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FERNALD ENVIRONMENTAL MANAGEMENT PROJECT (FEMP) - OEPA FACILITY NO. 1431110128 PERMIT TO INSTALL APPLICATION - RESPIRATOR WASHING FACILITY, FEMP IS NO. 11-004

12/29/93

C:RP:93-0183
FERMCO/HAMILTON CO
22
LETTER

Fernald Environmental

FERMCO

Restoration Management Corporation P.O. Box 398704 Cincinnati, Ohio 45239-8704 (513) 738-6200

December 29, 1993

U. S. Department of Energy
Fernald Environmental Management Project
Letter No. C:RP:93-0183

Mr. Peter Sturdevant
Compliance Specialist
Hamilton County Department
of Environmental Services
Air Quality Management
1632 Central Parkway
Cincinnati, Ohio 45210

Dear Mr. Sturdevant:

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT (FEMP) - OEPA FACILITY NO. 1431110128
PERMIT TO INSTALL APPLICATION - RESPIRATOR WASHING FACILITY, FEMP ID NO. 11-004

Enclosed please find a revised application for a Permit To Install (PTI) for the Respirator Washing Facility. The original PTI (Application No. 14-2750) has been revised to include the installation of two additional washer/dryer combination units, and an unloading station. The new application contains updated process information, including a larger air handling system and updated emission calculations.

Please contact Kip Klee of my staff at 738-8640 if you have any questions about this application.

Sincerely,

Kenneth L. Alkema
Vice President
Regulatory Programs

KLA:KOK:mhv
Attachments

cc: S. M. Beckman, FERMCO, w/o attachments
K. O. Klee, FERMCO, w/o attachments
Robert Mendelsohn, DOE Contract Specialist
W. J. Quaider, DOE-FN
P. B. Spotts, FERMCO, w/o attachments
AR Coordinator
RTS Files (PTI 14-2750)
File Record Storage Copy 108.6

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Check Appropriate Box(es)

___ Air Discharge

___ Water Discharge to New Source Treatment Works

___ Solid Waste Disposal Facility

___ Hazardous Waste Disposal Facility

PTI Application No. _____

Date Received _____

Premise No. _____

OHIO ENVIRONMENTAL PROTECTION AGENCY
Application for Permit to Install

Fernald Environmental Management Corp., Fernald Environmental Management Project
Applicant's Name

P. O. Box 398704
Mailing Address

Cincinnati	Hamilton	OH	45239	513/738-6502
City	County	State	Zip Code	Telephone Number

Stephen M. Beckman Manager, Regulatory Technical Support (513) 738-6502
Person to contact (Name and Title and Telephone Number)

This facility will located within the Services building (building #11) of the Department of Energy's Fernald Environmental Management Project (FEMP)
Location of Proposed Facility(State the location as completely and precisely as possible)*

Fernald Environmental Management Project, 7400 Willey Road

Fernald	Hamilton	45030
City or Township	County	Zip Code

Directions: A Permit to Install is required for new or modified sources of pollution under the provisions of OAC Rule 3745-31. An Application cannot be considered complete unless all applicable questions are answered and the required information has been submitted. This application must be signed in accordance with OAC Rule 3745-31-04(B) or it cannot be accepted.

Applicants for permits involving air emissions or wastewater treatment facilities will be required to pay a permit to install fee as shown in Section 3745.11(B) and (C) of the Ohio Revised Code. This fee is payable fifteen days after the date of final issuance of the permit.

Name of new or modified source or facility: Respirator Washing Facility (11-004)

Product of new or modified source /facility: Cleaned Respirators

Will the proposed source/facility involve any of the following: Check all that apply.

A. X Air Discharge

B. ___ Wastewater Treatment Works

C. ___ Solid Waste disposal Facility

D. ___ Hazardous Waste Disposal Facility

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* Example: "The source will be constructed on a 20 Acre plot to be located on Franklin Township Road No. 17, approximately 1 1/4 miles north of the intersection of State Route 99 and Franklin Township Road No. 17."

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Under OAC 3745-31-04, These signatures shall constitute personal affirmation that all statements or assertions of fact made in the application are true and complete, comply fully with applicable state requirements, and shall subject the signatory to liability under applicable state laws forbidding false or misleading statements.

Kenneth P. Allen 1-3-94

Authorized Signature (for facility) Date

Vice President, Regulatory Programs

Title

P. O. Box 398704 Cincinnati, Ohio 45239-8704

Address

For Wastewater Treatment Plants:

Signature of General Contractor or Agent Performing installation, if selected. Date

Company

Address

EPA 3150
6/8/82

E-5074

APPLICATION FOR AN AIR PERMIT TO INSTALL

RESPIRATOR WASHING FACILITY

1. **Describe the product or service to be produced by the applicant along with a description of the proposed source/facility.**

A new Respirator Washing Facility will be constructed within the Services Building at the Fernald Environmental Management Project (FEMP). The FEMP is located at 7400 Willey Road near Fernald, Ohio and has the EPA facility number of 1431110128.

The project involves the renovation of a room within the existing FEMP laundry area. Equipment to be installed in the new respirator facility includes: a ventilated unloading station, 3 respirator washer units, and 3 electric dryers along with all necessary electric/plumbing/ventilation connections. The main washer unit includes a sink and an automatic washer (both inside a hood), along with a wet vacuum unit. Respirators washed in this equipment will support a separate, stand-alone dryer. The other 2 washer units are to be combination washer/dryers (only the dryer portion of each will be ventilated, the washer is a closed system). All ventilated equipment will be connected to a prefilter/HEPA/fan located at and exhausted to the outside of the laundry building.

Contaminated respirators will first be unloaded from drums at the unloading station and then be hand washed in the sink of the main washer unit if heavily soiled. Respirators will next be transferred to any of the 3 washers (although one of the combination washers/dryer units will be dedicated to respirators generated from non-radiological areas). Following the sink and washer cycles, the wash water itself is to be discharged for treatment in an existing FEMP water treatment system outside the respirator washing facility. The cleaned, wet respirators are then to be vacuumed to remove gross moisture and transferred to any of the 3 dryers, depending upon availability. Lastly, the cleaned and dry respirators will then be radiologically monitored, inspected, and packaged before being released for reuse.

2. **List the name and quantity of all materials and chemicals (solid, liquid, or gaseous) that will be used or produced by the source/facility.**

The Respirator Washing Facility consists of equipment that is used to clean respirators that are used within the plant. The respirators are scrubbed and sanitized using a soap cleanser and a chlorine bleach solution. The following table lists the materials used in the process.

MATERIALS USED	QUANTITY	MATERIALS PRODUCED	QUANTITY
Used Respirators	44/hr	Clean Respirators	44/hr
Water	598 lb/hr	Contaminated Waste-water	598.5 lb/hr
Soap Cleanser	0.042 lb/hr		
Chlorine Bleach	1.44 lb/hr		
Liquid Detergent	0.5 lb/hr		

3. **State the reason for the application. Is this a new installation, modification to an existing source/facility, reconstruction of an existing source/facility, or startup of a source/facility that has been permanently shutdown for____ years? (State number of years)**

This is a new installation.

4. **Has a previous Ohio EPA application or plan submission been filed for this source/facility? If so, state the date and type of the application previously submitted.**

Yes, Permit to Install, Application No. 14-2750, was issued February 24, 1993. This application has been written to include the installation of two additional washer/dryer combination units and an unloading station.

5. **Will the proposed source/facility comply with all rules, laws, and regulations of Ohio EPA and U.S. EPA?**

Yes, the proposed source will comply with all rules, laws and regulations of the Ohio EPA and the US EPA.

6. **State the amount of each air contaminant (actual emissions) from each source in pounds per hour and tons per year at maximum and average conditions.**

Estimated actual emissions are listed in the table below.

AIR CONTAMINANT	Lb/hr	Tons/yr
Particulate	9.19E-06	2.41E-05
Uranium (5% of particulate)	4.59E-07	1.21E-06

7. **Are the proposed sources required to comply with the following federal requirements?**

i. **New Source Performance Standards (NSPS).----------No.**
ii. **National Emission Standards for Hazardous Air Pollutants (NESHAPS).--Yes.**
iii. **Prevention of Significant Deterioration (PSD).----------No.**
iv. **Appendix "S" - Emission Offset Policy.----------No.**

8. **Will the proposed sources employ best available technology?**

Yes, Best Available Technology for the Respirator Washing Facility has been determined to be a HEPA filtration system with a designed control efficiency of 99.97% at 0.3 microns.

9. **Will the proposed sources cause the significant degradation of air quality.**

No, the Respirator Washing Facility will not cause significant degradation of air quality.

10. **Will the proposed sources interfere with the attainment and maintenance of current air quality standards?**

No, the Respirator Washing Facility will not interfere with the attainment and maintenance of air quality standards.

11. **Describe any source monitoring, emissions monitoring, or control equipment monitoring devices to be installed by the applicant.**

None.

12. **Will the proposed sources involve the use of asbestos, benzene, beryllium, mercury, or vinyl chloride?**

No, the proposed sources will not involve the use of asbestos, benzene, beryllium, mercury, or vinyl chloride.

13. **Complete and attach an anticipated construction schedule for each proposed source.**

See the attached Installation Schedule.

14. **Please include the estimated cost of any air pollution control equipment to be installed on the proposed sources.**

The total estimated cost for the air pollution control equipment is $6,400.

15. **An appendix for each air contaminant source must accompany this application. From the following description of the appendices, determine which should accompany your application.**

See the attached Appendix A.

OHIO ENVIRONMENTAL PROTECTION AGENCY

INSTALLATION SCHEDULE

TO ACCOMPANY APPLICATION FOR PERMIT TO INSTALL

THIS FORM CONSTITUTES PART OF THE APPLICATION OF:

FACILITY NAME: Fernald Environmental Management Project

ADDRESS: 7400 Willey Road, Fernald, Ohio 45030

FOR A PERMIT TO INSTALL THE FOLLOWING AIR CONTAMINANT SOURCE:

IDENTIFICATION: Respirator Washing Facility

DESCRIPTION: The facility consists of a ventilated unloading station, a sink, an automatic washing unit, a wet vacuum unit, a drying unit, and two combination washer/dryer units; emissions are controlled via HEPA filtration.

THE INSTALLATION OF THE ABOVE AIR CONTAMINANT SOURCE IS PLANNED TO FOLLOW THE TIME SCHEDULE DESCRIBED BELOW:

	DATE
1. EQUIPMENT ORDERED	April 1994
2. COMMENCE CONSTRUCTION	July 1994
3. STARTUP	September 1994
4. PERFORMANCE TESTING	None

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Premise No. ___/___/___/___
Source No. ___/_____
Application No. ___/_____

APPENDIX A, PROCESS

OEPA NO. 1431110128 ___
A-1
FEMP ID NO. 11-004

PROCESS DATA

1. Name of process Respirator Washing Facility

2. End product of this process Cleaned Respirators

3. Primary process equipment See supplemental page A-1A

   Your identification _____ Year Installed _____

4. Manufacturer See supplemental page A-1A Make or Model _____

5. Capacity of equipment (lbs./hr): Rated 924 Respirators/day Max. 1320 Respirators/day

6. Method of exhaust ventilation: [X] Stack [ ] Window fan [ ] Roof vent
   [ ] Other, describe _____

   Are there multiple exhausts? [ ] Yes [X] No

OPERATING DATA

7. Normal operating schedule: 21 hrs./day, 5 days/wk., 50 wks./year.

8. Percent annual production (finished units) by season:
   Winter 25 Spring 25 Summer 25 Fall 25

9. Hourly production rates (lbs.): Average 44 Respirators/hr Maximum 55 Respirators/hr

10. Annual production (indicate units) 231,000 Respirators
    projected percent annual increase in production None

11. Type of operation: [ ] Continuous [X] Batch

12. If batch, indicate: Minutes per cycle 30 Max. Minutes between cycles 40 Max.

13. Materials used in process:

List of Raw Materials	Principal Use	Amount (lbs./hr.)
Water	Wash Water	598
Chlorine Bleach	Sanitizer	1.44
Liquid Detergent	Cleaning Agent	0.5
Soap Cleanser	Cleaning Agent	0.042
Respirators	Items to be cleaned	44 Respirators/hr

14. A PROCESS FLOW DIAGRAM MUST BE INCLUDED WITH THIS APPENDIX. Show entry and exit points of all raw materials, intermediate products, by products and finished products. Label all materials including airborne contaminants and other waste materials. Label the process equipment.

See attached Process Flow Diagram

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SUPPLEMENTAL PAGE

A-1A

OEPA NO. 1431110128

FEMP ID NO. 11-004

Answers to questions #3 and #4.

QUESTION #3			QUESTION #4	
Primary Process Equipment	**Identification**	**Year Installed**	**Manufacturer**	**Make or Model**
Unloading Station	Unloading Station	1994	General Dynamics	RDM 1000R
Sink	Sink	1994	General Dynamics	RDM 1000R
Automatic Washer	Respirator Cleaning Module	1994	General Dynamics	RDM 1000R
Wet Vacuum Unit	Wet Vacuum	1994		
Respirator Dryer	Dryer	1994	General Dynamics	PQ40B350
Washer/Dryer #1	Washer/Dryer #1	1994	To be determined	RCM-500 or equivalent
Washer/Dryer #2	Washer/Dryer #2	1994	To be determined	RCM-500 or equivalent

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CONTROL EQUIPMENT

OEPA NO. 1431110128
FEMP ID NO. 11-004

Control Equipment Code:

(A)	Settling Chamber	(G)	Cyclonic Scrubber	(M)	Adsorber
(B)	Cyclone	(H)	Impingement Scrubber	(N)	Condenser
(C)	Multiple Cyclone	(I)	Orifice Scrubber	(O)	Afterburner - Catalytic
(D)	Electrostatic Precipitator	(J)	Venturi Scrubber	(P)	Afterburner - Thermal
(E)	Fabric Filter	(K)	Plate or Tray Tower	(Q)	Other, Describe Cartridge/HEPA filters
(F)	Spray Chamber	(L)	Packing Tower		

15. Control Equipment Data:

Item	Primary Collector	Secondary Collector
(a) Type (See above Code)	Q - Cartridge Filter	Q - HEPA Filter
(b) Manufacturer	NFS-RPS or equivalent	NFS-RPS or equivalent
(c) Model No.	AK-03	AK-04
(d) Year Installed	1994	1994
(e) Your Identification	To be determined	To be Determined
(f) Pollutant Controlled	Particulate/Uranium	Particulate/Uranium
(g) Controlled pollutant emission rate (if known)	Unknown	PM - 9.19E-06 lb/hr U - 4.59E-07 lb/hr
(h) Pressure Drop	Unknown	1" w.g.
(i) Design efficiency	99.9% @ 1.0 Microns	99.97% @ 0.3 Microns
(j) Operating efficiency	99%	99.9%

STACK DATA

16. Your Stack Identification EP11-004

17. Are other sources vented to this stack? [ ] Yes [X] No
    If yes, identify sources _____

18. Type: [ ] Round, top inside diameter dimension 8 inches
    [ ] Rectangular, top inside dimensions (L)_____ X (W)_____

19. Height: Above roof N/A ft., above ground 10 ft.

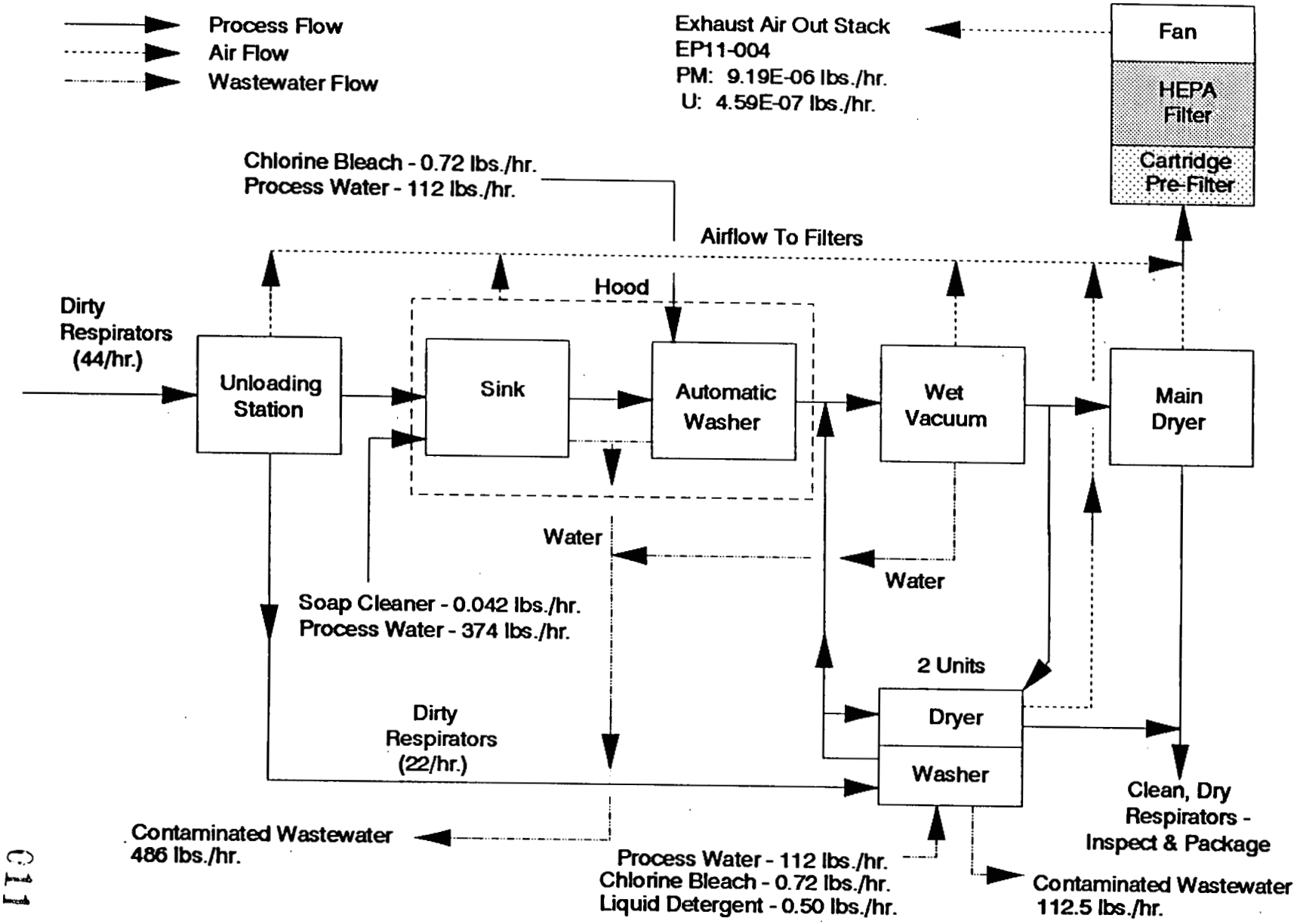
20. Exit gas: Temp. 120max. °F, Volume 2000-2500 ACFM, Velocity 5730-7160 ft./min.

21. Continuous monitoring equipment: [ ] Yes [X] No
    If yes, indicate : Type _____ , Manufacturer _____

    Make or Model _____, Pollutant(s) monitored _____

22. Emission data: Emissions from this source have been determined and such data is included with this appendix: [X] Yes [ ] No
    If yes, check method: [ ] Stack Test [X] Emission Factor [ ] Material Balance

Completed by Kip Klee , Date 12-8-93



PROCESS FLOW DIAGRAM RESPIRATOR WASHING FACILITY

Rev.2 12/22/93

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EMISSION CALCULATIONS

A. SUMMARY OF EMISSIONS

	Particulate		Uranium	
	Hourly (lbs/hr)	Annual (tons/yr)	Hourly (lbs/hr)	Annual (tons/yr)
Actual Emissions	9.19E-06	2.41E-05	4.59E-07	1.21E-06
Potential Emissions	9.19E-06	4.02E-05	4.59E-07	2.01E-06
Uncontrolled Potential Emissions	8.09E-05	3.54E-04	4.04E-04	1.77E-05
Allowable Emissions	9.19E-06	4.02E-05	4.59E-07	2.01E-06

B. ASSUMPTIONS, PROCESS INFORMATION AND TEST DATA

1. The Normal Operating Hours are:
$$\frac{21 \text{ hrs}}{\text{day}} \left| \frac{5 \text{ days}}{\text{week}} \right| \frac{50 \text{ wks}}{\text{year}} \Bigg| = 5250 \text{ hrs/year}$$
2. The Potential Operating hours are 8760 hours/year.
3. The efficiency of the control equipment is 99.9%.
4. As a conservative estimate, assume that the particulate emissions are comprised of 5% uranium.
5. Stack test data was collected during processing runs of approximately 11 respirators per hour. Since the processing of respirators is expected to be a maximum of 55 respirators per hour, the test data has been scaled up by a factor of 5 for the emissions estimates.

C. PROCEDURE FOR CALCULATING AVERAGE ANNUAL EMISSIONS:

NOTE: Stack emissions of the current respirator washing activities were sampled using a continuous stack monitor. The results of that testing (scaled up by a factor of 5) have been used to estimate emissions for the Respirator Washing Facility.

(1) Add the mass (mg) of emissions for the time period data was collected.

NOTE: Where the analytical results showed samples less than the minimum detection limit (0.01 mg for U) the minimum detection limit was used. The total amount of U collected was scaled up by a factor of 5. (All analyses were less than 0.01 mg U.)

(2) Determine the appropriate time period for which data is available (either from process knowledge or by summing the differentials between the on and off dates for the sample filters). (Total sample time was 8 weeks.)

(3) Convert the mass from mg to lb/yr using the following formula:

$$\text{Lbs/yr} = (X \text{ mg})(1 \text{ g}/1000 \text{ mg})(CF \text{ Kg/g})(2.205 \text{lbs/kg})/\text{hrs}$$

where

$$CF = \frac{[\text{Stack area } (ft^2)][\text{Average Stack Velocity (ft/min)}][1 \text{ Kg}/1000 \text{ g}]}{[\text{Sample nozzle area } (ft^2)][\text{Sample nozzle velocity (ft/min)}]}$$

D. CALCULATION OF EMISSION FACTORS

The streams entering and leaving the HEPA filter were sampled continuously for a period of eight weeks. The following data is provided by the continuous samplers:

Sample time	Before HEPA mg U	After HEPA mg U
2 weeks	<0.01	<0.01
2 weeks	<0.01	<0.01
2 weeks	<0.01	<0.01
2 weeks	<0.01	<0.01
TOTALS = 8 weeks	0.04 mg U	0.04 mg U
SCALED UP BY A FACTOR OF 5 =	0.2 mg U	0.2 mg U
CONVERSION FACTOR (CF) =	2.2	0.25

(a) Emission factor for U entering the HEPA filter:

$$\frac{0.2\ \text{mg}}{1000\ \text{mg}} \times \frac{\text{g}}{\text{g}} \times \frac{2.2\ \text{Kg}}{\text{Kg}} \times \frac{2.205\ \text{lbs}}{8\ \text{wks}} \times \frac{\text{Week}}{30\ \text{hrs}} = 4.04\text{E-}06\ \frac{\text{lb U}}{\text{hr}}$$

(b) Emission factor for PM entering the HEPA filter:

$$\frac{4.04\text{E-}06\ \text{lb U}}{1} \times \frac{100}{5} = 8.09\text{E-}05\ \frac{\text{lbs PM}}{\text{hr}}$$

(c) Emission factor for U leaving the HEPA filter:

$$\frac{0.2\ \text{mg}}{1000\ \text{mg}} \times \frac{\text{g}}{\text{g}} \times \frac{0.25\ \text{Kg}}{\text{Kg}} \times \frac{2.205\ \text{lbs}}{8\ \text{wks}} \times \frac{\text{Week}}{30\ \text{hrs}} = 4.59\text{E-}07\ \frac{\text{lb U}}{\text{hr}}$$

(d) Emission factor for PM leaving the HEPA filter:

$$\frac{4.59\text{E-}07\ \text{lb U}}{1} \times \frac{100}{5} = 9.19\text{E-}06\ \frac{\text{lbs PM}}{\text{hr}}$$

E. CALCULATION OF EMISSIONS

1. PARTICULATE

a) ACTUAL
Hourly emissions = 9.19E-06 lbs PM/hour

$$\text{Annual emissions} = \frac{9.19\text{E-}06\ \text{lbs PM}}{\text{hr}} \times \frac{5250\ \text{hrs}}{\text{yr}} \times \frac{\text{ton}}{2000\text{lbs}} = 2.41\text{E-}05\ \frac{\text{tons PM}}{\text{year}}$$

b) POTENTIAL
Hourly potential emissions = 9.19E-06 lbs PM/hour

$$\text{Annual potential emissions} = \frac{9.19\text{E-}06\ \text{lbs PM}}{\text{hr}} \times \frac{8760\ \text{hrs}}{\text{yr}} \times \frac{\text{ton}}{2000\text{lbs}} = 4.02\text{E-}05\ \frac{\text{tons PM}}{\text{year}}$$

c) UNCONTROLLED POTENTIAL
Hourly uncontrolled potential emissions = 8.09E-05 lbs PM/hour

$$\text{Annual uncontrolled potential emissions} = \frac{8.09\text{E-}05\ \text{lbs PM}}{\text{hr}} \times \frac{8760\ \text{hrs}}{\text{yr}} \times \frac{\text{ton}}{2000\text{lbs}} = 3.54\text{E-}04\ \frac{\text{tons PM}}{\text{year}}$$

d) ALLOWABLE
New sources are required to use BAT to control process emissions. Since this process uses BAT, the allowable emissions for particulate matter are equal to the potential particulate matter emissions from the process.

E. CALCULATION OF EMISSIONS (Continued)

2. URANIUM

a) ACTUAL
Hourly emissions = 4.59E-07 lbs U/hour

$$\text{Annual emissions} = \frac{4.59\text{E-}07 \text{ lbs U}}{\text{hr}} \left| \frac{5250 \text{ hrs}}{\text{yr}} \right| \frac{\text{ton}}{2000\text{lbs}} \Bigg| = 1.21\text{E-}06 \frac{\text{tons U}}{\text{year}}$$

b) POTENTIAL
Hourly potential emissions = 4.59E-07 lbs U/hour

$$\text{Annual potential emissions} = \frac{4.59\text{E-}07 \text{ lbs U}}{\text{hr}} \left| \frac{8760 \text{ hrs}}{\text{yr}} \right| \frac{\text{ton}}{2000\text{lbs}} \Bigg| = 2.01\text{E-}06 \frac{\text{tons U}}{\text{year}}$$

c) UNCONTROLLED POTENTIAL
Hourly uncontrolled potential emissions = 4.04E-06 lbs U/hour

$$\text{Annual uncontrolled potential emissions} = \frac{4.04\text{E-}06 \text{ lbs U}}{\text{hr}} \left| \frac{8760 \text{ hrs}}{\text{yr}} \right| \frac{\text{ton}}{2000\text{lbs}} \Bigg| = 1.77\text{E-}05 \frac{\text{tons U}}{\text{year}}$$

d) ALLOWABLE
New sources are required to use BAT to control process emissions. Since this process uses BAT, the allowable emissions for uranium are equal to the potential uranium emissions from the process.

NESHAP SUBPART H COMPLIANCE DEMONSTRATION

The CAP88PC computer code was used to evaluate stack monitoring/sampling requirements and application submittal requirements for the proposed Respirator Washing Facility.

The CAP88PC code requires the source terms for the radionuclides to be input in terms of Ci/year/radionuclide. To convert the estimates of kg U/year to Ci/year/radionuclide, the FEMP has developed a table of radionuclide emissions from past stack sample analyses. The table contains a list of radionuclides and the relative amounts of radionuclide in Curies of radionuclide per kg of total U (Ci/kg U). The source terms for the CAP88PC runs were developed by multiplying the annual release rate of kg U/year for each radionuclide times the ratio of Ci of radionuclide per kg of total uranium. Two different methods are used in developing the annual release rates of uranium from the process.

To determine whether a release point is subject to the continuous monitoring/sampling requirements, radionuclide releases are evaluated based on the discharge of the effluent stream that would result if all pollution control equipment did not exist, but the facilities operations were otherwise normal. For this situation, the hourly, uncontrolled potential emissions for uranium are multiplied by the normal operating schedule to determine the potential annual uranium release rate. NESHAP Subpart H requires continuous monitoring or sampling of release points which have the potential to discharge radionuclides into the air in quantities which could cause an effective dose equivalent in excess of 0.1 mrem/year.

An application for approval or notification of startup is not required if the effective dose equivalent is less than 0.1 mrem/year. For this situation, the effective dose equivalent is calculated using the source term derived using Appendix D to 40 CFR Part 61.

These release rates were input into a CAP88PC data set as a source term. The data set used the stack height and velocity represented in this application. The model was run using a meteorological file based on 5 years of records from the site's weather station. The dose impact was modeled to the site fence line in each of the 16 wind directions utilized by CAP88PC.

The results of the CAP88-PC runs are attached. The results indicate that neither an application for approval nor a continuous monitor/sampler are required for this process.

FOR THE CAP88-PC RUN TO DETERMINE MONITORING/SAMPLING REQUIREMENTS

A. Uranium emission factor for uncontrolled emissions (from earlier calculations) = 4.04E-06 lb U/hour

Normal operating hours:
(21 hours/day)(5 days/week)(50 weeks/year) = 5250 hours/year

Uranium emissions:

$$\frac{4.04E\text{-}06 \text{ lb U}}{\text{hour}} \left| \frac{5250 \text{ hours}}{\text{year}} \right| \frac{\text{kg}}{2.205 \text{ lbs}} \Bigg| = 9.62E\text{-}03 \frac{\text{kg U}}{\text{year}}$$

B. Estimated radionuclide release rates in Curies per year (Radionuclide list and Curies/kg U is based on site data):

Example of a typical conversion:

$$\frac{9.62E\text{-}03 \text{ kg U}}{\text{year}} \left| \frac{2.986E+02 \ \mu\text{Ci U-234}}{\text{kg U}} \right| = 2.9E\text{-}06 \frac{\text{Ci U-234}}{\text{year}}$$

ISOTOPE	micro Curies/Kg U	Curies/year
U-234	2.986E+02	2.9E-06
U-235	1.580E+01	1.5E-07
U-236	1.160E+01	1.1E-07
U-238	3.336E+02	3.2E-06
Sr-90	1.760E+00	1.7E-08
Tc-99	3.694E+01	3.6E-07
Cs-137	5.130E+00	4.9E-08
Ba-137m	5.130E+00	4.9E-08
Ra-226	2.120E-01	2.0E-09
Ra-228	8.500E-01	8.2E-09
Th-228	8.970E+00	8.6E-08
Th-230	2.640E+01	2.5E-07
Th-232	1.410E+00	1.4E-08
Th-234	1.319E+03	1.3E-05
Pa-234m	1.319E+03	1.3E-05
Np-237	1.070E-01	1.0E-09
Pu-238	1.270E-01	1.2E-09
Pu-239	8.390E-01	8.1E-09
Pu-240	2.140E-01	2.1E-09
Pu-241	3.125E+00	3.0E-08
Pu-242	4.600E-05	4.4E-13
Ru-106	6.860E+00	6.6E-08

C A P 8 8 - P C
Version 1.00
Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T
Non-Radon Individual Assessment
Dec 9, 1993 11:00 am

Facility: FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
Address: P.O. BOX 398704
7400 WILLEY ROAD
City: CINCINNATI
State: OH
Zip: 45239-8704

Effective Dose Equivalent
(mrem/year)

3.4E-04

At This Location: 804 Meters East Southeast at the FEMP fenceline.

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1994

Comments: The EDE was calculated at the FEMP fenceline for all sixteen compass directions.

KOK - Respirator Washing Facility: PTI run to determine monitoring requirements.

Dataset Name: RWF-MONITOR?
Dataset Date: Dec 9, 1993 11:00 am
Wind File: WNDFILES\FEMPSTD.WND

E-5074

RADIONUCLIDE EMISSIONS DURING THE YEAR 1994

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y	Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
U-234	Y	0.30	2.9E-06	2.9E-06	TH-230	Y	0.30	2.5E-07	2.5E-07
U-235	Y	1.00	1.5E-07	1.5E-07	TH-232	Y	0.30	1.4E-08	1.4E-08
U-236	Y	1.00	1.1E-07	1.1E-07	TH-234	Y	0.30	1.3E-05	1.3E-05
U-238	Y	0.30	3.2E-06	3.2E-06	PA-234M	Y	0.30	1.3E-05	1.3E-05
SR-90	Y	1.00	1.7E-08	1.7E-08	NP-237	Y	1.00	1.0E-09	1.0E-09
TC-99	W	1.00	3.6E-07	3.6E-07	PU-238	Y	1.00	1.2E-09	1.2E-09
CS-137	D	1.00	4.9E-08	4.9E-08	PU-239	Y	1.00	8.1E-09	8.1E-09
BA-137M	D	1.00	4.9E-08	4.9E-08	PU-240	Y	1.00	2.1E-09	2.1E-09
RA-226	Y	0.30	2.0E-09	2.0E-09	PU-241	Y	1.00	3.0E-08	3.0E-08
RA-228	Y	0.30	8.2E-09	8.2E-09	PU-242	Y	1.00	4.4E-13	4.4E-13
TH-228	Y	0.30	8.6E-08	8.6E-08	RU-106	Y	1.00	6.6E-08	6.6E-08

SITE INFORMATION

Temperature: 13 degrees C
Precipitation: 97 cm/y
Mixing Height: 1405 m

SOURCE INFORMATION

Source Number: 1
Stack Height (m): 3.00
Diameter (m): 0.20

Plume Rise
Momentum (m/s): 3.28E+01
(Exit Velocity)

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	0.700	0.399	0.442
Fraction From Assessment Area:	0.300	0.601	0.558
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

N - 1270	W - 1040	S - 1090	E - 740
NNW - 1330	WSW - 1060	SSE - 1050	ENE - 797
NW - 1740	SW - 1050	SE - 1080	NE - 1030
WNW - 1260	SSW - 1220	ESE - 804	NNE - 1490

FOR THE CAP88-PC RUN TO DETERMINE APPLICATION REQUIREMENTS

A. Amount of uranium entering the process

The amount of uranium entering is equal to the sum of the amounts of uranium leaving through the wastewater stream and the air emission stream.

Water usage: 1292 gallons/day
Conversion factor: 9.00E-05 lbs U/gal. per ppm U
Uranium concentration in Respirator Washing Facility wastewater: 6.3 ppb
times scale-up factor of 5 = 31.5 ppb
Uranium emission factor for uncontrolled emissions
(from earlier calculations): 4.04E-06
Normal operating hours: (21 hours/day), (5 days/week), (50 weeks/year)

Annual uranium in wastewater:

$$\frac{31.5 \text{ ppb U}}{} \left| \frac{1 \text{ ppm}}{1000 \text{ ppb}} \right| \frac{9.00\text{E-}05 \text{ lb U}}{\text{gal} \quad \text{ppm U}} \left| \frac{1292 \text{ gal}}{\text{day}} \right| \frac{250 \text{ days}}{\text{year}} \left| \frac{\text{kg}}{2.205 \text{ lb}} \right| = 4.15\text{E-}01 \frac{\text{kg U}}{\text{year}}$$

Annual uranium in air emissions:

$$\frac{4.04\text{E-}06 \text{ lb U}}{\text{hour}} \left| \frac{5250 \text{ hrs}}{\text{year}} \right| \frac{\text{kg}}{2.205 \text{ lb}} = 9.63\text{E-}03 \frac{\text{kg U}}{\text{year}}$$

TOTAL uranium entering the process:
(4.15E-01kg/yr) + (9.63E-03 kg/yr) = 4.25E-01 kg U/year

B. Uranium emission factor for CAP88-PC run

Multiply by 0.001 for liquids or particulate matter (per Appendix D):

$$\frac{4.25\text{E-}01 \text{ kg U}}{\text{year}} \left| \frac{0.001}{} \right| = 4.25\text{E-}04 \frac{\text{kg U}}{\text{year}}$$

Multiply by 0.01 for use of a HEPA filter (per Appendix D):

$$\frac{4.25\text{E-}01 \text{ kg U}}{\text{year}} \left| \frac{0.01}{} \right| = 4.25\text{E-}06 \frac{\text{kg U}}{\text{year}}$$

C. Estimated radionuclide release rates in Curies per year
(Radionuclide list and Curies/kg U is based on site data):

Example of a typical conversion:

$$\frac{4.25E\text{-}06 \text{ kg U}}{\text{year}} \left| \frac{2.986E+02 \ \mu\text{Ci U-234}}{\text{kg U}} \right| = 1.3E\text{-}06 \ \frac{\text{Ci U-234}}{\text{year}}$$

ISOTOPE	micro Curies/Kg U	Curies/year
U-234	2.986E+02	1.3E-09
U-235	1.580E+01	6.7E-11
U-236	1.160E+01	4.9E-11
U-238	3.336E+02	1.4E-09
Sr-90	1.760E+00	7.5E-12
Tc-99	3.694E+01	1.6E-10
Cs-137	5.130E+00	2.2E-11
Ba-137m	5.130E+00	2.2E-11
Ra-226	2.120E-01	9.0E-13
Ra-228	8.500E-01	3.6E-12
Th-228	8.970E+00	3.8E-11
Th-230	2.640E+01	1.1E-10
Th-232	1.410E+00	6.0E-12
Th-234	1.319E+03	5.6E-09
Pa-234m	1.319E+03	5.6E-09
Np-237	1.070E-01	4.6E-13
Pu-238	1.270E-01	5.4E-13
Pu-239	8.390E-01	3.6E-12
Pu-240	2.140E-01	9.1E-13
Pu-241	3.125E+00	1.3E-11
Pu-242	4.600E-05	2.0E-16
Ru-106	6.860E+00	2.9E-11

C A P 8 8 - P C
Version 1.00
Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T
Non-Radon Individual Assessment
Dec 9, 1993 1:35 pm

Facility: FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
Address: P.O. BOX 398704
7400 WILLEY ROAD
City: CINCINNATI
State: OH
Zip: 45239-8704

Effective Dose Equivalent (mrem/year)
1.5E-02

At This Location: 804 Meters East Southeast at the FEMP fenceline.

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1994

Comments: The EDE was calculated at the FEMP fenceline for all sixteen compass directions.

KOK - Respirator Washing Facility: PTI run to determine application requirements.

Dataset Name: RWF-APPLICATION?
Dataset Date: Dec 9, 1993 1:35 pm
Wind File: WNDFILES\FEMPSTD.WND

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BA-137M	D	1.00	2.2E-06	2.2E-06	PU-240	Y	1.00	9.1E-08	9.1E-08
RA-226	Y	0.30	9.0E-08	9.0E-08	PU-241	Y	1.00	1.3E-06	1.3E-06
RA-228	Y	0.30	3.6E-07	3.6E-07	PU-242	Y	1.00	2.0E-11	2.0E-11
TH-228	Y	0.30	3.8E-06	3.8E-06	RU-106	Y	1.00	2.9E-06	2.9E-06

SITE INFORMATION

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