



Department of Energy

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MAY 30 2007

Ms. Eleanor Thornton
U. S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Mailstop 6608J
Washington, DC 20460

EMCBC-00504-07

Dear Ms. Thornton:

2006 NATIONAL EMISSIONS STANDARDS FOR HAZARDOUS AIR POLLUTANTS ANNUAL REPORT FOR THE FERNALD SITE

Reference: United States Environmental Protection Agency letter, Jack Barnett to Johnny Reising, "Application for Approval to Use environmental Measurements to Demonstrate Compliance with the National Emission Standards for Hazardous Air Pollutants, Subpart H," dated August 11, 1997

This letter transmits the 2006 National Emissions Standards for Hazardous Air Pollutants (NESHAP) Subpart H Annual Report for the Fernald Site to the United States Environment Protection Agency (USEPA). This document fulfills the annual reporting requirements of 40 CFR 61.94(a) for the Fernald site. Furthermore, as committed to in Fernald's Integrated Environmental Monitoring Plan (IEMP), the 2006 NESHAP Annual report has been included as Appendix D of the Site Environmental Report (SER) for calendar year 2006 and will be available to Fernald stakeholders through distribution of the SER in June 2007.

The 2006 report marks the ninth consecutive year that Fernald has used an alternate, monitoring-based approach for demonstrating compliance with the NESHAP Subpart H requirements. Prior to 1998, annual reports used emission estimates and computer modeling to demonstrate compliance. The alternate approach, which relies on measurements of airborne radiological air particulate concentrations for calculating a maximum effective dose equivalent at the Fernald site boundary, was approved by the USEPA in the referenced letter and is detailed in Chapter 6 of the IEMP.

Based on 2006 radiological air particulate monitoring data, the maximum effective dose equivalent at the Fernald site boundary due to the air inhalation pathway was calculated to be 0.17 millirem (mrem) above background at a monitoring location along the east boundary of the site. This is in compliance with the NESHAP Subpart H standard of 10 mrem.

Ms. Thornton

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EMCBC-00504-07

If you have any questions, please contact Edward Skintik at (513) 246-0602.

Sincerely,



Johnny Reising

Director

Fernald Closure Project

Enclosure: As stated

cc w/enclosure:

P. J. Sturdevant, HCDES

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Project File 140.10(A) (Thru W. Sumner)

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Fernald, Ohio, Site

2006 National Emissions Standards For Hazardous Air Pollutants (NESHAP) Annual Report

May 2007



U.S. Department
of Energy

Office of Legacy Management

**U.S. Department of Energy
Radionuclide Air Emissions Annual Report
(Under Subpart H of 40 Code of Federal Regulations Part 61)
Calendar Year 2006**

Site Name: Fernald Preserve, Fernald, Ohio

Field Office Information:

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Cincinnati, Ohio 45253-8705

Contact: Ed Skintik Phone: (513) 246-0602

Site Information

Operating Contractor: S.M. Stoller, Inc

Address: 7400 Willey Road
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Acronyms

ALARA	as low as reasonably achievable
AMS	air monitoring station
BAT	best available technology
°C	degrees Celsius
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cm	centimeter
CY	calendar year
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
°F	degrees Fahrenheit
ft ³ /min.	cubic feet per minute
HEPA	high efficiency particulate air
IEMP	Integrated Environmental Monitoring Plan
km	kilometer
m ³ /min.	cubic meters per minute
mrem	millirem
mSv	milliSieverts
NESHAP	National Emission Standards for Hazardous Air Pollutants
OEPA	Ohio Environmental Protection Agency
pCi/m ³	picoCuries per cubic meter
USC	United States Code
WPP	Waste Pits Project

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Preamble

On May 23, 1997, the U.S. Department of Energy (DOE) Fernald Closure Project submitted a written request to the U.S. Environmental Protection Agency (EPA) for approval to use an alternate approach for demonstrating compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAP), Subpart H requirements (DOE 1997). The alternate approach uses environmental measurements of airborne radionuclide concentrations (as provided for under 40 CFR 61.93[b][5]) rather than air dispersion modeling to demonstrate that radionuclide emissions resulting from Fernald site operations remain below the annual NESHAP Subpart H standard. The request for approval of the alternative approach was driven by the recognition that the dominant sources of radiological emissions at the Fernald site had changed as the mission of the site changed from uranium metal production (which ended in 1989) to environmental remediation. During production, the primary emission sources from the facility were point sources (stacks and vents). However, under the current mission of full scale environmental remediation, the dominant emission sources are fugitive emissions from diffuse sources (e.g., large scale excavations, wind erosion from stockpiled materials, decontamination and dismantling, etc.). Because there is a high degree of uncertainty associated with modeling fugitive emissions, environmental measurements were proposed as an alternative to provide a more accurate assessment of site's emissions.

On August 11, 1997, the EPA granted approval to use environmental measurements as an alternative methodology for demonstrating NESHAP compliance (EPA 1997). The Fernald site began using environmental measurements for NESHAP compliance purposes in 1998.

Summary

For calendar year (CY) 2006, the maximum effective dose equivalent from emissions of radionuclides to the ambient air is estimated to be 0.17 millirem (mrem/yr) (0.0017 millisieverts [mSv/yr]) above background, which is in compliance with the Subpart H standard of less than 10 mrem/yr (0.1 mSv/yr) above background. This estimation is based on the Fernald site's radiological air particulate monitoring program, which consists of a network of high volume air monitoring stations (AMS) operated at the Fernald site boundary (16 locations) and a background location. As the site remedial actions associated with building demolition and soil excavation decreased through 2006, monitoring at six boundary stations was discontinued in April, and an additional five boundary stations were shut down in December as agreed upon in consultation with USEPA and OEPA.

End of current text

1.0 Facility Information

1.1 Site Description

The Fernald site is located on a 1,050-acre (425 hectare) area approximately 18 miles (29 kilometers [km]) northwest of downtown Cincinnati, Ohio, just north of the small farming community of Fernald, Ohio. The former production area covers approximately 136 acres (55 hectares) in the center of the site.

The area immediately surrounding the site is rural in nature and characterized by the predominance of agriculture, with some light industry and private residences. The site is located on a relatively level plain, outside of the 500-year flood plain of the Great Miami River, in an ancestral river valley known as the New Haven Trough.

The climate is characterized as continental/subtropical depending on the seasons, with average temperatures ranging from approximately 31 °F (−0.7 °C) in December to 76 °F (25 °C) in July. Average annual precipitation was approximately 40 inches (102 centimeters [cm]). Prevailing wind flow is from the southwest.

For 37 years, the former Feed Materials Production Center (the Fernald site) produced uranium metals for DOE and its predecessors. On July 10, 1989, uranium metals production was suspended. Management responsibilities of the Fernald site were transferred from the Defense Programs organization to the DOE's Office of Environmental Restoration and Waste Management.

Remedial action activities at the Fernald site are conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). These activities included sample analysis; waste characterization; the management, treatment, storage, and disposal of hazardous, mixed, low level, and solid wastes; and the decontamination and cleanup of radioactively contaminated buildings, equipment, soil, and ground water. The site also managed containerized thorium wastes and K 65 Silos waste material, which contained radium and produced radon gas. All remedial actions, with the exception of ground water restoration, were completed in 2006.

1.2 Source Descriptions

The majority of the radioactive airborne contaminants at the Fernald site consisted of thorium and uranium isotopes. Additional radioactive airborne contaminants consisted of daughter products from the uranium, actinium, and thorium series decay chains.

For CY 2006, potential radionuclide emissions sources at the Fernald site included:

- Stockpiles; fugitive emission from wind erosion.
- Former production area and waste pit area; fugitive emission from continued excavation of contaminated soils and debris.
- On-site disposal facility waste placement and material transfer areas; fugitive emissions from size-reducing material prior to and during placement in the cells.

- Silos 1, 2 and 3; fugitive emissions generated from decontamination and dismantling of treatment facilities.
- Continued operation of the Radon Control System (until April 2006).

Stack monitoring of the RCS and silo treatment facilities was completed in early 2006 and reported in the 2005 NESHAP annual report (Appendix D of the 2005 SER); therefore it will not be repeated here.

1.3 Radiological Air Particulate Monitoring Program Description

The Fernald site's radiological air monitoring program for CY 2006 is defined in the Integrated Environmental Monitoring Plan (IEMP), Revision 4 (DOE 2005). The program design, as approved by the EPA, is summarized below.

1.3.1 Monitoring Equipment and Locations

- A network of 17 high-volume environmental AMSs comprise the Fernald site's radiological air particulate monitoring program for NESHAP compliance (Figure 1). The monitors draw air continuously through 8-inch by 10-inch filters at a rate of 40 to 50 cubic feet per minute (ft³/min.) (1.13–1.42 cubic meters per minute [m³/min.]). Each AMS contains a flow rate chart recorder and a hour meter that provide a record of the monitor's operational run time over the sampling period. Additionally, each AMS is equipped with flow controllers that maintain a constant airflow through the monitor by automatically adjusting blower/motor speed to correct for variations in line voltage, temperature, pressure, or filter loading.
- The 17 AMSs are divided among boundary and background monitoring locations. Sixteen monitors are located on the Fernald site boundary, generally corresponding to the 16 wind rose sectors (Figure 2). One monitor collects background data and is located in the northwest direction, approximately 3.2 miles (5.2 km) from the center of the Fernald site. The EPA siting criteria (40 CFR 58, Appendix E) were considered when selecting these locations.

1.3.2 Analytical Regime and Sampling Frequency

The analytical regime and sampling frequency for this program were designed to collect defensible data, account for the major dose sources, and demonstrate compliance with NESHAP Subpart H, as defined in 40 CFR 61.93(b)(5)(ii).

- Filters were exchanged biweekly throughout the year and analyzed for total uranium and total particulates. Analytical results are used to document site emissions and demonstrate that the emission controls at the Fernald site were operating effectively.
- A portion of each biweekly filter was retained and used to form a monthly composite sample for the analysis of thorium isotopes. This was done to supplement the thorium data from the quarterly composites (i.e., two monthly thorium composites per quarter). Analytical results from the monthly and quarterly thorium composites are used to document thorium emissions and demonstrate that process controls at the Fernald site were operating effectively.

- The remaining portion of each biweekly filter was retained and used to form a quarterly composite sample. This composite sample is analyzed for the radionuclides expected to be the major contributors to dose from site emissions. Results from the quarterly composite samples are used to track compliance against the NESHAP Subpart H standard for the calendar year.
- Isotopes that comprise the quarterly composite analysis were selected based on the following considerations:
 - Radionuclides that are stored in large quantities at the Fernald site and were handled or processed during the remediation effort (uranium-234, uranium-235, uranium-238, thorium-228, thorium-230, thorium-232, and radium-226)
 - Radionuclides that were the major contributors to dose based on environmental and stack filter measurements (uranium-234, uranium-235 and uranium-238)
 - Radionuclides that, due to their concentrations in waste and contaminated soil, were the major contributors to dose (uranium-234, uranium-235, uranium-238, thorium-228, and thorium-230).

Uranium-238, thorium-232, and uranium-235 are initial radionuclides in the uranium, thorium, and actinide decay chains, respectively. The majority of uranium and thorium isotopes received and processed during the production era of the Fernald site had been separated from their decay chain progeny prior to shipment to the site. As a result, all decay chain progeny are not in equilibrium with the parent activity, but short half-life progeny are expected to be in equilibrium with the parent. Because some of the progeny are difficult to quantify using standard radiochemistry analytical techniques, in part due to the limited sample volume and low environmental concentrations of all radionuclides in the quarterly composite samples, a number of progeny radionuclides can be considered to be present in equilibrium with their parents (i.e., thorium-234, radium-228, actinium-228, radium-224, and thorium-231). The progeny nuclides noted above are used in the dose assessment.

Net air concentrations for measured isotopes are summarized in Table 1. For the boundary monitors, the net air concentration is defined as the gross result minus the blank and background values. The net air concentration at the background location is the gross result minus the blank.

1.3.3 Air Emission Data Reporting

In addition to this report, the environmental data from the Fernald site are available on the DOE Office of Legacy Management website: www.gjo.doe.gov/LM.

2.0 Air Emissions Data

2.1 Air Monitoring Data Completeness Status

During CY 2006, there were no concerns about data quality of the quarterly composite results. Blank filter results were within their historical limits, and observed positive detects on the blank samples were subtracted from the composite result.

2.2 Air Monitoring Station Operational Performance

During CY 2006, operational run times for the 17 NESHAP AMSs exceeded 96.8 percent (Table 2). In general, interruptions in monitor operations that were encountered during CY 2006 were the result of short-term power failures and/or equipment failures.

3.0 Dose Assessment

Based on the sum of the quarterly isotopic results and annual air volumes, the net measured concentration for each radionuclide was calculated at each boundary (fence line) monitor to determine annual average concentrations. The annual average concentrations at each boundary air monitor are divided by the corresponding values listed in Subpart H of 40 CFR 61, Appendix E Table 2 to form a radionuclide specific compliance ratio. For each boundary monitor, the sum of the radionuclide compliance ratios was calculated (Table 3), and the maximum value of the sum of the ratios was 0.017 at AMS-3. AMS-3 operated 97.8 percent of the time during 2006.

In accordance with 40 CFR 61.107, compliance with the NESHAP standard is demonstrated when the sum of the ratios is less than 1. Based on this approach for demonstrating compliance, the 40 CFR 61, Appendix E, Table 2 values represent the annual average radionuclide concentrations that correspond to a 10 mrem/yr effective dose equivalent. It follows that a fraction of the 40 CFR 61, Appendix E Table 2 values would correspond to an equivalent fraction of a 10 mrem/yr effective dose equivalent. Therefore, the ratio sum for each monitor, derived from all radionuclide ratios, is converted to a dose by multiplying the ratio sum by 10 mrem/yr (Table 3). The maximum value of the sum of the ratios (0.017) is observed at AMS-3, and this converts to a maximum effective dose equivalent of 0.17 mrem/yr (0.0017 mSv/yr) at the Fernald site boundary.

Because the nearest residences are located approximately 1,555 feet (474 meters) downwind (east southeast) from AMS-3, the actual dose received by this receptor would be substantially lower than 0.17 mrem/yr (0.0017 mSv/yr).

4.0 Compliance Assessment

For CY 2006, the maximum effective dose equivalent from emissions of radionuclides to the ambient air, based on samples collected at the Fernald site boundary, is estimated to be 0.17 mrem/yr (0.0017mSv/yr), which is in compliance with the Subpart H standard of less than 10 mrem/yr (0.1 mSv/yr).

5.0 Additional Information

5.1 Meteorological Data

Meteorological data were collected from the Fernald site until May 16, 2006 when the meteorological tower was taken out of service and demolished. Meteorological data are currently being collected from the Butler County Regional Airport because it is the closest location that provides the most comprehensive meteorological data set. These data are used to evaluate site-specific climatic conditions.

Refer to Figure 2 for the CY 2006 wind rose data.

5.2 Construction/Modifications at the Fernald Site

In CY 2006, there were no project changes that resulted in a need to apply to the EPA for approval (under the provisions of 40 CFR 61.96) to construct or modify operations that control source emissions.

6.0 References

DOE (U.S. Department of Energy), 2005. "Integrated Environmental Monitoring Plan," 2505 WP 0022, Revision 4, Final, Fluor Fernald, DOE, Fernald Area Office, Cincinnati, OH, January.

DOE (U.S. Department of Energy), 1997. "Application for Approval to Use Environmental Measurements to Demonstrate Compliance with the National Emission Standards for Hazardous Air Pollutants Subpart H," letter #DOE 0980 97, Johnny Reising to James Saric and Michael Murphy, May 23.

EPA (U.S. Environmental Protection Agency). 1997, "Application for Approval to Use Environmental Measurements to Demonstrate Compliance with the National Emission Standards for Hazardous Air Pollutants Subpart H," letter from Jack Barnett to Johnny Reising, August 11.

7.0 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 USC 1001).

Name: JOHNNY W. REISING

Signature: Johnny W. Reising Date: 5/24/07

Table 1. CY 2006 Net Air Concentrations

Location	Radium (pCi/m ³)	Thorium (pCi/m ³)			Uranium (pCi/m ³)		
	226	228	230	232	234	235/236	238
Boundary ^{a,b}							
AMS-2	0	8.2E-07	0	1.0E-06	2.6E-06	0	2.5E-06
AMS-3	2.0E-05	3.5E-06	4.5E-06	3.8E-06	7.9E-06	1.3E-07	9.4E-06
AMS-4	0	4.2E-06	0	4.0E-06	7.4E-06	0	9.7E-06
AMS-5	0	1.7E-06	0	1.4E-06	4.2E-06	0	4.0E-06
AMS-6	0	2.2E-07	3.2E-07	4.0E-07	2.1E-06	6.7E-08	2.1E-06
AMS-7	0	2.8E-06	0	1.1E-06	4.7E-06	0	7.1E-06
AMS-8A	0	8.9E-07	1.2E-06	1.2E-06	3.8E-06	4.6E-08	3.9E-06
AMS-9C	2.7E-05	8.0E-07	6.7E-07	1.2E-06	6.0E-06	6.3E-08	5.3E-06
AMS-22	0	2.9E-07	0	6.0E-07	4.1E-06	6.6E-07	3.1E-06
AMS-23	0	5.4E-06	0	3.1E-06	1.0E-05	1.7E-06	9.0E-06
AMS-24	0	1.5E-06	1.9E-06	2.2E-06	3.7E-06	0	3.9E-06
AMS-25	0	7.4E-07	0	0	4.6E-06	0	5.1E-06
AMS-26	0	0	0	0	0	5.4E-08	0
AMS-27	0	1.7E-06	1.1E-06	1.7E-06	2.6E-06	7.3E-08	2.6E-06
AMS-28	0	7.3E-07	0	1.2E-06	7.2E-06	0	6.3E-06
AMS-29	1.9E-06	2.6E-06	1.9E-06	2.5E-06	5.5E-06	8.3E-08	7.1E-06
Background							
AMS-12	1.5E-02	9.6E-04	3.0E-04	1.9E-03	2.5E-04	0	2.6E-04

^aFor fence-line monitors, net = total - blank - background (0 if net is negative)

^bAMS-4, 5, 7, 23, 25 and 28 were taken out of service on April 11, 2006.

AMS-9C, 22, 26, 27, and 29 were taken out of service on December 5, 2006.

Table 2. CY 2006 Operational Summary for Air Particulate Monitoring Stations

Location	Number of Samples	Sample Start Date	Last Sample Collection Date	Operating Time (hours)	Percent of Operation
Boundary ^a					
AMS-2	27	20-Dec-05	02-Jan-07	8908	98.2
AMS-3	27	20-Dec-05	02-Jan-07	8872	97.8
AMS-4	8	20-Dec-05	11-Apr-06	2688	100
AMS-5	8	20-Dec-05	11-Apr-06	2686	99.9
AMS-6	27	20-Dec-05	02-Jan-07	9035	99.6
AMS-7	8	20-Dec-05	11-Apr-06	2686	99.9
AMS-8A	27	20-Dec-05	02-Jan-07	8840	97.4
AMS-9C	25	20-Dec-05	05-Dec-06	8399	100
AMS-22	25	20-Dec-05	05-Dec-06	8392	99.9
AMS-23	8	20-Dec-05	11-Apr-06	2686	99.9
AMS-24	27	20-Dec-05	02-Jan-07	8971	98.9
AMS-25	8	20-Dec-05	11-Apr-06	2685	99.9
AMS-26	25	20-Dec-05	05-Dec-06	8373	99.7
AMS-27	25	20-Dec-05	05-Dec-06	8393	99.9
AMS-28	8	20-Dec-05	11-Apr-06	2686	99.9
AMS-29	25	20-Dec-05	05-Dec-06	8131	96.8
Background					
AMS-12	27	20-Dec-05	02-Jan-07	9068	100

^aAMS-4, 5, 7, 23, 25 and 28 were taken out of service on April 11, 2006.

AMS-9C, 22, 26, 27, and 29 were taken out of service on December 5, 2006.

Table 3. 2006 Annual NESHAP Compliance Ratios

Location	Ac-228 ^a	Ra-224 ^a	Ra-226	Ra-228 ^a	Th-228	Th-230	Th-231 ^a	Th-232	Th-234 ^a	U-234	U-235/6	U-238	Annual Total	Annual Dose ^b (mrem/yr)
Boundary^{c,d}														
AMS-2	2.8E-07	7.0E-06	0	1.8E-04	2.7E-04	0	0	1.7E-03	1.1E-06	3.3E-04	0	3.0E-04	2.8E-03	2.8E-02
AMS-3	1.0E-06	2.5E-05	6.0E-03	6.4E-04	1.1E-03	1.3E-03	4.6E-10	6.1E-03	4.3E-06	1.0E-03	1.8E-05	1.1E-03	1.7E-02	1.7E-01
AMS-4	1.1E-06	2.7E-05	0	6.8E-04	1.4E-03	0	0	6.5E-03	4.4E-06	9.6E-04	0	1.2E-03	1.1E-02	1.1E-01
AMS-5	3.7E-07	9.1E-06	0	2.3E-04	5.4E-04	0	0	2.2E-03	1.8E-06	5.5E-04	0	4.8E-04	4.0E-03	4.0E-02
AMS-6	1.1E-07	2.7E-06	0	6.8E-05	7.2E-05	9.5E-05	2.3E-10	6.4E-04	9.6E-07	2.8E-04	9.0E-06	2.6E-04	1.4E-03	1.4E-02
AMS-7	3.0E-07	7.4E-06	0	1.9E-04	9.2E-04	0	0	1.8E-03	3.2E-06	6.0E-04	0	8.5E-04	4.4E-03	4.4E-02
AMS-8A	3.3E-07	8.1E-06	0	2.1E-04	2.9E-04	3.7E-04	1.6E-10	2.0E-03	1.8E-06	4.9E-04	6.2E-06	4.7E-04	3.8E-03	3.8E-02
AMS-9C	3.3E-07	8.1E-06	8.2E-03	2.1E-04	2.6E-04	2.0E-04	2.2E-10	2.0E-03	2.4E-06	7.7E-04	8.6E-06	6.4E-04	1.2E-02	1.2E-01
AMS-22	1.6E-07	4.0E-06	0	1.0E-04	9.5E-05	0	2.3E-09	9.7E-04	1.4E-06	5.3E-04	8.9E-05	3.8E-04	2.2E-03	2.2E-02
AMS-23	8.3E-07	2.1E-05	0	5.2E-04	1.7E-03	0	6.0E-09	5.0E-03	4.1E-06	1.3E-03	2.4E-04	1.1E-03	9.9E-03	9.9E-02
AMS-24	5.9E-07	1.4E-05	0	3.7E-04	5.0E-04	5.6E-04	0	3.5E-03	1.8E-06	4.8E-04	0	4.7E-04	5.9E-03	5.9E-02
AMS-25	0	0	0	0	2.4E-04	0	0	0	2.3E-06	6.0E-04	0	6.1E-04	1.5E-03	1.5E-02
AMS-26	0	0	0	0	0	0	1.9E-10	0	0	0	7.3E-06	0	7.3E-06	7.3E-05
AMS-27	4.7E-07	1.2E-05	0	3.0E-04	5.5E-04	3.2E-04	2.5E-10	2.8E-03	1.2E-06	3.3E-04	9.9E-06	3.1E-04	4.6E-03	4.6E-02
AMS-28	3.2E-07	7.8E-06	0	2.0E-04	2.4E-04	0	0	1.9E-03	2.9E-06	9.4E-04	0	7.6E-04	4.0E-03	4.0E-02
AMS-29	6.9E-07	1.7E-05	5.8E-04	4.3E-04	8.3E-04	5.7E-04	2.9E-10	4.1E-03	3.2E-06	7.2E-04	1.1E-05	8.5E-04	8.1E-03	8.1E-02
Background														
AMS-12	3.2E-07	7.9E-06	1.5E-02	2.0E-04	9.6E-04	3.0E-04	0	1.9E-03	9.7E-07	2.5E-04	0	2.6E-04	NA ^e	NA ^e

Note: Compliance ratios are calculated with net concentrations (i.e., gross result - blank - background)

^aRatio determined by assuming air concentration is in secular equilibrium with the parent nuclide.

^bDose is based on the NESHAP standard of 10 mrem/yr multiplied by the annual total for all isotopes.

^cFor fenceline monitors, net = total - blank - background (0 if net is negative)

^dAMS-4, 5, 7, 23, 25 and 28 were taken out of service on April 11, 2006. AMS-9C, 22, 26, 27, and 29 were taken out of service on December 5, 2006.

^eNA = not applicable

FEMP Wind Rose (10 m level)

Starts: January 01, 2006 at 0 AM
Ends : May 16, 2006 at 7 AM
All times Eastern Standard (EST)

1% calm winds

- Category 1: 1 - 3 Knots
- Category 2: 4 - 6 Knots
- Category 3: 7 - 10 Knots
- Category 4: 11 - 16 Knots
- Category 5: 17 - 21 Knots
- Category 6: + 21 Knots

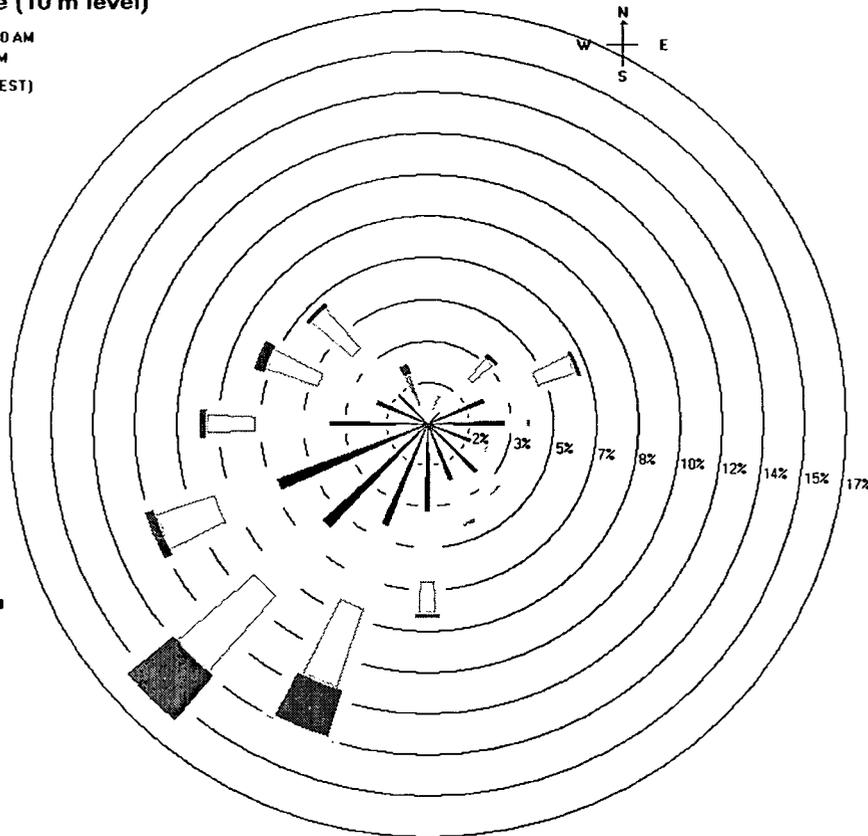


Figure 2. Wind Rose Diagram

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