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**1993 EMISSIONS STANDARDS FOR HAZARDOUS AIR POLLUTANTS ANNUAL  
REPORT FOR THE FERNALD ENVIRONMENTAL MANAGEMENT PROJECT, 40  
CFR 61, SUBPART H**

06/10/94

DOE-1907-94  
DOE-FN        USEPA  
11  
REPORT



Department of Energy  
Fernald Environmental Management Project  
P.O. Box 398705  
Cincinnati, Ohio 45239-8705

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JUN 10 1994

DOE-1907-94

Mr. Valdus V. Adamkus  
Regional Administrator  
U.S. Environmental Protection Agency  
Region V, 5A-14  
230 South Dearborn Street  
Chicago, IL 60604

Dear Mr. Adamkus:

**1993 EMISSIONS STANDARDS FOR HAZARDOUS AIR POLLUTANTS ANNUAL REPORT FOR THE FERNALD ENVIRONMENTAL MANAGEMENT PROJECT, 40 CFR 61, SUBPART H**

Enclosed is the Calendar Year 1993 National Emissions Standards for Hazardous Air Pollutants (NESHAP) Annual Report, required by 40 CFR 61.94(b), for the Fernald Environmental Management Project. This report estimates that the Effective Dose Equivalent (EDE) to the Maximally Exposed Individual (MEI), using 1993 site meteorological emission data, was 0.0066 mrem, which represents 0.066% of the 10 mrem standard.

If you or your staff have any questions, please contact Ed Skintik at (513)648-3151.

Sincerely,

  
Walter J. Quaider  
Assistant Manager  
Technical Support

FN:Skintik

Enclosures: As Stated

cc: w/enc:

S. M. Beckman, FERMC0/65-2

ARE Coordinator, FERMC0

P. J. Strudevart, HC-DOES

Tom Tucker, OEPA

cc: w/o enc:

F. L. Moleski, MTC

000001

4-2-83

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Air Emissions Annual Report  
(under Subpart H, 40 CFR 61.94)  
Calendar Year 1993

Site Name: Fernald Environmental Management Project (FEMP), Fernald, Ohio

Field Office Information:

Office: Fernald Field Office (FN), U. S. Department of Energy  
Address: Post Office Box 398705  
Mail Stop 45  
Cincinnati, Ohio 45239-8705

Contact: Mr. Wally Quaid Phone: (513) 648-3137

Site Information

Operating Contractor: Fernald Environmental Restoration Management Corp.

Address: 7400 Willey Road, Fernald, Ohio 45030 (location)  
Post Office Box 398704, Cincinnati, Ohio 45239-8704 (mail)

Contact: Kip Klee Phone: (513) 738-8640

SECTION I: FACILITY INFORMATIONA. Site Description

For 37 years, the Feed Materials Production Center (Fernald site) produced low-enriched uranium metals for the United States Department of Energy (DOE) and its predecessors. On July 10, 1989, production activities were suspended. In October of 1990, the DOE transferred management responsibilities of the Fernald site from the Defense Programs organization to its Office of Environmental Restoration and Waste Management. In February 1991, the DOE announced its intention to formally end production and submitted a closure plan to Congress. To reflect the new mission of the site, DOE changed the name of the facility to the Fernald Environmental Management Project (FEMP) on August 23, 1991.

Current activities on the site include:

- Conduct of Remedial Investigation/Feasibility Studies consistent with the requirements of CERCLA;
- Management of Hazardous, Mixed, Low Level Radioactive, and Solid Waste in accordance with EPA and DOE requirements;
- Performance of environmental monitoring, sampling, and surveillance;
- Analysis of a broad spectrum of wastes, water, air, and other environmental samples at the on-site laboratories;
- Characterization of wastes stored and generated in order to determine proper management and disposal requirements; and
- Operation of a coal-fired boiler plant to provide steam for heating and for other facility needs in support of cleanup activities.

B. Source Description

In calendar year 1993, the sources of radionuclide emissions included:

- Activities associated with CERCLA Removal Action No. 13: Removal of the Plant One Ore silos (Ore Silo stack and Size Reduction Bldg. stack);
- Plant 8 vacuum filters (3 grouped stacks) - radionuclides in facility waste water and entrained in mist loss;
- Building No. 8 Ventilation vents, during period of ventilation fan operation;
- The General Ventilation stack of Plant 9, which vented emissions associated with a treatability study associated with Operable Units 1 and 4.

- Laboratory hoods located in the Analytical Laboratory (EPN15-001, General Exhaust [2 stacks], and Perchloric Hoods [10 stacks, grouped]), the Water Plant Lab (Bldg. 20 [2 stacks]) and the Health and Safety (Bldg. 53 [7 stacks, grouped]) Buildings;
- Cooling tower - radionuclides dissolved in plant cooling water and entrained in mist lost during periods when fans were operated;
- the surface of Waste Pit No. 5 during periods when water cover was less than 100%.

For the past two years, this report has included dose estimates for fugitive losses of  $^{222}\text{Rn}$  and  $^{220}\text{Rn}$  decay products from buildings where interior monitoring indicated there was an elevated level of the two parent isotopes. It was assumed that there was a potential for the release of their decay products. Recent monitoring conducted at one of these structures indicate that elevated levels of  $^{222}\text{Rn}$  or  $^{220}\text{Rn}$  inside a structure did not result in elevated ambient levels. Furthermore, the doses calculated from the estimated releases provided an insignificant contribution to the site's total dose. For these reasons, doses from these "potential" emissions were not calculated for CY-1993.

## SECTION II: AIR EMISSIONS DATA

Tables 1 and 2 provide information on the measured and calculated emissions of radionuclides from the FEMP in CY-1993. Emissions were sampled and measured at five point sources: Analytical Laboratory stack EPN15-001, the Laundry facility stack, the General Ventilation stack of Plant 9, and the two stacks associated with Removal Action No. 13: Plant One Ore Silos. Particulate was collected on filters, which were changed out on a monthly schedule when sources were in operation. An annual composite sample was generated for each stack from these filters. Due to the low activity collected on the filters, analysis was conducted for only those radionuclides likely to contribute 10% or more to the dose from the specific source, as determined by process knowledge of the activities vented through the specific source. For the Plant 9 General Ventilation stack, particulate was collected on a filter which was only changed once during CY-1993, due to lack of operation in the treatability study. The filter was analyzed for total uranium using Laser Phosphorimetry and specific activities were calculated, based on process knowledge.

Engineering calculations were used to develop total Uranium emission estimates for the remaining sources described in Section I.B., both point and fugitive. These emission estimates were used to generate radionuclide-specific emission rates, using radionuclide-specific activity to mass total Uranium values (Ci/kg U) developed from past source sampling activities at the FEMP.

There were no unplanned releases of radionuclides in CY-1993 which led to emissions which crossed the site perimeter. This determination was based on a review of the 137 occurrence notifications filed during CY-1993 at the FEMP.

5648

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT  
FERNALD, OHIO

40 CFR 61, SUBPART H  
CY-1993 ANNUAL COMPLIANCE REPORT  
PAGE 4 OF 6

### SECTION III: DOSE ASSESSMENT

#### A. Description of Dose Model

The radionuclide dose calculations were performed using the CAP88-PC Version 1.0 computer code. This package contains EPA's most recent version of the AIRDOS-EPA computer code, which implements a steady-state, Gaussian plume, atmospheric dispersion model to calculate environmental concentrations of released radionuclides and U. S. Nuclear Regulatory Commission Regulatory Guide 1.109 (Revision 1, dated 10/77 is the most current version) foodchain models to calculate human exposures, both internal and external, to radionuclides deposited in the environment. The human exposure values are then used by the EPA's latest version of the DARTAB computer code to calculate radiation doses to man from radionuclides released during the year. The dose calculations use dose conversion factors in the latest version of the RADRISK data file, which is provided by the EPA with the CAP88-PC package.

#### B. Summary of Input Parameters

Unless otherwise discussed, all important input parameter values used were the default values provided with the CAP88-PC computer codes and databases by the EPA.

##### 1. Source Characteristics Data

Information on the emission sources was gathered from site records, and are provided in Tables 3 and 4. All point source emissions occur at or near ambient temperatures; thus, plume rise is momentum dominated. Distances from sources to nearest receptor(s) were calculated using information from a map of the site with the Ohio State Planar Coordinate System coordinates.

##### 2. Meteorological Data

CAP88-PC analysis was accomplished using meteorological data developed from the on-site FEMP meteorological station. The station experienced a data recovery rate of 99% in CY-1993, which is considered acceptable for the purposes of running the CAP88-PC code. Wind speed and direction data were compiled in a Statistical Array (STAR) format and converted using the GETWIND utility provided with the CAP88-PC package. The STAR formatted data is provided in Table 4. Additional data developed from the site station included:

Average Temperature: 11.3° C  
Average Rainfall: 97.84 cm

Additional meteorological datum were provided from information developed by the National Weather Service at its station at Dayton, Ohio. This input was:

Average Mixing Height: 965 meters

000005

### 3. Other Input Parameters

The CAP88-PC code provides dose estimates from radionuclides ingested. Beef, milk, and food crop production were assumed to be the maximum possible for the available ground area, an assumption that overstates these activities in the area. It was further assumed that 100% of the foodstuffs consumed by the local population were grown within the 80 km/50 mi radius, which also provides a conservative estimate for the impact. The default values used were:

Fraction of foodstuffs from:	Local Area	50-mile radius	Beyond 50 miles
Vegetables & Produce:	0.700	0.300	0.000
Meat:	0.442	0.558	0.000
Milk:	0.399	0.601	0.000

### C. Compliance Assessment

Results of the CAP88-PC runs are provided in the following table:

Emission sources considered	Effective Dose Equivalent to Maximally Exposed Individual mrem/year (mSv/year)	Location of Maximally Exposed Individual from center of FEMP (meters)
Point source alone	0.0066 (6.6E-05)	1081 ESE
All Sources	0.016 (1.6E-04)	1143 N

These results indicate that the FEMP is in compliance with the dose limitations of 40 CFR 61, Subpart H.

## SECTION IV: ADDITIONAL INFORMATION

### A) Construction/Modification at the FEMP

Title 40, Code of Federal Regulations, Subpart H [40 CFR 61.94(b)(8)], requires that this report provide information on all construction/modifications completed at the FEMP in CY-1993 for which approval was not sought from the EPA per the provisions of 40 CFR 61.96. This section addresses that requirement.

In CY-1993, the FEMP laundry facility was upgraded to include the operation of three gas-fired clothes dryers, which were designated to be used for drying clothing received from radiologically contaminated areas. Clothing from non-contaminated areas is washed and dried in separate washer/dryer units. The "contaminated clothing" dryers are configured to vent through a MEPA/HEPA filtration system, and then through a stack equipped with an in-line single point sampling system. Construction of this system was authorized under Ohio Environmental Protection Agency (OEPA) Permit to Install (PTI) no. 14-2459, issued May 6, 1992. Operation of the completed system was authorized by OEPA Permit to Operate (PTO) No. P274, issued October 22, 1993. As part of the preparation of the initial PTI application, emissions from expected operations

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT  
FERNALD, OHIO

40 CFR 61, SUBPART H  
CY-1993 ANNUAL COMPLIANCE REPORT  
PAGE 6 OF 6

with the control systems operating were modeled using the COMPLY code, version 1.4. This modeling run indicated that the potential dose from this source to the maximally exposed off-site receptor would be  $6.4E-02$  mrem/year ( $6.4E-04$  mSv/year), indicating that pre-construction authorization would not be required per the provisions of 40 CFR 61.96.

No other projects were completed in CY-1993 for which the requirements to apply to the EPA for approval to construct or modify were waived due to the provisions of 40 CFR 61.96. All other projects completed during this year were either those with no air emissions associated with their normal operation upon completion of construction, or those which were conducted subsequent to approval, by EPA - Region 5, of a Removal Action work plan. These Removal Actions were conducted in compliance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) for this site.

As discussed in Section 1, there were no unplanned releases of radionuclides to the atmosphere in CY-1993. This determination is based on a review of the reports related to the 137 notifications received by the site's release evaluators in CY-1993.

#### SECTION V: CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment. (see 18 U.S.C. 1001).

Edward Skintch (name)

ENVIR. ENGINEER (title)

6/10/94 (date)

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT  
FERNALD, OHIO

40 CFR 61, SUBPART H  
CY-1993 ANNUAL COMPLIANCE REPORT  
TABLES

### LIST OF TABLES:

- TABLE 1: Radionuclide release rates in Curies per year
- Table 2: Point Source input parameters
- Table 3: Diffuse/fugitive source input parameters
- Table 4: STAR format Meteorological file for CY-1993 from the FEMP site meteorological station.

NOTE: To convert values to the SI equivalent of Becquerels, use 1 Ci =  $3.7 \times 10^{10}$  Bq.

**TABLE 1: Radionuclide release rates in Curies per year**  
 Note: Values provided as on CAP88-PC report forms; CAP88-PC-performed rounding led to apparent inaccurate summations

a. Monitored Stacks :

STACKS	Emission Controls	% efficiency	U-234	U-235	U-238	Th-228	Th-230	Th-232	Th-234
Plant 1 - Ore Silo	MEPA/HEPA filters	99.9	NA	NA	NA	3.1E-08	1.2E-08		1.8E-09
Plant 1 - Size Reduction	MEPA/HEPA filters	99.9	NA	NA	NA	1.2E-08	7.2E-09		6.6E-10
Plant 9 - General Ventilation	MEPA/HEPA filters	99.9	4.3E-08	2.2E-09	2.7E-08	NA	NA		NA
Bldg. 11 - Laundry	MEPA/HEPA filter	99.9	6.7E-09	1.5E-09	5.5E-09	NA	NA		NA
Bldg. 15 - EPN 15-001	MEPA/HEPA filter	99.9	7.4E-08	8.3E-09	6.7E-08	NA	NA		NA

NA: Analysis Not Available for these isotopes; insufficient sample collected.

b. Unmonitored Stacks/vents -Emissions estimated (note: Grouped stacks are shaded, with number of stacks indicated in first column).

Stacks	U-234	U-235	U-236	U-238	Ra-226	Ra-228	Th-228	Th-230	Th-232	Th-234
Plant 8 - Vacuum Filters (3)	9.9E-06	5.3E-07	3.6E-07	1.3E-05	8.9E-09	3.6E-08	3.8E-07	2.7E-08	5.9E-08	5.5E-05
Plant 8 - Bldg. Vents	1.0E-08	5.6E-10	3.8E-10	1.4E-08	9.3E-12	3.7E-11	3.9E-10	2.8E-11	6.2E-11	5.8E-08
Bldg. 15 - General Exhaust (2 stacks)	6.5E-06 +6.5E-06	3.5E-07 +3.5E-07	2.6E-07 +2.6E-07	7.4E-06 +7.4E-06	4.7E-09 +4.7E-09	1.9E-08 +1.9E-08	2.0E-07 +2.0E-07	5.8E-07 +5.8E-07	3.1E-08 +3.1E-08	2.9E-08 +2.9E-08
Bldg. 15 - perchloric Hoods (10)	1.3E-05	7.0E-07	5.1E-07	1.5E-05	9.3E-09	3.7E-08	4.0E-07	1.2E-06	6.2E-08	5.8E-05
Bldg. 20 - Water Plant Lab (2 stacks)	2.6E-08	1.4E-09	1.0E-09	2.9E-08	1.9E-11	7.5E-11	7.9E-10	2.3E-09	1.2E-10	1.2E-07
Bldg. 53 - Lab Stacks (7)	1.4E-09	7.6E-11	5.2E-11	1.9E-09	1.3E-12	5.1E-12	5.4E-11	3.8E-12	8.5E-12	7.9E-09
	1.4E-09	7.6E-11	5.2E-11	1.9E-09	1.3E-12	5.1E-12	5.4E-11	3.8E-12	8.5E-12	7.9E-09
	2.8E-09	1.5E-10	1.0E-10	3.7E-09	2.5E-12	1.0E-11	1.1E-10	7.6E-12	1.7E-11	1.6E-08
	2.1E-07	1.1E-08	8.1E-09	2.3E-07	1.5E-10	5.9E-10	6.3E-09	1.8E-08	9.9E-10	9.2E-07

c. Diffuse/fugitive sources - Radionuclide release rates

SOURCES	U-234	U-235	U-236	U-238	Ra-226	Ra-228	Th-228	Th-230	Th-232	Th-234
Waste Pit 5	1.9E-06	7.8E-08	1.9E-07	1.4E-06	1.2E-06	1.5E-07	2.0E-07	2.2E-05	1.5E-07	1.4E-06
Cooling Tower	3.1E-05	1.6E-06	1.1E-06	4.1E-05	2.8E-08	1.1E-07	1.2E-05	8.2E-08	1.8E-07	1.7E-04

Table 2: Point Source input parameters

Source Description	Stack Height (m)	Stack Diameter (m)	Plume Rise	Exit Velocity (m/s)	Distance & direction to nearest off-site receptor (m)
Plant 1 - Ore Silo	14.3	0.76	Momentum	12.7	966 N
Plant 1 - Size Reduction	6.10	0.46	Momentum	16.6	966 N
Plant 9 - General Ventilation	24.4	0.52	Momentum	22.3	956 ESE
Bldg. 11 - Laundry	3.70	0.56	Momentum	13.0	1017 WSW
Bldg. 15 - EPN 15-001	14.75	0.91	Momentum	17.3	921 WSW
Plant 8 - Vacuum Filters	13.72	0.20	Momentum	13.1	969 WSW
Plant 8 - Building Vents	15.60	1.0	Momentum	11.4	969 WSW
Bldg. 15 - General Exhaust (2 stacks)	16.80/ 16.28	1.32/ 1.22	Momentum/ Momentum	17.2/ 15.2	921 WSW
Bldg. 15 - Perchloric Hoods	11.0	0.25	Momentum	9.34	921 WSW
Bldg. 20 - Water Plant Lab (2 Stacks)	8.53/ 8.53	0.30/ 0.30	Momentum/ Momentum	9.45/ 7.87	858 N
Bldg. 53 - Lab Stacks	14.90	8.69	Momentum	7.16	929 ESE

Table 3: Diffuse/fugitive source input parameters

Source	Release Height (m)	Stack Diameter (m)	Area Diameter (m)	Plume Rise type	Exit Velocity	Distance & direction to nearest off-site receptor (m)
Cooling Tower	14.9	8.69	NA	momentum	7.16	924 N
Waste Pit 5	1.0	NA	162	momentum	0.0	641 W

564500

Table 4:

STAR format Meteorological file for CY-1993 from the FEMP site meteorological station

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000011