.2.4 Abatement Equipment and Materials:

6 mil polyethylene - 1000 sq. ft.
Duct tape - 16 rolls
Disposal bags with labels - 30
Garden sprayer with amended water
Garden Sprayer with lockdown encapsulant
HEPA vacuums and hoses - 2
Disposable coveralls - 20 sets
Disposal towels - 200
Asbestos barrier tape - 1000 ft
Warning signs
Personal air monitoring pump and cassettes
High volume air monitoring pump and cassettes

7.8.3 Planning/Responsibilities

7.8.3.1 The Supervisor-in-charge of the Asbestos Team shall initiate a FEMP Work Permit when any activity involves work with asbestos, in accordance with Section 8.1.

7.8.3.2 The Supervisor shall schedule a time when the area is not in use or shall develop a plan to isolate the work area from occupied spaces, in accordance with Section 8.3.

7.8.3.3 The Supervisor shall assign workers with the proper training for the planned work, in accordance with Section 8.5.

7.8.3.4 Appropriate respirators shall be obtained in accordance with Section 9.2.

7.8.4 Procedure

7.8.4.1 Move all tools, equipment and materials to work area and secure area by locking doors or installing barrier tape to denote work area. Post warning signs. See Section 10.1.

7.8.4.2 Shut off and lock out HVAC system(s) serving work area in accordance with Section 10.2.

7.8.4.3 Put on respirators and perform fit checks in accordance with Section 9.3.

7.8.4.4 Put on protective clothing in accordance with Section 10.3.

7.8.4.5 Begin personal and area air monitoring in accordance with Section 10.4.

7.0 **MISCELLANEOUS MATERIALS** (cont.)

7.8.4.6 Preclean work area in accordance with Section 10.5.

7.8.4.7 Prepare area of siding removal operations and waste packaging with drop cloth, in accordance with Section 10.6.1.

7.8.4.8 Place tools, equipment and materials needed onto drop cloth.

7.8.4.9 Mist area of cement asbestos panels to be removed using garden sprayer containing amended water and allow water to soak in for several minutes. Using pry bar, chisel, or claw hammer, with HEPA vacuum nozzle within several inches of lifting, perform prying and lifting while keeping area wet. Carefully remove nails then whole pieces of siding without breaking. Keep material wet during work. When chips or bulk materials are removed, place in disposal bags. Mist removal area during removal of bulk material and residual material.

7.8.4.10 Wet wipe drop cloths and all equipment, including ladders, after all visible debris is removed.

7.8.4.11 Encapsulate area where ACM was cut or drilled, in accordance with Section 11.5.

7.8.4.12 Package waste for disposal, wet wipe bags and move to outside of work area in accordance with Section 11.7.

7.8.4.13 Clean work area, tools and equipment using wet wiping and HEPA vacuuming. Move clean tools and equipment outside of work area.

7.8.4.14 Stop air sampling work in accordance with Section 12.2.

7.8.4.15 Remove suits and place into disposal bags in accordance with Section 12.3.

7.8.4.16 Remove work area protection and place waste into disposal bags. HEPA vacuum along bottom of back side enclosure when removing enclosure.

7.8.4.17 Remove and clean respirators in accordance with Section 12.4.

7.8.4.18 Transport labeled disposal bags to waste storage area. Return tools, equipment, and remaining materials to storage area. Remove lock outs and turn on HVAC system(s).

7.0 **MISCELLANEOUS MATERIALS** (cont.)

7.8.4.19 Complete "Evaluation of Work Affecting ACM" form and other recordkeeping requirements in accordance with Section 13.1.

7.9 M-9 Cut or drill asbestos-containing drywall.

7.9.1 Summary:

This work practice covers the procedures for cutting or drilling of asbestos-containing drywall. Joint compounds and tape are also included in this procedure.

Examples of this procedure are attaching to or penetrating drywall for conduit, HVAC ductwork or other various items; also, installing new electrical receptacles.

7.9.2 Requirements:

7.9.2.1 Workers - Two members of the Asbestos Team are required. Worker 1 performs the work; Worker 2 provides tools, equipment, and materials to Worker 1 and supervises work area safety.

An IH Technician is required to insure proper personnel air monitoring, and to perform area air monitoring as required.

7.9.2.2 Type of Work Area Protection - Drop cloth and mini-enclosure with negative air.

7.9.2.3 Tools and Equipment:

Razor knife
Ladder or scaffold
Extension cords and GFCI adapters
Bucket with water for wet wiping

Lock out tags
Drill or hole saw as needed for operation

7.0 MISCELLANEOUS MATERIALS (cont.)

7.9.2.4 Abatement Equipment and Materials:

6 mil polyethylene - 200 sq. ft.
Duct tape - 4 rolls
Disposal bags with labels - 8
Garden sprayer with amended water
Garden Sprayer with lockdown encapsulant
HEPA vacuums and hoses - 2
Disposable coveralls - 6 sets
Disposal towels - 50
Asbestos barrier tape - 100 ft
Warning signs
Personal air monitoring pump and cassettes

High volume air monitoring pump and cassettes
Frame for mini-enclosure

7.9.3 Planning/Responsibilities

7.9.3.1 The Supervisor-in-charge of the Asbestos Team shall initiate a FEMP Work Permit when any activity involves work with asbestos, in accordance with Section 8.1.

7.9.3.2 The Supervisor shall schedule a time when the area is not in use or shall develop a plan to isolate the work area from occupied spaces, in accordance with Section 8.3.

7.9.3.3 The Supervisor shall assign workers with the proper training for the planned work, in accordance with Section 8.5.

7.9.3.4 Appropriate respirators shall be obtained in accordance with Section 9.2.

7.9.4 Procedure

7.9.4.1 Move all tools, equipment and materials to work area and secure area by locking doors or installing barrier tape to denote work area. Post warning signs. See Section 10.1.

7.9.4.2 Shut off and lock out HVAC system(s) serving work area in accordance with Section 10.2.

7.9.4.3 Put on respirators and perform fit checks in accordance with Section 9.3.

7.9.4.4 Put on protective clothing in accordance with Section 10.3.

573

7.0 MISCELLANEOUS MATERIALS (cont.)

7.9.4.5 Begin personal and area air monitoring in accordance with Section 10.4.

7.9.4.6 Preclean work area in accordance with Section 10.5.

7.9.4.7 Prepare area with drop cloth, erect mini-enclosure and set up negative air using HEPA vacuum, in accordance with Section 10.6.

7.9.4.8 Place tools, equipment and materials needed into enclosure. Include a second HEPA vacuum for vacuuming, drilling, or cutting operations.

7.9.4.9 Mist area of gypsum drywall to be cut or drilled using garden sprayer containing amended water and allow water to soak in for several minutes. Using drill or saw with HEPA vacuum nozzle within several inches of blade, perform cutting or drilling while keeping area wet. When chips or bulk materials are removed, place in disposal bags. Mist removal area during removal of bulk material and residual material. HEPA vacuum any debris below cutting or drilling area on both sides of drywall (if accessible).

7.9.4.10 Wet wipe drop cloths and all equipment, including ladders, after all visible residual material is removed.

7.9.4.11 Encapsulate area where drywall was cut in accordance with Section 11.5.

7.9.4.12 Package waste for disposal, wet wipe bags and move to outside of work area in accordance with Section 11.7.

7.9.4.13 Clean work area, tools and equipment using wet wiping and HEPA vacuuming. Move clean tools and equipment outside of work area.

7.9.4.14 Stop air sampling work in accordance with Section 12.2.

7.9.4.15 Remove suits and place into disposal bags in accordance with Section 12.3.

7.9.4.16 Remove work area protection and place waste into disposal bags. HEPA vacuum along bottom of back side enclosure when removing enclosure.

7.9.4.17 Remove and clean respirators in accordance with Section 12.4.

7.0 MISCELLANEOUS MATERIALS (cont.)

7.9.4.18 Transport labeled disposal bags to waste storage area. Return tools, equipment, and remaining materials to storage area. Remove lock outs and turn on HVAC system(s).

7.9.4.19 Complete "Evaluation of Work Affecting ACM" form and other recordkeeping requirements in accordance with Section 13.1.

7.10 M-10 Remove HVAC filters in unit serving plenum space with exposed ACM.

7.10.1 Summary:

This work practice covers the procedures for removing contaminated HVAC filters in unit serving plenum space with exposed ACM.

An example of this procedure is replacing roll-type filters in an HVAC unit in a mechanical room.

7.10.2 Requirements:

7.10.2.1 Workers - Two members of the Asbestos Team are required. Worker 1 performs the work; Worker 2 provides tools, equipment, and materials to Worker 1 and supervises work area safety.

An IH Technician is required to insure proper personnel air monitoring, and to perform area air monitoring as required.

7.10.2.2 Type of Work Area Protection - Drop cloth and mini-enclosure with negative air.

7.10.2.3 Tools and Equipment:

Razor knife
Ladder or scaffold
Extension cords and GFCI adapters
Bucket with water for wet wiping
Lock out tags

7.0 MISCELLANEOUS MATERIALS (cont.)

7.10.2.4 Abatement Equipment and Materials:

6 mil polyethylene - 200 sq. ft.
Duct tape - 8 rolls
Disposal bags with labels - 15
Garden sprayer with amended water
Garden Sprayer with lockdown encapsulant
HEPA vacuums and hoses - 2
Disposable coveralls - 6 sets
Disposal towels - 50
Asbestos barrier tape - 100 ft
Warning signs
Personal air monitoring pump and cassettes
High volume air monitoring pump and cassettes
Frame for mini-enclosure
New filters

7.10.3 Planning/Responsibilities

7.10.3.1 The Supervisor-in-charge of the Asbestos Team shall initiate a FEMP Work Permit when any activity involves work with asbestos, in accordance with Section 8.1.

7.10.3.2 The Supervisor shall schedule a time when the area is not in use or shall develop a plan to isolate the work area from occupied spaces, in accordance with Section 8.3.

7.10.3.3 The Supervisor shall assign workers with the proper training for the planned work, in accordance with Section 8.5.

7.10.3.4 Appropriate respirators shall be obtained in accordance with Section 9.2.

7.10.4 Procedure

7.10.4.1 Move all tools, equipment and materials to work area and secure area by locking doors or installing barrier tape to denote work area. Post warning signs. See Section 10.1.

7.10.4.2 Shut off and lock out HVAC system(s) serving work area in accordance with Section 10.2.

7.10.4.3 Put on respirators and perform fit checks in accordance with Section 9.3.

7.10.4.4 Put on protective clothing in accordance with Section 10.3.

7.0 **MISCELLANEOUS MATERIALS** (cont.)

7.10.4.5 Begin personal and area air monitoring in accordance with Section 10.4.

7.10.4.6 Preclean work area in accordance with Section 10.5.

7.10.4.7 Prepare area with drop cloth, erect mini-enclosure and set up negative air using HEPA vacuum in accordance with Section 8.3.6.

7.10.4.8 Place tools, equipment and materials needed into enclosure. Include a second HEPA vacuum for vacuuming filters during removal process.

7.10.4.9 The area where the air filters will be replaced and the floor immediately below and extending five (5) feet in all directions (or to the limits of the enclosure) will be HEPA vacuumed and wet wiped with disposable towels. Thoroughly HEPA vacuum the front side of the filter section that can be accessed from within this unit. Vacuum the filters in parallel passes with each pass overlapping the previous one by half the width of the vacuum attachment. At the completion of one cleaning, vacuum the filter a second time at right angles to the first.

7.10.4.10 Mist filters to be removed using garden sprayer containing amended water and allow water to soak in for several minutes. With HEPA vacuum within several inches of removal area, carefully remove filters and pass to Worker No. 2. When filter is removed, use HEPA vacuum to remove remaining dust inside HVAC unit. Mist removal area during removal of bulk material and residual material.

7.10.4.11 Wet wipe inside and outside of HVAC unit after all visible residual material is removed.

7.10.4.12 Encapsulate area where filters were removed in accordance with Section 11.5.

7.10.4.13 Package filters for disposal, wet wipe bags and move to outside of work area, in accordance with Section 11.7.

7.10.4.14 Install new HVAC filters.

7.10.4.15 Clean work area, tools and equipment using wet wiping and HEPA vacuuming. Move clean tools and equipment outside of work area.

7.10.4.16 Stop air sampling work in accordance with Section 12.2.

7.0 MISCELLANEOUS MATERIALS (cont.)

7.10.4.17 Remove suits and place into disposal bags in accordance with Section 12.3.

7.10.4.18 Remove work area protection and place waste into disposal bags. HEPA vacuum along bottom of back side enclosure when removing enclosure.

7.10.4.19 Remove and clean respirators in accordance with Section 12.4.

7.10.4.20 Transport labeled disposal bags to waste storage area. Return tools, equipment, and remaining materials to storage area. Remove lock outs and turn on HVAC system(s).

7.10.4.21 Complete "Evaluation of Work Affecting ACM" form and other recordkeeping requirements in accordance with Section 13.1.

7.11 M-11 Clean up debris from a minor fiber release episode.

7.11.1 Summary:

This work practice covers the procedures for cleaning up debris from a fiber release episode of less than 3 square feet or 3 linear feet from any source, including thermal system insulation or miscellaneous materials.

An example of this procedure is impact damage resulting in dislodging of 2 linear feet of 10" pipe insulation.

7.11.2 Requirements:

7.11.2.1 Workers - Two members of the Asbestos Team are required. Worker 1 performs the work; Worker 2 provides tools, equipment, and materials to Worker 1 and supervises work area safety.

An IH Technician is required to insure proper personnel air monitoring, and to perform area air monitoring as required.

7.11.2.2 Type of Work Area Protection - Drop cloth.

7.11.2.3 Tools and Equipment:

Razor knife
Ladder or scaffold
Extension cords and GFCI adapters
Bucket with water for wet wiping
Lock out tags

7.0 **MISCELLANEOUS MATERIALS** (cont.)

7.11.2.4 Abatement Equipment and Materials:

6 mil polyethylene - 600 sq. ft.
Duct tape - 5 rolls
Disposal bags with labels - 5
Garden sprayer with amended water
Garden Sprayer with lockdown encapsulant
HEPA vacuums and hoses - 2
Disposable coveralls - 8 sets
Disposal towels - 20
Asbestos barrier tape - 200 ft
Warning signs
Personal air monitoring pump and cassettes

High volume air monitoring pump and cassettes

7.11.3 Planning/Responsibilities

7.11.3.1 The Supervisor-in-charge of the Asbestos Team shall initiate a FEMP Work Permit when any activity involves work with asbestos, in accordance with Section 8.1.

7.11.3.2 The Supervisor shall schedule a time when the area is not in use or shall develop a plan to isolate the work area from occupied spaces, in accordance with Section 8.3.

7.11.3.3 The Supervisor shall assign workers with the proper training for the planned work, in accordance with Section 8.5.

7.11.3.4 Appropriate respirators shall be obtained in accordance with Section 9.2.

7.11.4 Procedure

7.11.4.1 Move all tools, equipment and materials to work area and secure area by locking doors or installing barrier tape to denote work area. Post warning signs. See Section 10.1.

7.11.4.2 Shut off and lock out HVAC system(s) serving work area in accordance with Section 10.2.

7.11.4.3 Put on respirators and perform fit checks in accordance with Section 9.3.

7.11.4.4 Put on protective clothing in accordance with Section 10.3.

7.11.4.5 Begin personal and area air monitoring in accordance with Section 10.4.

7.0 MISCELLANEOUS MATERIALS (cont.)

7.11.4.6 Preclean work area in accordance with Section 10.5.

7.11.4.7 Prepare area with drop cloth in accordance with Section 10.6.1.

7.11.4.8 Thoroughly saturate debris using garden sprayer containing amended water and allow water to soak in for several minutes. Using a HEPA vacuum to control small particles, pick up debris, bag, and clean area while keeping material wet. Mist removal area during removal of debris and residual material.

7.11.4.9 Wet wipe enclosure, drop cloths and all equipment, including ladders, after all visible debris is removed.

7.11.4.10 Encapsulate area where filters were removed in accordance with Section 11.5.

7.11.4.11 Package waste for disposal, wet wipe bags and move to outside of work area, in accordance with Section 11.7.

7.11.4.12 Clean work area, tools and equipment using wet wiping and HEPA vacuuming. Move clean tools and equipment outside of work area.

7.11.4.13 Stop air sampling work in accordance with Section 12.2.

7.11.4.14 Remove suits and place into disposal bags in accordance with Section 12.3.

7.11.4.15 Remove work area protection and place waste into disposal bags. HEPA vacuum along bottom of back side enclosure when removing enclosure.

7.11.4.16 Remove and clean respirators in accordance with Section 12.4.

7.11.4.17 Transport labeled disposal bags to waste storage area. Return tools, equipment, and remaining materials to storage area. Remove lock outs and turn on HVAC system(s).

7.11.4.18 Complete "Evaluation of Work Affecting ACM" form and other recordkeeping requirements in accordance with Section 13.1.

7.0 MISCELLANEOUS MATERIALS (cont.)

7.12 M-12 Clean up debris from a major fiber release episode.

7.12.1 Summary:

This work practice covers the procedures for cleaning up debris from a fiber release episode of equal to or greater than 3 square feet or 3 linear feet from any source, including thermal system insulation or miscellaneous materials.

An example of this procedure includes impact damage resulting in dislodging of 5 linear feet of 10" pipe insulation.

7.12.2 Requirements:

7.12.2.1 Workers - Three members of the Asbestos Team are required. Workers 1 and 2 perform the work; Worker 3 provides tools, equipment, and materials to Workers 1 and 2, and supervises work area safety.

An IH Technician is required to insure proper personnel air monitoring, and to perform area air monitoring as required.

7.12.2.2 Type of Work Area Protection - Drop cloth and mini-enclosure with negative air.

7.12.2.3 Tools and Equipment:

Razor knife
Ladder or scaffold
Extension cords and GFCI adapters
Bucket with water for wet wiping
Lock out tags

7.12.2.4 Abatement Equipment and Materials:

6 mil polyethylene - 600 sq. ft.
Duct tape - 15 rolls
Disposal bags with labels - 20
Garden sprayer with amended water
Garden Sprayer with lockdown encapsulant
HEPA vacuums and hoses - 2
Disposable coveralls - 16 sets
Disposal towels - 100
Asbestos barrier tape - 200 ft
Warning signs
Personal air monitoring pump and cassettes
High volume air monitoring pump and cassettes
Frame for mini-enclosure, as required

561

7.0 MISCELLANEOUS MATERIALS (cont.)

7.12.3 Planning/Responsibilities

7.12.3.1 The Supervisor-in-charge of the Asbestos Team shall initiate a FEMP Work Permit when any activity involves work with asbestos, in accordance with Section 8.1.

7.12.3.2 The Supervisor shall schedule a time when the area is not in use or shall develop a plan to isolate the work area from occupied spaces, in accordance with Section 8.3.

7.12.3.3 The Supervisor shall assign workers with the proper training for the planned work, in accordance with Section 8.5.

7.12.3.4 Appropriate respirators shall be obtained in accordance with Section 9.2.

7.12.4 Procedure

7.12.4.1 Move all tools, equipment and materials to work area and secure area by locking doors or installing barrier tape to denote work area. Post warning signs. See Section 10.1.

7.12.4.2 Shut off and lock out HVAC system(s) serving work area in accordance with Section 10.2.

7.12.4.3 Put on respirators and perform fit checks in accordance with Section 9.3.

7.12.4.4 Put on protective clothing in accordance with Section 10.3.

7.12.4.5 Begin personal and area air monitoring in accordance with Section 10.4.

7.12.4.6 Preclean work area in accordance with Section 10.5.

7.12.4.7 Prepare area with drop cloth or erect mini-enclosure and set up negative air using HEPA vacuum, in accordance with Section 10.6.

7.12.4.8 Place tools, equipment and materials needed into enclosure. Include a second HEPA vacuum for vacuuming, drilling, or cutting operations.

7.12.4.9 Thoroughly saturate debris using garden sprayer containing amended water and allow water to soak in for several minutes. Using a HEPA vacuum to control small particles, pick up debris, bag, and clean area while keeping material wet. Mist removal area during removal of debris and residual material.

7.0 **MISCELLANEOUS MATERIALS** (cont.)

7.12.4.10 Wet wipe enclosure, drop cloths and all equipment, including ladders, after all visible debris is removed.

7.12.4.11 Encapsulate area where filters were removed in accordance with Section 11.5.

7.12.4.12 Package waste for disposal, wet wipe bags and move to outside of work area, in accordance with Section 11.7.

7.12.4.13 Clean work area, tools and equipment using wet wiping and HEPA vacuuming. Move clean tools and equipment outside of work area.

7.12.4.14 Stop air sampling work in accordance with Section 12.2.

7.12.4.15 Remove suits and place into disposal bags in accordance with Section 12.3.

7.12.4.16 Remove work area protection and place waste into disposal bags. HEPA vacuum along bottom of back side enclosure when removing enclosure.

7.12.4.17 Remove and clean respirators in accordance with Section 12.4.

7.12.4.18 Transport labeled disposal bags to waste storage area. Return tools, equipment, and remaining materials to storage area. Remove lock outs and turn on HVAC system(s).

7.12.4.19 Complete "Evaluation of Work Affecting ACM" form and other recordkeeping requirements in accordance with Section 13.1.

7.13 M-13 Change filter in HEPA vacuum or HEPA fan unit.

7.13.1 Summary:

This work practice covers the procedures for changing the filters for either a HEPA vacuum or a HEPA fan unit. The procedures are recommended to be performed inside a mini-enclosure.

Examples of this procedure are changing the filter in a HEPA vacuum, and changing the filter in HEPA fan unit (negative air machine).

7.0 **MISCELLANEOUS MATERIALS** (cont.)

7.13.2 Requirements:

7.13.2.1 Workers - Two members of the Asbestos Team are required. Worker 1 performs the work; Worker 2 provides tools, equipment, and materials to Worker 1 and supervises work area safety.

An IH Technician is required to insure proper personnel air monitoring, and to perform area air monitoring as required.

7.13.2.2 Type of Work Area Protection - Drop cloth and mini-enclosure with negative air.

7.13.2.3 Tools and Equipment:

Razor knife
Extension cords and GFCI adapters
Bucket with water for wet wiping
Lock out tags

7.13.2.4 Abatement Equipment and Materials:

6 mil polyethylene - 100 sq. ft.
Duct tape - 2 rolls
Disposal bags with labels - 4
Garden sprayer with amended water
Clean HEPA vacuums and hoses - 1
Disposable coveralls - 6 sets
Disposal towels - 50
Asbestos barrier tape - 50 ft
Warning signs
Personal air monitoring pump and cassettes
Unit with filter(s) to be replaced
Replacement filters

7.13.3 Planning/Responsibilities

7.13.3.1 The Supervisor-in-charge of the Asbestos Team shall initiate a FEMP Work Permit when any activity involves work with asbestos, in accordance with Section 8.1.

7.13.3.2 The Supervisor shall schedule a time when the area is not in use or shall develop a plan to isolate the work area from occupied spaces, in accordance with Section 8.3.

7.13.3.3 The Supervisor shall assign workers with the proper training for the planned work, in accordance with Section 8.5.

7.13.3.4 Appropriate respirators shall be obtained in accordance with Section 9.2.

7.0 MISCELLANEOUS MATERIALS (cont.)

7.13.4 Procedure

7.13.4.1 Move all tools, equipment and materials to work area and secure area by locking doors or installing barrier tape to denote work area. Post warning signs. See Section 10.1.

7.13.4.2 Shut off and lock out HVAC system(s) serving work area in accordance with Section 10.2.

7.13.4.3 Put on respirators and perform fit checks in accordance with Section 9.3.

7.13.4.4 Put on protective clothing in accordance with Section 10.3.

7.13.4.5 Begin personal and area air monitoring in accordance with Section 10.4.

7.13.4.6 Preclean work area in accordance with Section 10.5.

7.13.4.7 Prepare area with drop cloth extending 10 feet on all sides from filter to be changed, in accordance with Section 10.6.1.

7.13.4.8 Place tools, equipment and materials needed onto drop cloth.

7.13.4.9 Wet wipe fan or vacuum and open as required to expose filter(s). Mist filter(s) to be removed using garden sprayer containing amended water and allow water to soak in for several minutes. With HEPA vacuum nozzle several inches from used filter, carefully remove filters and pass to Worker No. 2 for disposal. With filter removed, use HEPA vacuum to remove remaining dust or debris inside accessible part of fan or vacuum.

7.13.4.10 Place filters into disposal bags.

7.13.4.11 Clean work area, tools, and equipment using wet wiping and HEPA vacuuming. Move clean tools and equipment outside of work area.

7.13.4.12 Stop air sampling work in accordance with Section 12.2.

7.13.4.13 Remove suits and place into disposal bags in accordance with Section 12.3.

7.0 MISCELLANEOUS MATERIALS (cont.)

7.13.4.14 Remove work area protection and place waste into disposal bags. HEPA vacuum along bottom of back side enclosure when removing enclosure.

7.13.4.15 Remove and clean respirators in accordance with Section 12.4.

7.13.4.16 Transport labeled disposal bags to waste storage area. Return tools, equipment, and remaining materials to storage area. Remove lock outs and turn on HVAC system(s).

7.13.4.17 Complete "Evaluation of Work Affecting ACM" form and other recordkeeping requirements in accordance with Section 13.1.

PART III - COMMON WORK PRACTICES

The following work practices in Part III are common to two or more of the specific work practices listed in Part II, and are referred to throughout Part II for reference purposes.

8.0 PRE-WORK ACTIVITIES

8.1 Asbestos Work Permit

8.1.1 Asbestos O&M work is controlled through the issuance of an Asbestos Work Permit (AWP).

8.1.2 The AWP can be originated by any individual who has responsibility for the asbestos O&M project. This individual is referred to as the Point of Contact (POC). The POC delivers the AWP to Industrial Hygiene (IH).

8.1.3 IH authorizes and identifies special precautions and work practices for each O&M project by completing and returning the AWP to the POC, after it has been approved by Environmental Compliance and Quality Assurance.

8.1.4 The procedure for controlling the issuance of the AWP is described in WEMCO Document OSH-P-41-006.

8.2 Notifications

The notification to any governmental agency for any asbestos O&M activity is the responsibility of Environmental Compliance and Quality Assurance (EC&QA). EC&QA receives their information of these proposed activities through the Asbestos Permit System described above, and ensures that proper notifications are made (see WEMCO Document #90-100).

8.0 PRE-WORK ACTIVITIES (cont.)

8.3 Work Scheduling

Asbestos O&M projects are scheduled by the Maintenance Scheduler. The Scheduler reviews the information on the Asbestos Work Permit, and then assigns a priority basis to each project based on such information as Industrial Hygiene's assessment of potential health hazards.

8.4 Communication

An important part of the Asbestos O&M Program is communicating relevant information to the individuals who have responsibilities within the Program. Specifically, this communication is implemented as follows:

8.4.1 Weekly status report - Asbestos Removal Notification Forms (ARNF's)

An ARNF report is generated and distributed weekly by Environmental Compliance and Quality Assurance (EC&QA). This report details all current projects, future projects, and projects that have been completed within a two week period prior to the report issue date.

EC&QA also generates a weekly individual status report for the person who is responsible for each asbestos project, detailing the current and proposed projects for these persons.

8.4.2 Asbestos Work Order Schedules

The Asbestos Work Order Schedules are generated and distributed on a weekly basis by the Maintenance Department. These reports list projects by their Priority and include Work Order Numbers, Descriptions, Scheduled Start Dates, and Scheduled Finish Dates.

8.4.3 Monthly Asbestos Control Meetings

Meetings are held on a monthly basis to discuss any items that relate to asbestos activities. The Asbestos Program Coordinator chairs these meetings, and encourages reports and discussion of any asbestos related problems.

8.0 **PRE-WORK ACTIVITIES** (cont.)

8.5 Training

8.5.1 Asbestos Team

The WEMCO employees who work on asbestos O&M projects are dedicated to these projects only, and are known as the "Asbestos Team".

These employees all receive the 4-day OSHA "Certified Person" training, and they are all certified as Asbestos Hazard Abatement Specialists in the State of Ohio. This training is considerably in excess of the minimum that is required, but it is felt to be necessary due to the importance of abating asbestos properly at the FEMP.

8.5.2 Air Monitors

The Industrial Hygiene Technicians who monitor asbestos O&M projects have all received the AHERA Building Inspector/Management Planner training, and are all certified as Asbestos Hazard Evaluation Specialists in the State of Ohio.

8.5.3 Summary

The training requirements for employees who may participate either directly or indirectly in an asbestos O&M project are outlined in Figure #1.

8.0 **PRE-WORK ACTIVITIES** (cont.)

FEMP ASBESTOS TRAINING REQUIREMENTS
Figure 1

9.0 RESPIRATORS

9.1 Qualifications

9.1.1 If the employee must wear a respirator as a part of his/her job, an annual physical medical examination must taken that includes those items defined in Appendix C of 29 CFR 1926.58.

9.1.2 Employees who must wear respirators are required to attend, on a yearly basis, the "Basic Principles of Respiratory Protection". In addition, the employees must pass an exam given at the end of the course.

9.1.3 If asbestos work will be involved, employees must fulfill the respirator fit test requirements given in Appendix C of 29 CFR 1926.58. These fit tests must be taken every 6 months.

9.2 Selection

9.2.1 The desired level of worker protection and the expected fiber levels during the work are critical in respirator selection.

9.2.2 Respirator requirements enforced by OSHA are contained in the OSHA Respirator Standard (29 CFR 1910.58). The OSHA standards are based upon a permissible exposure limit for workers of 0.2 fibers per cubic centimeter (f/cc) of air.

9.2.3 The selection of the proper respirator, and respirator maintenance and control are defined in the WEMCO Respiratory Protection Manual (RPM), FMPC-2152.

9.2.4 The respirator requirements for each asbestos job shall be determined by IH and shall be specified on the Asbestos Work Permit.

9.2.5 Only the same brand and size of respirator in which the employee was fitted shall be worn during asbestos work.

9.3 Respirator Fit Checks

Fit checks shall be performed by each worker each time a respirator is put on. Both positive and negative pressure fit checks shall be performed, in accordance with Section 4.4 of FMPC-2152, "Respiratory Protection Manual".

10.0 SET-UP

10.1 Securing/Denoting Work Area

10.1.1 The work area should be secured by locking doors, setting up temporary barriers or by setting up asbestos barrier tape around the perimeter of the work area. Do not block access to any emergency exits, and post warning signs at all possible entries to the work area. If barrier tape is used to denote a work area, it should be placed 5 to 10 feet (if space permits) outside of any polyethylene protection used in the work area.

10.1.2 The actual manner of segregating the work area shall be determined by Industrial Hygiene and will depend on the size of the project and exposure potential.

10.1.3 Nearby building occupants shall be notified before asbestos work begins, to prevent unauthorized access to the work area.

10.2 HVAC System Shut-off

10.2.1 Any air-handling systems (supply, return, and exhaust) in or serving the area where work is to be performed shall be shut off and locked out with electrical lock out tags, in accordance with FMPC-719. An electrical lock out form will be attached to locked equipment. The form will note when and why power is shut down and personnel performing the lockout.

10.2.2 After the ventilation system has been shut down, ventilation duct openings shall be sealed with plastic when there is the potential for asbestos contamination to enter the building ventilation system.

10.3 Protective Clothing

10.3.1 Protective clothing for workers shall consist of washable or disposable coveralls. Coveralls shall have hoods and booties attached. Do not modify coveralls, as they should provide complete coverage of the body with the exception of the hands and face. Workers are encouraged to wear protective gloves that are duct taped at the cuffs to the protective coveralls. Protective clothing shall be put on after the respirator is put on, and the hood of the coveralls shall cover the respirator straps.

10.3.2 The type of protective clothing worn shall be determined by WEMCO IH, and shall be determined on a case-by-case basis. Protective clothing may not be required when there is a minimum potential of clothing being contaminated by asbestos fibers (i.e., clean-up of a small amount of asbestos using a HEPA vacuum).

10.0 SET-UP (cont.)

10.4 Starting Air Monitoring

10.4.1 Air monitoring during O&M activities can consist of personal monitoring, area monitoring, and clearance monitoring. All air monitoring work shall be determined by the WEMCO IH Department, and the actual monitoring shall be conducted by or under the instruction of a trained IH Technician.

10.4.2 Personal monitoring shall be conducted for all activities. IH may allow that if repetitive operations are conducted, monitoring is not necessary unless procedures change. Personal monitoring shall consist of samples to obtain an 8 hour time weighted average and excursion limit monitoring samples. All analysis shall be by phase contrast microscopy (PCM), or transmission electron microscopy (TEM) if desired.

10.4.3 Personal monitoring consists of a worker wearing a personal air monitoring pump during the work with an air sampling cassette attached to the hose from the pump and located within two feet of the worker's breathing zone. Cassettes are usually taped to the worker's shoulder with the open end facing downwards on the worker's chest about 3 inches below the shoulder. These samples are defined by WEMCO IH as Breathing Zone (BZ) samples.

10.4.4 Area monitoring is usually performed using high volume air sampling pumps. Pumps may be placed inside and outside of the work area. Area monitoring is used to determine fiber concentrations inside and outside a work area during the work.

10.4.5 Clearance monitoring is performed after removal an final clean-up work is completed to verify that fiber concentrations in the work area meet a pre-established clearance level. If the clearance level is not met, the work area is re-cleaned until the clearance level is obtained.

10.5 Precleaning Work Areas and Wet Wiping

All work areas shall be precleaned prior to the start of work to remove any accumulated debris that could be disturbed during the work. Precleaning includes wet wiping non-porous surfaces, HEPA vacuuming surfaces that cannot be wet wiped, and cleaning any carpeted surfaces using steam cleaning equipment.

10.6 Preparing Work Area

10.6.1 Drop Cloth

10.6.1.1 A polyethylene drop cloth is used in the work area to facilitate final cleanup after the work is completed. Drop cloths are typically used for materials that are not friable and do not readily release fibers during maintenance work.

10.0 **SET-UP** (cont.)

10.6.1.2 Preparing a work area with a drop cloth requires that a single layer of 6 mil polyethylene be spread on the floor of the work area. The drop cloth should cover at least an area approximately 5 feet in all directions (if space permits) beyond the immediate work location. The drop cloth should be taped to the floor to secure it in place.

10.6.1.3 If work is to be performed at an elevated level, the drop cloth should be placed on the work platform or extended further beyond the present work location to catch any debris that may be generated.

10.6.2 Mini-enclosure

10.6.2.1 This type of protection is used for areas where friable materials will be worked on and the possibility of a major fiber release exists.

10.6.2.2 A mini-enclosure is a polyethylene enclosure around a work area used to contain any fibers or debris generated during the work. Mini-enclosures also serve to provide a visual barrier between the workers and any other personnel around the work area. A mini-enclosure is typically constructed using a wood, metal, or plastic framework that is covered by one layer of 6 mil polyethylene.

10.6.2.3 The dimensions of the enclosure shall be at least 3 feet wide by 3 feet deep by 7 feet high to provide working room. A larger enclosure is preferable where space permits. The enclosure must be large enough to contain all portions of the work area. However, if the enclosure is too large, the final cleaning process may require more time. A 3 foot by 3 foot change room for removing protective clothing shall be attached to a mini-enclosure where possible.

10.6.2.4 Varieties of commercially available types of mini-enclosures shall be considered, including prefabricated pop-up boxes and adjustable framework assemblies to permit different sizes of enclosures to be constructed.

10.0 SET-UP (cont.)

10.6.2.5 Mini-enclosures shall be set up with a negative air system to reduce the possibility of fibers being released from the enclosure and to filter the air inside the enclosure. A small hole shall be cut into the polyethylene in an area opposite to the entry of the mini-enclosure. The inlet hose to a variable speed air pump shall be placed through this hole, and shall be taped in place so that no air can move through the opening unless it moves through the inlet hose.

The speed of the air pump shall be set so that the walls of the mini-enclosure bow slightly inward; make-up air shall enter the mini-enclosure through the entryway.

10.6.2.6 Doorways into mini-enclosures shall be constructed of three overlapping sheets of polyethylene to create a flapped doorway arrangement.

11.0 ACM WORK

11.1 Normal Removal

11.1.1 All materials shall be adequately wetted before removal (i.e., thoroughly soaked before removal is attempted). The use of surfactants to improve wetting should be considered. The water or wetting agent shall be applied by a mist or gentle spray so as not to damage the asbestos and create airborne asbestos fibers.

11.1.2 After initial wetting, it may be necessary to continue the wetting process until the asbestos material is bagged and sealed. Friable asbestos-containing material is not allowed to be handled in a dry condition, unless it meets the provisions of Section 11.2.

11.2 Dry Removal

11.2.1 If, in removal operations, wetting would unavoidably damage equipment or cause an unreasonable safety hazard, dry removal may be allowed.

11.2.2 A written request is submitted to the EPA at least thirty (30) days prior to the starting date of such operation, asking for a determination whether wetting to comply with OAC 3745-20-04 would unavoidably damage equipment or present an unreasonable safety hazard. This request must include adequate information to facilitate this determination.

11.2.3 The OEPA issues a written determination that equipment damage or an unreasonable safety hazard would be unavoidable.

11.0 **ACM WORK** (cont.)

11.2.4 An alternative emission control is utilized in accordance with the terms of the determination. At a minimum, local exhaust ventilation and HEPA filtration must be used. In any event, the control system can exhibit no visible emissions.

11.3 Glovebag Removal

11.3.1 Erect and secure necessary lift equipment, scaffold or ladders to make piping accessible for inspection and pre-cleaning.

11.3.2 Clean off loose debris and dust from the surface of the pipe insulation with a HEPA vac or by wetting and placing larger pieces in a disposal bag.

11.3.3 To determine the proper position of the glove bag, inspect the area to be removed for the type of jacket, method of fastening and location of joints.

11.3.4 Place necessary tools, wet wrap, or spray bottle containing lock-down into the glove bag prior to installing it on the section of insulation to be removed.

11.3.5 To facilitate removal on long straight runs, several glove bags may be installed and connected together so that one HEPA vac may be used to evacuate the several bags and work can progress with less interruption.

11.3.6 With the glove bag properly installed and sealed with necessary adhesive and tape, install a respirator filter in one of the "equipment" openings. Negative pressure is then created in the bag with the HEPA vac, with the make up air entering through the respirator filter. Work may now start on removing the first section of insulation.

11.3.7 Insert the nozzle for the surfactant containing water through the "equipment" opening, seal with tape, and start spraying insulation.

11.3.8 Depending on the type of jacket, location and type of fasteners, use either the wire cutter, knife, or pliers to loosen the jacket at the joint if possible.

11.3.9 With the jacket open, continue to spray the surface of the insulation and jacket as it is exposed so that no dust is visible. If a metal jacket is present, bend over any sharp corners and carefully lower it into the bottom of the glove bag.

11.3.10 If the insulation is secured with wire loops or bands, carefully remove while spraying, until the section can be removed and lowered to the bottom of the glove bag for further spraying of the inside and edges.

11.0 **ACM WORK** (cont.)

11.3.11 Care must be exercised so as not to allow bands, wires or sharp edges of jacketing to puncture or rip the glove bag. If this happens and debris escapes, carefully clean up the debris with a HEPA vac and/or wet wipes and then seal the opening with tape.

11.3.12 With double layer insulation, procedures are the same, but care must be taken since longitudinal and circumferential joints will be staggered and the inner layer will be wired in place also.

11.3.13 When a fitting (valve, elbow, tee, flange, etc.) is involved, care must be taken to remove the cement layer and any reinforcement while spraying, since the cement is usually mostly asbestos and very friable. If sections of mitered pipe insulation were used on larger fittings, they too are very friable and prone to breakage and dusting when removed, so sufficient spray must be employed.

11.3.14 After all visible insulation has been removed, the surface must be thoroughly cleaned by scraping and/or brushing of the wetted surfaces so that all traces of ACM cement is removed from pipe threads, bolts, and crevices before final wet wipe cleaning and spraying of lock-down.

11.3.15 Before removal of the glove bag, the exposed ends of adjoining pipe or fitting insulation must be sealed with tape, wet wrap, or spray lock-down to seal against fiber release during removal of the glove bag and the installation of the next one.

11.3.16 Air is evacuated from the glove bag with the HEPA vac, all openings are sealed with tape, and the glove bag is removed.

11.3.17 The glove bag is placed in a 6-mil disposal bag; air is evacuated with the HEPA vac; the disposal bag is sealed; and the process is repeated by placing the disposal bag into a second disposal bag. Further packaging and labeling is done in accordance with Section 11.7.

11.4 Wet Wrap

11.4.1 If the area to be repaired is friable, or could become friable during the installation of the wet wrap, carefully spray the area with encapsulant so that asbestos fibers are not released during installation of the wet wrap.

11.4.2 Measure the area to be repaired and cut the necessary piece of dry wet wrap to fit.

11.0 **ACM WORK** (cont.)

11.4.3 Saturate the wet wrap with water in the preparation pan and carefully install on the area being repaired. Smooth out with hand pressure to remove any air pockets and to ensure adhesion to the area being repaired.

11.4.4 When the repair is complete, carefully clean up the area if necessary with the HEPA vac and/or wet wipes and then inspect the repaired area to be sure the patch is secure for drying.

11.4.5 Place all cleaning materials and debris in 6-mil disposal bags, in accordance with Section 11.7.

11.5 Encapsulation

11.5.1 An "encapsulant" is a material that is put on ACM to decrease the possibility that the asbestos fibers can become airborne. There are basically two types of encapsulants; penetrating, and bridging.

11.5.2 Penetrating encapsulants will tend to drive in to the ACM, and will penetrate to a depth depending on the amount and viscosity of encapsulant used, porosity of the ACM, temperature, etc. These encapsulants will tend to bind the asbestos fibers together, but will provide only a moderate amount of abrasion protection.

11.5.3 Bridging encapsulants will not penetrate far into the ACM, but will provide a tough coating that will provide a considerable amount of abrasion protection.

11.5.4 Encapsulants may be very viscous, and may be applied by using a saturated glove; or, they may be brushed or sprayed onto an ACM surface.

11.5.5 If the ACM is very friable, a spray encapsulant should be used initially to fuse the fibers in place, in order to prevent any airborne emissions when the encapsulant is applied.

11.6 Lock-down

11.6.1 When ACM is removed from a surface, and no visible traces of ACM remain, there may still be many thousands of asbestos fibers adhering to the surface that are invisible to the eye. For this reason, a form of encapsulant is sprayed on the surface to "lock down" any asbestos fibers that may remain.

11.6.2 If a clear lock-down is used, it may not be obvious if anything has been applied to the surface; for this reason, color should be added to the lock-down for positive identification.

11.0 ACM WORK (cont.)

11.6.3 Although lock-down is a form of encapsulant, it is not used to penetrate or bridge ACM, but simply to fuse any invisible asbestos fibers to a non-ACM surface.

11.6.4 If other materials will later be applied to the non-ACM surface, the lock-down must be compatible with these materials.

11.7 Packaging Waste

11.7.1 Keeping the Asbestos-Containing Waste Material (ACWM) adequately wet, carefully place in a 6 mil disposal bag.

11.7.2 Disposal bags should be collapsed by evacuating the air from the bag with a HEPA vacuum. Once collapsed, twist the bag to form a neck and wrap it tight with duct tape.

11.7.3 Fold the neck of the bag over to form a loop, then again wrap duct tape around neck and loop.

11.7.4 Place this bag into another disposal bag and repeat the above procedure.

11.7.5 Label disposal bag with identification labels, stating address where material originated from and date removed.

11.7.6 The properly bagged ACWM shall then be placed into durable, leak-tight disposal containers such as drums or boxes. These containers must be labeled using letters of sufficient size and contrast so as to be readily visible and legible with the following information:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

R. Q. Hazardous Substance
N.S. Asbestos
ORM-E 9188

11.7.7 Waste Management shall then dispose of the ACWM per WEMCO Document 00024, "Packaging of Low-Level Waste for Outside Shipment".

12.0 TEAR DOWN

12.1 Clearing Work Area

After completion of the project, the work area shall remain segregated and warning signs posted until approval to remove the signs and barriers is obtained from Industrial Hygiene indicating that final inspection of the work area is completed.

12.0 **TEAR DOWN** (cont.)

12.2 Stopping Air Monitoring

12.2.1 Workers who are being monitored for excursion samples should stop their air pumps after 30 minutes, and should detach and properly seal the cassettes.

12.2.2 Workers who are being monitored for the 8-hour TWA should keep sampling their air for as close to 8 hours as possible.

12.2.3 IH Technicians will stop all area air monitoring pumps.

12.3 Removing Protective Clothing

12.3.1 Any visible asbestos shall be vacuumed from disposable clothing using a HEPA vacuum cleaner before removal of disposable clothing.

12.3.2 Disposable protective clothing shall be removed upon leaving the asbestos work area and placed in 6-mil plastic bags, labeled as asbestos waste, sealed, and placed in proper sealed containers.

12.3.3 When removing disposable protective clothing, respiratory protection shall continue to be used until all disposable protective clothing has been sealed in plastic bags.

12.4 Removing & Cleaning Respirators

12.4.1 Respirators shall be carefully removed, and shall be immediately inspected for any defects or signs of contamination.

12.4.2 If any defect is noted, the respirator shall be turned in to IH (along with a description of the suspected defect), and a replacement respirator shall be obtained.

12.4.3 If any signs of contamination are noted, the contamination shall be wet wiped and placed in a disposal bag.

13.0 **CLOSEOUT**

13.1 Evaluation of Work Form

13.1.1 For internal assessment and control purposes, it is necessary that each asbestos O&M job be evaluated according to the "Evaluation of Work Affecting Asbestos-Containing Materials" Form - See Figure #2.

13.1.2 These evaluations will be performed by representatives of Asbestos Program Management, and the forms will be kept in the office of the Asbestos Program Coordinator.

13.0 **CLOSEOUT** (cont.)

13.2 Recordkeeping

13.2.1 All the asbestos management documents discussed in this O&M Program should be stored in permanent files. These documents include but are not limited to:

Inspection and Assessment Reports
Work Practices and Procedures
Respirator Use Procedures
Fiber Release Reports
Maintenance Work Orders
Evaluations of Work Affecting ACM
Reinspections of ACM

13.2.2 For employees in asbestos related work, the following records shall be kept:

13.2.2.1 Personal Air Sampling Records, for at least 30 years.

13.2.2.2 Objective data used to qualify for exemptions from OSHA's initial monitoring requirements for the duration of the exemption.

13.2.2.3 Medical Records for each employee subject to the medical surveillance program for the duration of their employment plus 30 years.

13.2.2.4 All Employee Training Records for one year beyond the last date of each worker's employment.

13.2.3 In addition, OSHA requires that employers provide to each employee their record of exposure and medical surveillance under the Records Access Standard (29 CFR 1910.20) and the Hazard Communication Standard (29 CFR 1910.1200).

13.0 **CLOSEOUT** (cont.)

EVALUATION OF WORK AFFECTING ASBESTOS-CONTAINING MATERIALS
Figure 2

14.0 APPLICABLE DOCUMENTS

14.1 Resources - The following documents were used to prepare this manual.

14.1.1 29 CFR 1910.1200	Hazard Communication Standard
14.1.2 29 CFR 1910.1001	Occupational Safety and Health Standards on Asbestos, Tremolite, Anthophyllite, and Actinolite for General Industry
14.1.3 29 CFR 1910.20	Occupational Safety and Health Standards - Records Access Standard
14.1.4 29 CFR 1910.58	Occupational Safety and Health Standards - Respirator Standard
14.1.5 29 CFR 1926.58	Safety and Health Regulations for Construction - Asbestos, Tremolite, Anthophyllite, and Actinolite
14.1.6 40 CFR 61-M	National Emission Standards for Hazardous Air Program (NESHAP)
14.1.7 Ohio Administrative Code - Chapter 3701-34	Ohio Department of Health - Asbestos Hazard Abatement Rules
14.1.8 Ohio Administrative Code - Chapter 3745-20	Asbestos Emission Control from Renovation, Demolition, and Dispersal Operations

14.2 Adjuncts - The following WEMCO documents are available for use as supplementary task procedures.

14.2.1 WEMCO 140-100	Asbestos Regulatory Compliance Guide
14.2.2 IH&S-IH-03	Control of Work Involving Asbestos
14.2.3 FMPC-2152	Respiratory Protection Manual
14.2.4 PL-FMPC-3002	Asbestos Management Plan
14.2.5 FMPC-719	Lock and Tag Procedure
14.2.6 00024	Packaging of Low-Level Waste for Outside Shipment
14.2.7 OSH-P-41-006	Issuing Permits for Asbestos Work

CONTROL NO. 3288

Westinghouse Materials Company of Ohio — FMPC

SITE POLICY AND PROCEDURE

NUMBER:	REVISION:	ISSUE DATE:
FMPC-516	2	04-23-91

TITLE: CONTROL OF PERMITS FOR ACCOMPLISHING HAZARDOUS WORK

APPROVED BY: W. H. Britton, President

1.0 POLICY

Westinghouse Materials Company of Ohio (WMCO) shall establish positive means for controlling work tasks that involve hazardous, or potentially hazardous substances, equipment, operations or activities to maintain employee health and safety and assure environmental compliance.

2.0 SCOPE

This procedure describes the responsibilities and requirements for control of work tasks by WMCO employees, subcontractor personnel, and/or others involved with any of the following activities: working with asbestos; working on a chemically hazardous system; open flame and/or welding activities; working with radioactive material; and entering or working in a confined space.

3.0 DEFINITIONS

3.1 FMPC Work Permit (Form) - A pre-numbered document used to identify job requirements and record management approvals and employee awareness is required before a work task which involves any of the following activities may begin; working on a chemically hazardous system; open flame and/or welding activities; or entering and/or working in a confined space (See Attachment A). When working with asbestos, an Asbestos Work Permit (See Attachment B) shall be attached to the Work Permit Form.

3.2 Lock and Tag - Personal protection by isolation is indicated by the placement of a lock and/or tag on an energy-isolating device ("i.e.", valves, dampers, flanges, breakers, disconnects) to indicate the device shall not be operated.

3.3 Working with Asbestos - Any work task involving the substance "asbestos" including but not limited to chrysotile, amosite, crocidolite, tremolite, anthophylite, actinolite, and asbestos in composite form such as transite and floor tile.

3.4 Working on a Chemically Hazardous System - Any work task that involves disassembly, equipment addition, part replacement, system modification, repair, and/or demolition of any equipment, pipeline, and/or system or facility that contains or did contain a chemically hazardous substance, i.e., a nonradioactive hazardous substance such as acids, caustics, corrosives, flammables, explosives, oxidizers or toxic materials.

603

3.0 **DEFINITIONS** (cont.)

3.5 Open Flame or Welding Activities - An activity located outside a designated welding area of a maintenance shop that uses an open flame for welding or causes an electric arc.

3.6 Confined Space - An enclosure or space which is not intended for continuous personnel occupancy, has limited openings for entry and exit, or has an unfavorable natural ventilation that contains or can produce dangerous air contamination. Confined spaces include but are not limited to storage tanks, process vessels, pits (four feet deep or more, that may contain potentially hazardous atmosphere, i .e., natural gas, sewer gas, etc.) or is a permanent structure (silos, vats, degreasers, reaction vessels, furnaces, boilers, ventilation and exhaust ducts, manholes, sewers, tunnels, underground utility vaults and pipelines). Entry into a confined space requires a Confined Space Entry Permit. Deviations from permit requirements shall be processed as stated in Section 5.2.

Confined spaces are categorized into three classes.

Class "A" Confined Space - A confined space that presents a situation that is immediately dangerous to life or health (IDLH), such as oxygen deficient, explosive, flammable atmospheres, and/or toxic substances at unacceptable concentrations.

Class "B" Confined Space - A confined space that has the potential for causing injury or illness if protective measures are not used, but is not an immediate danger to life and health.

Class "C" Confined Space - A confined space in which a potential hazard would not require any special modifications to the work routine.

3.7 Hazardous Atmosphere - An atmosphere which poses a threat to personnel. Examples of hazardous atmospheric conditions include oxygen deficient (less than 19.5% by volume) or oxygen enriched atmospheres (above 23.5% by volume), toxic (exceeds permissible exposure level), or explosive (measure greater than 10% of the lower explosive limit) conditions.

R 3.8 Asbestos Permit - A separate form which is appended to the Work
R Permit Form when a work task involves work with asbestos
R containing materials. The Asbestos Permit is issued by the
R Industrial Hygiene Technician. In construction activities this
R form is associated with an FMPC Work Permit.

3.9 Flame and Welding Permit - A section of the Work Permit Form used when a work task involves an open flame or welding activities outside a designated welding area of a maintenance shop.

3.10 Confined Space Entry Permit - A section of the Work Permit Form used when a work task involves the entry into a confined space.

3.0 **DEFINITIONS** (cont.)

R 3.11 Chemical/Hazardous Material Permit - A section of the Work Permit
R Form used when a work task involves or potentially involves
R working with chemically hazardous materials and/or chemically
R hazardous systems. This includes trenching, excavation and
R elevated work.

3.12 Standby Person - A person(s) who has received confined space aware- ness training from IRS&T (or IRS&T approved training program) and is assigned to remain immediately outside the entrance of the confined space to maintain direct communication with the personnel inside and contact rescue or other emergency assistance if necessary.

3.13 Fire Watch - The person assigned the responsibility to watch for fires in exposed areas during non-maintenance shop cutting and welding activities. This person sounds an alarm in the event of a fire then attempts to extinguish the fire when determined to be within the capacity of available fire-fighting equipment. This person shall be trained in the use of available fire-fighting equipment, have appropriate personal protective equipment and know the location of the nearest fire alarm box, telephone or radio.

3.14 Facility Owner - The designated management representative responsible for the area, equipment, or structure where the work task will be conducted. The designated alternate as identified by the Facility Owner will also be referred to as the Facility Owner in this procedure.

3.15 Supervisor-in-Charge - The supervisor responsible for the personnel who will perform work specified on the Work Permit Form. The Construction Subcontractor Supervisor who is responsible for contractor and subcontractor personnel performing the work shall also be referred to as the supervisor-in-charge. For this procedure, the area supervisor (who may also be the Facility Owner's Designated Alternate) is not to be considered as the supervisor-in charge.

3.16 Confined Space Entry - Any action resulting in any part of the employee's face breaking the plane of any opening of the confined space. This includes any ensuing work activities inside the confined work space.

3.0 **DEFINITIONS** (cont.)

R 3.17 Assistant Emergency Duty Officer (AEDO) - The AEDO is the on site management authority for all unplanned and unwanted events. This position is filled by a Utilities Engineer. The AEDO reports to and communicates with the Emergency Duty Officer (EDO). The AEDO has the authority to take all actions necessary to protect personnel and mitigate the event, including the authority to classify the event and to activate the FMPC offsite emergency warning system, the Emergency Response Team, the plant-wide alarm, the Emergency Operations Center, and the Joint Public Information Center, and to notify appropriate agencies. The AEDO is responsible for completion of an MER (Minor Event Report) or UOR (Unusual Occurance Report) since he is the one who classifies events and controls report numbers. The AEDO will notify other management as required by applicable emergency management procedures.

R 3.18 Project/Task Specific Health and Safety Plan - A supplemental document used to specifically address the Safety and Health hazards for a particular project or task being performed in conjunction with hazardous substances. This document identifies and contains the required permits necessary to ensure the safety of personnel performing the designated project or task.

R 3.19 OSHA 29 CFR 1910.120 - The federal rules and regulations that gives guidance on employee protection and safe operating requirements for Hazardous Waste Operations and Emergency Response.

R 3.20 Reportable Event - A non-routine event that, after evaluation must be reported to DOE because of applicable regulations or public/media concern.

R 3.21 Radiation Work Permit (RWP) - A separate form which is appended to the work permit form and issued for the performance of any task that involves exposure to radiation or radioactive material.

R 3.22 Operations Manager (or Task Leader) - The individual responsible for immediate notification of the AEDO on any unusual occurance (an unforeseen problem not specifically identified in the procedure or work plan) encountered during a task accomplishment.

4.0 **RESPONSIBILITIES**

4.1 Facility Owner - Identifies the general precautions to be taken and provides information pertaining to a chemical/hazardous material permit.

606

4.0 **RESPONSIBILITY** - (cont.)

R 4.2 Supervisor in Charge - Initiates the work permit and ensures that personnel are properly trained and adhere to all procedures and requirements that apply to the work they perform. Identifies the types of permits required and specifies the types of protection and protective equipment needed per IH&S guidance for a chemical/hazardous material permit. (Note: WMCO Project Manager/Project Engineer or Construction Coordinator may also initiate a work permit.) The Supervisor-in-Charge immediately reports any unwanted, unplanned event to the AEDO through the Communications Center Officer, or directly to the AEDO by radio or telephone. The Area Supervisor investigates and performs a preliminary evaluation of the magnitude and nature of the incident, isolates and secures affected areas, and initiates corrective or response actions if possible under safe conditions, until the AEDO responds to the scene.

R 4.3 Industrial, Radiological Safety and Training (IRS&T) Department - Develops, implements, and administers employee training programs to ensure full understanding and use of the Work Permit Program; updates the Work Permit Procedures; verifies the protective equipment needed; and documents the training was completed; and reviews or verifies the methods and equipment used to achieve an effective and comprehensive hazard assessment of work tasks performed; and monitor work being performed.

R 4.4 Industrial Hygiene and Safety (IH&S) Representative - Issues asbestos work permits, confined space entry permits and open flame and welding permits and signs Sections F and G of the work permit. Observes day-to-day operations for compliance with applicable procedures. An IH&S Representative may be any member of the Health & Safety Section. The IS&H representative may also provide information and support to the facility owner for completion of a chemical hazard material permit section.

607

4.0 **RESPONSIBILITY** - (cont.)

4.5 WMCO Employees - Shall adhere to these procedures and the specific requirements outlined on the Work Permit Form. Shall ensure that their badge number is entered in the employees assigned space before beginning the work. Shall review and adhere to this procedure permit and the specific requirements. The employee shall also be cognizant of the hazards associated with the job assignment being performed.

R Upon recognition of an emergency condition or discovery of a
R spill, all FMPC employees are instructed to notify personnel
R within the vicinity of the immediate danger area of the
R occurrence, to evacuate all personnel from the immediate area, and
R to activate the local building evacuation alarm. The employee is
R also responsible for notifying his immediate supervisor. In an
R emergency situation, the employees are instructed to report
R directly to the Communications Office on emergency phone 6511 or
R have the message relayed via the Security FM radio network. When
R reporting a spill, the employees are instructed to identify the
R material released, the location of the spill and its source, the
R extent of the spill, whether there are any injured personnel, and
R any additional information deemed necessary.

Note: Any personnel assigned to a job after the Work Permit Form has been issued shall enter his/her badge number in the "employee(s) assigned" space on the form. For any personnel that has been assigned to an asbestos job after the Asbestos Work Permit has been issued, the Supervisor-in-Charge shall contact the Industrial Hygiene Technician to verify the personnel is qualified to work with asbestos. The Supervisor-in-Charge shall assure that all copy holders of the form are notified of any changes.

4.6 Project Manager and/or Requisitioner - Responsible for advising construction management personnel of the requirements of this procedure through construction work order specifications and/or purchase orders, respectively.

5.0 **GENERAL**

5.1 The period of validity for the Work Permit Form must be shown in Section A of the Form. If the work must extend beyond the date and time shown in Section A, a new work permit shall be required. Extended time periods greater than 24 hours must be given careful consideration by the authorizing organization and may require periodic monitoring. Permit expiration time shown in Section F for Confined Space Entry, and in Section G for Open Flame/Welding, must be the same as shown in Section A. Confined Space Entry permits shall not be valid for longer than 12 hours. The Industrial Hygiene Technician has the authority to change the expiration date and times for these two permits after additional monitoring has been completed.

5.0 GENERAL (cont.)

5.2 In some situations (for example: Class "C" type confined space situation) a deviation will be allowed from specific requirements, "i.e.", initiation of a confined space entry permit, if necessary. Deviations shall be requested by the Facility Owner in writing to the Manager of Industrial Hygiene and Safety for the specific location and/or equipment to be considered. Approved deviations containing the specific requirements to be followed before and during employee entry shall be permanently posted at the entrance(s) to the Class "C" type confined space.

5.3 Supervisors shall maintain contact with their personnel who are working alone through the use of a portable radio or frequent visits to the job site. (Caution should be used when operating 2-way radios as their use is restricted in some plant areas).

5.4 General precautions identified in Sections C of the Work Permit Form must be completed prior to the responsible IH&S Representative being requested to approve the applicable permit.

5.5 If a radiation permit is required, it shall be obtained in accordance with Radiological Safety requirements identified in (See FMPC-2084, "Radiation Control Manual.")

R 5.6 If any unplanned or unwanted event occurs while performing work
R under the guidelines of this permit it must be reported
R immediately to the Supervisor-in-Charge and/or the AEDO.

6.0 PROCEDURE

6.1 Preparation of the FMPC Work Permit Form

R Note: The AEDO shall be notified in the event of any unplanned or
R unwanted condition with regard to the work being performed.

SUPERVISOR-IN-CHARGE

6.1.1 Initiates a Work Permit Form when a work task involves asbestos; working on a chemically hazardous system; open flame or welding; radiation hazard; and/or entering a confined space.

6.1.2 Completes section A - Background Information - on the FMPC Work Permit Form (See Attachment A).

Note: If employees change during the job, the new employee's name must be entered on the form, and be familiarized with all identified hazards and required personal protective equipment.

6.1.3 Identifies in Section B the types of permits required.

609

6.0 **PROCEDURE** (cont.)

FACILITY OWNER

6.1.4 Completes Section C - General Precautions (and Section E - Chemical/Hazardous Material Permit, if required) of the FMPC Work Permit Form and returns the form to the Supervisor-In-Charge.

Note: Nuclear safety checks should insure that enriched materials and radiation detection alarm system will not be impacted by the work task.

R 6.1.5 Work involving hazardous materials are applicable to OSHA
R Standard 29CFR 1910.120 will require a completed
R Project/Task Specific Health and Safety Plan with an all
R worker safety meeting briefing before work can begin. The
R purpose of this briefing is to ensure that all personnel
R understand the limiting conditions, the safety, health and
R environmental constraints and the incident identification
R and reporting requirements. The Project Engineer or Manager
R of the work area involved is responsible for this plan.

SUPERVISOR-IN-CHARGE

6.1.6 Contacts the appropriate IH&S Representative if an Asbestos Permit, Confined Space Entry Permit, and/or Open Flame/Welding Permit is required.

6.2 Preparation of the FMPC Work Permit Form For A Chemical/Hazardous Material Permit

SUPERVISOR-IN-CHARGE

6.2.1 Ensures the actions in Section 6.1, steps A-E of this procedure have been completed.

FACILITY OWNER

6.2.2 Identifies the type and name of material to be worked on and identifies the precautions taken and/or special precautions in Section E of the Work Permit Form. Enters his/her signature, badge number and date in the spaces provided.

SUPERVISOR-IN-CHARGE

6.2.3 Completes Section D-Personnel Protective Equipment based on the information in the General Precautions Section C and Section E of the Work Permit Form. (Contacts the Facility Owner/Production Supervisor to determine protective equipment requirements and then IH&S if clarification is necessary. Ensures the employee is informed, trained, and is qualified medically.)

608 610

6.0 **PROCEDURE** (cont.)

FACILITY OWNER

6.2.4 Completes and approves Section E of Work Permit Form. The work may proceed unless an Asbestos Permit, Confined Space Entry Permit, and/or an Open Flame/Welding Permit is required.

EMPLOYEE

R R 6.2.5 Be knowledgeable of the permit requirements and follow these requirements.

Note: The Construction Subcontractor Supervisor-In-Charge must consult the Construction Environment Safety and Health Work Survey (Form FMPC-REST-2717) when completing Section D - Personnel Protective Equipment.

6.3 Preparation of the FMPC Work Permit Form when Asbestos is Involved

Note: Asbestos cannot be identified by the human eye. All existing insulation shall be considered as containing asbestos unless identified by labeling or confirmed by analysis as non-asbestos. An Industrial Hygiene Technician shall be contacted for verification as non-asbestos and/or to obtain samples for analysis.

INDUSTRIAL HYGIENE TECHNICIAN

6.3.1 Authorizes an Asbestos Permit in accordance with applicable IRS&T Procedures.

SUPERVISOR-IN-CHARGE AND THE FACILITY OWNER

R R 6.3.2 Ensures the actions in Section 6.1 of this procedure have been completed.

Note: WMCO's notification of asbestos removal submitted by a point of contact (Planner Estimator or Supervisor) to Environmental Compliance must be received by DOE/ORO prior to removal to ensure that DOE meets the regulatory notification policy. Please defer to the new regulatory guide for notification Control of Asbestos removal RCG-AW10 in effect 9-3-90.

R R R R R 6.3.3 Identifies the personal equipment needed and signs section D of the Work Permit Form. (Contacts the Facility Owner/ Production Supervisor to determine protective requirements and then IH&S if clarification is necessary. Ensure the employee is informed, trained, and is qualified medically.)

611

6.0 PROCEDURE - (cont.)

INDUSTRIAL HYGIENE TECHNICIAN

6.3.4 When the work area is properly prepared issues and signs section C of the Asbestos Permit, (Attachment B), which shall be attached to and posted with the Work Permit Form.

SUPERVISOR-IN-CHARGE

R R 6.3.5 Signs section C of the Asbestos Permit which shall be attached to and posted with the work permit form.

6.4 Preparation of the FMPC Work Permit Form for a Confined Space Entry

SUPERVISOR-IN-CHARGE AND/OR THE FACILITY OWNER

R R 6.4.1 Ensures the actions in Section 6.1 of this procedure have been completed.

INDUSTRIAL HYGIENE TECHNICIAN

6.4.2 Assesses the confined space to be entered or worked in for potential hazards, and issues a Confined Space Entry Permit.

SUPERVISOR-IN-CHARGE

R R 6.4.3 Assists the IH&S Representatives and Facility Owner in completing Section F Confined Space Entry Permit.

SAFETY AND FIRE INSPECTOR AND INDUSTRIAL HYGIENE MANAGER

R R R 6.4.4 Authorizes a Class "A" Space Entry on the permit form due to potential serious conditions. (Both signatures are required.)

INDUSTRIAL HYGIENE TECHNICIAN

6.4.5 Authorizes Class "B" and "C" Confined Space Entry on the permit form.

6.5 Preparation of the FMPC Work Permit Form for an Open Flame/Welding Permit

SUPERVISOR-IN-CHARGE

R R 6.5.1 Ensures the actions in Section 6.1 of this procedure have been completed.

118

612

6.0 PROCEDURE - (cont.)

SUPERVISOR-IN-CHARGE

6.5.2 Contacts Safety and Fire Inspector for authorization of a Open Flame/Welding Permit.

SAFETY AND FIRE INSPECTOR

R R R 6.5.3 Inspects work area to assure necessary precautions have been taken to prevent fire. Authorizes the Open Flame or Welding in accordance with IRS&T Procedures.

6.5.4 Completes Section G of the Work Permit Form and enters his/her signature and badge number in the blanks designated for the Safety and Fire Inspector.

6.6 Activation of Rescue in a Confined Space Emergency

STANDBY PERSON

6.6.1 Notifies the communication center to dispatch the Emergency Response Team to the confined space.

6.6.2 Prohibits the entry of personnel into the confined space until further directed by the Emergency Chief. (Safety and Fire Inspector in charge.)

Note: The standby person may attempt rescue but only from outside the confined space.

AEDO

R 6.6.3 Manages the emergency event.

EMERGENCY CHIEF

R R 6.6.4 Directs activities of the emergency response team members in performing confined space rescue.

6.7 Posting and Recording of the FMPC Work Permit Forms

SUPERVISOR-IN-CHARGE

R R R 6.7.1 Signs Work Permit Form in Section H to signify acceptance of permit requirements, and posts the top copy (white) of the Work Permit Form at the work site.

6.7.2 Files the middle copy (blue) of the Work Permit Form in his/her records. Construction subcontractor personnel shall forward this copy to the WMCO Project Managers/Construction Coordination through Rust Engineering.

613

6.0 **PROCEDURE** - (cont.)

IH&S REPRESENTATIVE

6.7.3 Receives the yellow copy of Work Permit Form and attached asbestos work permit (if applicable) from the Supervisor-in-Charge for storage in the IH&S Group's permanent files.

SUPERVISOR-IN-CHARGE

R R 6.7.4 Removes the copy posted at the work site after the activity has been completed.

6.7.5 Files posted copy with blue copy or forwards to IH&S for verification of persons added as "Assigned Employees" per Section 4.6.

RADIATION SAFETY REPRESENTATIVE

R 6.7.6 File results on the Radiation check of confined spaces.

7.0 **APPLICABLE DOCUMENTS**

Industrial Hygiene & Safety Manual, Volume VII, IH&S Section
NFPA-National Fire Code, Standard 51-B "Cutting and Welding Processes"

FMPC-2054, "WMCO Site Policies and Procedures Manual", Volume 1

Industrial, Radiological Safety and Training Department Procedures

FMPC-2084, "Radiation Control Manual"

R FMPC-2182, "Emergency and Non-Routine Event Notification and Reporting"

8.0 **FORMS USED**

FMPC-ES&H-2939 - FMPC Work Permit Form

FMPC-ES&H-2940 - FMPC Asbestos Permit Form

9.0 **ATTACHMENTS**

Attachment A - FMPC Work Permit Form

Attachment B - FMPC Asbestos Permit Form

NUMBER:	REVISION:	ISSUE DATE:
FMPC-516	2	04-23-91

ATTACHMENT A

FMPC WORK PERMIT

This work permit is to be completed in accordance with FMPC-516.

Work Permit Number: ' — 00128

SECTION A - BACKGROUND INFORMATION *(To be completed by supervisor-in-charge)*

A. MAINTENANCE REQUEST NO.:	B. STARTING DATE & TIME: DATE: TIME:	C. EXPIRATION DATE & TIME DATE: TIME:
D. EXACT LOCATION:	E. EQUIPMENT:	

F. EXACT DESCRIPTION OF WORK TO BE CONDUCTED:

G. EMPLOYEE(S) ASSIGNED TO JOB:	BADGE NO.:	H. SUPERVISOR(S)/WMCO PROJECT ENGINEER:

SECTION B - TYPES OF PERMITS REQUIRED *(Checked by supervisor-in-charge)*

- ☐ ASBESTOS (Copy to be attached)
- ☐ RADIATION (Copy to be attached)
- ☐ CHEMICAL/HAZARDOUS MATERIAL
- ☐ CONFINED SPACE ENTRY
- ☐ OPEN FLAME/WELDING

SECTION C - GENERAL PRECAUTIONS

ITEM	YES	NO
1. Equipment cleaned and purged		
2. Nuclear Safety checks completed		
3. Lock & Tag Procedures required and followed		
4. Water in space has been collected and sampled		
5. Complete isolation of process lines to space has been completed		
6. All mechanical equipment to the space have been tagged, disconnected and/or blocked		
7. Electrical isolation complete for Lock & Tag Procedure		
8. All lines within space have been cleaned and purged		

Equipment is safe and ready for work (FACILITY OWNER'S SIGNATURE):

BADGE NO.:	DATE:	TIME:

SECTION D - PERSONAL PROTECTIVE EQUIPMENT REQUIRED

EQUIPMENT	YES	NO	SPECIFY
Face Shield			
Hearing Protection			
Eye Protection			
Acid Splash Suit			
Gloves			
Respiratory Protection *(consult with IH rep.)*			
Flame Retardent Clothing			
Disposable Hood, Coveralls and Shoe Covers worn over Company-Issued Clothing			

OTHER PROTECTION REQUIREMENTS:

SUPERVISOR-IN-CHARGE SIGNATURE:	BADGE NO.:	DATE:

SECTION E - CHEMICAL/HAZARDOUS MATERIAL PERMIT

TYPE OF MATERIAL:	NAME OF MATERIAL(S):

PRECAUTION TAKEN	YES	NO	DNA
1. Equipment and/or lines have been drained, flushed, purged, or neutralized			
2. Valves have been closed and locked (when feasible) and danger tagged			
3. Area isolated			
4. Safety shower is operable close to worksite			
5. Special clothing or other protective equipment required			

6. Special precautions:

FACILITY OWNER'S SIGNATURE:	BADGE NO.:	DATE:

NO.	DISTRIBUTION OF COPIES
1	POST AT JOB
2	SUPERVISOR-IN-CHARGE
3	IH&S *(RECORD COPY)*

FMPC-OS&H-2939 (5/12/88)

SECTION F - CONFINED SPACE ENTRY PERMIT *(Valid for no more than 12 hours)*

ATMOSPHERIC GAS TESTING RESULTS

OXYGEN CONTENT TIME	OXYGEN CONTENT READINGS	COMBUSTIBLE GAS TIME	COMBUSTIBLE GAS READINGS	TOXICITY TIME	TOXICITY READINGS

PRECAUTIONS TAKEN/NEEDED	YES	NO	DNA
1. Forced ventilation required			
2. Work requires staging or ladder			
3. Ground Fault Interupting protection required			
4. Adequate/proper illumination required			
5. Standby notified what action to take			
6. Safety line and harness required			
7. Nonsparking tools required			
8. Periodic gas testing required			

STANDBY-WORKER COMMUNICATION:

SPECIAL INSTRUCTIONS:

TYPE OF CONFINED SPACE: ☐ CLASS A ☐ CLASS B ☐ CLASS C

IH&S REPRESENTATIVE SIGNATURE:	BADGE NO.:
PERMIT ISSUED DATE:	TIME:

SECTION G - OPEN FLAME/WELDING PERMIT

PRECAUTIONS VERIFIED *(within 35 feet of work)*	YES	NO	DNA
1. Combustibles, magnesium and uranium have been removed, covered or shielded.			
2. Flammable liquids have been removed or isolated.			
3. Wall and floor openings are covered or protected.			
4. A flame retardent tarp has been suspended underneath work.			
5. A combustible gas check has been made.			
6. (work on walls/ceilings) All combustibles have been removed from opposite sides.			
7. A Fire Watch will be required and will remain posted during breaks and for 30 minutes after work is completed.			
8. Fire Watch is supplied with an extinguisher and know-how to activate the nearest fire alarm.			
9. Fire & Safety Inspector shall be present during the burning operation.			
10. Fire & Safety Inspector shall be present to monitor when the system is initially opened.			

COMBUSTIBLE GAS TESTING RESULTS:

EQUIPMENT/AREA CHECKED:

SPECIAL INSTRUCTIONS/PRECAUTIONS:

FIRE & SAFETY INSPECTOR SIGNATURE:	BADGE NO.:
PERMIT ISSUED DATE:	TIME:

SECTION H - WORK AUTHORIZATION REVIEWED AND FOUND ACCEPTABLE FOR USE

SUPERVISOR-IN-CHARGE SIGNATURE:	BADGE NO.:	DATE:

615

ATTACHMENT B

FMPC ASBESTOS WORK PERMIT

This permit is only valid when it is attached to the FMPC Work Permit Form which has Section A through D completed.

FMPC WORK PERMIT NO.:

Sections A & B contain descriptive information about the job and the qualifications of personnel. This information should be obtained from the supervisor-in-charge.

SECTION A - BACKGROUND AND REGULATORY INFORMATION
(To be supplied by supervisor-in-charge)

1. Exact location:
2. Exact description of work to be conducted:
3. Amount of asbestos to be removed (in linear or/square feet):
4. Regulatory approval received to begin work: ☐ YES ☐ DNA
   * If yes, regulatory approval for this job starts _____ (DATE) and stops _____ (DATE)
5. Supervisor(s):

SECTION B - EMPLOYEE INFORMATION

1. Employee(s) assigned to Job: NAME _____ BADGE NO. _____

	YES	NO
2. Employee(s) assigned to job have attended asbestos worker training in past twelve (12) months.		
3. Employee(s) assigned to job have attended glovebag training (applicable to glovebag removal only).		
4. Employee(s) assigned to job have been respirator fit-tested in last six(6) months.		
5. Employee(s) have been instructed by supervision of proper disposal methods.		

Section C contains items which shall be complied with on this job as indicated.

SECTION C - PRE-JOB REQUIREMENTS

SPECIFIED BY: _____ IH TECHNICIAN INITIALS _____ DATE _____ TIME

PREPARATION OF WORK SITE *(All Asbestos Jobs)*

	REQ'D	DNA
1. Work area barricaded and/or roped off		
2. Asbestos warning signs posted at work site		
3. All small items removed from designated work area		
4. Large equipment secured and covered with plastic		
5. Floor and ledges covered with plastic		
6. Area ventilation systems locked and tagged out		
7. Nearby occupants shall be notified of asbestos work to prevent unauthorized access to work area		
8. Contact IH Technician to inspect work area preparation before asbestos removal begins		

PREPARATION OF WORK SITE *(For Total Enclosure Jobs Only)*

	REQ'D	DNA
1. Floor and wall penetrations covered and sealed		
2. Negative air enclosure set-up around work area		
3. Negative air machine operating continuously		
4. General area air samples taken before work begins		

RESPIRATORY PROTECTION REQUIRED

☐ HALF-MASK ☐ FULL-FACE ☐ AIRLINE
☐ OTHER: _____

FILTER TYPE REQUIRED:
☐ HIGH EFFICIENCY DUST (PURPLE)
☐ OTHER: _____

WORK PRACTICES

	REQ'D	DNA
1. Personal air samples required *(samples collected for entire shift when possible)*		
2. No smoking, eating or drinking permitted in work area		
3. HEPA-Filtered vacuum required for clean-up		
4. HEPA vacuum required at point of cut/drilling		
5. Glove bag removal of pipe insulation required		
6. Transite panels shall be removed whole		
7. Asbestos material shall not be allowed to drop		
8. Disposable clothing shall be periodically inspected for rips and tears		
9. Amended water shall be used to wet down material		
10. Asbestos material thoroughly wet down before removal		
11. Removed material promptly bagged *(not allowed to dry out)*		
12. Surfaces shall be coated with a sealant to encapsulate any remaining fibers		
13. Work area cleaned after completion of work each day		
14. Tools and equipment shall be cleaned of all residual dust before removal from work area.		
15. Personnel to decontaminate at each departure from work area		
16. Bag contaminated clothing and waste promptly		
17. Bagged waste material shall be placed in white drums or wooden boxes and labeled as asbestos waste *(exterior of containers shall be clean and asbestos-free)*		
18. Shower before lunch and at end of shift		

APPROVAL TO BEGIN WORK

IH TECHNICIAN SIGNATURE:	DATE: / TIME:	* SUPERVISOR-IN-CHARGE SIGNATURE:	BADGE NUMBER: / DATE:

SECTION D - FINAL INSPECTION REQUIREMENTS

SPECIFIED BY: _____ IH TECHNICIAN INITIALS _____ DATE _____ TIME

	REQ'D	DNA
1. Visual inspection of work area for residual dust required after completion of job *(contact IH Technician)*		
2. General area air samples required after completion of job *(contact IH Technician)*		
3. Obtain IH Technician approval before removal of barriers & warning signs		

* *This Asbestos Work Permit expires when removal of barriers and warning signs is approved, preparation of additional work area is needed, employees assigned to the job are changed, or job conditions require changes in permit requirements. In no case shall the permit be valid beyond the date in Section A.4, above.*

NO.	DISTRIBUTION OF COPIES
1	POST AT JOB SITE
2	IH&S *(RECORD COPY)*
3	IH&S *(FIELD COPY)*

APPROVAL TO REMOVE BARRIERS AND WARNING SIGNS

IH TECHNICIAN SIGNATURE:	DATE:	TIME:

FMPC-IRS&T-2940 (REV. 1/10/90)

CLB

FMPC-Q-2657-1 (REV 1 29/91)

616

CONTROL COPY

3288

Control Number 411

Westinghouse Materials Company of Ohio	Page 1 of 16	Revision: 2
Safety Procedures	Title: Issuing Permits for Asbestos Work	SP-P-41-006
		Department: IRS&T Section: IH
Authorization:		Supersedes: None Revision Date: 5/30/91

1.0 PURPOSE

To assign responsibilities and establish the procedure to be used to ensure that exposures of employees to asbestos are within applicable limits and are controlled to levels which are As Low As Reasonably Achievable (ALARA).

2.0 SCOPE

This procedure provides instruction by which Industrial Hygiene personnel issue asbestos work permits, identify acceptable work practices and housekeeping practices to be followed to control worker exposure to and general release of airborne asbestos dust. R

3.0 DEFINITIONS

3.1 Asbestos - a fibrous material suitable for use as an incombustible, non-conducting, or chemically resistant material; includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, actinolite and asbestos in composite form such as transite, etc.

3.2 Asbestos Fiber - a particulate form of asbestos, 5 micrometers or more in length, with a length-to-diameter ratio of at least 3 to 1.

3.3 Asbestos Work Area - any area in which asbestos work is being done.

3.4 Asbestos Worker - personnel who may be exposed to airborne asbestos fibers as a part of their defined or assigned job.

3.5 Friable Asbestos Material - any material containing more than one percent asbestos by weight, that hand pressure can crumble, pulverize, or reduce to powder when dry.

3.0 DEFINITIONS (continued)

3.6 Glove Bag - a polyethylene plastic bag fitted with arms through which work can be performed. Allows workers to remain completely isolated from the asbestos material being removed.

3.7 HEPA Vacuum - a portable vacuum cleaner approved for use with asbestos equipped with a high efficiency particulate air (HEPA) filter designed to be 99.97% efficient at collecting 0.3 micron size particles.

3.8 Supervisor-In-Charge - the person(s) supervising the employee(s) performing the work required.

4.0 RESPONSIBILITIES

4.1 The Manager of Industrial Hygiene shall ensure that affected IH personnel are informed or trained to the extent necessary prior to initiation of work.

4.2 Industrial Hygiene Technician

4.2.1 Verifies through contact with Environmental Compliance and Quality Assurance (EC&QA) for each asbestos job that regulatory notification has been completed and that approval to begin work has been granted.

4.2.2 Authorizes and identifies special precautions and work practices for each asbestos job by completing and returning the Asbestos Work Permit to the supervisor-in-charge of asbestos workers (job supervisor) when approved by EC&QA.

4.2.3 Identifies the type of personal protective equipment required for each asbestos job. R

4.2.4 Ensures adequate monitoring by sampling job operations as required in this procedure.

4.2.5 Evaluates effectiveness of control measures and/or engineering controls in maintaining the required asbestos time-weighted-average (TWA).

4.2.6 Performs periodic inspections of asbestos work-sites to ensure compliance with work permit requirements and acceptable asbestos work practices.

619

5.0 GENERAL

5.1 Asbestos refers to a group of fibrous silicate minerals which are valued for their ability to withstand heat, insulate, and to reinforce other materials. When the FMPC was built, and in later years, asbestos was widely used in steam pipe insulation, asbestos-cement pipes, corrugated board (transite) and furnace insulation. Asbestos dust is generated when such equipment is repaired or replaced. Asbestos may also be present in floor tile/sheeting, gaskets, brake linings, and other materials.

5.2 Asbestos cannot be identified by the human eye. All existing insulation and other items listed in Section 5.1 shall be considered as containing asbestos unless identified by labeling or confirmed by analysis as non-asbestos. R

5.3 Airborne asbestos dust, consisting of microscopic fibers, constitutes a respiratory hazard, because asbestosis, mesothelioma, and cancer of the lung or other body organs may result from inhalation after a latency period. Therefore asbestos dust exposures and releases to the environment must be minimized even though extra time and effort are required.

5.4 This procedure describes a permit system for controlling work with asbestos and is designed to comply with DOE/OSHA asbestos work requirements (see Section 7.0), and to satisfy DOE/OSHA recordkeeping requirements.

5.5 Before any asbestos demolition or renovation may commence, certain regulatory requirements must be met. Verbal or written notification must be provided to EC&QA in advance of commencing work (notification is required 25 to 35 days prior to the start of planned demolition or renovation projects). R

NOTE: Any questions or concerns regarding EPA regulations and reporting requirements shall be addressed to EC&QA.

5.6 Training requirements, personal protective measures, acceptable work practices and housekeeping practices to be followed for handling asbestos-containing materials are described below.

5.6.1 Personnel working with asbestos shall have completed an asbestos worker training program, and shall be informed of the requirements for handling asbestos and of the hazards associated with asbestos exposure, prior to performing the work.

NOTE: Specific asbestos worker training requirements are addressed in Section 5.6 of the IH&S Topical Manual IH&S-IH-03, "Control of Work Involving Asbestos" contained in the IH&S Topical Manual. R

5.6.2 Personnel working in asbestos work areas shall use suitable respiratory protection.

5.0 GENERAL (continued)

5.6.2.1 Employees wearing negative pressure respirators for protection from exposure to airborne asbestos fibers shall be fit-tested at least every six (6) months to assure proper respirator fit.

5.6.2.2 Only the same brand and size of respirator in which the employee was fitted shall be worn during asbestos work.

5.6.2.3 The minimum acceptable respirator to be used during asbestos work is a half-mask respirator equipped with high-efficiency dust cartridges.

5.6.2.4 The respirator requirements for each asbestos job shall be determined by Industrial Hygiene and specified on the Asbestos Work Permit.

5.6.3 Personnel working in the asbestos work area shall wear disposable coveralls, hood, and shoe covers over company issued clothing.

NOTE: Protective clothing requirements shall be determined by Industrial Hygiene on a case-by-case basis. Protective clothing may not be required when there is a minimum potential of clothing being contaminated by asbestos fibers (i.e., clean-up of a small amount of asbestos using a HEPA vacuum).

5.6.3.1 Any visible asbestos shall be vacuumed from disposable clothing using a HEPA vacuum cleaner before removal of disposable clothing. As an alternative to HEPA vacuuming of contaminated disposable clothing, a light misting with water may be used to fix any contamination to the disposable clothing prior to removal. R

5.6.3.2 Disposable protective clothing shall be removed upon leaving the asbestos work area and double-wrapped in two 6-mil plastic bags, sealed, labeled as asbestos waste, and placed in white 55 gallon drums or boxes (white metal boxes preferred) marked as asbestos waste.

5.6.3.3 When removing disposable protective clothing, continue using respiratory protection until all disposable protective clothing has been sealed in plastic bags.

5.6.3.4 Personnel working inside the asbestos work area shall decontaminate as per steps 5.6.3.1 through 5.6.3.3 at each departure from the work area and shall shower before lunch and at the end of their shift.

5.6.4 Smoking, chewing tobacco/gum, eating or drinking shall not be permitted in the asbestos work area.

5.0 GENERAL (continued)

5.6.5 The asbestos work area shall be segregated such that other personnel in close proximity to the work area will not be subjected to asbestos. This can be accomplished by roping-off the area, using banner-guard tape, or by using polyethylene plastic sheeting to totally enclose the work area. The manner of segregating the work area shall be determined by Industrial Hygiene and will depend on the size of the job and exposure potential. When total enclosure of the work area is required, Industrial Hygiene shall determine the need for use of a HEPA filtered negative pressure ventilation system and for special clearance air sampling. R

NOTE: Nearby building occupants shall be notified before asbestos work begins to prevent unauthorized access to the work area.

5.6.6 All asbestos work areas shall be posted with asbestos warning signs.

NOTE: After completion of the job, the work area shall remain segregated and warning signs posted until approval to remove the signs and barriers is obtained from Industrial Hygiene indicating that final inspection and acceptance of the work area is completed.

5.6.7 Small or moveable items should be removed from the work area to avoid asbestos contamination. Polyethylene (poly) plastic shall be placed beneath the entire work area to catch any material that may fall from the work site. Any other equipment in the work area shall also be covered and sealed with poly to allow for easier clean-up. When the removal job is completed, the poly shall be rolled up to contain any asbestos scrap, and disposed of as asbestos waste. R

5.6.8 Any local ventilation systems which have the potential to spread asbestos fibers in the immediate work area or throughout the building shall be tagged and locked out of service (per PP-FMPC-719) until the asbestos removal and clean-up is completed. After the ventilation system has been shut down, ventilation duct openings shall be sealed with poly when there is the potential for asbestos contamination to enter the building ventilation system.

5.6.9 All materials shall be adequately wetted before removal (i.e., thoroughly soaked before removal is attempted). Use of surfactants to improve wetting should be considered. The water or wetting agent shall be applied by a mist or gentle spray so as to not damage the asbestos and create airborne asbestos fibers.

NOTE: After initial wetting, it may be necessary to continue the wetting process until the asbestos material is bagged and sealed. Friable asbestos scrap material is not allowed to be handled in a dry condition.

5.0 GENERAL (continued)

5.6.10 Items (pipes, ducts, structural members, etc.) that are covered with materials containing asbestos, shall not be dropped or thrown to the ground, but shall be carefully lowered to the ground.

5.6.11 When removing asbestos pipe insulation, plastic glove bags maintained under negative pressure should be used during the removal to minimize the escape of asbestos fibers. R

NOTE: Glove bags cannot be used on pipes at temperatures above 130 degrees Fahrenheit because the plastic will melt. Every effort should be made to cool the piping before removing the insulation. When this is not practical, wet methods shall be used to remove the insulation.

5.6.12 After completion of all stripping/removal work, surfaces from which asbestos containing materials have been removed shall be cleaned to remove all visible residue. After cleaning, an encapsulating sealant shall be used on the cleaned surface to lock down any remaining fibers. R

5.6.13 Any asbestos debris on the floor or other surfaces in the work area shall be immediately removed by a HEPA vacuum or wetted and removed to avoid suspension of asbestos fibers in the air.

NOTE: Sweeping, be it wet or dry, with or without sweeping compound, is prohibited. R

5.6.14 Specific precautions are necessary when working with transite due to its unique characteristics. Transite is not as difficult to work with because the asbestos fibers are bonded in concrete until damaged, cut, etc.

5.6.14.1 The work area shall be isolated and defined by posting warning signs and securing with warning tape. Polyethylene plastic barriers shall be erected when the job conditions dictate (i.e., other personnel working in close proximity to the asbestos work area). R

5.6.14.2 All personnel working inside the asbestos work area shall wear disposable coveralls, head and shoe covers, gloves and a minimum of a half-mask respirator equipped with high efficiency dust cartridges. Respiratory protection requirements shall be identified by Industrial Hygiene on the Asbestos Work Permit.

NOTE: Protective clothing requirements shall be determined by Industrial Hygiene on a case-by-case basis. Protective clothing may not be required when there is a minimum potential of clothing being contaminated by asbestos fibers.

5.0 GENERAL (continued)

5.6.14.3 Transite panels shall be removed whole whenever feasible, and handled with care to avoid breakage.

5.6.14.4 As bolts are removed from each panel, the bolts and surrounding transite shall be wet down to minimize any dust which may be generated.

5.6.14.5 Once removed, panels shall be wrapped with two layers of poly and then placed in labeled wood or metal boxes (supplied by Waste Operations) for storage and shipment. When panels are larger than the container they are placed in, they shall be loosely wrapped in two layers of poly, sealed, then broken in half and folded over. The broken panels shall then be wrapped with one more layer of poly and sealed before they are placed into containers. R

5.6.14.6 When cutting or drilling through transite, either amended water or a HEPA vacuum shall be used to control the release of any fibers being generated. When using a power tool to penetrate the transite, HEPA filtered ventilation is required on that power tool to control the release of fibers.

NOTE: When cutting or drilling through transite the opposite side of the transite wall shall be sealed with poly if there is a potential for generation of dust on the other side of the wall. R

5.6.14.7 All surfaces adjacent to or in contact with the transite shall be thoroughly cleaned by wiping down with a wet rag or by vacuuming with a HEPA vacuum.

NOTE: If the surfaces appear to be contaminated with asbestos, they shall be thoroughly cleaned before working with the transite.

5.6.15 All material removed during the asbestos work, shall be wetted, double bagged in plastic (at least 12 mil total plastic), sealed, placed in white 55 gallon drums or boxes (white metal boxes preferred), suitably labeled, and disposed of in accordance with site disposal requirements. R

5.6.16 Deviations in the requirements of Section 5.6 may be approved by the Industrial Hygiene Technician issuing the specific permit for the job with prior authorization.

5.0 GENERAL (continued)

5.7 Air Monitoring Requirements for Asbestos Work Activities

5.7.1 Determination of employee exposure to asbestos shall be made from breathing zone air samples collected during asbestos work activities as required by OSHA regulations. This air sampling shall be used to evaluate the effectiveness of control measures and/or engineering controls in maintaining exposure to airborne asbestos inside the segregated work area to levels below the OSHA excursion limit and OSHA permissible exposure limit (PEL).

5.7.1.1 During each asbestos work activity, a thirty minute breathing zone air sample shall be collected during any work conditions having the greatest potential for releasing asbestos fibers. Employee exposure to asbestos during this 30 minute sampling period shall not exceed the OSHA excursion limit of 1.0 fibers per cubic centimeter in air. When there is a potential for this limit to be exceeded, respiratory protection and protective clothing are required.

NOTE: When there are several periods during a job when there is a potential for release of asbestos fibers which may exceed the excursion limit, it may be necessary to collect several 30 minute excursion samples during the job.

R

5.7.1.2 When an asbestos work activity requires more than thirty (30) minutes to complete, personal air samples shall be collected on the asbestos workers for the entire period of time they are working with asbestos containing materials. This sampling shall be conducted for the entire work shift whenever possible. OSHA requires this full shift sampling to measure the 8-hour time-weighted-average (TWA) for exposure to asbestos. The result of this TWA sampling must not exceed the OSHA PEL of 0.2 fibers per cubic centimeter in air. When there is the potential for this limit to be exceeded, respiratory protection and protective clothing are required.

5.7.2 General area air samples shall be collected outside the segregated work area to evaluate the effectiveness of the control measures and/or the engineering controls in maintaining asbestos exposure levels outside the segregated work area to below the OSHA action level of 0.1 fibers per cubic centimeter in air.

5.7.2.1 General area air samples shall be collected outside the segregated work area during asbestos-related tasks in which total enclosure of the work area is required.

5.0 GENERAL (continued)

5.7.2.2 General area air samples shall be collected outside the segregated work area during asbestos-related tasks which are segregated by means other than total enclosure (e.g., rope or banner guard tape) where previous monitoring results for similar tasks exceeded the action level, or where results for similar tasks are not available. R

5.7.3 When total enclosure of the work area is required, general area air samples shall be collected inside the enclosure before the start of any asbestos work to measure background fiber levels.

5.7.4 After completion of a total enclosure asbestos removal job, general area clearance air samples shall be collected inside the enclosure after clean-up of the enclosure has been completed. Results of asbestos clearance sampling shall be less than the EPA recommended 0.01 fibers per cubic centimeter (considering background) in air.

NOTE: There may be occasions when clearance air sample results are greater than 0.01 fibers per cubic centimeter. When this is the case, air sample results shall not be greater than air samples collected outside the enclosure or greater than air sample results collected inside the enclosure prior to the asbestos removal.

5.8 Work practices and procedures shall be specified to keep exposures below current OSHA PELs and associated action limits, and to keep exposures ALARA. R

6.0 PROCEDURE

6.1 Completing the FMPC Work Permit and Asbestos Work Permit forms.

NOTE: This procedure shall be used in conjunction with Site Procedure FMPC-516 "Control of Permits for Accomplishing Hazardous Work".

6.1.1 The supervisor-in-charge of the asbestos workers will initiate an FMPC Work Permit (see Attachment A) when any work activity involves work with asbestos. R

6.1.2 The supervisor-in-charge will complete Section A-Background Information and Section B-Types of Permits Required on the FMPC Work Permit.

6.1.3 Upon completion of Sections A and B, the supervisor-in-charge will forward the FMPC Work Permit to the Facility Owner for their completion of Section C-General Precautions. The Facility Owner will complete Section C and sign in the space provided. The Facility Owner will return the form to the supervisor-in-charge.

6.0 PROCEDURE (continued)

6.1.4 The supervisor-in-charge and/or the Facility Owner will complete Section D-Personal Protective Equipment Required by marking with a check or an "X" on the line to specify the required personal protective equipment required for the job. If the supervisor(s) have any questions concerning personal protective equipment requirements, the Industrial Hygiene Technician should be consulted.

6.1.5 The supervisor-in-charge will then sign in the space provided in Section D of the FMPC Work Permit Form.

6.1.6 The supervisor-in-charge will contact the on-duty Industrial Hygiene Technician for the authorization of an FMPC Asbestos Work Permit (see Attachment B).

6.1.7 The Industrial Hygiene Technician shall verify that approval has been received from (EC&QA) Environmental Compliance and Quality Assurance for the asbestos removal to proceed.

6.1.7.1 EC&QA will provide a list to Industrial Hygiene of all asbestos removal projects for which they have received notification. The Technicians shall post this list and shall refer to this list to verify that proper notification has been received.

6.1.7.2 If an asbestos removal project does not appear on this list, or there are any questions about regulatory requirements, EC&QA shall be contacted to verify that proper regulatory notification has been received and approval has been received for the asbestos removal to proceed. This shall be documented by recording the name of the EC&QA representative contacted for approval and the time which approval was given on line 4 of Section A of the Asbestos Work Permit. R

6.1.7.3 The Asbestos Work Permit shall not be issued if there are any problems with regulatory notification. The IH Technician should inform the supervisor-in-charge to contact EC&QA to correct the problem.

6.1.7.4 When the supervisor-in-charge has informed the Technician that regulatory approval has been received, the Technician shall contact EC&QA to verify that approval has been received and document this by recording the name of the EC&QA representative contacted for approval and the time which approval was given on line 4 of Section A of the Asbestos Work Permit.

6.0 PROCEDURE (continued)

6.1.8 The Industrial Hygiene Technician shall review Sections A through D on the Work Permit Form and resolve any questions with the supervisor completing the form.

6.1.9 The Industrial Hygiene Technician shall complete Sections A and B of the Asbestos Work Permit using information provided by the supervisor-in-charge.

6.1.9.1 All employees assigned to work with asbestos must have attended asbestos worker classroom training within the past 12 months. R

6.1.9.2 All employees assigned to remove asbestos materials by glove bag must have attended hands-on glove bag training (no retraining is required).

6.1.9.3 All employees assigned to work with asbestos materials that are required to wear negative pressure respirators must have been respirator fit-tested in the past six (6) months. R

6.1.9.4 Before start of work, employees must be instructed in proper disposal methods for asbestos waste, and informed of final on-site destination of the containerized waste.

NOTE: All waste shall have sufficient absorbent material added to it in order to be able to absorb two (2) times the volume of liquid in the bag.

6.1.10 The Industrial Hygiene Technician shall determine from the supervisor-in-charge the nature and extent of work to be done in order to estimate the degree of dust generation. With this information, the Technician shall complete Section C of the Asbestos Permit. This will involve making recommendations for acceptable work site preparation and work practices to be followed during and after the asbestos work.

6.1.11 The Technician shall initial and date the permit at the top of Section C in the space labeled "Specified By" and shall inform the supervisor-in-charge that the Approval to Begin Work will be signed off only after the preparation of the asbestos work area has been completed and the Industrial Hygiene Technician has been re-contacted to inspect the preparations.

6.0 PROCEDURE (continued)

6.1.12 When the asbestos work area has been prepared and the Industrial Hygiene Technician is satisfied the area is ready for work to begin, the Technician shall approve the permit by signing Approval to Begin Work, and shall inform the supervisor-in-charge that a final inspection by Industrial Hygiene is required before the warning signs and barriers can be removed. R

6.1.13 The Technician shall specify the final inspection requirements for the job in Section D and initial in the space labeled "Specified By" at the top of Section D.

6.1.14 The supervisor-in-charge will review the permit and approve it by signing the Approval to Begin Work section. The Technician shall remove the field copy (yellow) of the Asbestos Permit (with both signatures) and maintain this copy in IH files until the job is completed. R

6.1.15 The FMPC Work Permit and the Asbestos Work Permit shall then be posted at the perimeter of the asbestos work site prior to the start of work. The permit shall be posted outside of the actual work area, so it can be viewed without entering the asbestos work area.

6.1.16 After completion of the job the supervisor-in-charge will contact the Industrial Hygiene Technician to perform a visual inspection of the work site to determine if the area has been cleaned up satisfactorily. R

6.2 Release of the Work Area After Completion of Asbestos Work

6.2.1 The Industrial Hygiene Technician shall conduct a visual inspection of the work area after the asbestos workers have completed clean-up and inform the supervisor-in-charge or his designee of any deficiencies that must be corrected. This process shall be repeated until acceptable clean-up conditions are obtained. The work area shall remain segregated and warning signs posted until the results of visual inspection are acceptable.

NOTE: Acceptable clean-up of the work area shall consist of there being no visible asbestos debris present, all exposed areas of asbestos insulation sealed, all tools and equipment cleaned of any asbestos debris, and asbestos waste double bagged (as a minimum), sealed and labeled as asbestos waste. R

6.2.2 General area clearance air samples shall be collected following successful visual inspection when total enclosure of the work area is required. Results of asbestos clearance sampling shall meet the requirements of step 5.7.4 of this procedure.

6.0 PROCEDURE (continued)

6.2.3 The Industrial Hygiene Technician shall notify the supervisor-in-charge or his designee when the final clean-up is acceptable (visual inspection and clearance sampling, if required), and that all remaining barriers and signs may be removed.

NOTE: After approval has been given for the barriers to be removed, the Industrial Hygiene Technician shall sign and date the Asbestos Work Permit in the Approval to Remove Barriers and Warning Signs space.

6.3 The IH copy of the Work Permit and the record copy of the Asbestos Work Permit shall be reviewed by an IH Technologist or Supervisor for accuracy and completeness, initialed to signify concurrence, and shall be maintained in IH files. | R

7.0 APPLICABLE DOCUMENTS

7.1 29 CFR 1910.1001, "Asbestos Guidelines for General Industry".

7.2 29 CFR 1926.58, "Asbestos Guidelines for the Construction Industry".

7.3 40 CFR 61, subpart M, "USEPA National Emission Standards for Hazardous Air Pollutants (NESHAPS) Asbestos Regulations".

7.4 Regulatory Compliance Guide SW:2, "Asbestos Removal Notification".

7.5 FMPC-516, "Control of Permits for Accomplishing Hazardous Work".

7.6 IH&S-IH-03, "Control of Work Involving Asbestos".

7.7 PP-FMPC-719, "Energy Control (Lockout and Tagout)". | R

8.0 FORMS USED

8.1 FMPC Work Permit Form, FMPC-OS&H-2939.

8.2 FMPC Asbestos Work Permit, FMPC-OS&H-2940. | R

9.0 ATTACHMENTS

9.1 Attachment A, FMPC Work Permit Form.

9.2 Attachment B, FMPC Asbestos Work Permit. | R

ATTACHMENT A

FMPC WORK PERMIT FORM

FMPC WORK PERMIT

This work permit is to be completed in accordance with FMPC-516.

Work Permit Number: 14[illegible]

SECTION A - BACKGROUND INFORMATION *(To be completed by supervisor-in-charge)*

A. MAINTENANCE REQUEST NO.	B. STARTING DATE & TIME DATE: TIME:	C. EXPIRATION DATE & TIME DATE: TIME:
D. EXACT LOCATION	E. EQUIPMENT	
F. EXACT DESCRIPTION OF WORK TO BE CONDUCTED		
G. EMPLOYEE(S) ASSIGNED TO JOB	BADGE NO	H. SUPERVISOR(S)/WMCO PROJECT ENGINEER

SECTION B - TYPES OF PERMITS REQUIRED *(Checked by supervisor-in-charge)*

- ☐ ASBESTOS (Copy to be attched)
- ☐ RADIATION (Copy to be attached)
- ☐ CHEMICAL/HAZARDOUS MATERIAL
- ☐ CONFINED SPACE ENTRY
- ☐ OPEN FLAME/WELDING

SECTION C - GENERAL PRECAUTIONS

ITEM	YES	NO
1. Equipment cleaned and purged		
2. Nuclear Safety checks completed		
3. Lock & Tag Procedures required and followed		
4. Water in space has been collected and sampled		
5. Complete isolation of process lines to space has been completed		
6. All mechanical equipment to the space have been tagged, disconnected and/or blocked		
7. Electrical isolation complete for Lock & Tag Procedure		
8. All lines within space have been cleaned and purged		

Equipment is safe and ready for work (FACILITY OWNER'S SIGNATURE):

BADGE NO.: | DATE: | TIME:

SECTION D - PERSONAL PROTECTIVE EQUIPMENT REQUIRED

EQUIPMENT	YES	NO	SPECIFY
Face Shield			
Hearing Protection			
Eye Protection			
Acid Splash Suit			
Gloves			
Respiratory Protection *(consult with IH rep.)*			
Flame Retardent Clothing			
Disposable Hood, Coveralls and Shoe Covers worn over Company-issued Clothing			

OTHER PROTECTION REQUIREMENTS:

SUPERVISOR-IN-CHARGE SIGNATURE: | BADGE NO.: | DATE:

SECTION E - CHEMICAL/HAZARDOUS MATERIAL PERMIT

TYPE OF MATERIAL: | NAME OF MATERIAL(S):

PRECAUTION TAKEN	YES	NO	DNA
1. Equipment and/or lines have been drained, flushed, purged, or neutralized			
2. Valves have been closed and locked (when feasible) and danger tagged			
3. Area isolated			
4. Safety shower is operable close to worksite			
5. Special clothing or other protective equipment required			
6. Special precautions:			

FACILITY OWNER'S SIGNATURE: | BADGE NO.: | DATE:

NO.	DISTRIBUTION OF COPIES
1	POST AT JOB
2	SUPERVISOR-IN-CHARGE
3	IH&S (RECORD COPY)

631

SECTION F - CONFINED SPACE ENTRY PERMIT *(Valid for no more than 12 hours)*

ATMOSPHERIC GAS TESTING RESULTS

OXYGEN CONTENT TIME	OXYGEN CONTENT READINGS	COMBUSTIBLE GAS TIME	COMBUSTIBLE GAS READINGS	TOXICITY TIME	TOXICITY READINGS

PRECAUTIONS TAKEN/NEEDED	YES	NO	DNA
1. Forced ventilation required			
2. Work requires staging or ladder			
3. Ground Fault Interupting protection required			
4. Adequate/proper illumination required			
5. Standby notified what action to take			
6. Safety line and harness required			
7. Nonsparking tools required			
8. Periodic gas testing required			

STANDBY-WORKER COMMUNICATION:

SPECIAL INSTRUCTIONS:

TYPE OF CONFINED SPACE: ☐ CLASS A ☐ CLASS B ☐ CLASS C

IH&S REPRESENTATIVE SIGNATURE: | BADGE NO.:

PERMIT ISSUED DATE: | TIME:

SECTION G - OPEN FLAME/WELDING PERMIT

PRECAUTIONS VERIFIED *(within 35 feet of work)*	YES	NO	DNA
1. Combustibles, magnesium and uranium have been removed, covered or shielded.			
2. Flammable liquids have been removed or isolated.			
3. Wall and floor openings are covered or protected.			
4. A flame retardent tarp has been suspended underneath work.			
5. A combustible gas check has been made.			
6. (work on walls/ceilings) All combustibles have been removed from opposite sides			
7. A Fire Watch will be required and will remain posted during breaks and for 30 minutes after work is completed			
8. Fire Watch is supplied with an extinguisher and know-how to activate the nearest fire alarm.			
9. Fire & Safety Inspector shall be present during the burning operation			
10. Fire & Safety Inspector shall be present to monitor when the system is initially opened.			

COMBUSTIBLE GAS TESTING RESULTS:

EQUIPMENT/AREA CHECKED:

SPECIAL INSTRUCTIONS/PRECAUTIONS:

FIRE & SAFETY INSPECTOR SIGNATURE: | BADGE NO.:

PERMIT ISSUED DATE: | TIME:

SECTION H - WORK AUTHORIZATION REVIEWED AND FOUND ACCEPTABLE FOR USE

SUPERVISOR-IN-CHARGE SIGNATURE: | BADGE NO.: | DATE:

ATTACHMENT B

FMPC ASBESTOS WORK PERMIT

This permit is only valid when it is attached to the FMPC Work Permit Form which has Section A through D completed.

FMPC WORK PERMIT NO.:

Sections A & B contain descriptive information about the job and the qualifications of personnel. This information should be obtained from the supervisor-in-charge.

SECTION A - BACKGROUND AND REGULATORY INFORMATION *(To be supplied by supervisor-in-charge)*

1. Exact location:
2. Exact description of work to be conducted:
3. Amount of asbestos to be removed (in linear or/square feet):
4. Regulatory approval received to begin work: ☐ YES ☐ DNA
   * If yes, regulatory approval for this job starts _____ (DATE) and stops _____ (DATE)
5. Supervisor(s):

SECTION B - EMPLOYEE INFORMATION

1. Employee(s) assigned to Job: NAME / BADGE NO.

	YES	NO
2. Employee(s) assigned to job have attended asbestos worker training in past twelve (12) months.		
3. Employee(s) assigned to job have attended glovebag training (applicable to glovebag removal only).		
4. Employee(s) assigned to job have been respirator fit-tested in last six(6) months.		
5. Employee(s) have been instructed by supervision of proper disposal methods		

Section C contains items which shall be complied with on this job as indicated.

SECTION C - PRE-JOB REQUIREMENTS SPECIFIED BY: _____ IH TECHNICIAN INITIALS _____ DATE _____ TIME

PREPARATION OF WORK SITE *(All Asbestos Jobs)*

	REQ'D	DNA
1. Work area barricaded and/or roped off		
2. Asbestos warning signs posted at work site		
3. All small items removed from designated work area		
4. Large equipment secured and covered with plastic		
5. Floor and ledges covered with plastic		
6. Area ventilation systems locked and tagged out		
7. Nearby occupants shall be notified of asbestos work to prevent unauthorized access to work area		
8. Contact IH Technician to inspect work area preparation before asbestos removal begins		

PREPARATION OF WORK SITE *(For Total Enclosure Jobs Only)*

	REQ'D	DNA
1. Floor and wall penetrations covered and sealed		
2. Negative air enclosure set-up around work area		
3. Negative air machine operating continuously		
4. General area air samples taken before work begins		

RESPIRATORY PROTECTION REQUIRED

☐ HALF-MASK ☐ FULL-FACE ☐ AIRLINE

☐ OTHER: _____

FILTER TYPE REQUIRED:

☐ HIGH EFFICIENCY DUST (PURPLE)

☐ OTHER: _____

WORK PRACTICES

	REQ'D	DNA
1. Personal air samples required *(samples collected for entire shift when possible)*		
2. No smoking, eating or drinking permitted in work area		
3. HEPA-Filtered vacuum required for clean-up		
4. HEPA vacuum required at point of cut/drilling		
5. Glove bag removal of pipe insulation required		
6. Transite panels shall be removed whole		
7. Asbestos material shall not be allowed to drop		
8. Disposable clothing shall be periodically inspected for rips and tears		
9. Amended water shall be used to wet down material		
10. Asbestos material thoroughly wet down before removal		
11. Removed material promptly bagged *(not allowed to dry out)*		
12. Surfaces shall be coated with a sealant to encapsulate any remaining fibers		
13. Work area cleaned after completion of work each day		
14. Tools and equipment shall be cleaned of all residual dust before removal from work area.		
15. Personnel to decontaminate at each departure from work area		
16. Bag contaminated clothing and waste promptly		
17. Bagged waste material shall be placed in white drums or wooden boxes and labeled as asbestos waste *(exterior of containers shall be clean and asbestos-free)*		
18. Shower before lunch and at end of shift		

APPROVAL TO BEGIN WORK

IH TECHNICIAN SIGNATURE:	DATE:	* SUPERVISOR-IN-CHARGE SIGNATURE:	BADGE NUMBER:
	TIME:		DATE:

SECTION D - FINAL INSPECTION REQUIREMENTS SPECIFIED BY: _____ IH TECHNICIAN INITIALS _____ DATE _____ TIME

	REQ'D	DNA
1. Visual inspection of work area for residual dust required after completion of job *(contact IH Technician)*		
2. General area air samples required after completion of job *(contact IH Technician)*		
3. Obtain IH Technician approval before removal of barriers & warning signs		

* *This Asbestos Work Permit expires when removal of barriers and warning signs is approved, preparation of additional work area is needed, employees assigned to the job are changed, or job conditions require changes in permit requirements. In no case shall the permit be valid beyond the date in Section A.4. above.*

NO.	DISTRIBUTION OF COPIES
1	POST AT JOB SITE
2	IH&S *(RECORD COPY)*
3	IH&S *(FIELD COPY)*

APPROVAL TO REMOVE BARRIERS AND WARNING SIGNS

IH TECHNICIAN SIGNATURE:	DATE:	TIME:

FMPC-IRS&T-2940 (REV. 1/10/90)

632

ISSUE AND REVISION RECORD

DATE OF CHANGE	REVISION NUMBER	AFFECTED PAGES	REASON FOR REVISION
5/6/87	0	ALL	Original issue of procedure
3/30/89	1	ALL	To meet requirements of new form
5/30/91	2	ALL	To update air sampling requirements

L32A

FEMP WESTINGHOUSE MATERIALS COMPANY OF OHIO SITE SERVICES DOCUMENT PROGRAM	Page 1 of 6 Revision No. 2	
SITE SERVICES PROCEDURE	CONTROL AND UTILIZATION OF CONTAMINATED TRASH DUMPSTERS	SOP 30-C-604 AREA: As Applicable
Authorization: R. L. Gardner, Facilities & Warehousing Manager	Supersedes: None	Issue Date: 05-24-88

1.0 PURPOSE/DESCRIPTION

The purpose of this document is to provide procedures for filling dumpsters with contaminated trash.

2.0 APPLICABILITY

This procedure is applicable to contaminated trash dumpsters.

3.0 RESPONSIBILITIES

3.1 **Site Services** shall be responsible for the following:

3.1.1 Providing personnel with training or training material on controlling contaminated trash dumpsters.

3.1.2 Ensuring that designated contaminated trash dumpster access doors remain locked when not in use.

3.2 **Supervisors** shall be responsible for the following:

3.2.1 Ensuring that personnel are qualified per the established training requirements identified by the Department/Staff Manager.

3.2.2 Maintaining training records of personnel who are using the dumpsters.

3.2.3 Providing training records to Waste Operations.

3.2.4 Contacting Industrial Hygiene or Radiological Safety to determine the appropriate respiratory protection for handling contaminated trash.

3.2.5 Providing operators with the required respiratory protection.

3.3 **Waste Generators** shall be responsible for the following:

3.3.1 Ensuring that prohibited items are not placed into contaminated trash dumpsters.

3.3.2 Ensuring that contaminated trash is bagged in plastic prior to being placed in the dumpster.

3.4 **Facility Owners** shall be responsible for ensuring that designated contaminated trash dumpster access doors remain locked when not in use.

4.0 DEFINITIONS

4.1 Contaminated Waste Dumpster - Secured container for the collection of contaminated trash.

4.2 Contaminated Waste Generator - Person filling the contaminated trash dumpster

5.0 REFERENCES

None

6.0 INDUSTRIAL HEALTH AND SAFETY REQUIREMENTS

6.1 A defined safety system is not involved.

6.2 Safety glasses with side shields shall be worn unless other eye protection is specified by IRS&T or posted signs.

6.3 Respiratory protection provided by the supervisor shall be worn when required by IRS&T.

6.4 Leather-palm gloves shall be worn when handling rough and/or contaminated material.

6.5 Contaminated trash shall not be allowed to accumulate around the dumpsters.

6.6 Any circumstance which could have resulted in an intake of radioactive materials by inhalation, ingestion or absorption shall immediately be reported to a supervisor. The supervisor shall immediately report the circumstance of possible radioactive materials intake to IRS&T Radiological Safety Section for evaluation. The involved personnel shall report to the Urine Sampling Station at the end of their shift to complete an Incident Investigation Report (IIR) (Form FMPC-ES&H-1458), and submit an incident urine sample. The involved personnel shall also report to the Urine Sampling Station at the start of their next shift to submit a followup urine sample. Employees are responsible for complying with additional requirements as specified by the Radiological Safety Section.

NOTE: Warnings, cautions, and notes precede the Item or Step to which they apply.

7.0 PROCEDURE

7.1 Inspection

7.1.1 Examine the trash for prohibited items or categories of waste (Refer to Figure 1).

7.0 PROCEDURE (cont.)

7.1.1.1 If a suspect item is located and determination is impossible, remove the item.

7.1.1.2 Contact the supervisor and request instructions.

7.1.2 Remove prohibited items from the trash as instructed by supervision.

7.2 Filling Dumpsters

7.2.1 Dispose of small or loose items as follows:

7.2.1.1 Place the small/loose material in clear plastic bags.

7.2.1.2 Gather or twist the open end of the bag until the opening is closed.

7.2.1.3 Using tape, secure the bag.

7.2.2 Contact the person responsible for the dumpster to obtain approval and the door keys.

7.2.3 Unlock dumpster.

7.2.4 Place bulky items (such as oversize pieces of cardboard) directly into the dumpster.

7.2.5 Inspect the trash in the secured clear plastic bag to ensure there are no prohibited items.

NOTE: Do not place unsecured bags or damaged bags into the dumpster.

7.2.6 Inspect the bags for damage.

7.2.6.1 Place damaged bags into undamaged bags.

CAUTION: **PIPING AND PIECES OF WOOD OVER TWO FEET IN LENGTH SHALL NOT BE PLACED IN THE DUMPSTER.**

7.2.7 Place identified contaminated trash excluding items in Figure 1 into the dumpster.

7.2.8 Lock dumpster.

7.2.9 Return the door key to the responsible person.

8.0 APPLICABLE FORMS

None

FEMP WESTINGHOUSE MATERIALS COMPANY OF OHIO SITE SERVICES DOCUMENT PROGRAM	Page 5 of 6 Revision No. 2	
SITE SERVICES PROCEDURE	CONTROL AND UTILIZATION OF CONTAMINATED TRASH DUMPSTERS	SOP 20-C-604 AREA: As Applicable
Authorization: R. L. Gardner, Facilities & Warehousing Manager	Supersedes: None	Issue Date: 05-24-88

LIST OF WASTE TYPES PROHIBITED FROM THE CONTAMINATED TRASH DUMPSTERS

- Any kind of liquid
- Non-radioactive materials
- * Pressurized containers/spray cans
- Explosive materials
- Gaseous radioactive materials
- High-level radioactive waste
- Pyrophoric materials
- Hazardous materials
- Flammable substances
- * Alkaline metals
- Reactive or oxidizing materials
- Ashes, dry powders, or dusts
- Immobolized or ionized waste with pH less than 4.
- Mixed waste

R - Glass

WARNING: IF THERE IS ANY QUESTION ABOUT WHETHER OR NOT THE TRASH FALLS INTO ANY OF THE CATEGORIES ABOVE, CONTACT THE AREA SUPERVISOR OR SITE SERVICES.

PROHIBITED WASTE
Figure 1

SITE SERVICES PROCEDURE	CONTROL AND UTILIZATION OF CONTAMINATED TRASH DUMPSTERS	SOP 20-C-604 AREA: As Applicable
Authorization: R. L. Gardner, Facilities & Warehousing Manager	Supersedes: None	Issue Date: 05-24-88

LIST OF ISSUE/REVISION

DATE	REV. NO	DESCRIPTION AND AUTHORITY
05-24-88	0	New procedure issued from CIO C88-014 per Request No. P88-056, initiated by J. E. Harmon.
12-27-90	1	Revised procedure to incorporate CIO C90-024 per Request P90-255.
01-28-91	2	Revised to incorporate CIO C91-061 per Request No. P92-015.

CONTROL OF WORK INVOLVING ASBESTOS, IH-03

SEE STEP 2

CONTROL OF PERMITS FOR ACCOMPLISHING HAZARDOUS WORK, FMPC-0516

SEE STEP 4b

ISSUING PERMITS FOR ASBESTOS WORK, SP-P-41-006

SEE STEP 4b

ASBESTOS OPERATIONS & MAINTENANCE MANUAL, IN-6029

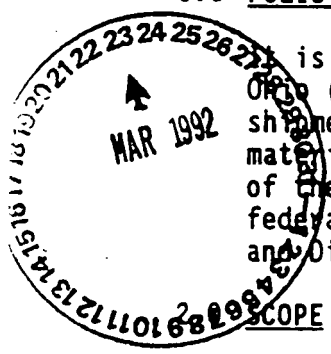
SEE STEP 4b

CONTROL NO. 3288

WESTINGHOUSE ENVIRONMENTAL MANAGEMENT COMPANY OF OHIO SITE DOCUMENT PROGRAM		SITE POLICY AND PROCEDURE Page 1 of 29
Title: **PACKAGING, ON-SITE MOVEMENT AND OFF-SITE SHIPMENT OF MATERIAL**		DOCUMENT NO: PP-0314 REVISION NO. 0
Authorization: W. H. Britton, President	Supersedes: FMPC-314, Dated 12-31-90, Rev. 2	Issue Date: 12-20-91

1.0 POLICY

NON-CONTROLLED COPY



It is the policy of the Westinghouse Environmental Management Company of Ohio (WEMCO) to ensure that the packaging, on-site movement and off-site shipment of hazardous and non-hazardous materials, including radioactive materials, is conducted in a safe manner that provides for the protection of the public and the environment, and is in compliance with the applicable federal, state, and local regulations, Department of Energy (DOE) Orders and Directives, and WEMCO policies and procedures.

2.0 SCOPE

This procedure identifies, defines, and establishes the policies and responsibilities that govern the packaging, on-site movement, and off-site shipment of materials. Provisions of this document are applicable to all WEMCO Sections involved in the packaging, on-site movement, and off-site shipment of non-hazardous materials and hazardous materials, including hazardous substances, hazardous wastes, nuclear, and radioactive materials.

3.0 DEFINITIONS

3.1 Carrier - Any person engaged in the transportation of passengers or property as common, contract, or private charter, or freight forwarder, as defined in the Interstate Commerce Act, as amended, or by the United States Postal Service.

3.2 Consignee - The person or organization designated in the shipping papers to receive a shipment.

3.3 Hazardous Material - A material or substance, including a hazardous substance, which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, or property during transport.

3.4 Hazardous Substance - A material, including its mixtures and solutions, as defined in 49 CFR 171.8, section 101 (14) and 102 of CERCLA, section 311 (b) (2) (a) of the CWA.

3.5 Hazardous Waste - Any waste material that is designated as hazardous by the Administrator of the Environmental Protection Agency (EPA) in 40 CFR Part 261 and that is subject to the Hazardous Waste Manifest requirements of 40 CFR Part 262.

3.6 Material - For purposes of this procedure, any material classified as non-hazardous items or hazardous materials, including hazardous substances, hazardous wastes, nuclear, and radioactive materials.

3.0 DEFINITIONS (cont.)

3.7 Off-Site - All areas outside the main perimeter security fence that are not controlled at all times by guards and security gates.

3.8 On-Site - All areas inside the main perimeter security fence that are controlled at all times by guards and security gates to gain entrance to the Fernald Environmental Management Project (FEMP) Site.

3.9 Package - A packaging plus its contents as presented for transportation.

3.10 Packaging - The assembly of one or more containers and any other components necessary to ensure compliance with the minimum packaging requirements of 49 CFR.

3.11 Radioactive Material - Any material having a specific activity greater than 0.002 microcuries per gram per 49 CFR.

3.12 Radioactive Source - For the purpose of this procedure any source used as a standard for the radiation it emits sealed in a capsule or having a bonded cover in which the capsule or cover is strong enough to prevent contact with, or dispersion of, the radioactive material under normal conditions of use, including a one-meter drop onto an unyielding surface.

3.13 Radioactive Waste - Solid, liquid, or gaseous material that contains radionuclides regulated under the Atomic Energy Act of 1954, as amended, and of negligible economic value when the costs of recovery are considered.

3.14 Shipment Originator - The person, or WEMCO Section, who initiates an on-site movement or off-site shipment of material.

3.15 Waste Originator - Any person, or WEMCO Section, whose operation or process generates hazardous waste, radioactive waste, or a mixed waste.

3.16 Nuclear Material - Collective term that includes all such materials designated by the DOE. A listing of designated nuclear materials may be found in DOE Order 5633.3; however, at the FEMP site, nuclear materials shall mean depleted, normal, or enriched (less than 20% U-235 by weight) uranium or thorium.

4.0 RESPONSIBILITIES

4.1 Centralized Training - Responsible for the proper development of training activities to comply with mandatory training requirements and to enable employees to qualify, requalify, or enhance their ability to perform job duties and tasks. Responsible for appropriate documentation and maintenance of training activities, development of in-house audio/video training aids, providing assistance in the development/section training, maintaining and administering the TRMS', maintaining the TMR, including the maintenance of subcontractor training records supplied to centralized training by technical instructors or by the manager of the contracting department.

4.2 Maintenance/Garage - Responsible for the inspection of inbound carrier vehicles that will be used for outbound shipments, providing for the inspection used for on-site shipments, and the preventative maintenance of all such government vehicles at FEMP, and documenting all maintenance and inspections.

4.3 Radiological Safety - Responsible for conducting radiological surveys of materials, packages, and carrier vehicles that will be used for outbound shipments, documenting results of surveys, and providing copies of the results as required. Radiological Safety is also to be notified so surveys can be performed on all on-site movements of materials.

4.4 Facilities and Warehousing - Responsible for packaging materials for on-site movement, packaging uranium metals, oxides, and related products for off-site shipment, providing support documentation, and assigning the personnel and equipment required for on-site movements, loading off-site shipments, and spotting/loading carrier trailers and freight containers.

4.5 Material Control and Accountability - Responsible for the nuclear materials control and accountability program at FEMP.

4.6 Procurement/Materials Management - Responsible for the review and approval of off-site miscellaneous shipping documentation.

4.7 Analytical Section (of Site Services) - Responsible for providing analytical documentation of material samples and the packaging of samples for off-site analysis.

4.8 Logistics Administration - Responsible for developing and updating transportation related procedures ensuring compliance with all Federal, State and Local regulations, Doe Orders and Directives.

4.0 RESPONSIBILITIES (cont.)

4.9 Site-Wide Quality Assurance - Responsible for verifying the packaging processes for uranium metals, oxides, and other related materials and for conducting periodic inspections of packaging operations. Coordinate all required Quality Assurance review activities including conducting annual audits of the packaging and transportation of hazard material shipments.

4.10 Radioactive Source Controller - Responsible for controlling and the coordination of radioactive source for shipment off-site.

4.11 Safeguards and Security - Responsible for the coordination of security and safeguard measures for off-site shipments.

4.12 Shipment Originator - Responsible for preparing documentation of materials for on-site movement or off-site shipment.

4.13 Transportation Safety Committee - Responsible for the evaluation of WEMCO policies and procedures for packaging and transport of all materials, exchange knowledge and experience in resolution of transportation safety problems, uniform interpretation and implementation of Federal, State, and Local regulations, including OSHA safety requirements, DOE Orders, and WEMCO guidelines as applicable to transportation safety.

4.14 Traffic Control - Responsible for providing guidance on the requirements for the on-site movement of hazardous materials. Responsible for preparing bills of lading, coordinating the loading of off-site shipments, and coordinating the scheduling of off-site shipments.

4.15 Waste Originator - Responsible for accumulating and packaging waste for storage or disposal and for making the proper notifications when accumulated wastes must be transported to on-site storage facilities.

4.16 Facilities and Material Evaluation - Responsible for providing assistance to waste generators, arranging for waste sampling, and categorizing waste.

4.17 Waste Operations - Responsible for packaging hazardous and radioactive wastes for off-site shipment.

4.18 Waste Shipping Coordinator - Responsible for preparing and reviewing waste shipment documentation for off-site shipments.

4.19 Waste Shipping - Responsible for preparing waste packages and packaging waste for off-site shipment.

WESTINGHOUSE ENVIRONMENTAL MANAGEMENT COMPANY OF OHIO SITE DOCUMENT PROGRAM		SITE POLICY AND PROCEDURE Page 5 of 29
Title: **PACKAGING, ON-SITE MOVEMENT AND OFF-SITE SHIPMENT OF MATERIAL**		DOCUMENT NO: PP-0314 REVISION NO. 0
Authorization: W. H. Britton, President	Supersedes: FMPC-314, Dated 12-31-90, Rev. 2	Issue Date: 12-20-91

4.0 RESPONSIBILITIES (cont.)

4.20 Safe Shutdown - Responsible for controlling order requirements for nuclear materials disposition activities at the FEMP for off-site shipment.

5.0 GENERAL

5.1 Sections responsible for the activities assigned herein shall develop implementing procedures, and perform operational and oversight functions that are consistent with internal WEMCO operating policies and procedures.

5.2 Shipment generators for off-site shipments must prepare a nuclear, radioactive, hazardous material/hazardous waste - non-nuclear, or miscellaneous shipping order and have the order processed and approved by the appropriate sections before material will be set up for off-site shipment. In addition, all packages must have been monitored by the Radiological Safety section for removable contamination, radiation levels, per the applicable departmental procedures and provide appropriate documentation to Traffic Control.

5.3 PACKAGING PROVISIONS

Package Description Per Pkg.	Material Description	Authorized Gross Weight
DOT Spec 17C metal 5-gal. drum (DOT 7A Type A)	samples, bulk type radioactive material	100 lbs.
DOT Spec 17H metal 30-gal. drum (DOT 7A Type A)	samples, bulk type radioactive material	500 lbs.
DOT Spec 17H metal 55-gal. drum (DOT 7A Type A)	samples, bulk type radioactive material	900 lbs.
FEMP Family of wooden Boxes DOT 7A Type A:		
Model No. G-4214	uranium metal products	1,260 lbs.
Model No. G-4245	uranium metal products	225 lbs.
Model No. G-4255	uranium metal products	1,470 lbs.
Model No. G-4273-5	uranium metal products	3,045 lbs.
Model No. G-4273-6	uranium metal products	3,540 lbs.
Model No. G-4292	uranium metal products	1,330 lbs.
Strong Tight Containers	LSA Material consigned as exclusive use Limited Quantity Material	Dependent on container per applicable department procedure

5.0 GENERAL (cont.)

5.3.1 No special packaging provisions are required for the on-site movement and off-site shipment of nonhazardous miscellaneous materials.

5.3.2 PCB substances which are regulated by the Toxic Substances Control Act (TSCA) and the Clean Air Act (CAA) and shall be controlled the same as RCRA waste material.

5.3.3 WEMCO shall respond to incoming emergency calls concerning an accident involving hazardous materials shipped from the FEMP or in transit in the area, supporting the agency with authority, as requested per FMPC-125, "Emergency Management."

6.0 PROCEDURE

6.1 Packaging Operations

CENTRALIZED TRAINING

6.1.1 Approve departmental lesson plans for the personnel in each organization that are involved with the packaging of hazardous materials, hazardous wastes, and radioactive materials.

6.1.2 Verify that the results of lesson plans are documented and that training qualifications records are included in the employee's personnel record and entered into Centralized Training computer files.

ANALYTICAL SECTION (of Site Services)

6.1.3 Analyze the samples to determine the hazardous constituents of the waste.

6.1.4 Document the waste analysis results on the Report of Analysis form.

6.1.5 Provide analytical data to Environmental Management, and the Project Engineer (if requested) for use in characterizing the waste.

6.1.6 Package samples in accordance with applicable Sampling Plan and Departmental procedures. Ensure compatibility of materials in one package meets all criteria of Title 49 CFR, Subpart C, 177.848.

WESTINGHOUSE ENVIRONMENTAL MANAGEMENT COMPANY OF OHIO SITE DOCUMENT PROGRAM		SITE POLICY AND PROCEDURE Page 7 of 29
Title: PACKAGING, ON-SITE MOVEMENT AND OFF-SITE SHIPMENT OF MATERIAL		DOCUMENT NO: PP-0314 REVISION NO. 0
Authorization: W. H. Britton, President	Supersedes: FMPC-314, Dated 12-31-90, Rev. 2	Issue Date: 12-20-91

6.0 PROCEDURE (cont.)

ANALYTICAL SECTION (of Site Services)

6.1.7 Request that Radiological Safety monitor the samples and packages according to departmental procedures and provide the appropriate documentation.

SITE-WIDE QUALITY ASSURANCE

6.1.8 For all hazardous and radioactive packaging, verifies compliance with regulations, specifications, plans and procedures through review of documentation, witnessing of activities, and examination. Verifies identification of packaged uranium metals, oxide and related products against the Shipping Order for Nuclear Material. Conduct internal and independent audits of the packaging of hazardous materials including hazardous substances, hazardous wastes, and nuclear and radioactive materials according to the appropriate DOE requirements.

6.1.9 Conduct periodic inspections of packaging operations per applicable departmental procedures, to verify compliance with applicable DOT/DOE/EPA regulations, WEMCO policies and procedures, and document inspections.

6.1.10 Verify that radiological surveys have been conducted for materials.

6.1.11 Review radiological survey results and verify that the radiation readings for packages are within the limits established by 49 CFR; document the review on Form FEMP-IRS&T-1993.

TRAFFIC CONTROL

6.1.12 Verify that hazardous material is packaged for off-site shipment according to the applicable Safety Analysis Report for Packaging and Certificate of Compliance supplied by the Traffic Control.

SHIPMENT ORIGINATOR

6.1.13 Verify that personnel have been properly trained to package hazardous materials, hazardous substances, hazardous wastes, and nuclear and radioactive materials.

6.0 PROCEDURE (cont.)

SHIPMENT ORIGINATOR

6.1.14 Obtain approval from Nuclear Safety before packaging off-site shipments of enriched radioactive materials to ensure criticality concerns are addressed according to applicable regulations. Verify that each package used for on-site movement or off-site shipment of hazardous materials, hazardous substances, hazardous wastes, nuclear and radioactive materials is correctly assembled and that all components of the packaging are sufficiently secured.

6.1.15 Ensure packaging is free of rust, dents or other conditions making it unsuitable for loading material.

6.1.16 Package non-hazardous materials, hazardous materials, hazardous substances, hazardous wastes, and nuclear and radioactive materials for on-site movement or off-site shipment per applicable WEMCO procedures.

6.1.17 Inspect all hazardous materials packages to verify that it has been packaged properly. Notify supervisor if any defects or deficiencies are detected.

6.1.18 Verify that packaging has the capability that will enable the use of mechanical loading equipment, items may be placed on pallets to meet this requirement.

6.1.19 Verify that a radiological survey has been conducted on all packagings that will be used for the off-site shipment of nuclear or radioactive material before the packaging is used.

NOTE: Packagings that are contaminated above the levels specified in Title 49 CFR 173.443 may not be used for off-site shipments unless they are cleaned or refurbished.

6.1.20 Verify that inner packaging is suitably cushioned in the outer packaging with an adequate quantity of material to prevent breaking and shifting during transport, as directed by Traffic Control.

6.0 PROCEDURE (cont.)

SHIPMENT ORIGINATOR

6.1.21 Apply and Verify that all packages for on-site movement or off-site shipping, including samples, are marked and/or labeled according to the requirements of 49 CFR and the written instructions provided by the Traffic Control.

NOTE: Selection of the proper DOT shipping name is based on process knowledge of the waste stream, laboratory analysis, or the Material Evaluation Form provided by EA & QA.

6.1.22 Verify that all packages of material are monitored for external removal contamination and radiation levels.

RADIOACTIVE SOURCE CONTROLLER

6.1.23 Request Radiological Safety to conduct radiological surveys of the radioactive source material and packaging.

6.1.24 Review radiological survey results to verify compliance with applicable regulations.

6.1.25 Maintain constant surveillance of radioactive source material.

WASTE ORIGINATOR

6.1.26 Accumulate and package waste for storage and/or disposal according to all applicable EPA/DOT/DOE regulations and WEMCO procedures.

6.1.27 Notify Facilities and Materials Evaluation when accumulated waste is packaged for on-site storage facilities.

6.1.28 Request radiological surveys of wastes and packages as necessary.

6.1.29 Provide waste tally sheet to Environmental Compliance for use in preparing Material Evaluation forms.

FACILITIES AND MATERIALS EVALUATION

6.1.30 Provide assistance to waste generators with characterization and packaging of wastes for storage and/or disposal.

6.0 PROCEDURE (cont.)

ENVIRONMENTAL COMPLIANCE

6.1.31 Characterize waste according to Resource Conservation and Recovery Act (RCRA) guidelines and DOE requirements based on the results of the waste analysis conducted by Analytical Laboratories.

RADIOLOGICAL SAFETY

6.1.32 Conduct radiological surveys of materials and packages.

6.1.33 Document survey results on the appropriate forms according to departmental procedures.

6.1.34 Forward copies of the surveys to the Shipment Originator, Waste Originator, and Site-Wide Quality Assurance as required.

TRANSPORTATION SAFETY COMMITTEE

6.1.35 Evaluate policies for packaging safety at the FEMP for compliance with applicable federal, state and local regulations.

6.1.36 Ensure packaging policies and practices are conducted in accordance with all FEMP and OSHA safety requirements.

WASTE OPERATIONS

6.1.37 Package hazardous waste and radioactive waste.

6.1.38 Ensure that hazardous waste has been packaged according to EPA/DOT/DOE regulations and WEMCO Guidelines.

6.1.39 Verify that hazardous waste, radioactive, or mixed waste is packaged according to 49 CFR.

6.1.40 Request radiological surveys of packaged waste as required.

WASTE SHIPPING

6.1.41 Prepare waste packaging for use by the Waste Originator according to departmental procedures.

6.1.42 Prepare packages of waste according to departmental procedures and specific consignee requirements.

6.1.43 Request radiological surveys of waste containers as required.

WESTINGHOUSE ENVIRONMENTAL MANAGEMENT COMPANY OF OHIO SITE DOCUMENT PROGRAM		SITE POLICY AND PROCEDURE Page 11 of 29
Title: PACKAGING, ON-SITE MOVEMENT AND OFF-SITE SHIPMENT OF MATERIAL		DOCUMENT NO: PP-0314 REVISION NO. 0
Authorization: W. H. Britton, President	Supersedes: FMPC-314, Dated 12-31-90, Rev. 2	Issue Date: 12-20-91

6.0 PROCEDURE (cont.)

6.2 On-Site Movements

CENTRALIZED TRAINING

6.2.1 Approve departmental lesson plans for the personnel in each organization involved with the loading, and transporting of hazardous materials on site, hazardous wastes, and radioactive materials.

6.2.2 Verify that the results of lesson plans are documented and that training qualifications records are included in the employee's personnel record and entered into Centralized Training computer files.

ANALYTICAL SECTION (of Site Services)

6.2.3 Ensure that samples are properly identified and quantified in order to determine on-site transport requirements.

6.2.4 Ensure that temporary storage of samples incidental to transport complies with existing requirements in applicable operating procedures and Nuclear Safety guidelines.

6.2.5 Contact Traffic Control if further guidance is needed when offering samples for on-site movement.

SITE-WIDE QUALITY ASSURANCE

6.2.6 Conduct periodic inspections of on-site shipping operations per applicable departmental procedures to verify compliance with applicable DOT/DOE/EPA regulations, WEMCO policies and procedures, and document inspections. Also conduct internal and independent audits of the on-site transportation of hazardous materials including hazardous substances, hazardous wastes, and nuclear and radioactive materials according to the appropriate DOE requirements.

6.2.7 Sign checksheet/release verifying that all Site-Wide Quality Assurance/Quality Certification functions have been performed and documented for on-site movement as required.

TRANSPORTATION SAFETY COMMITTEE

6.2.8 Evaluate policies for on-site transportation safety at the FEMP for compliance with applicable Federal, State and Local regulations.

6.0 PROCEDURE (cont.)

TRANSPORTATION SAFETY COMMITTEE

6.2.9 Ensure on-site transportation policies and practices are conducted in accordance with all FEMP and OSHA safety requirements.

SHIPMENT ORIGINATOR

6.2.10 Verify that the material is properly identified and quantified to determine on-site movement requirements.

6.2.11 Notify Facilities and Warehousing when the material is ready to be moved.

6.2.12 Attach appropriate transfer documents from Material Control and Accountability when required. Initiate appropriate transfer documents for on-site movement of material from one area to another.

6.2.13 Verify that the storage of materials incidental to transport complies with current requirements contained in the appropriate operating procedures and Nuclear Safety guidelines.

6.2.14 Contact the Traffic Control if further guidance is required when material is moved on-site.

6.2.15 When shipping nonradioactive hazardous materials, initiate form FMPC-OPR-3292, "Hazardous Material Transfer On-site Shipment."

6.2.16 Attach the completed form FMPC-OS&H-1993-1 to the Traffic Control copy of Form FMPC-OPR-3292.

6.2.17 Ensure a signed "Nonradioactive Hazardous Materials Shipment Approval Tag," form FMPC-OPR-2947 is attached to each package when shipping on radioactive hazardous materials on-site.

WASTE ORIGINATOR

6.2.18 Notify Facilities Services, Site-Wide Quality Assurance and MC&A when accumulated packaged waste must be transported to on-site storage facilities.

6.2.19 Request radiological surveys of wastes and packages as required.

6.2.20 Notify Facilities and Warehousing when packaged waste is ready to be transported to on-site storage facility.

WESTINGHOUSE ENVIRONMENTAL MANAGEMENT COMPANY OF OHIO SITE DOCUMENT PROGRAM		SITE POLICY AND PROCEDURE Page 13 of 29
Title: PACKAGING, ON-SITE MOVEMENT AND OFF-SITE SHIPMENT OF MATERIAL		DOCUMENT NO: PP-0314 REVISION NO. 0
Authorization: W. H. Britton, President	Supersedes: FMPC-314, Dated 12-31-90, Rev. 2	Issue Date: 12-20-91

6.0 PROCEDURE (cont.)

MAINTENANCE/GARAGE

6.2.21 Inspect, perform preventative maintenance, and repair all government vehicles used for on-site movement of material at FEMP.

6.2.22 Maintain records of services.

6.2.23 Notify government vehicle custodians of scheduled preventative maintenance and safety inspection services.

FACILITIES AND WAREHOUSING

6.2.24 Verify that on-site motor vehicle operators possess a valid state driver's license with the appropriate endorsements.

6.2.25 Verify that on-site motor vehicle operators have been properly trained and qualified according to the responsibilities to be performed.

6.2.26 Motor vehicle operator shall document the inspection results on the appropriate vehicle inspection form (Form OPR 2414), sign the inspection form and submit it to their supervision, and notify supervision of any defective or unsafe vehicle conditions.

NOTE: All defective or unsafe vehicle conditions must be corrected before the vehicle can be used.

6.2.27 Ensure that all packages are marked per applicable departmental procedures.

NOTE: If package markings are illegible or missing, notify supervision per applicable departmental procedure.

6.2.28 Ensure that all hazardous waste packages are labeled with the applicable DOT/EPA/OSHA labels and/or markings.

NOTE: If package labels are illegible or missing, notify supervision per applicable departmental procedure.

6.0 PROCEDURE (cont.)

FACILITIES AND WAREHOUSING

6.2.29 Load the material properly on the transport vehicle and ensure that the material is adequately distributed for weight distribution, stable and secured against shifting during transport.

NOTE: Hazardous materials shall be loaded onto a transport vehicle according to the guidelines provided in the DOT Hazardous Materials Segregation/Separation Chart and in compliance with all applicable Nuclear Safety guidelines.

6.2.30 Deliver the material to the designated delivery point by using the most direct and least congested route.

6.2.31 Prepare depleted, normal, or enriched uranium and other nuclear or radioactive material for on-site movement.

NOTE: Material Control and Accountability (MC&A) documentation must accompany the shipment from one area to the next area when necessary.

6.2.32 Request radiological surveys of materials and packages if not already available.

6.2.33 Review and verify radiological survey results for compliance with the appropriate regulatory requirements.

6.2.34 Assign personnel and equipment for on-site movement as requested.

6.2.35 Provide personnel and equipment for special emergency on-site movement as requested.

TRAFFIC CONTROL

6.2.36 Provide guidance for the required documents, packaging, marking, labeling, and the requirements for the placarding of hazardous materials for on-site movement.

6.2.37 Verify that the appropriate Federal and State Regulations and WEMCO Guidelines are followed for personnel and environmental safety.

6.0 PROCEDURE (cont.)

RADIOLOGICAL SAFETY

6.2.38 Conduct radiological surveys of materials, packages and vehicles on site.

6.2.39 Document the survey results on the appropriate forms according to departmental procedures.

6.2.40 Forward copies of the surveys to the Shipment Originator, Waste Originator, Traffic Control, and Site-Wide Quality Assurance as required.

MATERIAL CONTROL AND ACCOUNTABILITY (MC&A)

6.2.41 Prepare MC&A documentation for on-site movement of material as required.

NOTE: MC&A documents shall be used for verification of the materials and will serve as the shipping papers for on-site movement.

6.3 Off-Site Shipments

CENTRALIZED TRAINING

6.3.1 Approve departmental lesson plans for the personnel in each organization involved with the off-site loading, and transporting of hazardous materials, hazardous wastes, and radioactive materials.

6.3.2 Verify that the results of lesson plans are documented and that training qualification records are included in the employee's personnel record and entered into Centralized Training computer files.

ANALYTICAL SECTION (of Site Services)

6.3.3 Notify Material Control and Accountability and the Traffic Control when a sample containing nuclear radioactive material is to be shipped off-site.

6.3.4 Initiate Shipping Order for Nuclear Material Form, FEMP CONT-558, for samples that are to be shipped to off-site laboratories for analysis

657

6.0 PROCEDURE (cont.)

ANALYTICAL SECTION (of Site Services)

6.3.5 Forward the shipping order to Material Control and Accountability.

6.3.6 Initiate Shipping Order for Hazardous Material/ Hazardous Waste Non-Nuclear Form, FEMP CONT-3388, for samples that are to be shipped to off-site laboratories for analysis.

6.3.7 Forward the shipping order to Material Control and Accountability.

6.3.8 Verify that the waste samples are in proper packaging for off-site shipment according to departmental procedures.

6.3.9 Generate Form No. FMPC-OPR-2595, Off-Site Loading and Tie Down Inspection.

6.3.10 Maintain and verify the chain of custody transfer for off-site shipment according to applicable procedures.

6.3.11 Request that Radiological Safety monitor the samples and packages according to departmental procedures and provide the appropriate documentation to Traffic Control.

SITE-WIDE QUALITY ASSURANCE

6.3.12 Verify the identification of packaged uranium metals, oxides, and related products with the Shipping Order for Nuclear Material.

6.3.13 Conduct periodic inspections of the shipping operations per applicable departmental procedures to verify compliance with applicable DOT/DOE/EPA regulations and WEMCO policies and procedures and document inspections.

6.3.14 Review the Garage Section incoming vehicle inspection form for vehicle defects or deficiencies.

6.3.15 Attach the Quality Assurance Inspection Sheet, Form QAC-891010-1, Rev 1, to the support documentation for each vehicle loaded.

6.3.16 Verify that radiological surveys have been conducted for each carrier trailer and the materials for off-site shipment.

6.0 PROCEDURE (cont.)

SITE-WIDE QUALITY ASSURANCE

6.3.17 Verify that the exclusive use trailers have been sealed by Radiological Safety and document verification on Form FEMP-ES&H-1956-1.

6.3.18 Review the radiological survey results and verify that radiation readings for packages and the carrier vehicles are within the limits established by 49 CFR; document the review on Form FEMP-IRS&T-1993.

6.3.19 Verify, during the loading of carrier vehicles, that the packaging, marking, labeling, and placarding of off-site shipments are in compliance with 49 CFR; document compliance on appropriate form.

6.3.20 Review all documentation that supports each off-site shipment, including Quality Assurance documentation; document this review on Form QAC-890601-1, Rev. 0.

6.3.21 Sign the appropriate consignee shipment certification (NVO-211) certifying that Low Level Radioactive Waste shipments comply with the waste acceptance criteria established by the consignee.

6.3.22 Sign the shipping order verifying that all Site-Wide Quality Assurance/Quality Certification functions have been performed and documented for off-site shipments as required.

6.3.23 Coordinate all Quality Assurance review activities with the appropriate WEMCO sections and conduct internal and independent audits of the packaging and transportation of hazardous materials including hazardous substances, hazardous wastes, and nuclear and radioactive materials according to the appropriate DOE requirements.

RADIOLOGICAL SAFETY

6.3.24 Conduct radiological surveys of materials and packages in accordance with applicable departmental procedures.

6.3.25 Coordinate the radiological survey of inbound carrier vehicles, with the Traffic Control, before and after loading, and prior to release from FEMP.

6.0 PROCEDURE (cont.)

RADIOLOGICAL SAFETY

6.3.26 Document the survey results on the appropriate forms according to departmental procedures.

6.3.27 Forward copies of the surveys to the Shipment Originator, Waste Originator, Traffic Control, and Site-Wide Quality Assurance as required.

SHIPMENT ORIGINATOR

6.3.28 Provide the Traffic Control with the required advance notification of off-site shipment.

6.3.29 Verify that material is properly identified and quantified.

6.3.30 Provide the Traffic Control with the information required to determine the appropriate DOT requirements for the shipment.

6.3.31 Notify Facilities and Warehousing when the material is prepared for loading or movement to the designated area for off-site shipment.

6.3.32 Provide Facilities and Warehousing with the documentation that designates the location on-site where the material for off-site shipment is to be picked up, location on-site where the material for off-site shipment is to be delivered, and the name and quantity of the material to be moved.

6.3.33 Provide any additional information required to the transporter to facilitate the safe loading and movement of material.

6.3.34 Verify that the temporary storage of materials incidental to off-site transport is in compliance with the existing requirements of the appropriate operating procedures and Nuclear Safety guidelines.

6.3.35 Prepares Product Order per FMPC-714 for proposed shipments of nuclear product material.

6.3.36 Initiate Shipping Order for Nuclear Material (Form FMPC Cont-558) for nuclear materials that are to be shipped off-site and forward shipping order to Material Control and Accountability.

WESTINGHOUSE ENVIRONMENTAL MANAGEMENT COMPANY OF OHIO SITE DOCUMENT PROGRAM		SITE POLICY AND PROCEDURE Page 19 of 29
Title: **PACKAGING, ON-SITE MOVEMENT AND OFF-SITE SHIPMENT OF MATERIAL**		DOCUMENT NO: PP-0314 REVISION NO. 0
Authorization: W. H. Britton, President	Supersedes: FMPC-314, Dated 12-31-90, Rev. 2	Issue Date: 12-20-91

6.0 PROCEDURE (cont.)

SHIPMENT ORIGINATOR

6.3.37 Initiate Shipping Order for hazardous Material/Hazardous Waste - non-nuclear (Form FMPC Cont-3388) for all hazardous non-nuclear material that is to be shipped off site and forward shipping order to Material Control and Accountability.

6.3.38 Initiates Miscellaneous Shipping Order (FMPC-ADMS-871) and obtains applicable approvals for all non-nuclear nonhazardous material shipments. Forwards approved Miscellaneous Shipping Order (MSO) to the Traffic Control.

6.3.39 Request radiological survey results of materials and packages to ensure compliance with applicable regulations and site procedures.

6.3.40 Notify and obtain approval of site-wide Quality Assurance/ Quality Certification for shipments of nuclear material.

6.3.41 Obtain Radiological Safety sign-off for nonradioactive material on a Miscellaneous Shipping Order.

6.3.42 Obtain Environmental Compliance sign-off for nonhazardous material on a Miscellaneous Shipping Order.

6.3.43 Provide Traffic Control with the information necessary to the applicable DOT requirements and prepare the bill of lading.

6.3.44 Contact the Traffic Control for further guidance when preparing material for off-site shipment.

FACILITIES AND WAREHOUSING

6.3.45 Verify that the transport vehicle is appropriate for the weight and center of gravity of the material to be loaded.

6.3.46 Inspect the transport vehicle and record the findings of the inspection.

6.3.47 Accept or reject equipment based on the vehicle inspection.

6.3.48 Position packages on the vehicle so that the weight is equally distributed over the width and length of the vehicle and as equally as possible among the vehicle's axles.

6.0 PROCEDURE (cont.)

FACILITIES AND WAREHOUSING

6.3.49 Ensure the load is placed on the vehicle in such a manner that it does not obscure the driver's view ahead or to the right or left sides, interfere with the free movement of his arms or legs, prevent his free and ready access to accessories required for emergencies, or prevent the free and ready exit of any person from the vehicle's cab or driver's compartment.

6.3.50 Ensure that all loading of hazardous materials, hazardous substances, hazardous wastes, and radioactive materials is conducted according to the guidelines provided in the DOT Hazardous Materials Segregated/Separation Chart in compliance with all applicable Nuclear Safety guidelines.

6.3.51 Block and brace all packages on or in the vehicle to prevent shifting or changing of position during normal transportation conditions, and in such a manner that the packages will remain stable after the restraints are removed prior to unloading the packages.

NOTE: Do not rely upon the ends, sides, or doors of the vehicle to prevent shifting of heavy loads unless they are specifically designed for this purpose.

6.3.52 Ensure that all sides, sideboards, rear endgates and endboards capable of preventing packages shifting are in their proper place and are strong enough and high enough to ensure that packages will not shift upon, or fall from the vehicle.

6.3.53 Use as many tiedown assemblies to secure all packages being transported on vehicles which are not equipped with sides or sideboards, and rear endgate or endboard as directed by applicable FEMP procedures.

6.3.54 Use only tiedown assemblies that conform to the rules of 49 CFR 393.102; plastic or fiber rope, any material with unknown strength or any damaged materials shall not be used as components of a tiedown system.

6.3.55 Tiedown assemblies will be installed to ensure the load will not move or shift during normal transport.

WESTINGHOUSE ENVIRONMENTAL MANAGEMENT COMPANY OF OHIO SITE DOCUMENT PROGRAM		SITE POLICY AND PROCEDURE Page 21 of 29
Title: **PACKAGING, ON-SITE MOVEMENT AND OFF-SITE SHIPMENT OF MATERIAL**		DOCUMENT NO: PP-0314 REVISION NO. 0
Authorization: W. H. Britton, President	Supersedes: FMPC-314, Dated 12-31-90, Rev. 2	Issue Date: 12-20-91

6.0 PROCEDURE (cont.)

FACILITIES AND WAREHOUSING

6.3.56 Ensure the principal tiedown forces are transmitted to the vehicle's frame rather than the wood or metal decking, and that the strength of the tiedown attachment points on the vehicle are equal to or greater than the strength of the tiedowns.

6.3.57 Ensure that flexible tiedowns (e.g., rope, strap, chain, etc.) are free from contact with any other stationary objects when they are taut to prevent chafing and damage during transport.

6.3.58 Visually check all packages before loading to ensure no defects are present.

6.3.59 Complete and submit the Off-Site Loading and Tie-Down Inspection Form to the Traffic Control when necessary

6.3.60 Review and verify the radiological survey results for compliance with the appropriate regulatory requirements.

6.3.61 Submit appropriate paperwork to Traffic Control after loading.

6.3.62 Assign personnel and equipment for loading off-site shipments as required.

6.3.63 Assign personnel and equipment for spotting/loading of carrier trailers and freight containers used for off-site shipments.

PROCUREMENT/MATERIALS MANAGEMENT

6.3.64 Review and approve Miscellaneous Shipping Orders (MSO) and other documentation for off-site shipment of non-hazardous materials.

6.3.65 Forward approved copies of the Miscellaneous Shipping Order (MSO) to the Traffic Control.

6.3.66 Verify, using the appropriate shipping order, that the packages of material are identified as on the shipping order.

6.3.67 Attach the required markings, labels, and tally sheet to the packages of hazardous materials adhering to departmental procedures and direction by Traffic Control.

6.0 PROCEDURE (cont.)

MAINTENANCE/GARAGE

6.3.68 Inspect the inbound carrier vehicles that will be used for off-site shipments according to Federal Motor Carrier Safety Regulations and WEMCO procedures.

6.3.69 Document the inspection results on the FEMP Preliminary Visual Trailer Inspection Form with appropriate comments.

6.3.70 Forward copies of the maintenance and inspection documents to Site-Wide Quality Assurance and Facility Service and Support Sections.

6.3.71 Inspect, lubricate, perform the preventative maintenance for, and repair all government vehicles used for loading off-site shipments at FEMP.

6.3.72 Maintain records of services.

6.3.73 Notify the government vehicle custodians of scheduled preventative maintenance and safety inspection services.

TRAFFIC CONTROL

6.3.74 Provide guidance for the required documents and the requirements for the placarding of off-site shipments.

6.3.75 Verify compliance with appropriate Federal and State Regulations and WEMCO Guidelines.

6.3.76 Coordinate the scheduling of off-site shipment with the Shipment Originator, Site Services, and the carrier.

6.3.77 Coordinate the loading of off-site shipment with Site Services, Facilities and Warehousing, and the carrier.

6.3.78 Review shipping documents for completeness, proper authorization(s), and compliance with WEMCO policy, procedures, and accounting requirements.

6.3.79 Ensure that all off-site shipments are in compliance with legal restrictions on weight and dimension prior to release.

6.0 PROCEDURE (cont.)

TRAFFIC CONTROL

6.3.80 Prepare the Uniform Hazardous Waste Manifest according to the requirements of 40 CFR and the appropriate departmental procedures using documentation provided by the Shipping Originator and WEMCO support sections.

6.3.81 Prepare and sign the bill of lading according to the requirements of 49 CFR using documents provided by the Shipping Originator and WEMCO support sections.

6.3.82 Obtain the signature of the carrier's agent (driver) on all bills of lading and hazardous waste manifests to acknowledge receipt of the shipment by the carrier.

6.3.83 Use only ICC and PUCO approved commercial or contract carriers according to the appropriate DOE requirements.

NOTE: Commercial or contract carriers must have received an identification number from the Administrator of the USEPA. Additionally, State EPA identification numbers must be obtained from the Administrator of the State EPA Office when required.

6.3.84 Issue the appropriate shipment notifications to consignees.

6.3.85 Return the shipping order and notify Material Control and Accountability when a shipment of hazardous material, hazardous waste (non-nuclear), or nuclear material is shipped from FEMP.

TRANSPORTATION SAFETY COMMITTEE

6.3.86 Evaluate policies for off-site transportation safety at the FEMP for compliance with applicable Federal, State and Local regulations.

6.3.87 Ensure off-site transportation policies and practices are conducted in accordance with all FEMP and OSHA safety requirements. Conduct periodic inspections and evaluations of all activities associated with the handling and transporting of hazardous materials for off-site shipments.

6.0 PROCEDURE (cont.)

SAFEGUARDS AND SECURITY

6.3.88 Provide interpretation and advice concerning the security and safeguard measures required for off-site shipment of classified or strategic nuclear materials.

6.3.89 Coordinate with Traffic Control to spot incoming carrier vehicles for inspection by the Maintenance Garage and to have the radiological survey conducted.

6.3.90 Verify that vehicle doors are properly secured.

6.3.91 Verify that the seal number, when recognizable, matches the serial number on the bill of lading before the shipment leaves the FEMP site.

6.3.92 Verify that the bill of lading has been signed by the Traffic Control authorizing the shipment to be released.

6.3.93 Coordinate emergency response activities for off-site shipments with the Emergency Operations Center as required.

MATERIAL CONTROL AND ACCOUNTABILITY (MC&A)

6.3.94 Verify that the consignee is authorized to receive the specific nuclear materials before the materials are shipped.

6.3.95 Process, verify the type of material and lot numbers, and approve the Shipping Order for Nuclear Material Form, FEMP CONT-558, for off-site shipment of nuclear material.

6.3.96 Forward the shipping order to the Traffic Control.

6.3.97 Process, verify the type of material and lot numbers, and approve the Shipping Order for Hazardous Material/ Hazardous Waste Non-Nuclear Form, FEMP CONT-3388, for off-site shipment of material.

6.3.98 Forward the shipping order to the Traffic Control.

6.3.99 Receive shipping order from Traffic Control.

6.3.100 Notify the consignee that the preparation for off-site shipment has been completed.

6.0 **PROCEDURE** (cont.)

MATERIAL CONTROL AND ACCOUNTABILITY (MC&A)

6.3.101 Prepare and forward to the consignee, DOE/NRC Nuclear Materials Transaction Report, Form 741, for off-site shipments.

NOTE: These documents are used for verification of materials and shipping paper by Facility Site Services for material transport.

RADIOACTIVE SOURCE CONTROLLER

6.3.102 Notify the Traffic Control of the intent to ship radioactive source material off-site.

6.3.103 Provide copy of the purchase order to the Traffic Control.

6.3.104 Request Radiological Safety to conduct radiological 48-hour surveys of the radioactive source material and packaging.

6.3.105 Review the radiological survey results to verify compliance with applicable departmental procedures.

6.3.106 Initiate Shipping Order for Hazardous Material/Hazardous Waste Non-Nuclear Form, FEMP CONT-3388, after approval from EC&QA.

6.3.107 Notify the Traffic Control when the packaged material is ready to be shipped off-site.

6.3.108 Maintain constant surveillance of radioactive source material until it is loaded onto the transport vehicle for off-site shipment.

6.3.109 Remove the radioactive source material shipped from the inventory list.

WASTE OPERATIONS

6.3.110 Package hazardous waste and radioactive waste for off-site shipments.

6.3.111 Verify that hazardous waste for off-site shipment has been packaged according to EPA/DOT/DOE regulations and WEMCO Guidelines.

6.3.112 Request radiological surveys of packaged waste as required per applicable departmental procedures.

6.0 PROCEDURE (cont.)

WASTE SHIPPING COORDINATOR

6.3.113 Prepare and forward the Storage and Disposal Data Sheet, the Tally Sheet, and other documents as required to Site-Wide Quality Certification for review and approval.

6.3.114 Prepare additional shipping documentation according to consignee requirements.

NOTE: Consignee requirements must exceed the requirements of 49 CFR.

6.3.115 Receive the documentation associated with off-site shipment from the appropriate departments.

6.3.116 Forward the documentation to Site-Wide Quality Assurance for review.

WASTE SHIPPING

6.3.117 Prepare waste packaging for use by the Waste Originator according to departmental procedures.

6.3.118 Prepare packages of waste for off-site shipping according to departmental procedures and specific consignee requirements.

6.3.119 Request the radiological survey of waste containers as required.

SAFE SHUTDOWN

6.3.120 Prepares Nuclear Materials Disposition Order (NMDO) per PP-5031 for proposed shipments of nuclear materials.

6.3.121 Acts as liaison internally to facilitate shipment and externally to ensure customer satisfaction.

6.3.122 Tracks NMDO through completion, issues completion notice and maintains documentation on activity.

7.0 APPLICABLE DOCUMENTS

7.1 Drivers

7.1.1 DOE 1540.1, "Materials Transportation and Traffic Control Management"

WESTINGHOUSE ENVIRONMENTAL MANAGEMENT COMPANY OF OHIO SITE DOCUMENT PROGRAM		SITE POLICY AND PROCEDURE Page 27 of 29
Title: **PACKAGING, ON-SITE MOVEMENT AND OFF-SITE SHIPMENT OF MATERIAL**		DOCUMENT NO: PP-0314 REVISION NO. 0
Authorization: W. H. Britton, President	Supersedes: FMPC-314, Dated 12-31-90, Rev. 2	Issue Date: 12-20-91

7.0 APPLICABLE DOCUMENTS (cont.)

7.1.2 OR 1540.1B, "Materials Transportation and Traffic Control Management"

7.1.3 DOE 1540.2, "Hazardous Material Packaging for Transport - Administrative Procedures"

7.1.4 DOE 1540.3, "Base Technology for Radioactive Material Transportation Packaging Systems"

7.1.5 DOE 5000.3A, "Occurrence Reporting and Processing of Operations Information"

7.1.6 DOE 5480.3, "Safety Requirements for the Packaging and Transportation of Hazardous Materials"

7.1.7 DOE 5632.1, "Physical Protection of Classified Matter and Information"

7.1.8 DOE 5632.2A, "Physical Protection of Special Nuclear Material and Vital Equipment"

7.1.9 DOE 5700.6B, "Quality Assurance"

7.1.10 DOE/EV 06194-3, "Explosives Safety Manual"

7.1.11 DOE 5480.19 "Conduct of Operations"

7.1.12 10 CFR Part 71, "Packaging of Radioactive Material for Transport and Transportation of Radioactive Material Under Certain Conditions"

7.1.13 40 CFR Parts 116 -117, "Designation of Hazardous Substances and Their Reportable Quantities"

7.1.13 40 CFR Parts 260-265, "Standards Applicable to Hazardous Wastes"

7.1.14 49 CFR Parts 100-199, "Hazardous Material Regulations"

7.1.15 49 CFR Parts 383-397, "Federal Motor Carrier Safety Regulations"

7.1.16 International Atomic Energy Agency (IAEA) "Safety Series No. 6," 1985 Edition, as amended

7.0 APPLICABLE DOCUMENTS (cont.)

7.1.17 International Air Transport Association (IATA) "Dangerous Goods Regulations," 1991 Edition

7.1.18 International Civil Aviation Organization (ICAO) "Technical Instructions," 1985 Edition

7.1.19 American National Standards Institute (ANSI) N14 Series

7.1.20 Directory of DOE Certificates of Compliance for Radioactive Materials Packaging

7.2 Reference Documents

THIS SECTION WILL CONTAIN A LIST OF APPLICABLE WEMCO PROCEDURES.

8.0 APPLICABLE FORMS

THIS SECTION WILL CONTAIN A LIST OF APPLICABLE WEMCO FORMS AND FORM NUMBERS.

9.0 ATTACHMENTS

None

WESTINGHOUSE ENVIRONMENTAL MANAGEMENT COMPANY OF OHIO SITE DOCUMENT PROGRAM		SITE POLICY AND PROCEDURE Page 29 of 29
Title: **PACKAGING, ON-SITE MOVEMENT AND OFF-SITE SHIPMENT OF MATERIAL**		DOCUMENT NO: PP-0314 REVISION NO. 0
Authorization: W. H. Britton, President	Supersedes: FMPC-314, Dated 12-31-90, Rev. 2	Issue Date: 12-20-91

RECORD OF ISSUE/REVISIONS

DATE	REV. NO	DESCRIPTION AND AUTHORITY
12-20-91	0	Document describing how on-site and off-site materials are packaged and moved per Request No. P91-387, initiated by J. McGrogan.

LOW-LEVEL WASTE MANAGEMENT PROCEDURES

SUBMITTED TO USEPA ON 8/30/91 AS REMOVAL ACTION #9 WORK PLAN

U.S. Department of Energy

Washington, D.C.

3288 **ORDER**

DOE 5480.10

6-26-85

SUBJECT: CONTRACTOR INDUSTRIAL HYGIENE PROGRAM

1. PURPOSE. To establish the requirements and guidelines applicable to Department of Energy (DOE) contractor operations for maintaining an effective industrial hygiene program to preserve employee health and well-being.

2. CANCELLATION. Chapter X, DOE 5480.1A, ENVIRONMENTAL PROTECTION, SAFETY, AND HEALTH PROTECTION PROGRAM FOR DOE OPERATIONS, of 5-22-81.

3. SCOPE. The provisions of this Order apply to all Departmental Elements and to contractors performing work for the Department as provided by law and/or contract and as implemented by the appropriate contracting officer.

4. APPLICABILITY. The Order lists the responsibilities and authorities of Departmental Elements for policy development and overview of industrial hygiene programs at Government-owned contractor-operated (GOCO) facilities. The industrial hygiene program elements contained in this Order apply to contractor organizations performing the actual work or job-related tasks and whose contracts include the occupational safety and health contract clause specified in DOE Acquisition Regulation, 48 CFR 970.5204-2, "Safety and Health. The program elements do not apply to control of occupational exposure to ionizing radiation. The provisions of this Order do not apply to non-GOCO contractor employees doing work for the Department or the Federal employees occupational safety and health program as defined by DOE 3790.1A.

5. REFERENCES.

   a. DOE 1324.2, RECORDS DISPOSITION, of 5-22-80, which provides guidance on maintenance of exposure records.

   b. DOE 3790.1A, FEDERAL EMPLOYEE OCCUPATIONAL SAFETY AND HEALTH PROGRAM, of 10-22-84, which defines policy for Federal employee safety and health programs.

   c. DOE 5480.1A, ENVIRONMENTAL PROTECTION, SAFETY, AND HEALTH PROTECTION PROGRAM FOR DOE OPERATIONS, of 8-13-81, which provides overall environment, safety, and health policy.

DISTRIBUTION:
All Departmental Elements

INITIATED BY:
Assistant Secretary for Environment, Safety, and Hea

673

d. DOE 5480.4, ENVIRONMENTAL PROTECTION, SAFETY, AND HEALTH PROTECTION STANDARDS, of 5-15-84, which provides mandatory industrial hygiene standards and exemption procedures.

e. DOE 5482.1A, ENVIRONMENTAL PROTECTION, SAFETY, AND HEALTH PROTECTION APPRAISAL PROGRAM, of 8-13-81, which provides requirements for appraisals of DOE and DOE contractor industrial hygiene programs.

f. DOE 5483.1A, OCCUPATIONAL SAFETY AND HEALTH PROGRAM FOR DOE CONTRACTOR EMPLOYEES AT GOVERNMENT-OWNED CONTRACTOR-OPERATED FACILITIES, of 6-22-83, which provides occupational safety and health protection to DOE contractor employees consistent with the protection afforded private industry employees under the Occupational Safety and Health Act.

g. DOE 5484.1, ENVIRONMENTAL PROTECTION, SAFETY, AND HEALTH PROTECTION INFORMATION REPORTING REQUIREMENTS, of 2-24-81, which provides incident and illness reporting requirements.

h. Title 10 CFR 1008, Records Maintained on Individuals (Privacy Act), which provides the procedures to implement the Privacy Act of 1974 (5 U.S.C. 552a) within the Department of Energy.

i. Title 29 CFR 1904, Recording and Reporting Occupational Injury and Illnesses, which provides criteria for recording and reporting occupational illnesses.

j. Title 29 CFR 1910.20, Access to Employee Exposure and Medical Records, which provides criteria for allowing access to employee exposure and medical records.

k. Title 29 CFR 1910, Subpart Z, Toxic and Hazardous Substances, which provides permissible exposure limits for toxic and hazardous materials.

l. Title 48 CFR Chapter 9, Acquisition Regulation, which contains the occupational safety and health contract clause.

m. "TLVs Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment with Intended Changes," most current edition, published by the American Conference of Governmental Industrial Hygienists, which provides exposure limits for toxic chemicals and physical agents.

6. DEFINITIONS.

a. Industrial Hygiene. The science and art devoted to the recognition, evaluation, and control of environmental factors or stresses arising in or from the workplace that may cause sickness, impaired health and well-being, or significant discomfort and inefficiency among workers or those with whom they come into contact.

b. Program Senior Official, for this Order only, is an outlay program manager which includes the Assistant Secretaries for Fossil Energy, Defense Programs, Nuclear Energy, and Conservation and Renewable Energy, and the Directors of Energy Research and Civilian Radioactive Waste Management.

c. Field Organization is a Departmental Element located outside the Washington, DC, geographical area.

7. POLICY. It is the policy of the Department that contractor organizations:

a. Provide places and conditions of employment that are free from or protected against recognized hazards that cause or are likely to cause sickness, impaired health and well-being, or significant discomfort and inefficiency among workers or those with whom they come into contact.

b. Assure that contractor employees and employee representatives have the opportunity to participate in the operation of the contractor employee industrial hygiene program.

c. Assure that contractors make well-defined assignments of responsibilities within their organization for the conduct of an employee industrial hygiene program.

8. RESPONSIBILITIES AND AUTHORITIES.

a. Assistant Secretary for Environment, Safety, and Health shall:

(1) Develop general requirements for industrial hygiene programs that are applicable to Government-owned, contractor-operated facilities.

(2) Provide advisory and interpretative services on matters dealing with the policy, responsibilities, requirements, and procedures contained in this Order.

(3) Review, approve, or deny, as appropriate, and respond to requests for exemptions from industrial hygiene requirements as delineated by the exemption procedures for policy requirements of DOE 5480.4, Attachment 2, page 6, paragraph 3.

(4) Appraise the industrial hygiene performance of field organizations, and upon the request of field organizations or program senior officials conduct independent appraisals of contractor industrial hygiene programs (refer to DOE 5482.1A).

(5) Provide technical guidance on the evaluation and control of occupational health hazards upon the request of field organizations or program senior officials.

b. Program Senior Officials shall:

(1) Assure that contractor industrial hygiene programs are in compliance with the requirements of this Order through appropriate field organizations.

(2) Review, coordinate with, and submit to the Assistant Secretary for Environment, Safety, and Health, requests for exemptions from mandatory requirements as delineated by the exemption procedures for policy requirements of DOE 5480.4, Attachment 2, page 6, paragraph 3.

(3) Identify needs to the Assistant Secretary for Environment, Safety, and Health for new guidelines to address industrial hygiene concerns.

(4) Approve, as appropriate for facilities under their purview, proposals for additional or more stringent requirements for implementation by field organizations after consultation with the Assistant Secretary for Environment, Safety, and Health, field organizations, and other affected program senior officials.

c. Heads of Field Organizations shall:

(1) Assure that the contractor organizations under their purview implement and maintain industrial hygiene programs in accordance with the intent and requirements of this Order.

(2) Review, coordinate, and submit to the appropriate program senior official requests for exemptions from industrial hygiene requirements as delineated by the exemption procedures for policy requirements of DOE 5480.4, Attachment 2, page 6, paragraph 3.

(3) Prescribe, as appropriate, additional or more stringent requirements if these are determined to be essential to the health and well-being of contractor employees or the efficiency of safety and health programs. Notify affected senior officials of additional or more stringent requirements prescribed.

(4) Conduct appraisals of contractor industrial hygiene programs in accordance with DOE 5482.1A.

(5) Identify needs to the Assistant Secretary for Environment, Safety, and Health for guidelines to address industrial hygiene concerns.

9. REQUIREMENTS. The manager of the contractor organization performing the actual work or job-related task shall assure compliance with the requirements of this paragraph. These requirements are necessary elements for implementing and maintaining an effective industrial hygiene program and providing protection in accordance with the standards of DOE 5480.4, Attachment 2, page 2, paragraph 2d(3).

a. Directives. Internal directives or operating procedures shall be developed to implement industrial hygiene programs. These directives may be incorporated into existing documents covering safety and health programs. The directives shall clearly specify the authority and responsibilities of the organizational staff administering the industrial hygiene program. The directives shall also specify the responsibilities of other functional organizations. Topics that should be addressed are:

(1) The Operating Organization having line safety and health responsibilities should be required to: (a) conduct operations consistent with established health and safety procedures; (b) include the industrial hygiene staff in the design review process whenever new construction or remodeling of an existing process is planned; and (c) request the industrial hygiene staff to evaluate the effectiveness of proposed environmental control equipment and approve procedures for its use.

(2) The Medical Organization should be required to: (a) maintain records of occupational illnesses in accordance with the recordkeeping requirements of Title 29 CFR 1904; (b) consult with the industrial hygiene staff on the need for job-related medical examinations or bioassays; (c) alert the industrial hygiene staff to all suspected occupational illnesses to facilitate early evaluations and correction of problems; and (d) include the industrial hygiene staff, if appropriate, in the investigations of occupational illnesses.

(3) Purchasing and Contracting Organizations should be required to: (a) participate as requested by the industrial hygiene staff to assure that potentially hazardous material or equipment being procured are adequately identified, evaluated, and controlled; and (b) require contractors or subcontractors performing potentially hazardous operations within a DOE or DOE-controlled facility to comply with the mandatory industrial hygiene standards of DOE 5480.4 and make provisions to allow the industrial hygiene staff to monitor compliance.

(4) First-line Supervisors should be required to: (a) maintain healthful working conditions within his or her own organization and implement industrial hygiene recommendations; (b) train employees to perform assignments in a safe manner; and (c) follow administrative procedures to allow appropriate disciplinary action to be taken when health and safety rules are violated.

(5) Employees should be required to: (a) observe all safety and health rules; (b) use all prescribed personal protective equipment; (c) follow established health and safety practices and procedures; and (d) notify supervisors immediately of suspected exposures to harmful agents or conditions.

b. Function. The industrial hygiene program shall be designed to preserve employee health and well-being. This shall be accomplished by identification, evaluation, and control of environmental factors and stresses found in the workplace. These environmental factors and stresses include: chemical (e.g., liquid, particulate, vapor, and gas); physical (e.g., electromagnetic radiation, noise, vibration, and magnetic fields); biological (e.g., agents of infectious diseases); and ergonomic (e.g., body position in relation to task, repetitive motion, and mental or physical fatigue). The contractor industrial hygiene program must have the following features:

(1) Identification of Health Hazards. The industrial hygiene staff shall identify and document existing and potential occupational health hazards through: knowledge and assessment of the operations; periodic walk-through surveys; information provided by interorganizational communication; the review of proposed projects, facilities, engineering plan, and specifications; and maintenance of a hazards inventory or tracking system.

(2) Hazard Evaluation. Once potential health hazards are identified, the industrial hygiene staff must determine the extent of the hazard through appropriate consultation with other professionals, sound judgment, and the application of established standards or guides and such evaluation techniques as air sampling and bioassay. A report shall be sent to the first level supervisor with the industrial hygiene staff's evaluation of whether occupational exposures are within permissible limits, together with supporting evidence. The permissible exposure limits used in hazard evaluation shall not exceed those in the mandatory industrial hygiene standards of DOE 5480.4, Attachment 2, page 2, paragraph 2d(3). When a potential health hazard is identified that has no assigned permissible exposure limit, a guideline on evaluation and control should be developed based on the best available information (refer to paragraph 10a(1)).

(3) Control Measures. Control measures shall be implemented whenever it is determined that a potential health hazard exists sufficient to produce illness or injury or that applicable standards are not being followed. The industrial hygiene staff shall formally recommend control measures to the first level supervisor who must respond promptly. Where feasible, engineering control measures, process change, or material substitution shall be used to prevent or minimize exposure to hazards. Administrative controls and personal protective equipment should supplement engineering controls as appropriate.

(4) Periodic Review. The satisfactory control of occupational health hazards shall be given continuing attention despite the imposition of control measures. Periodic monitoring is essential to assure maintenance of satisfactory conditions. The industrial hygiene staff shall determine the type and frequency of periodic monitoring. The industrial hygiene staff shall report to line management regarding the continuing adequacy of controls, the need for additional controls, or recommendations for maintenance or reemphasis of administrative controls. Employees of DOE contractor organizations shall be provided the results of the monitoring program for toxic materials or harmful physical agents, upon request.

(5) Employee Education. The industrial hygiene staff shall assist the first level supervisor in the development of an employee information and training program whenever a potential health hazard exists requiring engineering controls, administrative procedures, or personal protective equipment. The program shall include written notification of employees of environmental monitoring results when the results indicate that the employees are exposed above permissible limits. Training should include information on operations that may lead to exposure, the potential health effects of the hazard, the content of applicable standards, and the purpose and results of environmental monitoring. Training should be updated and repeated periodically.

(6) Medical Monitoring. The industrial hygiene staff shall inform the medical organization of potential and existing health hazards identified, the results of hazard evaluations, and other industrial hygiene information needed for operation of a medical monitoring program. The industrial hygiene staff should be available to accompany medical staff on periodic worksite visits (refer to DOE 5480.1A, Chapter VIII, paragraph 4a(2)).

c. Carcinogen Control Program

(1) Purpose. To establish policy and requirements for the identification, evaluation, and control of occupational exposure to chemical carcinogens.

(2) Policy. A program shall be implemented to maintain occupational exposure to chemical carcinogens as low as reasonably achievable.

(3) Applicability. The chemical substances covered by this program shall be those regulated as carcinogens by the Occupational Safety and Health Administration (OSHA) standard, Title 29 CFR 1910, Subpart Z, and those listed as carcinogens and suspect carcinogens in Appendix A of the American Conference of Governmental Industrial Hygienists

(ACGIH) TLV booklet. The program shall apply to operations where the industrial hygiene staff has determined that use of a carcinogen creates a significant potential for occupational exposure. For carcinogens with prescribed exposure limits, the program shall apply to operations where the industrial hygiene staff determines that controls are necessary to maintain occupational exposure below limits.

(4) Requirements. For OSHA-regulated carcinogens, a program shall be implemented that, at a minimum, conforms to the requirements of applicable OSHA standards (refer to DOE 5483.1A). Exposure to carcinogen listed in the ACGIH TLV booklet shall be controlled by application of the industrial hygiene functions of identification, evaluation, control, periodic review, employee education, and medical monitoring listed in paragraph 9b, above. In addition, the following requirements shall apply to the use and/or potential exposure to carcinogens.

(a) Safety plans, standard operating procedures, or experimental protocols shall be written describing the use of chemical carcinogen and the procedures used to control exposure. These documents shall be reviewed and approved by the industrial hygiene staff prior to the initiation of an operation.

(b) Regulated areas shall be established where chemical carcinogens are used. The characteristics of regulated areas shall be appropriate to assure that access is controlled and will depend on the quantity and physical properties of the material being used and on the operations being performed. A record shall be maintained of all personnel working in regulated areas.

(c) Engineering controls shall be the primary method used to minimize exposure to carcinogens and to prevent the release of carcinogens into the workroom environment. Provisions shall be made to assure that hazardous levels of contaminated air are not released into adjacent work areas or the outside environment. All contaminated liquid and solid waste shall be disposed utilizing approved methods (refer to DOE 5480.4, Attachment 1, paragraph 2b(11)).

(d) Signs warning of the presence of chemical carcinogens shall be posted at all entrances to regulated work areas. Labels should be used on all carcinogen containers to identify the chemical and to warn of the carcinogenic hazard.

(e) Good hygiene shall be maintained through workpractices, such as: use of protective clothing; availability of showers and change rooms; bans on eating, drinking, and smoking in regulated areas; and use of nonpermeable work surfaces.

(f) Procedures shall be established for emergency actions involving chemical carcinogens (e.g., cleanup of spills or accidental releases). Occurrences which could result in exposure of personnel or release to the environment shall be investigated and, if appropriate, reported (refer to DOE 5484.1).

d. Industrial Hygiene Staff.

(1) The staff responsible for the direction and operation of the industrial hygiene program must be professionally qualified, adequate in number, and have sufficient time and authority to design and implement the industrial hygiene program set forth in this Order.

(2) As an alternative to a staff industrial hygienist, consultants qualified in industrial hygiene and knowledgeable of the requirements of this Order may be retained to augment the contractor staff and perform comprehensive or specific industrial hygiene surveys as needed.

e. Facilities, Instrumentation, and Technical Support Personnel shall be available to implement the requirements of this Order. Provisions shall be made to take and analyze air and water samples and bioassay specimens, and to test, calibrate, and maintain instruments. Where it is impractical to provide these services on-site, the services of off-site laboratory facilities and instrument services shall be retained.

f. Recordkeeping Requirements.

(1) An inventory of occupational health hazards shall be maintained. The inventory should be a listing of potential chemical, physical, and biological health hazards by location and/or job category of users and indicate when the hazards were present.

(2) The industrial hygiene staff's evaluation of potential health hazards shall be documented in written reports. If a deficiency is identified the report shall recommend corrective actions. The report, along with any response from line management and/or documentation of corrective actions, shall be retained.

(3) The data resulting from occupational environmental monitoring shall be easily retrievable. Monitoring data should be tabulated along with information on the location and operation monitored, the identity and job classification of the employees associated with the operation, estimated time-weighted average or short-term exposure levels, and a reference to the sampling and analytical methods used.

(4) Records shall be retained in accordance with DOE 1324.2, RECORDS DISPOSITION.

(5) Industrial hygiene hazard inventories, reports, and monitoring data shall be readily accessible to the medical organization responsible for operating the medical monitoring program. Records access shall be provided to employees or designated representatives of employees in accordance with OSHA Regulation 29 CFR 1910.20 and DOE Privacy Act Regulation 10 CFR 1008.17(b)(5).

10. TECHNICAL GUIDANCE. The Assistant Secretary for Environment, Safety, and Health has established an industrial hygiene advisory program. The program's objectives are to provide interim exposure guidelines, guidance, and consultation on evaluation and control of health hazards, and testing of unapproved respirators used in Department facilities.

a. Program Components.

(1) The Toxic Material Advisory Program is directed to: (a) provide consultation support to all Departmental Elements on all aspects of hazard recognition, including toxicology; (b) develop a data base management system to share DOE contractor-developed material safety data sheets; (c) facilitate the timely development of interim exposure guidelines for chemical and physical occupational and environmental hazards associated with Departmental activities when no other guidelines exist; and (d) perform special studies as requested. The Toxic Material Advisory Program is operated for the DOE by the Brookhaven National Laboratory Center for Assessment of Chemical and Physical Hazards.

(2) The Industrial Hygiene Task Force is directed to: (a) provide consultation support to all Departmental Elements on all aspects of evaluation and control of occupational health hazards, with telephone assistance, an information clearinghouse, and onsite assistance for short-term unique hazards; (b) develop technical guidance on monitoring methods and control technology; and (c) perform special studies as requested. The Task Force conducts industrial hygiene surveys to evaluate potential hazards at Department facilities when other industrial hygiene support is unavailable, on unique industrial hygiene problems, or when third party consulting is required. The Industrial Hygiene Task Force is operated for the DOE by the Los Alamos National Laboratory Industrial Hygiene Group.

(3) The Respirator Studies Program is directed to test contractor developed respiratory protective devices for which the National Institute for Occupational Safety and Health (NIOSH) has no approval schedule or for which NIOSH approval is not practicable. All respirators used in Department facilities must be either approved by NIOSH or tested and accepted for use through the Respirator Studies Program. The program will also provide consultation on all aspects of respiratory protection programs. The Respirator Studies Program is operated for the DOE by the Los Alamos National Laboratory, Industrial Hygiene Group.

b. Use of Advisory Programs. The advisory programs were established to help assure the high technical quality of all DOE and DOE contractor industrial hygiene programs. All Departmental Elements should utilize these programs to help resolve technical problems with recognition, evaluation, or control of potential health hazards.

(1) Consultation may be obtained by directly contacting the Brookhaven National Laboratory, Center for Assessment of Chemical and Physical Hazards, or the Los Alamos National Laboratory Industrial Hygiene Group.

(2) Other technical support requests should be reviewed by field organizations and forwarded to the Office of Operational Safety.

BY ORDER OF THE SECRETARY OF ENERGY:

WILLIAM S. HEFFELFINGER
Director of Administration

CONTROL OF WORK INVOLVING ASBESTOS, IH-03

SEE STEP 2

FMPC 2128, INDUSTRIAL & HYGIENE SAFETY MANUAL

AVAILABLE UPON REQUEST

SAFE SHUTDOWN WORK PLAN

SUBMITTED TO USEPA 10/31/91
TO FULFILL CONSENT AGREEMENT,
REMOVAL ACTION #12

ASBESTOS SURVEY & ASSESSMENT FOR THE FEMP

AVAILABLE UPON REQUEST

OU3 RI/FS WORK PLAN ADDENDUM

TO BE TRANSMITTED TO USEPA 6/2/92

STUDY FOR SYSTEMATIC REMOVAL OF BUILDINGS AND FACILITIES

DUE TO USEPA 3/16/93 IN REFERENCE TO CONSENT AGREEMENT IX.4

689

3288

WORK PLAN FOR PLANT 7 DISMANTLING

DUE TO USEPA 6/21/93 IN REFERENCE TO CONSENT AGREEMENT IX.2

OU3 REMEDIAL INVESTIGATION REPORT

DUE TO USEPA 6/11/96 IN REFERENCE TO CONSENT AGREEMENT X.C.3

OU3 FEASIBILITY STUDY REPORT

DUE TO USEPA 11/5/96
IN REFERENCE TO CONSENT AGREEMENT, X.C.3

ASBESTOS PROGRAM INTERNAL AUDIT/SELF ASSESSMENT SYSTEM

COMPONENT	FREQUENCY	RESPONSIBLE PERSON(S)	PURPOSE
1) Audit/Site surveillances of Work Practices	Semi-annually	Asbestos Mgmt. Committee	These audits or surveillances are performed to verify that asbestos abatement work is being performed according to the appropriate procedures. They are also intended to ensure that employees working in areas where ACM is located understand the hazard or potential hazards of their work area.
A. IH practices vs. procedures	Jan./July	IH+CAP+QA*	
B. Abatement work practices vs. procedures*	Feb./Aug.	Maint.+CAP+QA*	
C. Notification practices vs. procedures*	March/Sept.	EC+CAP+QA*	
D. Storage & Disposal practices vs. procedures	April/Oct.	Waste Mgmt.+CAP+QA*	
E. Training requirements/ practices vs. procedures	May/Nov.	Cent. Trng.+CAP+QA*	
F. Contractor/Proj. Mgmt. practices vs. procedures	June/Dec.	Proj. Mgmt.+Const. Coord.+ CAP+QA*	
2) Site Surveillance of Asbestos Hazards	Quarterly		These surveillances are conducted to ensure the hazard assessments from the site survey and migration studies are kept up-to-date and that critical areas requiring immediate attention are identified.
A. Environmental Monitoring	J,A,J,O	IH Techs and/or Env. Monit. techs.	
B. Building Inspections (update survey)	beginning March 1992	Facility Owners+CAP,IH,WM, Maint. or BI/MP qualified	
C. Waste Storage Inspections			
D. QA verification of above	Semi-annually	QA*+appropriate personnel	

* recommend that QA personnel <u>not</u> be members of AMC so they can provide <u>independent</u> assessment.

ASBESTOS PROGRAM INTERNAL AUDIT/SELF ASSESSMENT SYSTEM

COMPONENT	FREQUENCY	RESPONSIBLE PERSON(S)	PURPOSE
3) Self Assessment Review A. Results of Surveillances B. Comparison w/ other programs internal and external to DOE. C. Regulatory requirements - adequately addressed in procedures (1A,1B,1C,1D, 1E,1F)? D. Protection and Prevention Has employee/public health been protected and environmental emissions prevented? - Personal monitoring results - Environmental Monitoring E. Asbestos Management Plan (AMP) Is it followed? Based on 2A,2B,2C,2D and the previous questions, is it a good plan F. Resources Are they adequate to execute the plan/program?	Annually	3-5 AMC members* + DOE representatives + SACI**	To self-assess the Asbestos Program/Mgmt. Plan in regards to protecting employees, preventing environmental emissions and ensuring compliance. Key areas for improvement will be identified and communicated to management. The first objective is to assess the program's capability (resources, systems) to achieve its goals. A second objective, supported by the internal audits and surveillances, is to evaluate the execution of the Asbestos Program/ Mgmt. Plan.

*at least one from each department or section surveyed.
**recommend that personnel from SACI participate in monthly AMC meetings and annual self-assessment, if not enlisted as a member of the AMC.

PJB 12/19/91
Rev. 1

U.S. Department of Energy
DRAFT NOTICE

SUBJECT: SELF-ASSESSMENT

1. PURPOSE. To establish procedures for the implementation of self-assessment for the Department of Energy (DOE).

2. SCOPE. The provisions of this Notice apply to all levels of the Department's line organization; Headquarters Program Secretarial Officer (PSO) organizations: Defense Programs (DP), Environmental Restoration and Waste Management (EM), Energy Research (ER), Nuclear Energy (NE), New Production Reactors (NP), Fossil Energy (FE), Civilian Radioactive Waste Management (RW), and Conservation and Renewable Energy (CE); DOE Field/Area Offices; Power Marketing Offices Headquarters, Administrative Offices (Chief Financial Officer, Procurement, and Administration); and contractors performing work for DOE as provided by law and/or contract and as implemented by the appropriate contracting officer. (For additional details, see subsection 1.2.1 and Appendix G in the attached Self-Assessment Guidance Document.)

3. EXEMPTIONS. Work conducted under the Naval Nuclear Propulsion Program.

4. REFERENCES. See Appendix A of the enclosed Self-Assessment Guidance Document.

5. DEFINITIONS. See Appendix B of the enclosed Self-Assessment Guidance Document.

6. POLICY. It is DOE policy to implement self-assessment in environmental, safety, and health (including nuclear safety) areas; safeguards and security; and other disciplines for which self-assessment may be required by SEN-6D-91 and other initiatives. This Notice provides implementation guidance for this policy by the Department to ensure that self-assessment requirements are clearly specified for the broad spectrum of work performed by DOE and its contractors.

7. OBJECTIVES. DOE's objectives are to ensure the following:

a. That management provides at all levels: planning, organization, direction, control, and support to achieve effective implementation of self-assessment;

b. That the line organizations and contractors continually perform self-assessment;

c. That overall self-assessment performance is reported and evaluated following the rigorous assessment process.

8. REQUIREMENTS. Self-assessment, as described in the attached Self-Assessment Guidance Document, will be implemented within the Department as specified in the SEN-6-89 through SEN-6D-91 series and DOE Memorandum S-1 of July 31, 1990.

9. RESPONSIBILITIES AND AUTHORITIES. Organizational leaders in paragraph two above are responsible for ensuring that the requirements of this Notice are implemented. They also have the following responsibilities:

(1) Ensure that DOE Headquarters, Field Offices/Area Offices and contractors to which this Notice applies, implement the attached guidance.

(2) Provide self-assessment program and project direction and resources to the organizations for which they are responsible.

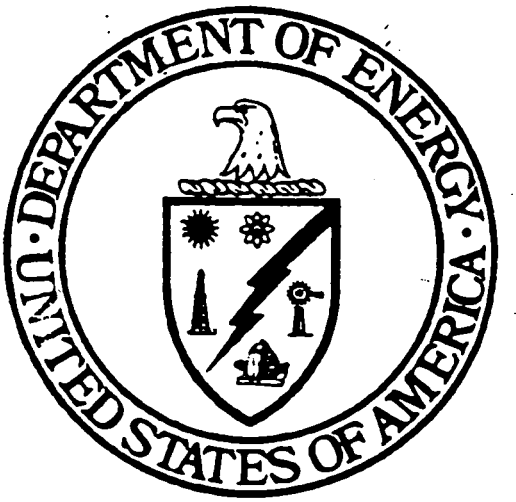
(3) Assess the adequacy of self-assessment programs and implementation.

(4) Implement a self-assessment program governing the work of their organizations in accordance with the requirements of the attached guidance document.

In addition, EH, NS, and Security Affairs are responsible for assessing the effectiveness of the line organizations' self-assessment programs and implementation as well as the effectiveness of the Self-Assessment Offices and organizations.

10. INTERPRETATIONS. Requests for interpretation of the requirements of this Notice shall be forwarded for action, together with proposed resolutions, to NE-80 and EH-5.

U.S. DEPARTMENT OF ENERGY



DRAFT

SELF-ASSESSMENT GUIDANCE DOCUMENT

January 16, 1992

TABLE OF CONTENTS

Section			Page
1.0	Introduction		1
	1.1	Purpose of Self-Assessment Guidance	1
	1.2	Self-Assessment Scope	1
		1.2.1 Applicability	1
		1.2.2 Functions Involved	2
	1.3	Background for Self-Assessment Program	2
		1.3.1 DOE Plan to Strengthen Operations	2
		1.3.2 SEN-6-89 and Revisions through SEN-6D-91: Departmental Organizational and Management Arrangements	2
		1.3.3 Secretary's Guidance on ES&H Self-Assessment	2
		1.3.4 FY 1994 Secretarial Planning Guidance	3
		1.3.5 Evolution of Current Self-Assessment Guidance	3
	1.4	Responsibilities for the Self-Assessment Program	3
	1.5	Provisions and Organization of the Self-Assessment Guidance	3
		1.5.1 Provisions	3
		1.5.2 Organization of the Self-Assessment Guidance	3
2.0	Overview of Self-Assessment Process		5
	2.1	Description of Self-Assessment	5
		2.1.1 Self-Assessment Process	5
		2.1.2 Self-Assessment Evaluation	6
		2.1.3 Extent and Frequency of Evaluations	8
		2.1.4 Planned versus Reactive Evaluations	8
		2.1.5 Integration and Coordination of Self-Assessment Activities	8
	2.2	Self-Assessment Organizational Interface Process	9
		2.2.1 General Organization of Self-Assessment Programs	9
		2.2.2 Program Organization and Interfaces	9
		2.2.3 Interfaces Between Line Self-Assessment and Departmental Oversight	11
3.0	Self-Assessment Functional Guidelines and Implementation		13
	3.1	Program Design and Scope	14
		3.1.1 Formal Charters and Program Implementation Plans	14
		3.1.2 Scope	14
		3.1.3 Performance Objectives and Criteria	15
		3.1.4 Schedule for Self-Assessment Activity	15
		3.1.5 Management Support and Involvement	16
		3.1.6 Cooperation with External Oversight and Assessment	17
		3.1.7 Atmosphere of Continual Quality Improvement	18
		3.1.8 Procedures to Plan and Document Self-Assessments	18
		3.1.9 Independent Offices and Organizations for Self-Assessments	19
	3.2	Evaluations	20
		3.2.1 Self-Evaluation Activities	20
		3.2.2 Independent Evaluation Activities	21

3.3 Performance Analysis and Issues Management Elements 21
3.3.1 Root Cause Analysis 23
3.3.2 Tracking and Reporting System 23
3.3.3 Trend Analysis 24
3.3.4 Issue and Corrective Action Prioritization 24
3.3.5 Corrective Action Verification and Validation 25
3.3.6 Lessons-Learned Program 26
3.4 Administrative Support Requirements 26
3.4.1 Self-Assessment Staffing, Staff Qualifications, and Training 27
3.4.2 Facilities and Equipment Planning 28
3.4.3 Strategic Planning and Budgeting 28

4.0 Guidance for Self-Assessment Annual Reports 31
4.1 Purpose 31
4.2 Scope 31
4.3 General Requirements 31

5.0 Self-Assessment Process Interface with Other Institutional Programs 33
5.1 Strategic Planning (SEN-25A-91) 33
5.2 Cost Plus Award Fee (CPAF) 33
5.3 Multiprogram Laboratory Appraisals 33
5.4 Institutional Planning 34
5.5 Internal Review Budget (IRB) 34
5.6 Federal Manager's Financial Integrity Act (FMFIA) and Internal Control Systems 34
5.7 Five Year Plans: (Environmental Restoration and Waste Management; Safety and Health) 34
5.8 Performance Indicators and Trending Program (SEN-29-91) 35

Appendices

A References A-1
B Definitions B-1
C Self-Assessment Guidelines for Annual Reports C-1

General Guidelines for Preparing Annual Self-Assessment Report - Facility Level C-2
General Format for Preparing Facility Level Annual Self-Assessment Report C-3
General Guidelines for Preparing Annual Self-Assessment Report - Contractor Level C-5
General Format for Preparing Contractor Level Annual Self-Assessment Report C-6
General Guidelines for Preparing Annual Self-Assessment Report - Field Office Level C-8
General Format for Preparing Field Office Level Annual Self-Assessment Report C-9

TABLE OF CONTENTS (Continued)

General Guidelines for Preparing Annual Self-Assessment Report - Headquarters - PSO Level C-11
General Format for Preparing Headquarters PSO Level Annual Self-Assessment Report C-12

D Performance Objectives and Criteria Listing D-1
E Root Cause and Causal Factor Analysis Systems E-1
F Acronyms and Abbreviations F-1
G Responsibilities for the Self-Assessment Program G-1

DOE Headquarters Level G-1
Field Office Level G-2
Site/Facility Level G-3

LIST OF FIGURES AND TABLES

Figures — Page

2-1 Self-Assessment Program Steps 7
2-2 Self-Assessment Interface Model 10
3-1 Examples of Self-Assessment Activities 22

Tables

3-1 Summary of Program Elements for Self-Assessment Programs . . . 13
3-2 Typical Training Courses for Self-Assessment Personnel 27

1.0 INTRODUCTION

1.1 Purpose of Self-Assessment Guidance

The purpose of this guidance is to provide assistance and support for the Secretary of Energy's program of self-assessments in environment, safety, and health (ES&H), which includes nuclear safety; safeguards and security (S&S); as well as other disciplines for which self-assessment may be required. The information gained from the self-assessment program is key to accomplishing the Secretary's goal of establishing definitive, priority-driven, and well-costed management plans. The objective is for line organizations to take a proactive approach by critically examining their effectiveness; identifying strengths and weaknesses; determining root causes for weaknesses; and designing, implementing, and evaluating effectiveness of corrective actions and lessons-learned programs to minimize weaknesses while maximizing strengths, thus moving towards operational excellence.

The major objective of the self-assessment program is to establish accountability and excellence at the "grassroots" level, thereby involving people who are the most familiar with the processes and their management. An effective self-assessment program diminishes the need for independent assessments. Self-assessment programs are to be an integral part of the management fabric of DOE and its facilities. The ultimate objective is not only the achievement of compliance with applicable laws and regulations for all concerned, but also continuous improved performance. This guidance does not, however, presuppose that there is an absence of effective self-assessment within DOE, but rather provides for the essential management elements of consistency, discipline, and formality.

1.2 Self-Assessment Scope

1.2.1 Applicability

This guidance applies to all levels of DOE's line organization; Headquarters Program Secretarial Officer (PSO) organizations: Defense Programs (DP), Environmental Restoration and Waste Management (EM), Energy Research (ER), Nuclear Energy (NE), New Production Reactors (NP), Fossil Energy (FE), Civilian Radioactive Waste Management (RW), and Conservation and Renewable Energy (CE); Power Marketing Administrations (PMAs); DOE Field Offices* (FOs); and contractors**.

---

* DOE "Field Offices" includes DOE area offices and site offices, Energy Technology Centers, and Power Marketing Administration Offices (see Appendix B for DOE "field office" definition).

** "contractors" refers to S&S and a seller of supplies and services, involved in performing work on-site at a DOE-owned or -leased facility, and awarded a contract or subcontract containing the clause "Safety and Health (Government-owned and -leased facility)" [DEAR 970-5204-2] or another clause whereby DOE elects to require compliance with DOE ES&H and S&S requirements.

It is expected that the self-assessment program will include the Department's administrative functions and management system that support the line programs. These guidelines were developed primarily for use in the evaluation of ES&H and S&S activities, but can be used as guidance for self-assessment in many disciplines.

Self-assessment of administrative functions may require the development of additional performance objectives suitable to the evaluation of these activities.

1.2.2 Functions Involved

Self-assessment involves all operations, support functions, management activities, and all other functions that would affect or involve ES&H and S&S areas. The various line managers and contractors may also identify other areas for inclusion in self-assessment programs.

1.3 Background for Self-Assessment Program

1.3.1 DOE Plan to Strengthen Operations

On June 27, 1989, Secretary Watkins issued a 10-Point Plan to strengthen DOE operations. This plan, among other initiatives, called for the resetting of priorities to place ES&H issues ahead of production goals, and also provided various means and goals for achieving and maintaining full compliance with Federal, state, local, and Department ES&H requirements.

1.3.2 SEN-6-89 and Revisions through SEN-6D-91: Departmental Organizational and Management Arrangements

Starting in May 19, 1989 and continuing through May 16, 1991, the Secretary approved various restructuring initiatives within the DOE organization "...to improve how we do our job...." Moreover, independent and separate self-assessment offices were to be established within the Program Secretarial Officers (PSOs) of DP, EM, ER, NE, NP, FE, RW, and CE at DOE Headquarters. These self-assessment offices will conduct independent assessments of the adequacy of DOE and contractor performance of ES&H as well as S&S within their areas of concern. The independent self-assessment offices are to be complemented by similar self-assessment organizations located in the field, at DOE, and at contractor sites. All self-assessment organizations were directed by the Secretary to be completely operational, both at Headquarters and in the field, by September 30, 1991.

1.3.3 Secretary's Guidance on ES&H Self-Assessment

On January 26, 1990, the Secretary "...directed that all line organizations implement a comprehensive self-assessment program to identify and characterize ES&H concerns relating to their operations." Further, on July 31, 1990, the Secretary issued guidance which set in motion the development of procedures to improve the identification, reporting, and correction of ES&H deficiencies throughout the DOE establishment. The comprehensive nature of this ES&H self-assessment program required the identification of the basic program elements and the integration of activities for self-assessments.

1.3.4 FY 1994 Secretarial Planning Guidance

On November 27, 1991, the Secretary stated again the "...need to protect the environment and safety of our workers and the public...." Moreover, he provided that "...FY 1994 plans must emphasize self-assessments [emphasis added] for environment, safety and health, as well as safeguards and security."

1.3.5 Evolution of Current Self-Assessment Guidance

FOs and contractors attempting to follow the Secretarial direction raised procedural issues relative to the basic definition of self-assessment, functional requirements for self-assessments, coordination among PSOs, performance objectives and criteria, integration of self-assessment activities, implementation of self-assessment offices and organizations and their functions at all levels. In response to these issues, in July 1991, the senior managers directed the establishment of an Inter-Office Task Force on Self-Assessment (Task Force) with broad representation from the program offices as well as from EH, Security Affairs (SA), and NS. The Task Force developed this guidance for the purpose of addressing these issues and assisting DOE organizations and their contractors in the development and implementation of their self-assessment programs. Information pertaining to the various self-assessment implementation can be found in the following sections.

1.4 Responsibilities for the Self-Assessment Program

Responsibilities for the implementation of the self-assessment program throughout DOE reside within the complete organizational structure including the Headquarters level, FO level, and the sites/facilities. The responsibilities for each organizational level are defined throughout this guidance document and summarized in Appendix G.

1.5 Provisions and Organization of the Self-Assessment Guidance

1.5.1 Provisions

For a complete understanding of this guidance, it is essential to review the definitions in Appendix B.

1.5.2 Organization of the Self-Assessment Guidance

The remainder of this guidance document is organized as follows: Section 2.0 contains an overview of the self-assessment program concepts as well as a discussion of internal and external interfaces. Section 3.0 provides the various self-assessment elements and explains how self-assessment will be coordinated and integrated within the line organization. Section 4.0 provides guidelines for the annual reports. Section 5.0 discusses the interface with other institutional programs. Appendices A and B provide listings of references and definitions, respectively. Appendix C provides detailed guidance for the annual self-assessment report. Appendix D lists performance objectives and criteria. Appendix E lists root cause analysis systems. Appendix F contains a list of the acronyms and abbreviations used in this document. Appendix G contains a general summary listing of the responsibilities for the implementation of the self-assessment program at the DOE Headquarters, FO, and site/facility levels.

This page intentionally left blank.

2.0 OVERVIEW OF SELF-ASSESSMENT PROCESS

This section presents an overview of the self-assessment process and key self-assessment concepts. The first subsections contains a description of the self-assessment process. It sets forth the basic principles of self-assessment and defines the major actions and responsibilities associated with self-assessment programs. The second subsection contains a model of self-assessment organizations and organizational interfaces. This model illustrates the scope and applicability of self-assessment, identifies key functional and organizational interfaces, and identifies key self-assessment activities.

2.1 Description of Self-Assessment

2.1.1 Self-Assessment Process

Self-assessment is a multifaceted process that is continually conducted at all levels of a line organization including contractors, FOs, and Headquarters Offices. The self-assessment is conducted by those line organizational units that are responsible for actual work or job-related tasks, and by separate organizations, such as the self-assessment offices and organizations that were established by SEN-6D. The general philosophy of self-assessment is that line organizations should continually and critically examine their effectiveness; identify strengths and weaknesses; determine root causes for weaknesses; design, implement, and evaluate effectiveness of corrective actions; develop lessons learned from this process; and proceed to minimize weaknesses, maximize strengths, and move toward excellence.

The following are several basic principles that underlie the self-assessment process:

- The minimum acceptable level of performance is full compliance with applicable laws and regulatory requirements.
- Self-assessment is the responsibility of the DOE line organization. Within the general requirements set forth for self-assessment by the Secretary and DOE Orders, the line defines the scope, sequences, and methods of self-assessment.
- It is the responsibility of the line to ensure that self-assessment becomes a way of doing business at all organizational levels and within all program areas.
- Performance excellence and compliance with requirements are most effectively achieved when they are the principal goals of all members of the line organization, particularly at the operating level, and not because of inspections conducted by independent groups.
- ES&H and S&S goals and objectives are compatible with those established for productivity and cost-effectiveness.
- Candid and open reporting of deficiencies and weaknesses are viewed positively with no fear of reprisal or punitive actions for disclosure.

- As line organizations become more effective at identifying and correcting their performance problems and begin to fulfill their performance objectives, the need for independent evaluation should diminish.

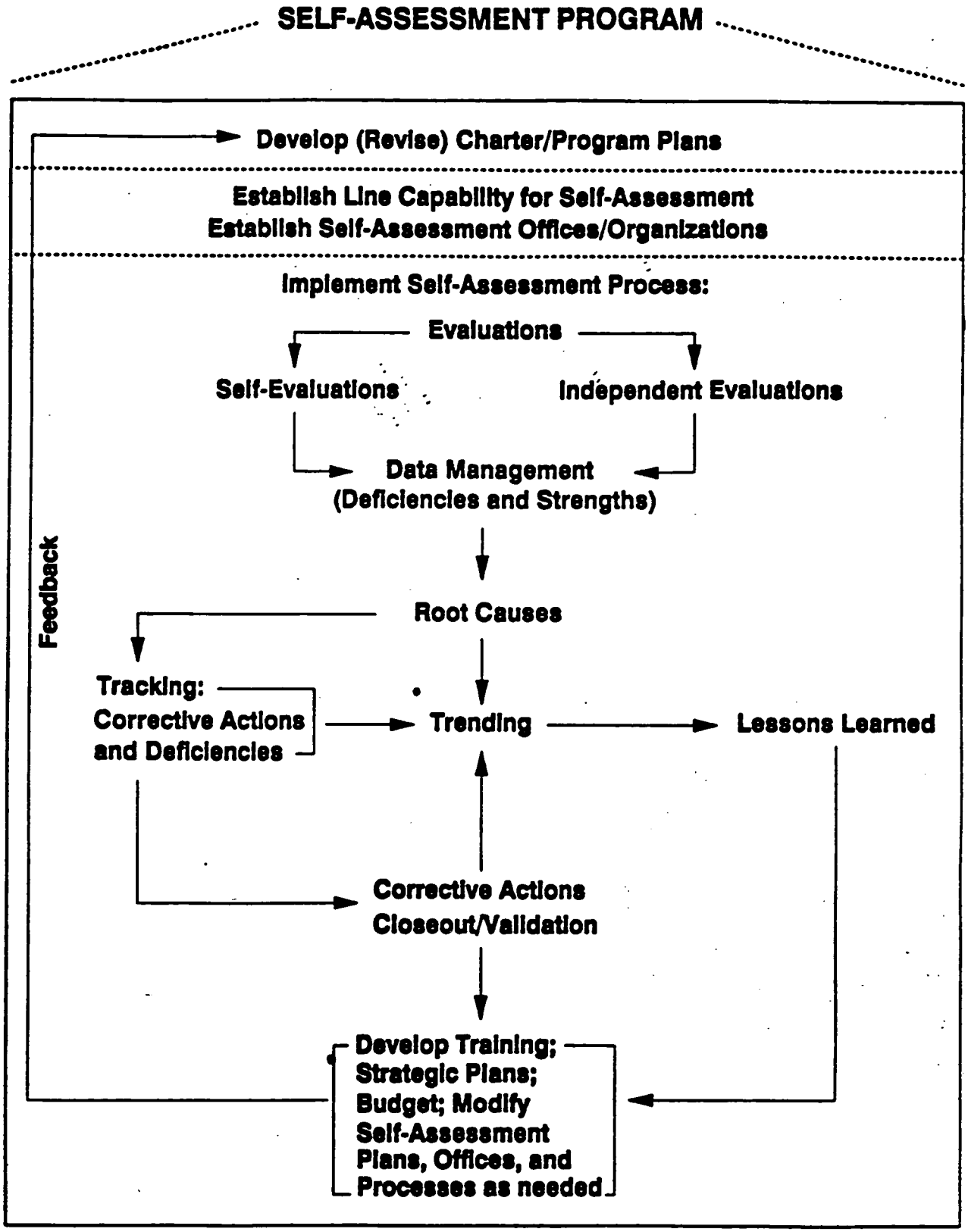
The self-assessment process primarily consists of (1) a variety of evaluation activities that generate a stream of performance and compliance data, and (2) formal systems for analyzing the data stream, communicating status and lessons learned information to management or other points in the line organization, and for managing corrective actions (see Figure 2-1). Self-assessment programs may include formal and informal evaluation activities; however, most evaluation activities should be formal, making use of written guidance, performance objectives and criteria, and qualified evaluators to ensure appropriate depth, quality, and consistency of evaluations and resulting data. A primary criterion for including an evaluation activity in the self-assessment process is that the activity should feed into a performance and compliance data stream and, therefore, become a documented basis for identifying strengths, improvement items, and corrective actions.

2.1.2 Self-Assessment Evaluation

Self-assessment evaluations include both self-evaluation and independent evaluation activities. Self-evaluation activities are those that are conducted by organizational units within the line organization for the purpose of assessing their own performance. Managers and workers directly responsible for facility operations are the key to performance improvement and they need to increase their awareness of requirements, improve problem identification and reporting procedures, and institute effective corrective action programs that prevent recurrence of problems. The scope of self-evaluation is determined by the line organization and based on the need to gather sufficient data to determine if each organizational unit is meeting all of its performance objectives.

Independent evaluations are those conducted primarily by persons not directly responsible for the performance of the activities being evaluated and may include evaluation activities conducted by offices or organizations external to the operations being assessed, by a FO, or by a Headquarters Self-Assessment Office. The scope of an independent evaluation is determined by line organizations in their pursuit of compliance and performance excellence as required by law, DOE, and other Government regulations, consent decrees, other requirements and performance objectives that govern the operations of a facility and by requirements imposed on a contractor by its corporate management.

Structured, effective, and self-critical evaluations are the heart of the self-assessment program. Consequently, there is a need for adequate assessment research and preparation in order to develop an adequate assessment plan. The assessments must be conducted professionally, with qualified, trained, and well-prepared staff. Assessment reports should accurately reflect the results of the assessment, and concerns and corrective actions should be tracked to closure. In addition, there are assessment techniques that have proven effective in the conduct of assessments, including daily team meetings, good communications with facility management, rolling up related findings into programmatic concerns, proper identification and prioritization of findings and concerns, and gaining acceptance on the findings by the line organization.



710

FIGURE 2-1
SELF-ASSESSMENT PROGRAM STEPS

2.1.3 Extent and Frequency of Evaluations

The extent and frequency of both self- and independent evaluation activities should be commensurate with the hazard attendant with the respective operating activities, and consistent with DOE policy of protection of the public, facility personnel, property, and the environment. Both self-evaluation and independent evaluation activities should include performance-based appraisals of appropriate functional areas, technical disciplines, and management systems and practices.

2.1.4 Planned versus Reactive Evaluations

Evaluations can be proactive and reactive in nature. Effective self-assessment programs usually contain a mix of both types. Proactive evaluations are predetermined in scope and schedule, and may include appraisals, evaluation activities prescribed by DOE Orders or Secretary of Energy Notices (SENs) (e.g., DOE 5482.1B mandated appraisals or SEN-29-91's performance indicator-based evaluations), and other self-initiated activities, such as management walk-throughs and reviews. Reactive evaluations are usually systematic inquiries and investigations into incidents, accidents, and other adverse situations. Reactive evaluations may include mandated evaluations, such as those required by DOE 5000.3A, but are more commonly management's response to an undesirable or unanticipated event or problem.

2.1.5 Integration and Coordination of Self-Assessment Activities

Self-assessment activities should be integrated both vertically and horizontally within the line organization to ensure a comprehensive top-to-bottom, self-assessment process that addresses conduct of operations; technical functional areas; ES&H and S&S disciplines; and management systems and practices at all levels. Effective integration of evaluation activities improves efficiency, minimizes redundancy, and ensures that performance and status information is properly directed.

Self-assessment activities should be coordinated among PSOs to eliminate conflicting directions being given to contractors and to ensure consistent, efficient, and effective self-assessment programs at the FO and site/facility levels. Coordination is particularly critical at sites and facilities that are funded by several Program Offices. Memoranda of Agreement (MOAs) and Tri-party Agreements (TPAs) between the Lead PSO, the other PSOs with site programs, and the FOs should include agreements for approval of Self-Assessment Program Implementation Plans and for coordinating the facility's requirements for self-assessment programs. These agreements should address the responsibility for self-assessment of FO functions, the coordination of assessment schedules, the use of FO and PSO site resources (particularly personnel with expertise who could be used in evaluation activities), reporting requirements, and the responsibility for performance analysis and issues management systems, such as root cause analysis, tracking programs, trending analysis, and lessons-learned programs.

Self-assessment activities should be coordinated with Departmental oversight and assessment activities performed by EH, SA, and NS. Both EH and NS are committed to relying more heavily on self-assessment data and results in their evaluations of line performance and compliance to reduce their review and appraisal activities, provided (1) it can be demonstrated that the self-assessment programs can generate an accurate profile of line performance and compliance, and (2) line

management is effectively using the self-assessment program to achieve compliance and performance goals.

2.2 Self-Assessment Organizational Interface Process

The self-assessment program model in Figure 2-2 was developed to illustrate the general organization of self-assessment programs, and the internal and external interfaces that are typical for self-assessment programs and for the independent self-assessment offices. The model also illustrates the key interface with departmental oversight groups. The subsections that follow discuss these interfaces.

2.2.1 General Organization of Self-Assessment Programs

There is a variety of organization configurations and structures within DOE line programs as they extend from the PSO or equivalent level down to a specific DOE facility. The most common model is one that contains three levels: (1) Headquarters, (2) FO, and (3) site/facility. Figure 2-2 identifies these three levels, the line organizations, and the Independent Self-Assessment Offices and organizations, and it illustrates the self-assessment and independent assessment relationships, as well as the oversight relationships, among and between the organizational levels and units.

The three-level model does not directly apply to all line programs; however, the model is generally representative of most line organizations and, together with this guidance, will serve to illustrate the self-assessment process and all its interfaces. Line programs can adapt or customize the guidance to their specific line organization configuration. Organizations, offices, and site/facilities that do not have an obvious fit in the model (see Figure 2-2) should request additional guidance and direction from their management at the next higher level as to the appropriate configuration in their reporting system.

2.2.2 Program Organization and Interfaces

The following paragraphs include general discussions of the key functions and interfaces within the self-assessment process (see Figure 2-2).

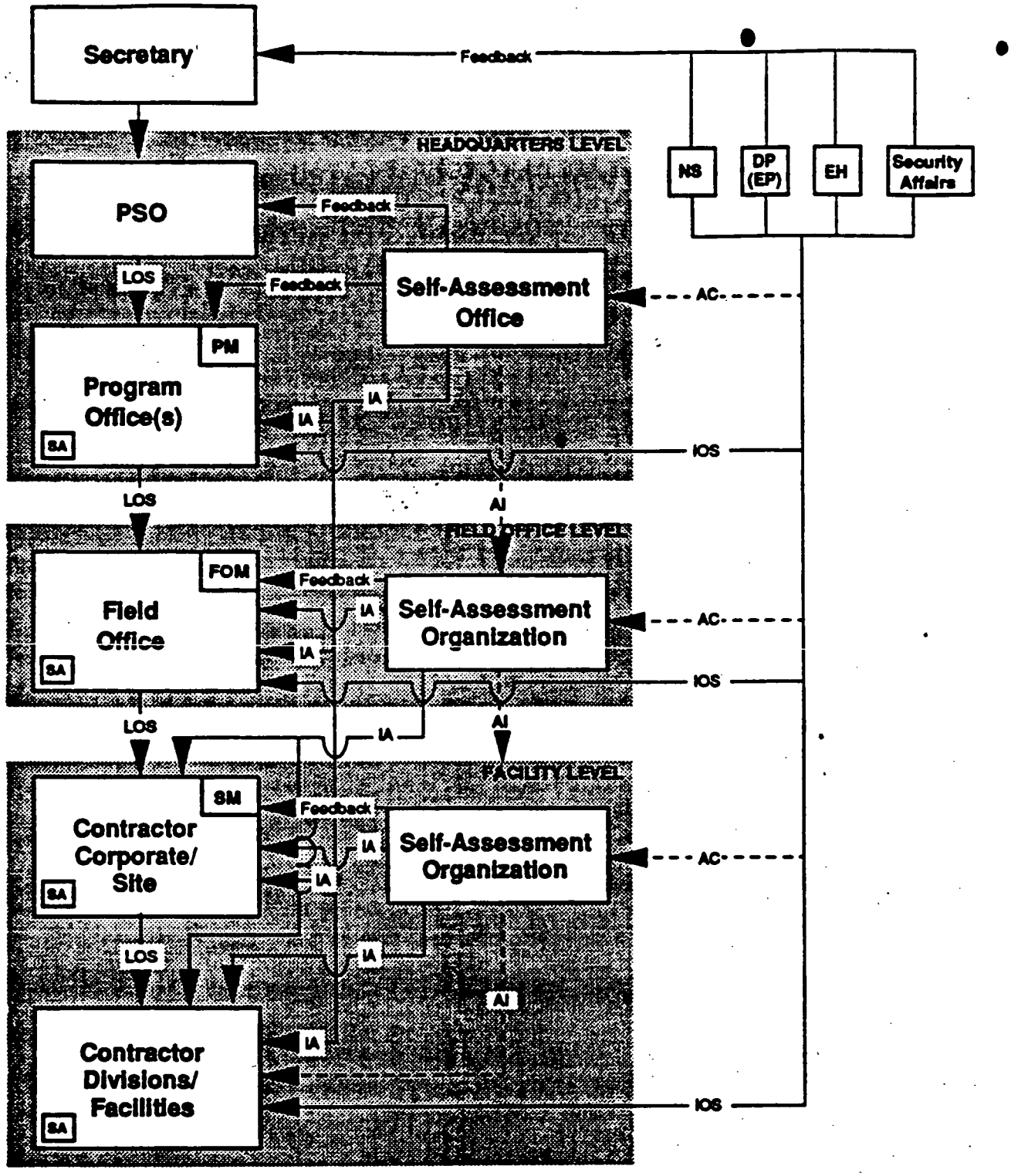
(1) Self-assessment activities within line organization units (at each level of the three-tier model).

Self-assessment activities, (indicated in Figure 2-2 by a small box containing the letters SA at each level) are the self- and independent evaluation activities that are conducted within each organization to critically examine their effectiveness; identify strengths and weaknesses; determine root causes; and design, implement and evaluate effectiveness of corrective actions. As indicated in Figure 2-2, evaluation of internal effectiveness takes place at all organizational levels in the line not just at the site/facility level.

(2) Interfaces among line organization units including PSOs, Program Offices, FOs, and site/facility organizations.

Interfaces within the line organizations are characterized by the downward flow of line oversight (LOS) and the upward flow and reporting of performance and compliance data. The line oversight consists of management guidance and

712



SA Self-Assessment (Internal)
PM Program Manager
FOM Field Office Manager
SM Site Manager

AI - Assessment Integration
- Monitoring Self-Assessment Program Effectiveness
- Facilitating Effective Independent & Self Assessments
- Integrating Assessment Results (Roll-Up)
- Coordinating Scope/Schedule of Assessments

AC - Assessment Coordination
IOS - Independent Oversight
LOS - Line Oversight
IA - Independent Assessment

FIGURE 2-2
SELF-ASSESSMENT INTERFACE MODEL

direction for management and operations, and the independent evaluation of the effectiveness of both. Independent evaluation of programs, organizations, and facility operations effectiveness is conducted as part of line oversight and may include monitoring and surveillance activities, program reviews and appraisals. Program direction and guidance and program evaluation should flow downward through the three levels of organization. Program offices should also directly evaluate programs, organizations, and facility effectiveness at the FO and the site/facility levels.

(3) Relationships between independent self-assessment offices and other elements of the line organizations.

The independent self-assessment offices and organizations are established to be an independent check of line performance with direct reporting to senior management at each organizational level. (Section 3.0 contains additional guidance on the roles and responsibilities of the independent self-assessment offices and organizations.) Figure 2-2 illustrates their general roles for performing independent evaluations and providing feedback. The independent self-assessment office or organization conducts evaluations of performance at their own organizational level and levels below.

(4) Vertical relationships between all the self-assessment offices and organizations.

There should be a strong functional relationship between Headquarters self-assessment offices and independent self-assessment organizations in the field for coordination and integration of self-assessment activities within the line. For example, ER-8 which has responsibility for implementing the SEN-6 series requirements for ER headquarters has no line authority over the Chicago Field Office (CH) self-assessment organization even though ER is the Lead PSO for CH. As indicated in Figure 2-1, assessment integration includes both facilitating effective independent and self-evaluations and integrating assessment results.

2.2.3 Interfaces Between Line Self-Assessment and Departmental Oversight

The Departmental oversight organizations, such as EH, NS, SA, and parts of DP, are responsible for oversight, including program reviews and evaluation of line self-assessment. The oversight groups evaluate the self-assessment program's effectiveness at all organizational levels and specifically assess the effectiveness and performance of the Independent Self-Assessment Offices and organizations established by the SEN-6 series.

CIT

714

This page intentionally left blank.

715

3.0 SELF-ASSESSMENT FUNCTIONAL GUIDELINES AND IMPLEMENTATION

This section discusses 20 self-assessment program elements that fall into 4 self-assessment categories: Program Design and Scope, Evaluations, Performance Analysis and Issues Management Elements, and Administrative Support Requirements (see Table 3-1). Program elements are discussed in terms of the three-level process model (see Figure 2-2). Functions assigned within the model should be included in the self-assessment programs, but may be relocated to accommodate the needs of implementing organizations consistent with agreements recorded in

TABLE 3-1
SUMMARY OF PROGRAM ELEMENTS FOR SELF-ASSESSMENT PROGRAMS

Program Design and Scope		3.1
1.	Formal Charters and Program Implementation Plans	3.1.1
2.	Scope	3.1.2
3.	Performance Objectives and Criteria	3.1.3
4.	Schedule for Self-Assessment Activity	3.1.4
5.	Management Support and Involvement	3.1.5
6.	Cooperation with External Oversight and Assessment	3.1.6
7.	Atmosphere of Continual Quality Improvement	3.1.7
8.	Procedures to Plan and Document Self-Assessments	3.1.8
9.	Independent Offices and Organizations for Self-Assessments	3.1.9
Evaluations		3.2
10.	Self-Evaluation Activities	3.2.1
11.	Independent Evaluation Activities	3.2.2
Performance Analysis and Issues Management		3.3
12.	Root Cause Analysis	3.3.1
13.	Tracking and Reporting System	3.3.2
14.	Trend Analysis	3.3.3
15.	Issue and Corrective Action Prioritization	3.3.4
16.	Corrective Action Verification and Validation	3.3.5
17.	Lessons-Learned Program	3.3.6
Administrative Support Requirements		3.4
18.	Self Assessment Staffing, Staff Qualifications, and Training	3.4.1
19.	Facilities and Equipment Planning	3.4.2
20.	Strategic Planning and Budgeting	3.4.3

716

MOAs and TPAs developed to implement SEN-6D-91. Self-assessment program Self-Assessment Program Implementation Plans (see subsection 3.1.1) should record the assignment of these functions.

3.1 Program Design and Scope

Program Design and Scope contains nine elements that are discussed in the following subsections.

3.1.1 Formal Charters and Program Implementation Plans

Self-assessment programs should have documented Self-Assessment Program Implementation Plans that should be approved, implemented, and available for examination.

Program charters and Self-Assessment Program Implementation Plans that define goals, objectives, priorities, and general program requirements should be developed and updated as needed by organizations at the three levels identified in the process model (see Figure 2-2). PSOs should require that the charters and Self-Assessment Program Implementation Plans incorporate the 20 elements of this guidance and may provide additional guidance for implementing line self-assessment programs.

Implementing procedures (see subsection 3.1.8) should define detailed implementation of the requirements in the charters and Self-Assessment Program Implementation Plans. Uniformity among self-assessment programs is necessary except where unique features of facilities or programs make uniformity impossible. Unique features should be identified in specific self-assessment program Self-Assessment Program Implementation Plans. The Lead PSO or designee should approve self-assessment program charters and Self-Assessment Program Implementation Plans consistent with the line management responsibilities established in the MOAs and TPAs developed for SEN-6D-91.

The following subsections address the additional elements of self-assessment programs. Each of these elements should be addressed in Self-Assessment Program Implementation Plans.

3.1.2 Scope

Self-assessment program activities include (but are not limited to) design, construction, operation, support, and management of DOE programs and facilities. A comprehensive self-assessment program should cover all activities under the control of the line management entity, and should examine areas at multiple levels within the DOE and contractor organizations.

Activities that are included under the self-assessment program of another PSO should be identified in the self-assessment program Self-Assessment Program Implementation Plans of each PSO (see subsection 3.1.1) consistent with agreements of the MOA and TPA. The self-assessment program should provide line management with a continuous measure of performance -- enabling both improvement of weak areas and dissemination and expansion of strengths.

Self-assessment scope should be organized using the performance objectives and criteria (POCs) listed in Appendix D. Each organization level should develop a

written scope for their self-assessment program. The scope should identify general areas (i.e., specific disciplines, functional areas, and operations areas) to be evaluated in the self-assessment program and applicable performance objectives.

3.1.3 Performance Objectives and Criteria

One of the most important steps of establishing a self-assessment program is to examine the adequacy of the POCs specified in Appendix D. POCs selected should meet the key test of relevance to one's own organization and should set reasonable standards against which to be evaluated. Once established, the POCs should be included in approved Self-Assessment Program Implementation Plans (see subsection 3.1.1). The POCs should be examined frequently, but not less than annually, to determine if priorities are addressed and proper emphasis is placed on specific PSO issues and concerns. Any required changes or additions to established POCs should be documented and submitted to the approval authority. Such changes should be included in the Self-Assessment Program Implementation Plan and the annual report (see Section 4.0).

Line managers at all levels should plan self-assessment by applying all these POCs on the basis of appropriateness to their operation and management priority, and should include additional POCs that they determine are needed. It is likely that these POCs will be the basis for independent assessments by Departmental oversight (NS, EH, and SA) and independent self-assessment offices and organizations.

Functional Guidelines

- Performance objectives should be established and kept current for each program and facility activity in the line organization. Changes to POCs should be approved by the approval authority. This encompasses the site/facility levels that are primarily responsible for operating functions and the FO and Headquarters levels that have primary responsibility for line oversight and program management of ES&H/S&S compliance requirements and improvement areas that are applicable to each functional area, program, or facility activity.

- Each performance objective should have specific criteria for determining the degree of achievement of the objective.

- The self-assessment program should include methods for evaluating actual performance versus the desired performance set forth in each of the criteria associated with a performance objective.

3.1.4 Schedule for Self-Assessment Activity

Scheduling self-assessment activities is a necessary step in attaining sitewide and line organization coordination. Scheduling also allows for coordination of activities among PSOs, Department oversight organizations, and external organizations (e.g., state and Federal regulatory authorities). With the exception of unanticipated reactive evaluations, self-assessment activities should be scheduled to minimize impact on day-to-day operations and management, optimize utilization of resources, and combine and eliminate unnecessary duplication of similar site, line, and institutional activities.

718

Facility or program managers should review schedules issued by assessing organizations for potential conflicts, redundancies, or unacceptable impact on their operations. They should resolve schedule problems directly with the assessing organizations. Unresolved schedule problems should be passed up the line management chain to the level necessary to force resolution, including PSO, Lead PSO, or higher management levels.

Functional Guidelines

- Self-assessment activities and schedules should be identified in the Self-Assessment Program Implementation Plans, kept current, and made readily available to all line managers.

- DOE and contractor assessing organizations should schedule assessment activities, including self-assessment and independent oversight activities, 6 to 12 months in advance.

- Assessing organizations should make a good faith effort to resolve schedule problems identified by the line organizations.

- Lead PSOs should include provisions to resolve assessment schedule problems in MOAs and TPAs.

- DOE and contractor organizations should be cognizant of, and plan around, those DOE Orders and initiatives that require regularly scheduled appraisals and reviews, continuous monitoring, or other similar activities (e.g., DOE 3790.1A and DOE 5482.1B require conduct of management appraisals at least once every 3 years). Many of these activities can and should be considered part of the self-assessment process because they contribute information that can be used to assess performance.

- Self-assessment scheduling should be based on the DOE policy that the extent and frequency of evaluation activities should be commensurate with the potential for adverse effect of the individual operations on the environment, the safety and health of workers and the public, and the S&S of DOE facilities.

- Reactive evaluation activities that are less immediate in nature and are precipitated by technical issues, performance indicators, trends, and senior manager concerns (or for other reasons) should be integrated into the scheduling process whenever possible and coordinated with the different line organizations and departmental oversight groups, and appraisals and assessments conducted by organizations outside the Department.

3.1.5 Management Support and Involvement

One of the most important contributors to the success of self-assessment is management support. If self-assessment is to become a way of doing business, then line organizations must seek, find, and correct deficiencies and integrated performance improvement at all levels of management. Managers should continually demonstrate their commitment to self-assessment.

Functional Guidelines

- DOE and contractor managers at all levels should participate in self-assessment evaluation activities. This includes both DOE and contractors at the Headquarters level down through site and facility operations and support levels.

- Management should serve as a model to support the basic philosophy of self-assessment through a willingness to identify management's own performance deficiencies, seek out and take appropriate corrective actions, and follow up with demonstrated improved performance.

- Management should actively solicit improvement ideas from all levels of the organization. These efforts should not be limited to the traditional suggestion box, but consist of formal programs where worker improvement initiatives are solicited and evaluated.

- Outstanding performance in ES&H, S&S, and nontechnical areas should be recognized on a par with technical and scientific achievements and equally rewarded.

- The goals of the self-assessment program should be communicated to all DOE employees and contractor personnel at all levels of the organization. These people should be trained and encouraged to actively participate in the program.

- Results of Self-Assessment activities that identify weaknesses must not result in adverse action by outside organizations. Organizations must receive credit for finding and correcting their own problems.

3.1.6 Cooperation with External Oversight and Assessment

A cooperative attitude fosters a willingness to accept, learn from, and share information about weaknesses and strengths with outside groups, as well as within the Department.

Functional Guidelines

- Line organizations at all levels are expected to fully cooperate with local, state, Federal, and Departmental regulatory and oversight groups.

- Line organizations should establish coordination functions to facilitate external group inspection and assessment activities.

- Line organizations should be responsive to requests for information, access to DOE and contractor personnel, support services (e.g., escorting), and walking spaces, and should avail themselves to external groups for meetings, interviews, and participation in self-assessment activities.

3.1.7 Atmosphere of Continual Quality Improvement

Striving for excellence through the process of continuous performance improvement should be a way of doing business on a day-to-day basis. The attitudes, motivation, and morale of staff and workforce personnel affect performance. The "continuous performance improvement" culture should be fostered and supported with continuous communication of goals and objectives of self-assessment and identifiable achievements and progress. In addition to fostering such a culture, there should be systematic efforts to evaluate the degree to which an atmosphere of continual quality improvement has been achieved and the nature, strength, and direction of organizational culture.

Functional Guidelines

- There should be specific programs and activities designed to promote an atmosphere of continual quality improvement and a strong ES&H/S&S culture.
- Management should pursue new and additional methods and techniques that will provide mechanisms and reward incentives for improved performance.
- The need for improved performance should be recognized as a priority item and considered as such during planning and budget reviews.
- A sense of pride and satisfaction for doing the right things right the first time should be the philosophy adopted at all levels and should be reflected in vision statements and goals and obligations which becomes endemic at all levels of the Department.

3.1.8 Procedures to Plan and Document Self-Assessments

Written procedures should be developed and promulgated to describe the process used, roles and responsibilities assigned, and the documentation needed to organize, schedule, conduct, analyze, integrate, and follow up the self-assessment activities performed by the PSO, FO, and contractor. Procedures will be reviewed and approved by successively higher levels of management and such required approvals will be specified in the Self-Assessment Program Implementation Plan.

Functional Guidelines

Documentation to support the completion of the self-assessment will also be prepared at those three levels of organization to provide, at a minimum, details on the following:

- the process, management systems, and organization used to conduct, analyze, integrate, report, and follow up the self-assessment;
- the results of other assessments, appraisals, evaluations, and audits used as part of the self-assessment;
- the results of any independent assessments conducted on the adequacy of the self-assessment program; and

- the methodology used to identify and develop key findings, noteworthy practices, causal factors, root causes, trending, and lessons learned.

3.1.9 Independent Offices and Organizations for Self-Assessments

SEN-6D-91 established independent self-assessment offices at the Headquarters level and directed that these offices be complemented by similar organizations at the FO and site/facility levels. SEN-6D-91 spelled out specific functional requirements for these offices and organizations. The following functional guidelines should be used to help establish the roles and responsibilities for the independent assessment offices and organizations. In addition, this guidance identifies other ideas and responsibilities to be considered. These requirements are listed below. These guidelines are not all-inclusive; additional activities and responsibilities may be identified and required by the line organization.

- Independent self-assessment offices are established at the Headquarters level that report directly to the PSOs or comparable officials.

- The offices conduct independent assessments of the adequacy of DOE and contractor performance of their responsibilities for ES&H/S&S within the areas of their concern.

- The offices act as a means of independent feedback to the PSOs on how effectively both line management implementation and oversight of ES&H/S&S programs satisfy the basic goals and tenets of SEN-6.

- The offices conduct a program of design, construction, and operational assessments which sample performance in the ES&H/S&S areas to gauge line managements approach, commitment, and accountability in these areas.

- The Headquarters self-assessment offices are complemented by similar self-assessment organizations located in the field at DOE and contractor sites.

- The self-assessment offices and organizations do not preempt or replace the self-assessment responsibilities of management. All key areas of management responsibility, including contracts, procurement, and program direction, should be subject to stringent and regular management review.

In addition to the SEN-6D functional requirements, the Task Force has identified functional guidelines for the independent self-assessment offices and organizations. The PSOs or other appropriate line managers may determine that the independent self-assessment offices and organizations should provide additional self-assessment services, such as trending or root cause analysis. This may be done at the discretion of the line if it results in a more effective self-assessment program and more efficient use of limited resources due to integration and coordination of activities; however, as noted in SEN-6D, the self-assessment offices and organizations do not preempt or replace the self-assessment responsibilities of management.

Functional Guidelines

The independent self-assessment offices and organizations should do the following:

- Evaluate the adequacy and extent of line implementation of the self-assessment program.
- Facilitate the development and implementation of FO and site/facility self-assessment programs.
- Assist in coordination of appraisal schedules and scope with line organizations and with DOE oversight groups.

3.2 Evaluations

Evaluation generates the basic data necessary to determine compliance and performance status for any organizational unit or program.

Evaluation should test facility or program performance against established performance objectives and criteria (see subsection 3.1.3) using functional guidelines identified in this section. Findings should be reported in accordance with subsection 3.3.2.

Self-assessment evaluation activities include self-evaluation and independent evaluation functions that are described in subsections 3.2.1 and 3.2.2 below.

3.2.1 Self-Evaluation Activities

Self-evaluation activities are conducted by organizational units within the line organization for the purpose of assessing their own performance. They are conducted in accordance with the criteria outlined in the formal Self-Assessment Program Implementation Plan, by qualified individuals using written implementing procedures. Evaluation should be performance based and cover functional areas, technical disciplines, and management systems and practices. Evaluation activities should feed information into a performance data stream for use by line management, self-assessment organizations, and independent assessment organizations.

The three general categories of self-evaluation activities are monitoring and surveillance activities, program review activities, and appraisal activities. Figure 3-1 illustrates the concept and relationships of self-assessment evaluation activities. It also identifies types of evaluation activities that would fall into one of the three general categories of self-evaluation activities. The following paragraphs describe the categories of monitoring and surveillance, program reviews, and appraisals.

Monitoring and surveillance activities are evaluations in which functions, operations, facilities, or equipment are monitored to identify deviations from norms as well as to measure conformance with performance and compliance requirements. Monitoring activities include performance indicator programs, various failure analysis and trending programs, surveillances, and lessons-learned programs where overall complex and industry performance is monitored for applicability to specific facilities. They also include

observation programs such as safety or environment observer programs, management walk-throughs, site representatives, system/cognizant engineer programs, and building manager programs. To fully support a self-assessment program, they should be identified in a Self-Assessment Program Implementation Plans and executed on a schedule. Observations should be recorded in a structured manner that allows them to be fed into the self-assessment data stream to support corrective action, information exchange, and lessons learned.

Program reviews are formal evaluations of management systems, technical and institutional programs against preset program objectives and performance elements to include all levels of the organization. Program reviews may include a broad spectrum of evaluation activities including award fee determinations, annual technical program reviews, business management and financial reviews, total quality management program reviews, operational readiness reviews, and portions of incident investigations. Strengths and weaknesses should be identified during reviews.

Appraisals include team assessments, audits, surveys, and inventories that are conducted to measure performance and/or compliance. Appraisals identify performance strengths, weaknesses, and findings of fact. Appraisals are formal and may be initiated as either self- or independent appraisals. Appraisals are planned, structured, and documented. They are conducted in accordance with written, validated guidance and criteria to verify that applicable requirements are implemented in accordance with performance goals and compliance requirements. Traditional line organization appraisal activities, such as functional appraisals, internal appraisals, management appraisals, and environmental surveys and audits, that are set forth in DOE 5482.1B should be incorporated into self-assessment programs as part of the evaluation activities.

The scope of self-evaluation activities should be determined by the line manager responsible for a facility or program to cover all of his functions as described in subsection 3.1.2. Information generated into the data stream by line and assessment organizations should be used in planning self-evaluation activities. New information generated during evaluations should be recorded and inserted into the data stream using the reporting guidelines of subsection 3.3.2.

3.2.2 Independent Evaluation Activities

Independent evaluation activities are conducted by persons or organizational units not directly responsible for the performance of the activities being evaluated. They should be conducted in accordance with the criteria outlined in a formal Self-Assessment Program Implementation Plan. Independent evaluation activities also include monitoring and surveillance activities, program review activities, and appraisal activities. As indicated in Figure 3-1, independent evaluation includes many of the same types of evaluation activities as self-evaluation. The distinction is based on who performs the evaluation.

3.3 Performance Analysis and Issues Management Elements

The purpose of performance analysis and reporting is to ensure that line organization personnel and managers are informed of their strengths and weaknesses, made aware of the basic underlying causes for weaknesses, and that they use this information when making corrective action decisions and plans for overall performance improvements.

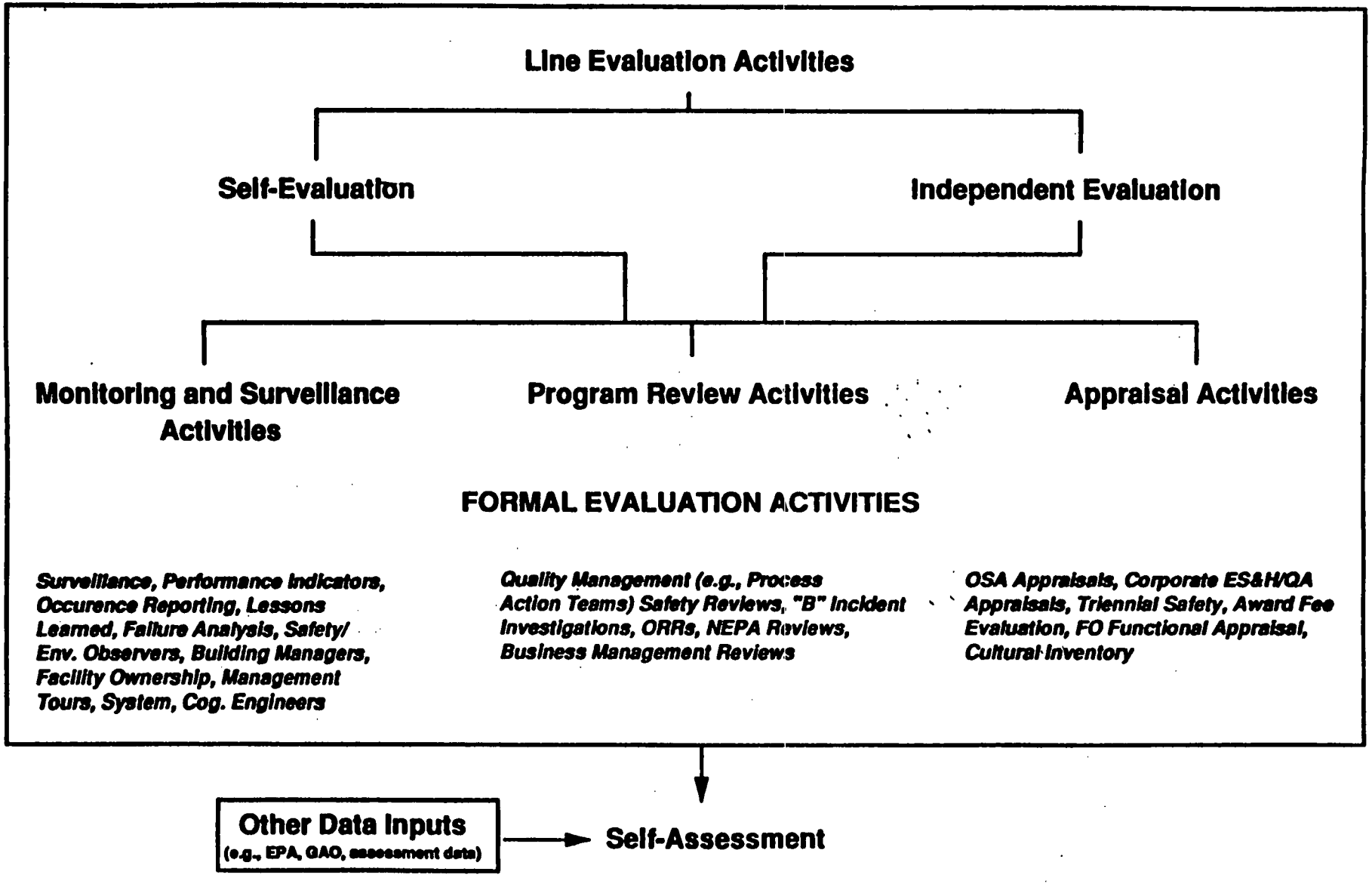


FIGURE 3-1
EXAMPLES OF SELF-ASSESSMENT ACTIVITIES

The various performance analyses, tracking and reporting systems, trending and lessons learned programs are discussed in subsections 3.3.1 through 3.3.4.

3.3.1 Root Cause Analysis

The purpose for analyzing deficiencies and weaknesses for root causes is to identify the most basic deficiency that, if corrected, will prevent recurrence of the same problem. Root cause analysis often includes the identification of more easily identifiable causes or causal factors that have in some way contributed to the problem. The root cause that is ultimately identified is the most basic causal factor. The advantage to finding the root causes for common problems is that when appropriate corrective actions are taken, the result is usually prevention of similar and related types of problems. Thus, there are measurable economies and benefits that can result from the utilization of the root cause analyses process. In addition, when both management and personnel participate in this process, the learning experience for both provides increased awareness of problems at all levels which also helps to eliminate problem recurrences.

A formal root cause analysis process should be selected by the management for each facility/site, FO, and Program offices; with DOE and contractor personnel involved in self-assessment throughout their organizations. The method selected should be formal, systematic, applicable to the operations or management functions for which it is used, and could be repeated with some reasonable consistency in results. Root causes that are identified as a result of the process, plus the originally identified deficiencies, should be tracked and followed up with appropriate corrective actions. All root causes should be trended and the data included in the lessons learned process (see subsection 3.3.7).

A variety of these analysis processes are available; examples of some of the more widely used root cause and cause analyses systems are presented in Appendix E.

3.3.2 Tracking and Reporting System

The purpose of this program element is to ensure that the line organizations have the capability to provide line managers, the Secretary, and Departmental oversight groups with current, accurate, and consistent information on the status of compliance and performance activities at individual facilities, sites, and at all levels of the organization.

Functional Guidelines

- A description of the tracking system(s) to be used for self-assessment programs should be in the Self-Assessment Program Implementation Plan (see subsection 3.1.1).

- Tracking systems should account for the status of all deficiencies resulting from the ongoing self-assessment process and, ideally, the data integrated into a sitewide or a major organizational tracking system. The system should identify each deficiency and track major milestones for corrective actions, identify verification data of each closeout, and identify the validation date of each closeout.

- The tracking system data should be used as an information tool for measuring progress and management's performance, and for planning and budgeting purposes.

- Data from the tracking system serve as a source of information for trending and lessons-learned programs and developing numerous Departmental reports (e.g., Annual Environmental Monitoring Reports) and for planning and budget purposes.

3.3.3 Trend Analysis

The purpose for trending compliance and performance data is to identify chronic and significant issues that exist within the organizations and to track changes in their condition.

Trending can measure and track key performance and compliance data (including root causes) and all performance indicator information. SEN-29-91 directed that a Department-wide uniform performance indicator (PI) system for trending and analysis of operational data be established. In addition to the direction provided in SEN-29-91, line management should identify and trend additional performance data within the program.

Functional Guidelines

- SEN-29-91 directs that a Department-wide uniform PI system for trending and analysis of operational data be established. This data should be utilized by organizations at all levels when developing or revising their self-assessment evaluation activities.

- Self-assessment deficiencies, root causes, performance indicator data (SEN-29-91), and other data as appropriate, should be trended on an ongoing basis.

- Strengths should be trended, as well as deficiencies, to point out practices and programs worthy of adopting by other DOE organizations.

- The trending program should be documented in procedures (see subsection 3.1.8) and staffed by persons with defined roles, responsibilities, and include procedures and reporting requirements.

- The PSO should assure that the trending program is integrated throughout the line organization to ensure comprehensive coverage, eliminate redundant efforts, facilitate communication and reporting, and efficient use of resources.

3.3.4 Issue and Corrective Action Prioritization

The self-assessment program should have a prioritization process that allows management to efficiently and effectively differentiate between critical, important, and less important issues allowing for the ranking of corrective actions and associated projects. The prioritization process should address risks and be complemented with a cost-benefit analysis to support management decisions regarding corrective action funding, planning, and scheduling. The process will

provide line management with a mechanism that will enable them to more rationally respond to the varying demands from Headquarters, Departmental oversight groups, and state and local regulatory agencies regarding site/facility operations. The prioritization methodology used must recognize the relevance of established priority systems such as those associated with the following:

- planned corrective actions resulting from DOE Tiger Team Assessments;
- operating contractor award fee determination;
- strategic plans-of-action;
- institutional plans-of-action; and
- Five-Year Plans.

The operating contractor should document the methodology used to assign and integrate priorities first at the individual facility level and, subsequently, at the operating contractor level. The FO should independently evaluate the prioritization provided by the operating contractors, integrate the results with other needs and priorities, and provide an overall FO priority ranking. The PSO will provide appropriate guidance on and perform integrated prioritization across several FOs.

Functional Guidelines

- A systematic method should be used by managers to determine risk, benefit, and cost for issues and corrective actions.
- A process should be developed for ranking corrective actions according to a priority determined by comparing risk, benefit, and cost of corrective action plans.
- Needs and priorities of the site/facility should be incorporated into the process at each level.
- Priorities should be formally reassessed periodically and a written justification should be developed for additions or changes to priority rankings.

3.3.5 Corrective Action Verification and Validation

Corrective action verification and validation are basic required activities of an effective corrective action system. Verification refers to assurance that the corrective action was implemented as designed. Validation refers to the determination that the corrective action is functioning as designed and has eliminated the specific problem/issue for which it was designed. Primary responsibility for both verification and validation should reside at the lowest level in the line management structure; however, validation should be performed by personnel not directly responsible for implementing the corrective actions. FO management and PSO-level oversight may independently verify and validate corrective actions and activities. Constant management attention to changing

conditions is needed to recognize their impact on planned and completed corrective actions.

Functional Guidelines

- Track verification and validation requirements and results on the formal tracking and reporting system(s).

- Issue status reports of verification and validation of corrective actions periodically and present them to top management.

3.3.6 Lessons-Learned Program

The purpose of a lessons-learned or operating experience review program is to ensure that lessons from facility, site, DOE complex, and industry operating experience are identified and translated into corrective actions that improve facility or program ES&H/S&S concerns and prevent recurrence. An effective lessons-learned program will include the sharing of good practices with acceptable results as well as those poor practices which are to be avoided. Information to be used in any lessons-learned system will be independently validated and accepted prior to its dissemination. PSOs will assure that programs are established at the Headquarters, FO, and contractor levels and supported by program incentives. Program incentives should include performance elements in employee evaluations, awards, and temporary assignments to provide expert advice. Integrated analysis of lessons learned should be performed at the successively higher levels of the organizational structure. Sharing and dissemination of information should occur not only within the PSO's organizational structure, but also with other PSOs.

Functional Guidelines

- PSOs should establish a formal lessons-learned program that formally reviews performance and operating experience, both in-house and from other DOE and industry sources, for applicability to their activities.

- The program should utilize the Occurrence Reporting and Processing System (ORPS) to include review of Occurrence Reports (ORs) and meet the requirements of DOE 5000.3A, as well as performance indicators and self-assessment testing data.

- The program should be documented and have written procedures (see subsection 3.1.8).

- There should be a process for identifying immediate-attention items and for ensuring that they are acted upon.

- Program results should be incorporated into training and required reading programs.

3.4 Administrative Support Requirements

The program elements in this category are directed at ensuring that self-assessment programs are provided adequate resources.

3.4.1 Self-Assessment Staffing, Staff Qualifications, and Training

The July 31, 1990, memorandum from the Secretary emphasizes that self-assessment activities should be conducted by qualified people. This is a critical requirement for both self-evaluation and independent evaluation activities. DOE sites and facilities have faced shortages of qualified personnel in a number of areas. Few sites or facilities have had the personnel and expertise to conduct the evaluations needed in the environmental disciplines and in safety and health areas such as OSHA. Contractors are generally brought in to conduct the evaluations.

For self-assessment programs to become more effective, in-house expertise is required. Line management should assign the appropriate personnel and resources to self-assessment activities and limit the use of contractors to providing special skills or to meet peak personnel requirements.

The July 31, 1990, memorandum identifies the requirement for a formal training program for personnel with assessment responsibilities. Self-assessment training should be established for personnel with assessment responsibilities at all three organizational levels of the process model (see Figure 2-2) and for persons conducting both self-evaluation and independent evaluation activities.

Training requirements should be included in the Program Implementation Plan (see subsection 3.1.1). Line managers should define specific training requirements for each self-assessment position and activity. Training for personnel with self-assessment responsibility generally falls into the categories of discipline training, assessment skills training, and analytical techniques training. Typical training courses presented to personnel with self-assessment responsibilities are listed in Table 3-2.

TABLE 3-2
TYPICAL TRAINING COURSES FOR SELF-ASSESSMENT PERSONNEL

Discipline Training
OSHA, NEPA reviews, applicable laws, and regulations

Assessment Skills Training

Auditing	Surveillance Training
Lead Auditor Training	Observation Training (per INPO)
Evaluation Training (per INPO)	Operational Readiness Reviews
Conduct of Operations (DOE)	Facility Evaluation (DOE)
Tiger Team Training (DOE)	Quality Management

Analysis Training

MORT	Human Performance Evaluation
Failure Modes and Effects Analysis	Fault Tree Analysis
Kepner - Tregoe (KT) Decision Analysis	Causal Factor Analysis

Functional Guidelines

- Organizations should identify the number and qualifications of personnel required to support self-assessment programs.
- Organizations should identify sources for recruiting the required personnel and expertise to staff Independent Self-Assessment Offices and organizations and their activities.
- Line organizations, including self-assessment offices, should share available expertise to optimize use of personnel resources; further, different line organizations that have facilities at the same site should share available expertise to optimize use of personnel resources.
- Agreements to share personnel should be documented (e.g., MOAs and Memoranda of Understanding).
- Qualifications and training requirements should be identified for self-assessment positions and for self-assessment activities performed by personnel on a collateral duty basis.
- Procedures for self-assessment activities should include training and qualification requirements.
- Self-assessment training records should be maintained and periodically reviewed to identify additional training needs.

3.4.2 Facilities and Equipment Planning

Self-assessment programs are more dependent on available personnel and expertise for success than they are on facilities and equipment. However, unfulfilled requirements for facilities or equipment can have a significant negative impact on self-assessment. There are existing examples where insufficient office space at headquarters has resulted in self-assessment office personnel being separate and located in different Headquarters facilities. While these instances do not greatly diminish the evaluation capability of the self-assessment offices, they do make it more difficult to communicate and coordinate activities within the offices.

Functional Guidelines

- Facilities and equipment necessary to implement an institutionalized self-assessment program should be identified, centralized, and made available.

3.4.3 Strategic Planning and Budgeting

Subsection 3.1 states that one of the basic principles of self-assessment is that as line organizations become more effective at identifying and correcting their performance problems and begin to fulfill their performance objectives, the need for independent evaluation and non-line oversight should diminish. Currently, however, there is heavy reliance on independent evaluation at the site/facility levels. To ensure availability of resources for self-assessment, self-assessment

requirements should be addressed by line management on a formal and long-term basis.

Functional Guidelines

- Self-assessment program implementation should be addressed in budget planning and budget requests.
- Self-assessment should be factored into strategic planning both in terms of resource requirements and in terms of its ultimate positive impact on the efficiency and productivity of technical programs.

This page intentionally left blank.

4.0 GUIDANCE FOR ANNUAL SELF-ASSESSMENT REPORTS

4.1 Purpose

A Self-Assessment Annual Report to document the results of the self-assessment process is to be prepared by each PSO. The report will summarize, evaluate, and integrate the results of the individual self-assessments performed by the facilities, contractors, FOs, and Headquarters elements and funded and/or provided direction by the PSO or the Lead PSO. The report is to provide Headquarters, FOs, and contractors with a documented, periodic evaluation of the condition of the programs, activities, operations, and facilities under their direction as assessed against established, standardized performance objectives and criteria. The report will also provide line managers an opportunity to organize, evaluate, analyze, integrate, and document the many ongoing assessment activities that are used to measure their performance, and provides a mechanism for the identification of strengths and common problems, major issues, root causes, and trending, and can foster improved tracking and follow-up of corrective actions.

4.2 Scope

The report will inventory all programs, activities, operations, and facilities at the Headquarters, FOs, and contractor levels that were the subject of self-assessments during the period covered. In addition, it should identify other assessments, appraisals, and evaluations that were considered in the preparation of the report.

4.3 General Requirements

An integrated report will be prepared annually by the PSO to summarize and evaluate the condition of the facilities, operating contractors, FO elements, and Headquarters activities under their direction. To assist in the preparation of this report, each level of organization specified below will prepare an annual submission in the suggested format and by the timetable to be specified by the PSO and in coordination with the Lead PSO. Reports will utilize the specified performance objectives and criteria, or approved modifications, included in subsection 3.1.3.

Formats and related guidelines are provided in Appendix C. These guidelines and formats are not mandatory and may be modified to better meet individual program needs. Such modifications must be approved and promulgated through the Lead PSO. The reports are intended to provide documented and periodic information to assist line management in the assessment of its own activities. In addition, as the reports are submitted to the next levels of management, it is intended that their roll-up, evaluation, analysis, and integration of results will provide additional insight on common problems, issues, and root causes.

It is expected that the results of the PSO Self-assessment Report will be communicated to both Headquarters and field elements. In addition, an active exchange of information between the PSOs and Lead PSO is encouraged to permit a more comprehensive assessment of the FOs, contractors, and their facilities.

This page intentionally left blank.

5.0 SELF-ASSESSMENT PROCESS INTERFACE WITH OTHER INSTITUTIONAL PROGRAMS

The self-assessment process interfaces with a number of ongoing DOE programs, procedures, and requirements. Information generated from self-assessments can frequently contribute to the planning of these initiatives. In turn, the evaluation activities associated with many of these initiatives may contribute to self-assessment. Discussions of the interfaces between self-assessment and some of the major DOE programs and initiatives are provided for consideration when developing, implementing, and integrating Self-Assessment Program Implementation Plans and programs.

5.1 Strategic Planning (SEN-25A-91)

The goals and principles underlying strategic planning are consistent with self-assessment goals and principles, i.e., strategic planning is intended to assure that longer range destinations, goals, and objectives for achieving excellence, are obtained. Strategic planning, which is conducted on an annual basis, utilizes information and data from various sources to make decisions for future planning. Self-assessment is an ongoing activity designed for continuous identification and correction of deficiencies and problem areas. The information generated from self-assessments should be analyzed and utilized to enhance the strategic planning process. As such, self-assessment can be used as a tool for helping design more effective long-range plans. Strategic plans should also include self-assessment programs and plans for improving these programs.

5.2 Cost Plus Award Fee (CPAF)

The CPAF process utilizes a payment incentive to the various DOE contractors based on performance. Performance is rated semiannually by several levels of DOE management and reviewed by various oversight organizations.

The CPAF process requires the DOE contractors to perform a self-assessment based on the previous 6 months of performance which is used as the baseline for the review process. Contractors rate their performance against the objectives set forth in the CPAF plan. Self-assessments also include evaluations of the contractors' performance and this data should be incorporated into the CPAF assessment process. The CPAF assessments (once every 6 months) by themselves are by no means a substitute for the program-level or FO-level self-assessment programs which are continual activities.

5.3 Multiprogram Laboratory Appraisals

DOE 5000.2A establishes the DOE policy for appraising the DOE multiprogram laboratories in the areas of management, programmatic and operations support, and administrative performance. These appraisals are conducted by the line organizations and are used to rate the laboratories performance on an annual basis. The results of the appraisals are also factored into the strategic planning and institutional planning processes. Information resulting from self-assessments provides similar performance data that should be reviewed as part of the performance appraisal process. These laboratory appraisals are functions that, in turn, can be a part of the self-assessment process.

5.4 Institutional Planning

Self-assessment goals, objectives, and the process are consistent with those required by DOE 5000.1A, "Institutional Planning by Multiprogram Laboratories (IP)," which establishes the Departmental policies on the institutional planning of multiprogram laboratories and outlines the process and responsibilities. IP is a principal Departmental oversight process for the multiprogram laboratories and provides a planning umbrella for all other laboratory Self-Assessment Program Implementation Plans. The IP process is performed annually and is integrated with strategic planning and the budget processes. Key components of the IP process that interface with self-assessment include an annual self-assessment and the identification of significant laboratory issues and initiatives and their proposed resolutions. The data resulting from self-assessments at multiprogram laboratories should be included as a source for additional information in the IP process.

Many of the activities performed for the IP process are functions that can be incorporated into self-assessment programs to build upon the overall comprehensiveness of self-assessment. It should be recognized, however, that self-assessment and IP are two separate initiatives that are not substitutes for each other although they do have common elements that can be shared.

5.5 Internal Review Budget (IRB)

Strategic Planning and Institutional Planning are basic steps preceding and leading to the IRB. It follows that the self-assessment data information that influenced and helped to direct the strategic plans-of-action and institutional plans-of-action should also be considered during the IRB process.

5.6 Federal Manager's Financial Integrity Act (FMFIA) and Internal Control Systems

DOE 1000.3B implements the Department's Internal Control Systems in response to the FMFIA which emphasizes the need for strong internal control systems to minimize or eliminate waste, loss, mismanagement, unauthorized use, or misappropriation of resources. The DOE internal control program is a continuous process that provides a framework for self-assessment and reporting on material weaknesses and related corrective action. All DOE managers must participate in this process. Many of the functional requirements of the internal control process are consistent with the self-assessment objectives and parallel the procedures and the common elements in self-assessments and the Internal Control Systems should be shared.

5.7 Five Year Plans: (Environmental Restoration and Waste Management; Safety and Health)

When implemented, self-assessment will result in the continual process of identifying deficiencies, root causes for these deficiencies, and the corresponding corrective actions for both. Many of these corrective actions should be prioritized for funding and scheduling purposes using the 5-Year Plan methodologies. These items should be reflected in the Environmental Restoration and Waste Management 5-Year Plan or the Safety and Health & Safety 5-Year Plan, which in turn will serve as the vehicle to propose needed funds and also show progress on how funds are expended.

5.8 Performance Indicators and Trending Program (SEN-29-91)

A substantial part of the purpose for Performance Indicators and Trending (PI&T) is to establish a uniform system for early identification of potential problems. Moreover, PI&T provides a mechanism to assess and support progress in improving performance as well as a means to strengthen line management in the control of operations. Organizations involved in self-assessment are encouraged to use and/or develop appropriate performance indicators and trending information and include this information in the self-assessment data base for use in developing a lessons-learned system. Likewise, self-assessment information (i.e., trending of findings, concerns, root causes, lessons learned) should be incorporated into the PI&T Program.

In addition to the above programs and initiatives, there may be other forms of appraisals, reviews, and evaluation activities (e.g., total quality management) within and external to the Department that parallel and interface with self-assessment. These should be evaluated on a case-by-case basis by DOE managers and contractors to ascertain their potential for interface with self-assessment.

This page intentionally left blank.

APPENDIX A
References

References

- For Functional Assessments: Technical Safety Appraisal Performance Objectives and Criteria, DOE/EH-0135, April 1990.
- For Environmental Assessments: Performance Objectives (Environmental Sub-Team) copied from the Tiger Team Assessment of the Argonne National Laboratory in October 1990.
- For Management Assessments: Recommended Management Performance Objectives and Criteria for Tiger Team Management Assessments, June 1990.
- For Safeguards and Security Assessments: DOE Office of Security Affairs (SA-14) Headquarters Guide for Program Element Self-Assessment of Safeguards and Security, Memorandum dated October 9, 1991, and Safeguards and Security Standards and Criteria, October 1988, U.S. DOE, Assistant Secretary for Defense Programs, Office of Safeguards and Security (now EH-4, Office of Security Evaluations).

Note: Additional references will be added to the ones listed above at a later date such as the following:

- DOE Orders
- DOE Safety Guides
- DOE TSAs
- INPO Guidelines and Good Practices
- NRC Inspection Modules
- Performance Objectives and Evaluation Criteria (Westinghouse)
- NSAC 170 Self-Assessment Handbook

This page intentionally left blank.

741

APPENDIX B
Definitions

The following paragraphs contain definitions for self-assessment terms and concepts. To as great a degree as possible, the Task Force has developed definitions that are consistent with traditional DOE assessment and organizational terminology.

Assessment Coordination: Assessment coordination (see AC in Figure 2-2) includes monitoring self-assessment program effectiveness, facilitating effective independent and self-assessments, and coordinating scope/schedule of Departmental oversight assessments.

Assessment Integrations: Assessment integration (see AI in Figure 2-2) includes monitoring self-assessment program effectiveness, facilitating effective independent and self-assessments, integrating assessment results (roll-up) and coordinating scope/schedule of assessments.

Compliance-Based Assessment: An assessment designed to determine the degree of achievement of mandatory requirements such as DOE orders; ES&H laws and regulations including applicable state and local regulations; and consent decrees. The compliance-based assessment generally indicates whether compliance has or has not been achieved and does not attempt to measure performance in excess of the mandatory requirement.

Concern: A concern identifies an adverse condition discovered during an assessment that has potential significance to worker or public health and safety, environmental protection, nuclear safety, facility operations, or management, security or safeguards.

Contractor: Contractor refers to a seller of supplies and services, involved in performing work on-site at a DOE-owned or -leased facility, and awarded a contract or subcontract containing the clause "Safety and Health (Government-owned and -leased facility)" [DEAR 970-5204-2] or another clause whereby DOE elects to require compliance with DOE ES&H and S&S requirements.

DOE Field Office: Including DOE site/area offices take on a broader than usual definition to encompass all DOE managed, directed, or funded field elements form which the Department has responsibilities for ES&H and S&S.

Evaluation Activities: Evaluation Activities for self-assessment programs may include monitoring and surveillances, program reviews and appraisals. Self-assessment programs may include formal and informal evaluation activities. However, most activities should be formal and make use of written guidance and standard performance criteria and measures to ensure appropriate depth and consistency of evaluations. A primary criteria for including an evaluation activity in the self-assessment process is that the activity feeds into a performance and compliance data stream maintained by the line organization and is a documented basis for improvement items or corrective actions.

There should be proactive evaluation activities to consider the potential for adverse effect of the individual operation on ES&H/S&S concerns and reactive evaluation activities precipitated by reportable occurrences and/or technical issues; performance indicators, trends, or problems; or senior manager concerns.

742

- Monitoring and Surveillance Activities are evaluations in which functions, operations, facilities, or equipment are monitored in order to identify deviations from norms as well as to measure conformance to performance and compliance requirements. Monitoring activities include performance indicator programs, various failure analysis and trending programs, surveillances, and lessons-learned programs where overall complex and industry performance is monitored for applicability to specific facilities. They also include observation programs such as safety or environment observer programs, management walk-throughs, site representatives, system/cognizant engineer programs, and building manager programs.

- Program Reviews are formal evaluations of management systems, technical and institutional programs against preset program objectives and performance elements to include all levels of the organization. Program reviews may include a broad spectrum of evaluation activities including award fee determinations, annual technical program reviews, business management and financial reviews, total quality management program reviews, operational readiness reviews, and portions of incident investigations. Strengths and weaknesses should be identified during reviews.

- Appraisals include team assessments, audits, surveys, and inventories that are conducted to measure performance and/or compliance. Appraisals identify performance strengths, weaknesses, and findings of fact. Appraisals are formal and may be initiated as either self- or independent appraisals. Appraisals are planned, structured, and documented. They are conducted in accordance with written, validated guidance and criteria to verify that applicable requirements are implemented in accordance with performance goals and compliance requirements. Traditional line organization appraisal activities, such as functional appraisals, internal appraisals, management appraisals, and environmental surveys and audits, that are set forth in DOE 5482.1B should be incorporated into self-assessment programs as part of the evaluation activities.

Facility: This refers to all property, systems, structures, and components associated with a DOE production, research, or administration function.

Finding of Fact: This identifies a positive or negative condition discovered during an assessment that, in and of itself, may have limited effect on worker or public health and safety, environmental protection, nuclear safety, facility operations, S&S, or management performance. One or more findings of fact may provide a basis for identification of a programmatic strength, improvement item, or concern. An example of a finding of fact would be isolated examples of failing to follow a procedure or a single violation of a permit requirement.

Improvement Item: An improvement item is a condition identified through an assessment that indicates a recommendation for improvement to reach excellence, but does not represent a deviation from DOE Orders or notices, rules, regulations, or TSRs, or a potential challenge to environment, safety, facility operations, or management performance. Improvement items should be supported by one or more findings of fact. They should be worded in a positive manner. An example would be an improvement in conduct of operations.

Independent Evaluation Activities: Independent evaluation activities are those that are conducted by "persons not directly responsible for the performance of the activities being evaluated" and may include evaluation activities conducted by an internal organization (such as an ES&H organization internal appraisal) and by external organizational units (such as a FO functional area appraisal of a contractor or a headquarters Office of Self-Assessment diagnostic evaluation of a production facility). The scope of independent evaluation is determined by line organizations in their pursuit for compliance and performance excellence and by the law, DOE regulations, other Government regulations, consent decrees, and other requirements that govern the operations of a facility and by independent evaluation requirements that are imposed on a contractor by its corporate management. Independent evaluation activities for each facility must include performance-based appraisals of appropriate functional areas, technical disciplines and management systems and practices.

Line Organization: A Line Organization is an unbroken chain which extends from the Program Secretarial Officer (PSO) who sets program policy and Self-Assessment Program Implementation Plans and develops assigned programs to the field organization and office managers who are responsible to the PSO for the for execution of these programs to the contractors who conduct the programs.

Oversight: This is day-to-day and long-term direction, guidance and evaluation that occurs through the discharge of designated ES&H/S&S program responsibility. Line oversight (LOS in Figure 2-2) refers to the direction, guidance, and assessment provided by line organizations in performing their ES&H/S&S program management and assessment responsibilities. Departmental oversight (see IOS in Figure 2-2) refers to the direction, guidance, and assessment provided by headquarters organizations, such as NS, EH, and SA.

Performance-Based Assessment: An assessment designed to determine the absolute level of performance and not just measure the degree of achievement of mandatory requirements such as DOE Orders; ES&H laws and regulations including applicable state and local regulations; and consent decrees. The performance-based assessment not only indicates whether compliance has or has not been achieved but also measures performance in excess of the mandatory requirement and determines the degree of achievement of performance excellence.

Self-Evaluation Activities: Self-evaluation activities are those that are conducted by organizational units within the line organization in order to assess their own performance. The scope of self-evaluation is determined by the line organization on the basis of what information is required to ensure that each organizational unit operates in full compliance with the law and DOE regulations and constantly strives for performance excellence. The quality, frequency, and depth of self-evaluation activities should be commensurate with the hazard attendant with the respective operating activities; consistent with both DOE policy of comparability and equivalence with similar regulatory programs; and consistent with DOE policy of protection of the public, facility personnel, property, and the environment.

Strength: A strength is an example of exceptional performance or achievement of excellence. A strength may be a noteworthy practice, activity, or program that clearly exceeds the acceptable level of performance and that can be documented and is supported by findings of fact. Strengths have general application to other DOE programs or operations. The purpose for documenting the strength is

for communicating the strength within DOE. General application of a strength, either by its design or its execution, results in more effective and improved management or operational performance. An example of a strength could be improved information systems and programs to communicate worker safety requirements.

APPENDIX C
Self-Assessment Guidelines for Annual Reports

Appendix C provides guidelines for preparing annual self-assessment reports at the various organization levels. The following are included:

- General guidelines for preparing annual self-assessment report - facility level;
- General format for preparing facility level annual self-assessment report;
- General guidelines for preparing annual self-assessment report - contractor level;
- General format for preparing contractor level annual self-assessment report;
- General guidelines for preparing annual self-assessment report - FO level;
- General format for preparing FO level annual self-assessment report;
- General guidelines for preparing annual self-assessment report - Headquarters PSO level; and
- General format for preparing Headquarters PSO level annual self-assessment report.

GENERAL GUIDELINES FOR PREPARING ANNUAL SELF-ASSESSMENT REPORT FACILITY LEVEL

An Annual Self-Assessment Report is to be prepared at the contractor's individual facility level to provide an informed and documented evaluation of the condition of programs, activities, operations, and facilities funded by DOE and under contractor authority. This Report, to be submitted to the contractor organization, should provide an overview of all self-assessments performed at the facility during the reporting period, and the results of the assessments in both detailed and summary form. Additional reporting may be needed to meet PSO requirements outlined in any Memorandum of Agreement executed in accordance with the provisions of SEN-6D-91. Needed clarification on additional PSO reporting requirements should be discussed with the DOE FO

Part I of the Report, Background/Scope, should identify the individual site facility, the scope and schedule of all self-assessments performed during the year at the facility, and other relevant facility assessments, appraisals, and evaluations conducted.

Part II of the Report, Assessment Results, should provide adequate information on the facility's self-assessment results evaluated against established performance objectives and criteria, including those addressing environment, health and safety, management and safeguards and securities. Self-assessment findings/strengths and corrective actions will be provided in this section of the report.

In Part III, Facility Summary, an overview of the individual facilities should be provided, addressing key findings, root causes, planned corrective actions, and strengths of each site facility. The key findings/root causes, should be associated, wherever possible, with the appropriate PSO organization and program. In general, the PSO organization that would be responsible for funding the corrective action should be identified. In those instances where multiple PSOs are affected, the summary should indicate and explain. If it is not clear which PSO organization would be responsible for the corrective action, designate the Lead PSO.

The facility should provide the Annual Self-Assessment Report to its contractor organization on the dates specified by DOE. A suggested format for the content of the Report follows.

GENERAL FORMAT FOR PREPARING FACILITY LEVEL ANNUAL SELF-ASSESSMENT REPORT

Facility Level:

Part I: Background/Scope

- Period covered
- Scope
  - Programs, projects, installations assessed
- Other Assessments, Appraisals, Evaluations Performed
  - Internal, functional, management appraisals performed
  - External appraisals conducted
  - Independent assessment of adequacy of self-assessment program
- Performance Objectives and Criteria
  - Identify modifications/additions to established performance objectives and criteria
  - Provide reason for modification/addition

Part II: Facility Assessment Results

- Environment
  - Findings/strengths
  - Corrective actions
- Health and Safety
  - Findings/strengths
  - Corrective actions
- Management
  - Findings/strengths
  - Corrective actions
- Operations
  - Findings/strengths
  - Corrective actions

- Safeguards and Security

  - Findings/strengths
  - Corrective actions

Part III: Facility Program Summary

- Environment

  - Program A:

    -- Key findings/root causes
    -- Corrective actions
    -- Strengths

  - Program B:

- Health and Safety

  - Program A:

    -- Key findings/root causes
    -- Corrective actions
    -- Strengths

  - Program B:

- Management

  - Program A:

    -- Key findings/root causes
    -- Corrective actions
    -- Strengths

  - Program B:

- Operations

    -- Key findings/root causes
    -- Corrective actions
    -- Strengths

- Safeguards and Security

  - Program A:

    -- Key findings/root causes
    -- Corrective actions
    -- Strengths

  - Program B:

GENERAL GUIDELINES FOR PREPARING ANNUAL SELF-ASSESSMENT REPORT CONTRACTOR LEVEL

An Annual Self-Assessment Report are to be prepared by the contractor to provide an informed and documented evaluation of the condition of programs, activities, operations, and facilities funded by DOE and under contractor authority. This Report, to be submitted to the appropriate DOE FO, will roll-up the results and prepare an analysis of the information provided by the individual facilities, and will pass on the site's facilities assessments performed by the contractors. In addition, the Report will include the contractor's independent evaluation of the adequacy of its self-assessment programs. Additional reporting may be needed to meet PSO requirements outlined in any Memorandum of Agreement executed in accordance with the provisions of SEN-6D-91. Needed clarification on additional PSO reporting requirements should be discussed with the DOE FO.

Part I of the Report, Background/Scope, should identify the contractor organization, the scope and schedule of all self-assessments performed during the year at the individual facility and contractor levels, and other relevant facility/contractor assessments, appraisals, and evaluations conducted.

Part II of the Report, Contractor Assessment Results, is divided into the following sections:

- Assessment Summary. This section should provide adequate information on the contractor's assessment of both the individual facility and the contractor organization's self-assessment programs, including the scope and findings of the self-assessments conducted during the period covered and other assessments, appraisals, evaluations, considered relevant.

- Contractor's Summary of Results of Individual Facility Self-Assessments. In this section, the contractor organization should prepare a comparative facility summary, integrating the results of the self-assessments conducted at all the site facilities under its control, analyzing the significant findings, and determining common causes to be addressed in needed actions. This section of the Report should also provide the contractor organization's validation of the individual facility program assessments reported, addressing key findings, root causes, planned corrective actions, and strengths of each individual facility.

The contractor organization should provide the Annual Self-Assessment Report to its appropriate DOE FO on the dates specified by DOE. A suggested format for the content of the Report follows.

GENERAL FORMAT FOR PREPARING CONTRACTOR LEVEL ANNUAL SELF-ASSESSMENT REPORT

Contractor Level:

Part I: Background/Scope

- Contractor
- Period covered
- Scope of Self-Assessment
  - List by facility
    -- Programs, projects, installations assessed
    -- Independent assessment of adequacy of self-assessment program
  - Contractor
    -- Programs, operations, functions subjected to self-assessment
- Other Assessments, Appraisals, Evaluations Performed This Period
  - List by facility
    -- Internal, functional, management appraisals performed
    -- External appraisals conducted
  - Contractor
    -- Describe external appraisals conducted at contractor level

Part II: Contractor Assessment Results

- Assessment Summary
  - List by facility
    -- Discuss results of independent assessment(s) of individual facilities' self-assessment programs

- Contractor

  -- Discuss results of any self-assessment or independent assessment of contractors programs, operations, functions

- Contractor's Summary of Results of Individual Facility Self-Assessments

  - General contractor summary

    -- Comparative facility overview

  - Validated facility summary (list by facility)

    -- (See Part III of Attachment 1, Facility Program Summary)

    -- Discuss any changes made at the contractor level to the individual facility submissions

GENERAL GUIDELINES FOR PREPARING ANNUAL SELF-ASSESSMENT REPORT FIELD OFFICE LEVEL

An Annual Self-Assessment Report will be prepared by the Field Office (FO) to present an integrated, aggregated documentation of self-assessment activities, results, and analyses for DOE-funded programs, activities, operations, and facilities. This Report, to be submitted to DOE Headquarters, will roll-up the results and prepare an analysis of the information provided by the contractors, and will pass on the site's facilities assessments performed by the contractors. In addition, the Report will include the FO's independent evaluation of the adequacy of its self-assessment programs. Additional reporting requirements specified in the relevant Memorandum of Agreement executed in accordance with the provisions of SEN-6D-91 will also be observed.

Part I of the Report, Background/Scope, should identify the contractor organization, the scope and schedule of all self-assessments performed during the year at the contractor and FO levels, and other relevant contractor/FO assessments, appraisals, and evaluations conducted.

Part II of the Report, Field Office Assessment Results, is divided into the following sections:

- Assessment Summary. This section will provide an evaluation of the contractors' and the FO's self-assessment programs, including a discussion of the scope and results of the self-assessments conducted during the period covered and other assessments, appraisals, evaluations, considered relevant.

- FO's Summary of Results of Contractors' Self-Assessments. In this section, the FO should prepare a comparative contractor summary, integrating the results of the self-assessments conducted at all the site facilities under its control, analyzing the significant findings, and determining common causes to be addressed in needed actions. This section of the Report should also provide the FO's validation of the individual facility program assessments reported, addressing key findings, root causes, planned corrective actions, and strengths of each individual facility.

The FO should provide the Annual Self-Assessment Report to all Headquarters PSO organizations with FO programs, and to the Lead PSO organization to which it reports on the dates specified by DOE. A suggested format for the content of the Report follows.

GENERAL FORMAT FOR PREPARING FIELD OFFICE LEVEL ANNUAL SELF-ASSESSMENT REPORT

Field Office Level:

Part I: Background/Scope

- Field Office (FO)
- Period Covered
- Scope of Self-Assessment
  - List by contractor
    - -- Facilities, programs, projects assessed
    - -- Independent assessment of adequacy of contractor's self-assessment program
  - FO
    - -- Programs, projects, functions assessed
    - -- Independent assessment of adequacy of FO's self-assessment program
- Other Assessments, Appraisals, Evaluations Performed This Period
  - List by contractor
    - -- Internal, functional, management appraisals performed
    - -- External appraisals conducted
  - FO
    - -- Internal, functional, management appraisals performed
    - -- External appraisals conducted

Part II: FO Assessment Results

- Assessment Summary
  - List by contractor
    - -- Discuss results of independent assessment(s) of individual contractor's self-assessment program

- FO

  -- Discuss results of any self-assessment or independent assessment of FO programs, operations, functions.

- FO's Summary of Results of Contractor's Self-Assessments

  - General FO summary

    -- Comparative contractors overview

  - Validated facility summary (list by facility)

    -- (See Part III of Attachment 1, Facility Program Summary)

    -- Discuss any changes made at the FO level to the individual facility submissions.

GENERAL GUIDELINES FOR PREPARING ANNUAL SELF-ASSESSMENT REPORT HEADQUARTERS - PSO LEVEL

An Annual Self-Assessment Report is to be prepared by the Headquarters PSO organizations to present an integrated, aggregated documentation of self-assessment activities, results, and analyses for DOE-funded programs, activities, operations, and facilities. This Report will roll-up the results and prepare an analysis of the information provided by the Field Offices (FOs), and will validate site/facility assessments performed by the contractors. In addition, the Report will include the Headquarters PSO's independent evaluation of the adequacy of its self-assessment programs.

Part I of the Report, Evaluation of the Self-Assessment Process, should provide information on the Headquarters PSO self-assessment programs in place for the line programs and the independent assessment office. In addition, this section of the Report will discuss the scope and results of all self-assessments performed during the year at the FO, contractor, and facility levels under Headquarters PSO authority, and those of other relevant assessments, appraisals, and evaluations conducted.

Part II of the Report, Headquarters PSO Assessment Results, is divided into the following sections:

- Assessment Summary. This section will provide an evaluation of the FOs' and the Headquarters PSO's self-assessment programs, including a discussion of the scope and results of the self-assessments conducted during the period covered and other assessments, appraisals, evaluations, considered relevant.

- Headquarters PSO's Summary of Results of FOs' Self-Assessments. In this section, the Headquarters PSO organization should prepare a comparative FO summary, integrating the results of the self-assessments conducted at all the site facilities under its control, analyzing the significant findings, and determining common causes to be addressed in needed actions. This section of the Report should also provide the Headquarters PSO's validation of the individual facility program assessments reported, addressing key findings, root causes, planned corrective actions, and strengths of each individual facility.

A suggested format for the content of the Report follows.

GENERAL FORMAT FOR PREPARING HEADQUARTERS PSO LEVEL ANNUAL SELF-ASSESSMENT REPORT

Headquarters - PSO Level:

Part I: Evaluation of the Self-Assessment Process

- Headquarters PSO Level
  - Line programs
  - Independent assessment office
- Field Office (FO)/Contractor/Facility (list under individual FO)
  - Discuss the scope and results of any self-assessments, independent assessments, or external assessments performed
  - Include in the discussion, as a minimum, an evaluation of self-assessment program
    - -- Extent of implementation
    - -- Adequacy of policy/procedures
    - -- Quality/expertise/adequacy of staff performing self-assessments
    - -- Quality of analysis (root cause, common problem identification, roll-up and integration, trending)
    - -- Condition of management and follow-up systems
    - -- Extent of sharing of significant information
  - Discuss recommended corrective action

Part II: Headquarters PSO Self-Assessment Results

- Assessment Summary
  - List by FO
    - -- Discuss results of independent assessment(s) of individual FO's self-assessment program
  - Headquarters PSO
    - -- Discuss results of any self-assessment or independent assessment of Headquarters PSO programs, operations, functions.
- Headquarters PSO's Summary of Results of FO's Self-Assessments

3288

- General Headquarters PSO summary
  - -- Comparative FOs overview
- Validated facility summary (list by facility)
  - -- (See Part III of Attachment 1, Facility Program Summary)
  - -- Discuss any changes made at the Headquarters PSO level to the individual facility submissions

758

This page intentionally left blank.

APPENDIX D
Performance Objectives and Criteria Listing

Environmental

Performance Objectives and Criteria for Conducting DOE Environmental Audits, DOE/EH-0229. Available to DOE and DOE contractors from the Office of Scientific and Technical Information, P.O. Box 62, Oak Ridge, TN 37831, (FTS) 626-8401/(615) 576-8401; available to the public from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.

Safety and Health

Technical Safety Appraisal Reference Manual, DOE/EH-0090, 2 vols, U.S. DOE, May 1989. Available from EH-33, (FTS) 233-4435/(301) 353-4435.

Performance Objectives and Criteria for TSAs at DOE Facilities and Sites. Available from EH-33, (FTS) 233-4455/(301) 353-4435.

Management

Performance Objectives and Criteria for Management Appraisals, U.S. DOE, March 1987. Available from EH-33, (FTS) 233-4435/(301) 353-4435.

Environment, Safety, and Health Management Performance Objectives and Criteria for Tiger Team Management Assessments (Draft), August 15, 1991. Available from EH-5, (FTS) 896-1870/(202)586-1870.

This page intentionally left blank.

APPENDIX E
Root Cause and Causal Factor Analysis Systems

The following are some examples of commonly used root cause and causal factor analysis systems; however, many other systems are available that managers may prefer to use for their particular programs and operations.

- MORT
- Failure Modes and Effects Analysis
- Kepner - Tregoe (KT) Decision Analysis
- Human Performance Evaluation
- Fault Tree Analysis
- Causal Factor Analysis

This page intentionally left blank.

APPENDIX F
Acronyms and Abbreviations

CE	DOE Office of Conservation and Renewable Energy
CFR	Code of Federal Regulations
CPAF	Cost Plus Award Fee
DOE	U.S. Department of Energy
DP	DOE Office of Defense Programs
EH	DOE Office of Environment, Safety and Health
EM	DOE Office of Environmental Restoration and Waste Management
EPA	U.S. Environmental Protection Agency
ER	DOE Office of Energy Research
ES&H	Environment, Safety, and Health
FE	DOE Office of Fossil Energy
FMFIA	Federal Manager's Financial Integrity Act
FO	Field Office
GAO	Government Accounting Office
IP	Institutional Planning
IRB	Internal Review Budget
MOA	Memorandum of Agreement
NE	DOE Office of Nuclear Energy
NEPA	National Environmental Policy Act
NP	DOE Office of New Production Reactors
NS	DOE Office of Nuclear Safety
OR	Occurrence Report
ORPS	Occurrence Reporting and Processing System
PI	Performance Indicator
PI&T	Performance Indicators and Trending
PMA	Power Marketing Administration
POC	Performance Objective and Criterion
PSO	Program Secretarial Officer
QA	Quality Assurance
RW	Civilian Radioactive Waste Management
S&S	Safeguards and Security
SA	DOE Office of Security Affairs
SEN	Secretary of Energy Notice
Task Force	Inter-Office Task Force on Self-Assessment
TPA	Tri-party Agreement
FY	Fiscal Year

This page intentionally left blank.

- publishing noteworthy pratices as identified and lessons learned in annual report, and more frequently if they may be useful to other organizations;

- establishing and staffing a Headquarters program self-assessment office;

- cooperating with DOE and external oversight and assessment organizations (e.g. EPA, GAO, inspectors);

- providing training support as needed to achieve self-assessment goals and maintain programs throughout the line organizations; and

- including self-assessment considerations in the planning and budgeting process.

Additionally, lead PSOs will be responsible for (1) providing integrated annual reports to identify and characterize ES&H and S&S concerns and resultant corrective actions, and (2) evaluating and adequacy of results of self-assessments performed by line organizations for which the lead PSOs are responsible. These results will be published by February 1 of each subsequent fiscal year. The first annual report is due February 1, 1993 for the period covering fiscal year 1992.

Field Office Level

DOE's Field Offices (FOs) will be responsible, as a minimum, for the following activities:

- developing plans and updating its own self-assessment charter/Program Implementation Plans (including goals, objectives, priorities, and general program requirements);

- providing day-to-day guidance to sites/facilities for which they have responsibility, and verifying that self-assessment is progressing;

- identifying contractual needs and direction/coordination to contractor organizations for which the field office is responsible for self-assessment activities;

- reviewing/commenting and forwarding Self-Assessment Program Implementation Plans and charters as well as updates to PSOs for approval (the first plan due by July 15, 1992;

- coordinating the scheduling of self-assessment activities at the FO and facility/site levels;

- dissemination of self-assessment policy, guidance, direction, and information from the PSOs to the cognizant facilities/sites;

APPENDIX G
Responsibilities for the Self-Assessment Program

The following listing of responsibilities are summarized from the various sections of the self-assessment guidance document. This listing is not comprehensive or restrictive in the accomplishment of self-assessment functions. These responsibilities should be used as a starting point for the development of MOAs and Tri-party Agreements. For more detailed information regarding responsibilities, the reader will need to review the entire self-assessment guidance document. PSO directed additional responsibilities or modifications to these guidelines may occur or additional directives may be issued as this program progresses.

DOE Headquarters Level

As a minimum, each line PSO of DP, EM, ER, NE, NP, FE, RW, and CE and the Administrators of the Power Marketing Administration are responsible for performing the following activities:

- developing and keeping updated program self-assessment policies and plans;
- providing direction on self-assessment to applicable field organizations;
- conducting and coordinating periodic management reviews of cognizant field self-assessment activities;
- reviewing/approving self-assessment charters and Program Implementation Plans from the field (including goals, objectives, priorities, general program requirements);
- initiating contracting actions in order to implement contractor self-assessments;
- providing self-assessment support and resources to the line organizations;
- ensuring that the line organizations implement and adhere to self-assessment guidance, update Memoranda of Agreements and Tri-Party Agreements as necessary;
- coordinating the scheduling of self-assessment activities with other PSOs/Department oversight and assessment groups to eliminate conflicting schedules and direction;
- interfacing/integrating actions with other PSOs for those facilities where more than one Program Office funds activities:
- participating in independent assessments of DOE/contractor performance at the field and facility/site levels;

- managing and supporting the establishment of self-assessment organizations, staffing, and training needs;
- coordinating scheduling of self-assessments across the facility and with the appropriate FO and PSO Headquarters organizations;
- reporting scheduling conflicts of self-assessments via the chain-of-command to the next reporting level in DOE;
- developing and obtaining approval of self-assessment Program Implementation Plans, including specific disciplines, functional and M&O areas to be evaluated, performance objectives, and a self-assessment methodology (updated at least annually, the first annual plan is due by June 1, 1992);
- integrating the self-assessment program activities with other ongoing programs (e.g. strategic planning, CPAF, Multiprogram Laboratory Appraisals, institutional planning, IRB, five-year plans, PI&T);
- performing self-assessment (evaluations) monitoring/surveillance throughout year (all portions of the facility at least once every 3 years) to identify strengths and weaknesses;
- performing causal factors/root cause analyses, designing, implementing and evaluating effectiveness of corrective actions, reporting findings (lessons learned), track corrective actions/deficiencies, and adjust other ongoing planning actions as appropriate;
- establishing an independent self-assessment office and staffing it with trained personnel; and
- creating an atmosphere of continual quality improvement.

Each site or facility office will also be responsible for preparing an annual report of self-assessment with issues and corrective action prioritization. This report shall be published by October 15 of the subsequent fiscal year. The first report is due October 15, 1992 for the period covering fiscal year 1992.

- coordinating and facilitating the review and approval process for self-assessment documents, and the flow of self-assessment information generated from the field to the PSO and Headquarters level;

- conducting own FO level self-assessments in accordance with PSO approved program plans;

- integrating the self-assessment program activities with other ongoing programs (e.g., strategic planning, CPAF, Multiprogram Laboratory Appraisals, institutional planning, IRB, five-year plans, PI&T);

- performing causal factors/root cause analyses, designing, implementing and evaluating effectiveness of corrective actions, reporting findings (lessons learned), track corrective actions/deficiencies; and adjust other ongoing planning actions as appropriate;

- providing appropriate self-assessment training for both the DOE and contractor personnel at the FO level and sites/facilities for which the FO is responsible;

- establishing and staffing independent self-assessment organizations at the FO level;

- providing a line management-fostered atmosphere of continual quality improvement at the FO and facility/site levels; and

- cooperating with DOE and external oversight and assessment organizations (e.g. EPA, GAO, inspectors).

Each FO is also responsible for preparing an annual report of self-assessment of organizations for which the field office is responsible. Including in this annual report shall be comments on lessons learned and noteworthy practices. This report shall be published by December 1 of the subsequent fiscal year. The first report is due December 1, 1992 for the period covering fiscal year 1992.

Site/Facility Level

DOE's operating sites will be responsible, as a minimum, for the following activities:

- developing a self-assessment charter/Program Implementation Plans (including goals, objectives, priorities, general program requirements);

- cooperating with DOE and external oversight and assessment organizations;

- ensuring adequate personnel/resources and facilities to support self-assessment activities;

FEMP ASBESTOS TRAINING REQUIREMENTS

EMPLOYEE	ASBESTOS RESPIR. FIT TEST [1]	ASBESTOS 'COMPETENT PERSON' TRNG. [2]	8 HR. REFRESHER FOR 'COMPETENT PERSON' TRNG. [3]	3 HR. OSHA TRNG. [4]	ASBESTOS AWARENESS VIDEOTAPE [5]
GROUP I PIPEFITTERS CARPENTERS IND. CLEANERS	X	X	X		X
GROUP II ANY OTHER ASBESTOS WORKERS	X	XQ	XQ	X*	X
GROUP III SUPERVISORS OF ANY ASBESTOS WORKERS	X	X	X		X
GROUP IV FAC. OWNERS					X #
GROUP V EVERYONE ELSE					X

[1] Required every 6 months. Similar to normal fit testing, but repeated 3x to ensure proper fit per Ohio DOH

[2] Four day, 32 OSHA 'Competent Person' Training (or Equivalent). Required once, with 8 hr. annual refresher thereafter. Comprehensive Abatement & Supervisor training. Replaced initial 8 hr. glovebag training.

[3] 8 hr. Refresher for 'Competent Person' Training. Required annually after initial training.

[4] Required yearly, conducted by IH.

[5] Covered in General Safety training which is required of every employee annually.

# = Addition Fac. Owner Training to be determined
Q = Required only if worker is removing or repairing more than 50 lineal ft. or 50 sq. ft. of ACM, otherwise 3 hr. OSHA Trng. is satisfactory.
• = Not needed if worker has received 'competent person' training or its annual refresher.

Regulatory Drivers:

- OSHA - 1926.58
- Requires 1, 2, 3 and 4 per R. Grant.
- OSHA 1910.1200 "Hazard Communications" requires 5.

Ohio Admin. Code 3701-34

Note: 'Competent person' training is probably excessive for Group I employees; three day, 24 hour OHSA training is probably sufficient. However, as of 9/10/91, present Group I employees had already received the four day 'Competent Person' Training. New Group I employees may only need three day 24 OSHA training...that determination will be made before FY93.