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

08/30/94

DOE-2290-94
DOE-FN USEPA
100
REPORT

Department of Energy
Fernald Environmental Management Project
P. O. Box 398705
Cincinnati, Ohio 45239-8705
(513) 648-3155

AUG 30 1994
DOE-2290-94

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:

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

Per discussions with Mr. Mike Murphy of your office, enclosed is a revised signature page, additional information on surface exposure area for the waste pits, corrected Table 1 of the annual report, printouts of CAP88PC modeling runs and printouts of source to receptor distances (see enclosed summary of additional information requested).

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

Sincerely,

J. R. Craig
Acting Director

FN:Skintik

Enclosures: As Stated

cc: w/enc:

AR Coordinator, FERMCO

cc: w/enc (except CAP88PC modeling runs):

K. Duvall, EH-232, FORS
S. M. Beckman, FERMCO/65-2
P. J. Sturdevant, HC-DOES
T. Tucker, OEPA
F. L. Moleski, MTC

Recycled and Recyclable

THIS PACKAGE INCLUDES THE FOLLOWING ADDITIONAL INFORMATION REQUESTED BY MIKE MURPHY OF THE USEPA

1. Page 6 of 6 of the CY-1993 ANNUAL NESHAP REPORT to be signed by Mr. Hansen;

2. Additional information regarding the surface exposure area of Waste Pits No. 5 and No. 6;

3. A corrected Table 1 of the annual report (typos);

4. Printouts of the following files from CAP88PC modeling runs:

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CY93-15HEPA-IND......WEATHER    DATA
CY93-15HEPA-IND......GENERAL    DATA
CY93-15HEPA-IND......DOSE    AND RISK CONVERSION  FACTORS

CY93-PLT1-IND........SYNOPSIS    REPORT
CY93-PLT1-IND........DOSE    AND RISK EQUIVALENT  SUMMARIES

CY93-09-IND..........SYNOPSIS    REPORT
CY93-09-IND..........DOSE    AND RISK EQUIVALENT  SUMMARIES

CY93-BLDG11-IND......SYNOPSIS    REPORT
CY93-BLDG11-IND......DOSE    AND RISK EQUIVALENT  SUMMARIES

CY93-15HEPA-IND......SYNOPSIS    REPORT
CY93-15HEPA-IND......DOSE    AND RISK EQUIVALENT  SUMMARIES

CY93-15GEN-IND.......SYNOPSIS    REPORT
CY93-15GEN-IND.......DOSE    AND RISK EQUIVALENT  SUMMARIES

CY93-PLT8-IND........SYNOPSIS    REPORT
CY93-PLT8-IND........DOSE    AND RISK EQUIVALENT  SUMMARIES

CY93-15PERC-IND......SYNOPSIS    REPORT
CY93-15PERC-IND......DOSE    AND RISK EQUIVALENT  SUMMARIES

CY93-20-IND..........SYNOPSIS    REPORT
CY93-20-IND..........DOSE    AND RISK EQUIVALENT  SUMMARIES

CY93-53-IND..........SYNOPSIS    REPORT
CY93-53-IND..........DOSE    AND RISK EQUIVALENT  SUMMARIES

CY93-PITS-IND........SYNOPSIS    REPORT
CY93-PITS-IND........DOSE    AND RISK EQUIVALENT  SUMMARIES

CY93-CT-IND..........SYNOPSIS    REPORT
CY93-CT-IND..........DOSE    AND RISK EQUIVALENT  SUMMARIES
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5. Printouts of source to receptor distances from the following locations:

   Plant One - (Ore Silos and Size Reduction Building)
   Plant 9: General Ventilation Stack
   Service Building (11) - (Laundry stack)
   Building 15 - (Laboratory Stacks)
   Plant 8 - (Vacuum Filter Stacks and Building Vents)
   Water Plant - (Building 20 - Water Plant Lab Stacks)
   Building 53 - (Heath & Safety Fume Hoods)
   Waste Pit 5
   Cooling Water Tower

The above information was delivered to Ed Skintik on 8/22/94 by Kip Klee. KOK

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 Quaider 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 INFORMATION

A. 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}Rn and ^{220}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}Rn or ^{220}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.

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

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

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).

_____ (name)

Acting Manager (title)

8/30/94 (date)

INFORMATION REGARDING SURFACE AREA EXPOSURE OF WASTE PITS NO. 5 AND NO. 6

	Quarterly Averaged Exposure		Percent of Time Wind Speed is greater than 12 mph	Number of dry days per quarter (rainfall < 0.01 in.)
	Pit 5	Pit 6		
1st quarter	7.07%	0.00%	1.12	50
2nd quarter	0.00%	0.00%	0.74	55
3rd quarter	2.17%	0.00%	0.00	62
4th quarter	0.06%	0.00%	0.82	62
Surface area of Waste Pits	3.56 acres	0.62 acres		
Weight fraction U	0.00057	0.091		

Converting the formula developed by Bohn, et.al. (1978) referenced in A METHOD FOR ESTIMATING FUGITIVE PARTICULATE EMISSIONS FROM HAZARDOUS WASTE SITES, EPA/600/2-87/066, August 1987, to express quarterly emissions, the formula becomes:

E =	1.7	S	d	f	SA	Wt. Fraction U	% pit exposure	91 days	Kg
		1.5	(235*0.25)	15				qtr.	2.205 lb

Where S = percent silt (= 10%);
d = number of dry days;
f = percent of time wind speed exceeds 12 mph;
SA = surface area of waste pit.

The quarterly emissions are:

1st quarter.....4.26E-03 Kg
2nd quarter.....0.00E+00 Kg
3rd quarter.....0.00E+00 Kg
4th quarter.....3.10E-05 Kg
Total.....4.29E-03 Kg

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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-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 1.3E-05	3.5E-07 +3.5E-07 7.0E-07	2.6E-07 +2.6E-07 5.1E-07	7.4E-06 +7.4E-06 1.5E-05	4.7E-09 +4.7E-09 9.3E-09	1.9E-08 +1.9E-08 3.7E-08	2.0E-07 +2.0E-07 4.0E-07	5.8E-07 +5.8E-07 1.2E-06	3.1E-08 +3.1E-08 6.2E-08	2.9E-05 +2.9E-05 5.8E-05
Bldg. 15 - Perchloric Hoods (10)	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. 20 - Water Plant Lab (2 stacks)	1.4E-09 1.4E-09 2.8E-09	7.6E-11 7.6E-11 1.5E-10	5.2E-11 5.2E-11 1.0E-10	1.9E-09 1.9E-09 3.7E-09	1.3E-12 1.3E-12 2.5E-12	5.1E-12 5.1E-12 1.0E-11	5.4E-11 5.41-11 1.1E-10	3.8E-12 3.8E-12 7.6E-12	8.5E-12 8.5E-12 1.7E-11	7.9E-09 7.9E-09 1.6E-08
Bldg. 53 - Lab Stacks (7)	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-06	8.2E-08	1.8E-07	1.7E-04

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Version 1.00

Clean Air Act Assessment Package - 1988

W E A T H E R D A T A

Non-Radon Individual Assessment
Mar 22, 1994 8:42 am

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

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1993

Comments: This is for the 1993 neshap Demonstration
Location: Bldg 15\MEPA-HEPA stack, IND EDE; RKR

Dataset Name: CY93-15HEPA-IND
Dataset Date: Mar 22, 1994 8:39 am
Wind File: WNDFILES\FEMP93.WND

HARMONIC AVERAGE WIND SPEEDS (WIND TOWARDS)

	Pasquill Stability Class							
Dir	A	B	C	D	E	F	G	Wind Frequency
N	1.412	1.370	1.284	1.514	1.415	0.784	0.000	0.048
NNW	1.435	1.593	1.741	1.172	1.177	0.797	0.000	0.020
NW	0.879	0.772	1.187	1.187	0.970	0.772	0.000	0.014
WNW	1.140	1.037	1.021	1.044	0.926	0.787	0.000	0.019
W	1.497	1.102	1.419	1.302	0.965	0.791	0.000	0.038
WSW	1.786	1.311	1.487	1.530	1.129	0.841	0.000	0.071
SW	1.938	1.642	1.726	1.829	1.043	0.772	0.000	0.048
SSW	2.097	1.851	1.908	2.005	0.949	0.772	0.000	0.039
S	1.784	3.236	3.327	2.440	1.074	0.772	0.000	0.033
SSE	1.965	1.911	2.008	1.962	0.973	0.800	0.000	0.042
SE	2.175	2.008	1.431	1.643	0.954	0.784	0.000	0.075
ESE	2.160	1.560	1.775	1.837	1.065	0.776	0.000	0.109
E	1.609	1.754	1.309	1.645	1.054	0.773	0.000	0.116
ENE	1.572	1.309	1.182	1.304	0.940	0.785	0.000	0.115
NE	1.769	1.587	1.702	1.429	1.074	0.799	0.000	0.118
NNE	2.091	2.594	1.634	1.831	1.386	0.785	0.000	0.095

ARITHMETIC AVERAGE WIND SPEEDS (WIND TOWARDS)

	Pasquill Stability Class						
Dir	A	B	C	D	E	F	G
N	2.116	2.283	2.147	2.379	2.397	0.812	0.000
NNW	2.371	2.302	2.362	1.856	1.794	0.854	0.000
NW	1.086	0.772	1.672	1.797	1.446	0.772	0.000
WNW	1.603	1.429	1.558	1.442	1.201	0.821	0.000
W	2.111	1.543	2.229	1.861	1.287	0.834	0.000
WSW	2.549	2.163	2.263	2.365	1.605	0.984	0.000
SW	2.572	2.291	2.329	2.515	1.462	0.772	0.000
SSW	3.143	2.401	2.746	2.751	1.252	0.772	0.000
S	2.572	3.644	3.721	3.356	1.539	0.772	0.000
SSE	2.797	3.077	3.028	3.081	1.341	0.862	0.000
SE	3.061	3.028	2.264	2.583	1.286	0.813	0.000
ESE	2.952	2.428	2.804	2.647	1.675	0.787	0.000
E	2.527	2.729	2.384	2.514	1.561	0.777	0.000
ENE	2.534	2.199	1.767	2.074	1.322	0.815	0.000
NE	2.486	2.287	2.531	2.169	1.552	0.859	0.000
NNE	2.824	3.218	2.687	2.743	2.220	0.814	0.000

FREQUENCIES OF STABILITY CLASSES (WIND TOWARDS)

	Pasquill Stability Class						
Dir	A	B	C	D	E	F	G
N	0.1611	0.0457	0.0408	0.2836	0.3655	0.1033	0.0000
NNW	0.1038	0.0403	0.0519	0.2717	0.4108	0.1215	0.0000
NW	0.1349	0.0394	0.0318	0.2780	0.3174	0.1985	0.0000
WNW	0.1570	0.0661	0.0541	0.2593	0.2530	0.2105	0.0000
W	0.1432	0.0428	0.0640	0.3169	0.2563	0.1769	0.0000
WSW	0.1206	0.0498	0.0563	0.4341	0.2572	0.0820	0.0000
SW	0.0977	0.0453	0.0524	0.6064	0.1551	0.0430	0.0000
SSW	0.0473	0.0326	0.0295	0.6828	0.1337	0.0742	0.0000
S	0.0447	0.0308	0.0344	0.5507	0.2357	0.1038	0.0000
SSE	0.0874	0.0380	0.0570	0.4415	0.2154	0.1608	0.0000
SE	0.1308	0.0318	0.0442	0.2726	0.1918	0.3288	0.0000
ESE	0.0802	0.0264	0.0243	0.3030	0.2102	0.3559	0.0000
E	0.1039	0.0228	0.0298	0.2683	0.2486	0.3267	0.0000
ENE	0.1440	0.0240	0.0290	0.2171	0.2980	0.2880	0.0000
NE	0.1422	0.0370	0.0409	0.2697	0.3301	0.1801	0.0000
NNE	0.1828	0.0400	0.0363	0.3027	0.3354	0.1029	0.0000
TOT	0.1217	0.0349	0.0391	0.3333	0.2636	0.2073	0.0000

ADDITIONAL WEATHER INFORMATION

Average Air Temperature: 11.3 degrees C
284.5 K
Precipitation: 97.8 cm/y
Lid Height: 965 meters
Surface Roughness Length: 0.010 meters
Height Of Wind Measurements: 10.0 meters
Average Wind Speed: 1.926 m/s

Vertical Temperature Gradients:
STABILITY E 0.073 k/m
STABILITY F 0.109 k/m
STABILITY G 0.146 k/m

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

G E N E R A L D A T A

Non-Radon Individual Assessment
Mar 22, 1994 8:42 am

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

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1993

Comments: This is for the 1993 neshap Demonstration
Location: Bldg 15\MEPA-HEPA stack, IND EDE; RKR

Dataset Name: CY93-15HEPA-IND
Dataset Date: Mar 22, 1994 8:39 am
Wind File: WNDFILES\FEMP93.WND

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

Nuclide	Clearance Class	Particle Size (microns)	Scavenging Coefficient (per second)	Dry Deposition Velocity (m/s)
U-234	Y	0.3	9.78E-06	1.80E-03
U-235	Y	1.0	9.78E-06	1.80E-03
U-238	Y	0.3	9.78E-06	1.80E-03

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

	DECAY CONSTANT (PER DAY)			TRANSFER COEFFICIENT	
Nuclide	Radio-active (1)	Surface	Water	Milk (2)	Meat (3)
U-234	0.00E+00	5.48E-05	0.00E+00	6.00E-04	2.00E-04
U-235	0.00E+00	5.48E-05	0.00E+00	6.00E-04	2.00E-04
U-238	0.00E+00	5.48E-05	0.00E+00	6.00E-04	2.00E-04

FOOTNOTES: (1) Effective radioactive decay constant in plume; set to zero if less than 1.0E-2

(2) Fraction of animal's daily intake of nuclide which appears in each L of milk (days/L)

(3) Fraction of animal's daily intake of nuclide which appears in each kg of meat (days/kg)

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

	CONCENTRATION UPTAKE FACTOR		GI UPTAKE FRACTION	
Nuclide	Forage (1)	Edible (2)	Inhalation	Ingestion
U-234	8.50E-03	1.71E-03	2.00E-03	2.00E-01
U-235	8.50E-03	1.71E-03	2.00E-03	2.00E-01
U-238	8.50E-03	1.71E-03	2.00E-03	2.00E-01

FOOTNOTES: (1) Concentration factor for uptake of nuclide from soil for pasture and forage (in pCi/kg dry weight per pCi/kg dry soil)

(2) Concentration factor for uptake of nuclide from soil by edible parts of crops (in pCi/kg wet weight per pCi/kg dry soil)

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

HUMAN INHALATION RATE	
Cubic centimeters/hr	9.17E+05
SOIL PARAMETERS	
Effective surface density (kg/sq m, dry weight) (Assumes 15 cm plow layer)	2.15E+02
BUILDUP TIMES	
For activity in soil (years)	1.00E+02
For radionuclides deposited on ground/water (days)	3.65E+04
DELAY TIMES	
Ingestion of pasture grass by animals (hr)	0.00E+00
Ingestion of stored feed by animals (hr)	2.16E+03
Ingestion of leafy vegetables by man (hr)	3.36E+02
Ingestion of produce by man (hr)	3.36E+02
Transport time from animal feed-milk-man (day)	2.00E+00
Time from slaughter to consumption (day)	2.00E+01
WEATHERING	
Removal rate constant for physical loss (per hr)	2.90E-03
CROP EXPOSURE DURATION	
Pasture grass (hr)	7.20E+02
Crops/leafy vegetables (hr)	1.44E+03
AGRICULTURAL PRODUCTIVITY	
Grass-cow-milk-man pathway (kg/sq m)	2.80E-01
Produce/leafy veg for human consumption (kg/sq m)	7.16E-01
FALLOUT INTERCEPTION FRACTIONS	
Vegetables	2.00E-01
Pasture	5.70E-01
GRAZING PARAMETERS	
Fraction of year animals graze on pasture	4.00E-01
Fraction of daily feed that is pasture grass when animal grazes on pasture	4.30E-01

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

ANIMAL FEED CONSUMPTION FACTORS	
Contaminated feed/forage (kg/day, dry weight)	1.56E+01
DAIRY PRODUCTIVITY	
Milk production of cow (L/day)	1.10E+01
MEAT ANIMAL SLAUGHTER PARAMETERS	
Muscle mass of animal at slaughter (kg)	2.00E+02
Fraction of herd slaughtered (per day)	3.81E-03
DECONTAMINATION	
Fraction of radioactivity retained after washing for leafy vegetables and produce	5.00E-01
FRACTIONS GROWN IN GARDEN OF INTEREST	
Produce ingested	1.00E+00
Leafy vegetables ingested	1.00E+00
INGESTION RATIOS:	
IMMEDIATE SURROUNDING AREA/TOTAL WITHIN AREA	
Vegetables	7.00E-01
Meat	4.42E-01
Milk	3.99E-01
MINIMUM INGESTION FRACTIONS FROM OUTSIDE AREA (Minimum fractions of food types from outside area listed below are actual fixed values.)	
Vegetables	0.00E+00
Meat	0.00E+00
Milk	0.00E+00
HUMAN FOOD UTILIZATION FACTORS	
Produce ingestion (kg/y)	1.76E+02
Milk ingestion (L/y)	1.12E+02
Meat ingestion (kg/y)	8.50E+01
Leafy vegetable ingestion (kg/y)	1.80E+01
SWIMMING PARAMETERS	
Fraction of time spent swimming	0.00E+00
Dilution factor for water (cm)	1.00E+00

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D O S E A N D R I S K C O N V E R S I O N F A C T O R S

Non-Radon Individual Assessment
Mar 22, 1994 8:42 am

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

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1993

Comments: This is for the 1993 neshap Demonstration
Location: Bldg 15\MEPA-HEPA stack, IND EDE; RKR

Dataset Name: CY93-15HEPA-IND
Dataset Date: Mar 22, 1994 8:39 am
Wind File: WNDFILES\FEMP93.WND

DOSE AND RISK FACTOR UNITS

The units for each type of dose rate conversion factor are shown below, by pathway:

Pathway	Units
Ingestion	millirem/picoCurie
Inhalation	millirem/picoCurie
Immersion	millirem-cubic centimeter/microCurie-year
Surface	millirem-square centimeter/microCurie-year

Risks for internal exposures (inhalation and ingestion) are the lifetime risk of premature death in a birth cohort of 100,000 people for a 1 picoCurie/year intake rate, where the average lifetime is 70.7565 years. This is simplified to lifetime risk per 100,000 picoCuries.

The units for each type of risk conversion factor are shown below, by pathway:

Pathway	Units
Ingestion	lifetime risk/100,000 picoCuries
Inhalation	lifetime risk/100,000 picoCuries
Immersion	lifetime risk-cubic centimeter/100,000 picoCurie-years
Surface	lifetime risk-square centimeter/100,000 picoCurie-years

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* NUCLIDE U-234 *
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DOSE RATE CONVERSION FACTORS

Organ	Ingestion	Inhalation	Air Immersion	Ground Surface
GONADS	3.851E-05	1.592E-05	8.140E+05	7.067E+02
BREAST	3.851E-05	1.616E-05	2.046E+06	3.585E+03
R MAR	1.031E-03	4.158E-04	2.760E+05	9.139E+01
LUNGS	3.851E-05	1.906E+00	4.107E+05	1.735E+02
THYROID	3.851E-05	1.593E-05	6.068E+05	2.305E+02
ENDOST	1.625E-02	6.552E-03	7.104E+05	2.949E+02
RMNDR	1.396E-03	5.861E-04	3.777E+05	1.251E+02
EFFEC	1.051E-03	2.292E-01	7.456E+05	7.996E+02

RISK CONVERSION FACTORS

Cancer	Ingestion	Inhalation	Air Immersion	Ground Surface
LEUKEMIA	1.006E-04	3.736E-05	8.742E-02	2.895E-05
BONE	8.532E-05	3.128E-05	1.257E-02	5.219E-06
THYROID	6.663E-07	2.476E-07	2.760E-02	1.048E-05
BREAST	5.605E-06	2.041E-06	8.014E-01	1.404E-03
LUNG	7.126E-06	3.056E-01	2.036E-01	8.603E-05
STOMACH	5.173E-06	1.915E-06	1.096E-01	3.621E-05
BOWEL	7.559E-06	4.079E-06	5.172E-02	1.577E-05
LIVER	5.015E-06	1.797E-06	1.212E-01	3.269E-05
PANCREAS	3.500E-06	1.236E-06	6.471E-02	2.715E-05
URINARY	3.044E-04	1.070E-04	4.689E-02	1.258E-05
OTHER	4.280E-06	1.511E-06	7.915E-02	3.321E-05

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* NUCLIDE U-235 *
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DOSE RATE CONVERSION FACTORS

Organ	Ingestion	Inhalation	Air Immersion	Ground Surface
GONADS	3.811E-05	1.177E-05	8.732E+08	1.939E+05
BREAST	3.779E-05	2.002E-05	9.546E+08	2.198E+05
R MAR	1.013E-03	2.656E-04	6.068E+08	1.336E+05
LUNGS	3.767E-05	1.017E+00	6.327E+08	1.391E+05
THYROID	3.754E-05	1.549E-05	8.510E+08	1.876E+05
ENDOST	1.572E-02	3.938E-03	9.361E+08	2.068E+05
RMNDR	1.299E-03	4.131E-04	6.231E+08	1.372E+05
EFFEC	1.004E-03	1.223E-01	7.508E+08	1.672E+05

RISK CONVERSION FACTORS

Cancer	Ingestion	Inhalation	Air Immersion	Ground Surface
LEUKEMIA	1.074E-04	2.827E-05	1.920E+02	4.231E-02
BONE	8.775E-05	2.024E-05	1.656E+01	3.661E-03
THYROID	6.655E-07	3.760E-07	3.869E+01	8.533E-03
BREAST	5.647E-06	4.338E-06	3.730E+02	8.609E-02
LUNG	7.138E-06	1.635E-01	3.129E+02	6.897E-02
STOMACH	5.160E-06	7.298E-06	1.852E+02	4.090E-02
BOWEL	9.027E-06	2.076E-05	9.162E+01	2.018E-02
LIVER	4.107E-06	5.644E-06	2.022E+02	4.462E-02
PANCREAS	3.535E-06	4.078E-06	1.185E+02	2.625E-02
URINARY	2.829E-04	6.281E-05	7.427E+01	1.639E-02
OTHER	4.323E-06	4.988E-06	1.450E+02	3.210E-02

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* NUCLIDE U-238 *
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DOSE RATE CONVERSION FACTORS

Organ	Ingestion	Inhalation	Air Immersion	Ground Surface
GONADS	3.464E-05	1.565E-05	5.365E+05	5.550E+02
BREAST	3.467E-05	1.841E-05	1.550E+06	2.967E+03
R MAR	1.087E-03	4.658E-04	1.413E+05	5.550E+01
LUNGS	3.464E-05	1.695E+00	2.505E+05	1.214E+02
THYROID	3.461E-05	1.708E-05	3.774E+05	1.572E+02
ENDOST	1.408E-02	5.716E-03	4.514E+05	2.094E+02
RMNDR	1.248E-03	6.243E-04	2.247E+05	8.303E+01
EFFEC	9.465E-04	2.039E-01	5.060E+05	6.410E+02

RISK CONVERSION FACTORS

Cancer	Ingestion	Inhalation	Air Immersion	Ground Surface
LEUKEMIA	1.364E-04	5.724E-05	4.477E-02	1.758E-05
BONE	7.601E-05	2.843E-05	7.989E-03	3.706E-06
THYROID	6.076E-07	3.099E-07	1.717E-02	7.153E-06
BREAST	5.123E-06	2.719E-06	6.072E-01	1.162E-03
LUNG	6.509E-06	2.737E-01	1.242E-01	6.017E-05
STOMACH	4.656E-06	4.982E-06	6.460E-02	2.346E-05
BOWEL	7.207E-06	3.229E-05	2.964E-02	9.812E-06
LIVER	3.860E-06	3.151E-06	7.238E-02	1.985E-05
PANCREAS	3.197E-06	1.878E-06	3.638E-02	1.846E-05
URINARY	2.760E-04	9.720E-05	2.748E-02	7.335E-06
OTHER	3.909E-06	2.298E-06	4.450E-02	2.258E-05

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Version 1.00

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S Y N O P S I S R E P O R T

Non-Radon Individual Assessment
Mar 22, 1994 11:53 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)

2.90E-05

At This Location: 966 Meters Northeast

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1993

Comments: This is for the 1993 neshap Demonstration
Plant 1 (1=SILO, 2=SIZE RED), RKR

Dataset Name: CY93-PLT1-IND
Dataset Date: Mar 22, 1994 11:53 am
Wind File: WNDFILES\FEMP93.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 966 Meters Northeast
Lifetime Fatal Cancer Risk: 4.62E-10

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	8.66E-08
BREAST	8.75E-08
R MAR	1.12E-05
LUNGS	1.95E-04
THYROID	8.57E-08
ENDOST	1.39E-04
RMNDR	2.86E-07
EFFEC	2.90E-05

RADIONUCLIDE EMISSIONS DURING THE YEAR 1993

Nuclide	Class	Size	Source #1 Ci/y	Source #2 Ci/y	TOTAL Ci/y
TH-228	Y	0.30	3.1E-08	1.2E-08	4.3E-08
TH-230	Y	0.30	1.2E-08	7.2E-09	1.9E-08
TH-232	Y	0.30	1.8E-09	6.6E-10	2.5E-09

SITE INFORMATION

Temperature:	11 degrees C
Precipitation:	98 cm/y
Mixing Height:	965 m

SOURCE INFORMATION

Source Number:	1	2
Stack Height (m):	14.30	6.10
Diameter (m):	0.76	0.46
Plume Rise Momentum (m/s): (Exit Velocity)	1.27E+01	1.66E+01

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 USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

966	1441	1376	1083	1866	996	1909	1210	1494	1495
1626	1345	2008	1688	1563	1026	1076	1363		

FEMP RECEPTOR LOCATOR PROGRAM
Closest Receptor in Sector

SOURCE NAME: PLANT ONE
NORTH/SOUTH COORDINATES: 481000
EAST/WEST COORDINATES: 1380160

DATE: August 17
Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
2	N	966
32	NNW	1441
B	NW	1376
5	WNW	1083
23	W	1866
6	WSW	996
F	SW	1909
7	SSW	1210
13	S	1494
14	SSE	1495
16	SE	1626
18	ESE	1345
24	E	2008
19	ENE	1688
20	NE	1563
1	NNE	1026

FEMP RECEPTOR LOCATOR PROGRAM
Distances to all Receptors

SOURCE NAME: PLANT ONE
NORTH/SOUTH COORDINATES: 481000
EAST/WEST COORDINATES: 1380160

DATE: August 17
Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
2	N	966
22	N	1284
28	N	1374
32	NNW	1441
B	NW	1376
C	NW	1664
3	NW	1674
E	NW	1712
D	NW	1757
5	WNW	1083
4	WNW	1346
23	W	1866
A	W	2278
6	WSW	996
26	WSW	2219
F	SW	1909
G	SW	1937
7	SSW	1210
8	SSW	1310
9	SSW	1349
10	SSW	1514
11	SSW	1517
13	S	1494
12	S	1555
14	SSE	1495
15	SSE	2109
16	SE	1626
29	SE	1703
27	SE	2533
18	ESE	1345
17	ESE	1363
24	E	2008
30	E	2364
31	E	2424
25	E	2610
19	ENE	1688
20	NE	1563
H	NE	1663
1	NNE	1026
21	NNE	1076

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D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

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Dataset Name: CY93-PLT1-IND
Dataset Date: Mar 22, 1994 11:53 am
Wind File: WNDFILES\FEMP93.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
GONADS	8.66E-08
BREAST	8.75E-08
R MAR	1.12E-05
LUNGS	1.95E-04
THYROID	8.57E-08
ENDOST	1.39E-04
RMNDR	2.86E-07
EFFEC	2.90E-05

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	1.57E-07
INHALATION	2.88E-05
AIR IMMERSION	5.63E-14
GROUND SURFACE	5.42E-10
INTERNAL	2.90E-05
EXTERNAL	5.42E-10
TOTAL	2.90E-05

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
TH-228	1.89E-05
TH-230	8.58E-06
TH-232	1.52E-06
TOTAL	2.90E-05

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
LEUKEMIA	1.00E-11
BONE	6.63E-12
THYROID	1.48E-14
BREAST	1.29E-13
LUNG	4.44E-10
STOMACH	1.23E-13
BOWEL	2.19E-13
LIVER	5.63E-13
PANCREAS	7.94E-14
URINARY	5.97E-14
OTHER	9.71E-14
TOTAL	4.62E-10

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	5.97E-13
INHALATION	4.62E-10
AIR IMMERSION	1.27E-18
GROUND SURFACE	1.19E-14
INTERNAL	4.62E-10
EXTERNAL	1.19E-14
TOTAL	4.62E-10

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
TH-228	3.82E-10
TH-230	7.19E-11
TH-232	8.64E-12
TOTAL	4.62E-10

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	966	1441	1376	1083	1866	996	1909
N	1.1E-05	6.4E-06	6.8E-06	9.4E-06	4.5E-06	1.0E-05	4.4E-06
NNW	5.4E-06	3.3E-06	3.5E-06	4.7E-06	2.3E-06	5.2E-06	2.2E-06
NW	4.0E-06	2.5E-06	2.6E-06	3.5E-06	1.8E-06	3.8E-06	1.8E-06
WNW	4.9E-06	3.1E-06	3.3E-06	4.3E-06	2.3E-06	4.7E-06	2.2E-06
W	9.2E-06	5.8E-06	6.2E-06	8.1E-06	4.2E-06	8.9E-06	4.1E-06
WSW	1.7E-05	1.0E-05	1.1E-05	1.5E-05	7.0E-06	1.6E-05	6.7E-06
SW	1.0E-05	5.7E-06	6.0E-06	8.5E-06	3.9E-06	9.5E-06	3.7E-06
SSW	7.9E-06	4.6E-06	4.9E-06	6.8E-06	3.2E-06	7.6E-06	3.1E-06
S	6.6E-06	4.0E-06	4.3E-06	5.8E-06	2.9E-06	6.4E-06	2.8E-06
SSE	9.1E-06	5.7E-06	6.1E-06	8.0E-06	4.2E-06	8.8E-06	4.1E-06
SE	1.6E-05	1.1E-05	1.2E-05	1.4E-05	8.7E-06	1.5E-05	8.5E-06
ESE	2.3E-05	1.6E-05	1.7E-05	2.1E-05	1.3E-05	2.2E-05	1.2E-05
E	2.6E-05	1.8E-05	1.9E-05	2.3E-05	1.4E-05	2.5E-05	1.3E-05
ENE	2.9E-05	1.9E-05	2.0E-05	2.6E-05	1.5E-05	2.8E-05	1.4E-05
NE	2.9E-05	1.8E-05	1.9E-05	2.6E-05	1.3E-05	2.8E-05	1.3E-05
NNE	1.9E-05	1.2E-05	1.2E-05	1.7E-05	8.2E-06	1.9E-05	8.0E-06

	Distance (m)						
Direction	1210	1494	1495	1626	1345	2008	1688
N	8.1E-06	6.1E-06	6.1E-06	5.5E-06	7.0E-06	4.1E-06	5.2E-06
NNW	4.1E-06	3.1E-06	3.1E-06	2.8E-06	3.6E-06	2.1E-06	2.7E-06
NW	3.1E-06	2.4E-06	2.4E-06	2.1E-06	2.7E-06	1.7E-06	2.1E-06
WNW	3.8E-06	3.0E-06	3.0E-06	2.7E-06	3.4E-06	2.1E-06	2.6E-06
W	7.2E-06	5.6E-06	5.6E-06	5.0E-06	6.3E-06	3.9E-06	4.8E-06
WSW	1.3E-05	9.5E-06	9.5E-06	8.5E-06	1.1E-05	6.3E-06	8.0E-06
SW	7.3E-06	5.4E-06	5.4E-06	4.7E-06	6.2E-06	3.5E-06	4.5E-06
SSW	5.8E-06	4.4E-06	4.4E-06	3.9E-06	5.1E-06	2.9E-06	3.7E-06
S	5.0E-06	3.8E-06	3.8E-06	3.4E-06	4.4E-06	2.6E-06	3.3E-06
SSE	7.1E-06	5.5E-06	5.5E-06	5.0E-06	6.2E-06	3.8E-06	4.7E-06
SE	1.3E-05	1.1E-05	1.1E-05	9.9E-06	1.2E-05	8.0E-06	9.6E-06
ESE	1.9E-05	1.6E-05	1.6E-05	1.5E-05	1.7E-05	1.2E-05	1.4E-05
E	2.1E-05	1.7E-05	1.7E-05	1.6E-05	1.9E-05	1.3E-05	1.5E-05
ENE	2.3E-05	1.9E-05	1.9E-05	1.7E-05	2.1E-05	1.3E-05	1.6E-05
NE	2.3E-05	1.8E-05	1.8E-05	1.6E-05	2.0E-05	1.2E-05	1.5E-05
NNE	1.5E-05	1.1E-05	1.1E-05	9.9E-06	1.3E-05	7.4E-06	9.4E-06

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)			
Direction	1563	1026	1076	1363
N	5.8E-06	1.0E-05	9.4E-06	6.9E-06
NNW	2.9E-06	5.1E-06	4.8E-06	3.5E-06
NW	2.3E-06	3.7E-06	3.5E-06	2.7E-06
WNW	2.9E-06	4.6E-06	4.4E-06	3.4E-06
W	5.3E-06	8.7E-06	8.2E-06	6.2E-06
WSW	8.9E-06	1.6E-05	1.5E-05	1.1E-05
SW	5.0E-06	9.2E-06	8.6E-06	6.1E-06
SSW	4.1E-06	7.3E-06	6.8E-06	5.0E-06
S	3.6E-06	6.2E-06	5.8E-06	4.3E-06
SSE	5.2E-06	8.5E-06	8.1E-06	6.1E-06
SE	1.0E-05	1.5E-05	1.4E-05	1.2E-05
ESE	1.5E-05	2.2E-05	2.1E-05	1.7E-05
E	1.6E-05	2.4E-05	2.3E-05	1.9E-05
ENE	1.8E-05	2.7E-05	2.6E-05	2.0E-05
NE	1.7E-05	2.7E-05	2.6E-05	2.0E-05
NNE	1.0E-05	1.8E-05	1.7E-05	1.2E-05

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Direction	Distance (m) 966	1441	1376	1083	1866	996	1909
N	1.7E-10	1.0E-10	1.1E-10	1.5E-10	7.2E-11	1.7E-10	7.0E-11
NNW	8.7E-11	5.2E-11	5.5E-11	7.5E-11	3.7E-11	8.3E-11	3.6E-11
NW	6.3E-11	3.9E-11	4.2E-11	5.5E-11	2.9E-11	6.1E-11	2.8E-11
WNW	7.8E-11	5.0E-11	5.3E-11	6.9E-11	3.7E-11	7.5E-11	3.6E-11
W	1.5E-10	9.3E-11	9.8E-11	1.3E-10	6.8E-11	1.4E-10	6.6E-11
WSW	2.7E-10	1.6E-10	1.7E-10	2.4E-10	1.1E-10	2.6E-10	1.1E-10
SW	1.6E-10	9.0E-11	9.7E-11	1.4E-10	6.2E-11	1.5E-10	6.0E-11
SSW	1.3E-10	7.4E-11	7.8E-11	1.1E-10	5.1E-11	1.2E-10	5.0E-11
S	1.1E-10	6.4E-11	6.8E-11	9.2E-11	4.6E-11	1.0E-10	4.4E-11
SSE	1.5E-10	9.2E-11	9.7E-11	1.3E-10	6.7E-11	1.4E-10	6.5E-11
SE	2.5E-10	1.8E-10	1.8E-10	2.3E-10	1.4E-10	2.4E-10	1.3E-10
ESE	3.6E-10	2.6E-10	2.7E-10	3.3E-10	2.0E-10	3.5E-10	2.0E-10
E	4.1E-10	2.8E-10	3.0E-10	3.7E-10	2.2E-10	4.0E-10	2.1E-10
ENE	4.5E-10	3.1E-10	3.2E-10	4.1E-10	2.3E-10	4.4E-10	2.3E-10
NE	4.6E-10	2.9E-10	3.1E-10	4.1E-10	2.1E-10	4.5E-10	2.1E-10
NNE	3.1E-10	1.9E-10	2.0E-10	2.7E-10	1.3E-10	3.0E-10	1.3E-10

Direction	Distance (m) 1210	1494	1495	1626	1345	2008	1688
N	1.3E-10	9.8E-11	9.7E-11	8.7E-11	1.1E-10	6.5E-11	8.3E-11
NNW	6.5E-11	5.0E-11	5.0E-11	4.4E-11	5.7E-11	3.3E-11	4.2E-11
NW	4.9E-11	3.8E-11	3.8E-11	3.4E-11	4.3E-11	2.6E-11	3.3E-11
WNW	6.1E-11	4.8E-11	4.8E-11	4.3E-11	5.4E-11	3.3E-11	4.1E-11
W	1.1E-10	8.9E-11	8.9E-11	8.0E-11	1.0E-10	6.1E-11	7.7E-11
WSW	2.0E-10	1.5E-10	1.5E-10	1.4E-10	1.8E-10	1.0E-10	1.3E-10
SW	1.2E-10	8.6E-11	8.6E-11	7.6E-11	1.0E-10	5.5E-11	7.2E-11
SSW	9.3E-11	7.0E-11	7.0E-11	6.2E-11	8.1E-11	4.6E-11	5.9E-11
S	8.0E-11	6.1E-11	6.1E-11	5.5E-11	7.0E-11	4.1E-11	5.2E-11
SSE	1.1E-10	8.8E-11	8.8E-11	7.9E-11	9.9E-11	6.1E-11	7.6E-11
SE	2.1E-10	1.7E-10	1.7E-10	1.6E-10	1.9E-10	1.3E-10	1.5E-10
ESE	3.0E-10	2.5E-10	2.5E-10	2.3E-10	2.7E-10	1.9E-10	2.2E-10
E	3.3E-10	2.7E-10	2.7E-10	2.5E-10	3.0E-10	2.0E-10	2.4E-10
ENE	3.7E-10	3.0E-10	3.0E-10	2.7E-10	3.3E-10	2.1E-10	2.6E-10
NE	3.6E-10	2.8E-10	2.8E-10	2.5E-10	3.2E-10	1.9E-10	2.4E-10
NNE	2.3E-10	1.8E-10	1.8E-10	1.6E-10	2.0E-10	1.2E-10	1.5E-10

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)			
Direction	1563	1026	1076	1363
N	9.2E-11	1.6E-10	1.5E-10	1.1E-10
NNW	4.7E-11	8.0E-11	7.6E-11	5.6E-11
NW	3.6E-11	5.9E-11	5.6E-11	4.2E-11
WNW	4.5E-11	7.3E-11	6.9E-11	5.3E-11
W	8.4E-11	1.4E-10	1.3E-10	9.9E-11
WSW	1.4E-10	2.5E-10	2.4E-10	1.7E-10
SW	8.0E-11	1.5E-10	1.4E-10	9.8E-11
SSW	6.6E-11	1.2E-10	1.1E-10	7.9E-11
S	5.8E-11	9.8E-11	9.3E-11	6.9E-11
SSE	8.3E-11	1.4E-10	1.3E-10	9.8E-11
SE	1.6E-10	2.4E-10	2.3E-10	1.9E-10
ESE	2.4E-10	3.5E-10	3.3E-10	2.7E-10
E	2.6E-10	3.9E-10	3.7E-10	3.0E-10
ENE	2.8E-10	4.3E-10	4.1E-10	3.3E-10
NE	2.7E-10	4.3E-10	4.1E-10	3.1E-10
NNE	1.7E-10	2.9E-10	2.7E-10	2.0E-10

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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
Mar 29, 1994 12:05 am

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

Effective Dose Equivalent
(mrem/year)

8.95E-06

At This Location: 956 Meters Northeast

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

Comments: This is for the 1993 neshap demonstration, INDrun
Location: Plant 9: General Ventilation stack

Dataset Name: CY93-09-IND
Dataset Date: Mar 29, 1994 12:05 am
Wind File: WNDFILES\FEMP93.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 956 Meters Northeast
Lifetime Fatal Cancer Risk: 1.16E-10

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	2.38E-08
BREAST	2.72E-08
R MAR	4.92E-07
LUNGS	7.06E-05
THYROID	2.32E-08
ENDOST	7.15E-06
RMNDR	6.26E-07
EFFEC	8.95E-06

RADIONUCLIDE EMISSIONS DURING THE YEAR 1994

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
U-234	Y	0.30	4.3E-08	4.3E-08
U-235	Y	1.00	2.2E-09	2.2E-09
U-238	Y	0.30	2.7E-08	2.7E-08

SITE INFORMATION

Temperature:	11 degrees C
Precipitation:	98 cm/y
Mixing Height:	965 m

SOURCE INFORMATION

Source Number:	1
Stack Height (m):	24.40
Diameter (m):	0.52
Plume Rise Momentum (m/s): (Exit Velocity)	2.23E+01

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 USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

961	1033	1961	1498	2294	1372	1479	1620	1442	1391
989	956	1582	1316	1311	1027	1316			

FEMP RECEPTOR LOCATOR PROGRAM
Closest Receptor in Sector

SOURCE NAME: Plant 9: General Ventilation Stack
NORTH/SOUTH COORDINATES: 480976
EAST/WEST COORDINATES: 1381573
DATE: August 17
Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
21	N	961
2	NNW	1033
3	NW	1961
5	WNW	1498
23	W	2294
6	WSW	1372
7	SW	1479
12	SSW	1620
14	S	1442
16	SSE	1391
17	SE	989
18	ESE	956
24	E	1582
19	NE	1316
20	NNE	1311

FEMP RECEPTOR LOCATOR PROGRAM
Distances to all Receptors

SOURCE NAME: Plant 9: General Ventilation Stack
NORTH/SOUTH COORDINATES: 480976
EAST/WEST COORDINATES: 1381573

DATE: August 17
Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
21	N	961
1	N	1027
2	NNW	1033
22	NNW	1402
28	NNW	1517
32	NNW	1592
3	NW	1961
C	NW	1963
E	NW	2020
D	NW	2058
5	WNW	1498
4	WNW	1728
B	WNW	1752
23	W	2294
26	W	2641
A	W	2701
6	WSW	1372
F	WSW	2253
G	WSW	2284
7	SW	1479
8	SW	1529
9	SW	1559
12	SSW	1620
11	SSW	1664
10	SSW	1676
14	S	1442
13	S	1466
16	SSE	1391
29	SSE	1435
15	SSE	1952
17	SE	989
27	SE	2247
18	ESE	956
24	E	1582
30	E	1935
31	E	1996
25	E	2187
19	NE	1316
20	NNE	1311
H	NNE	1436

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Version 1.00

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Individual Assessment
Mar 29, 1994 12:05 am

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

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

Comments: This is for the 1993 neshap demonstration, INDrun
Location: Plant 9: General Ventilation stack

Dataset Name: CY93-09-IND
Dataset Date: Aug 16, 1994 2:21 pm
Wind File: WNDFILES\FEMP93.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
GONADS	2.38E-08
BREAST	2.72E-08
R MAR	4.92E-07
LUNGS	7.06E-05
THYROID	2.32E-08
ENDOST	7.15E-06
RMNDR	6.26E-07
EFFEC	8.95E-06

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	4.52E-07
INHALATION	8.49E-06
AIR IMMERSION	1.16E-13
GROUND SURFACE	5.85E-09
INTERNAL	8.94E-06
EXTERNAL	5.85E-09
TOTAL	8.95E-06

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
U-234	5.62E-06
U-235	1.66E-07
U-238	3.16E-06
TOTAL	8.95E-06

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
LEUKEMIA	5.42E-13
BONE	3.79E-13
THYROID	5.70E-15
BREAST	6.43E-14
LUNG	1.14E-10
STOMACH	3.64E-14
BOWEL	4.57E-14
LIVER	3.53E-14
PANCREAS	2.41E-14
URINARY	1.36E-12
OTHER	2.94E-14
TOTAL	1.16E-10

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	2.36E-12
INHALATION	1.14E-10
AIR IMMERSION	2.69E-18
GROUND SURFACE	1.35E-13
INTERNAL	1.16E-10
EXTERNAL	1.35E-13
TOTAL	1.16E-10

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-234	7.27E-11
U-235	2.16E-12
U-238	4.12E-11
TOTAL	1.16E-10

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	961	1033	1961	1498	2294	1372	1479
N	3.9E-06	3.7E-06	1.8E-06	2.5E-06	1.5E-06	2.7E-06	2.5E-06
NNW	1.8E-06	1.8E-06	9.4E-07	1.2E-06	8.0E-07	1.4E-06	1.3E-06
NW	1.3E-06	1.3E-06	7.0E-07	9.0E-07	6.0E-07	9.8E-07	9.1E-07
WNW	1.6E-06	1.5E-06	8.4E-07	1.1E-06	7.3E-07	1.2E-06	1.1E-06
W	3.0E-06	2.8E-06	1.5E-06	2.0E-06	1.3E-06	2.2E-06	2.0E-06
WSW	6.1E-06	5.7E-06	2.8E-06	3.9E-06	2.4E-06	4.3E-06	3.9E-06
SW	3.9E-06	3.6E-06	1.7E-06	2.4E-06	1.4E-06	2.7E-06	2.4E-06
SSW	3.0E-06	2.8E-06	1.4E-06	1.9E-06	1.1E-06	2.1E-06	1.9E-06
S	2.3E-06	2.2E-06	1.1E-06	1.5E-06	9.7E-07	1.7E-06	1.5E-06
SSE	3.0E-06	2.8E-06	1.5E-06	2.0E-06	1.3E-06	2.2E-06	2.0E-06
SE	4.3E-06	4.1E-06	2.5E-06	3.0E-06	2.2E-06	3.2E-06	3.1E-06
ESE	6.3E-06	6.0E-06	3.5E-06	4.4E-06	3.2E-06	4.7E-06	4.4E-06
E	7.3E-06	6.9E-06	4.0E-06	5.0E-06	3.6E-06	5.4E-06	5.1E-06
ENE	7.9E-06	7.6E-06	4.5E-06	5.7E-06	4.0E-06	6.1E-06	5.7E-06
NE	8.9E-06	8.5E-06	4.7E-06	6.1E-06	4.0E-06	6.6E-06	6.2E-06
NNE	6.8E-06	6.3E-06	3.2E-06	4.3E-06	2.7E-06	4.8E-06	4.4E-06

	Distance (m)						
Direction	1620	1442	1391	989	956	1582	1316
N	2.3E-06	2.6E-06	2.7E-06	3.8E-06	3.9E-06	2.3E-06	2.9E-06
NNW	1.2E-06	1.3E-06	1.3E-06	1.8E-06	1.8E-06	1.2E-06	1.4E-06
NW	8.4E-07	9.3E-07	9.7E-07	1.3E-06	1.3E-06	8.6E-07	1.0E-06
WNW	1.0E-06	1.1E-06	1.2E-06	1.5E-06	1.6E-06	1.0E-06	1.2E-06
W	1.9E-06	2.1E-06	2.2E-06	2.9E-06	3.0E-06	1.9E-06	2.3E-06
WSW	3.5E-06	4.0E-06	4.2E-06	5.9E-06	6.1E-06	3.6E-06	4.5E-06
SW	2.2E-06	2.5E-06	2.6E-06	3.8E-06	3.9E-06	2.2E-06	2.8E-06
SSW	1.7E-06	2.0E-06	2.0E-06	2.9E-06	3.0E-06	1.8E-06	2.2E-06
S	1.4E-06	1.6E-06	1.7E-06	2.3E-06	2.3E-06	1.4E-06	1.7E-06
SSE	1.8E-06	2.1E-06	2.1E-06	2.9E-06	3.0E-06	1.9E-06	2.2E-06
SE	2.8E-06	3.1E-06	3.2E-06	4.2E-06	4.3E-06	2.9E-06	3.4E-06
ESE	4.1E-06	4.5E-06	4.6E-06	6.2E-06	6.3E-06	4.2E-06	4.9E-06
E	4.7E-06	5.2E-06	5.4E-06	7.1E-06	7.3E-06	4.8E-06	5.6E-06
ENE	5.3E-06	5.8E-06	6.0E-06	7.8E-06	7.9E-06	5.4E-06	6.3E-06
NE	5.7E-06	6.3E-06	6.5E-06	8.8E-06	8.9E-06	5.8E-06	6.9E-06
NNE	4.0E-06	4.5E-06	4.7E-06	6.6E-06	6.8E-06	4.1E-06	5.0E-06

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)		
Direction	1311	1027	1316
N	2.9E-06	3.7E-06	2.9E-06
NNW	1.4E-06	1.8E-06	1.4E-06
NW	1.0E-06	1.3E-06	1.0E-06
WNW	1.2E-06	1.5E-06	1.2E-06
W	2.3E-06	2.8E-06	2.3E-06
WSW	4.5E-06	5.7E-06	4.5E-06
SW	2.8E-06	3.6E-06	2.8E-06
SSW	2.2E-06	2.8E-06	2.2E-06
S	1.8E-06	2.2E-06	1.7E-06
SSE	2.3E-06	2.8E-06	2.2E-06
SE	3.4E-06	4.1E-06	3.4E-06
ESE	4.9E-06	6.0E-06	4.9E-06
E	5.6E-06	6.9E-06	5.6E-06
ENE	6.3E-06	7.6E-06	6.3E-06
NE	6.9E-06	8.5E-06	6.9E-06
NNE	5.0E-06	6.4E-06	5.0E-06

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Direction	Distance (m) 961	1033	1961	1498	2294	1372	1479
N	5.1E-11	4.7E-11	2.3E-11	3.2E-11	1.9E-11	3.5E-11	3.2E-11
NNW	2.4E-11	2.2E-11	1.2E-11	1.6E-11	9.9E-12	1.7E-11	1.6E-11
NW	1.7E-11	1.6E-11	8.5E-12	1.1E-11	7.3E-12	1.2E-11	1.1E-11
WNW	2.0E-11	1.9E-11	1.0E-11	1.4E-11	9.0E-12	1.5E-11	1.4E-11
W	3.8E-11	3.6E-11	2.0E-11	2.6E-11	1.7E-11	2.8E-11	2.6E-11
WSW	7.9E-11	7.4E-11	3.7E-11	5.0E-11	3.0E-11	5.5E-11	5.1E-11
SW	5.0E-11	4.7E-11	2.2E-11	3.1E-11	1.8E-11	3.4E-11	3.1E-11
SSW	3.9E-11	3.6E-11	1.7E-11	2.4E-11	1.4E-11	2.6E-11	2.4E-11
S	3.0E-11	2.8E-11	1.4E-11	1.9E-11	1.2E-11	2.1E-11	2.0E-11
SSE	3.8E-11	3.6E-11	1.9E-11	2.5E-11	1.6E-11	2.8E-11	2.6E-11
SE	5.5E-11	5.3E-11	3.2E-11	3.9E-11	2.8E-11	4.2E-11	3.9E-11
ESE	8.1E-11	7.7E-11	4.6E-11	5.6E-11	4.1E-11	6.0E-11	5.7E-11
E	9.4E-11	8.9E-11	5.2E-11	6.5E-11	4.6E-11	7.0E-11	6.6E-11
ENE	1.0E-10	9.8E-11	5.8E-11	7.3E-11	5.1E-11	7.9E-11	7.4E-11
NE	1.2E-10	1.1E-10	6.0E-11	7.9E-11	5.2E-11	8.6E-11	8.0E-11
NNE	8.8E-11	8.2E-11	4.1E-11	5.6E-11	3.4E-11	6.2E-11	5.7E-11

Direction	Distance (m) 1620	1442	1391	989	956	1582	1316
N	2.9E-11	3.3E-11	3.5E-11	4.9E-11	5.1E-11	3.0E-11	3.7E-11
NNW	1.5E-11	1.6E-11	1.7E-11	2.3E-11	2.4E-11	1.5E-11	1.8E-11
NW	1.0E-11	1.2E-11	1.2E-11	1.6E-11	1.7E-11	1.1E-11	1.3E-11
WNW	1.3E-11	1.4E-11	1.4E-11	1.9E-11	2.0E-11	1.3E-11	1.5E-11
W	2.4E-11	2.7E-11	2.8E-11	3.8E-11	3.8E-11	2.4E-11	2.9E-11
WSW	4.6E-11	5.2E-11	5.4E-11	7.7E-11	7.9E-11	4.7E-11	5.8E-11
SW	2.8E-11	3.2E-11	3.4E-11	4.9E-11	5.1E-11	2.9E-11	3.6E-11
SSW	2.2E-11	2.5E-11	2.6E-11	3.8E-11	3.9E-11	2.2E-11	2.8E-11
S	1.8E-11	2.0E-11	2.1E-11	2.9E-11	3.0E-11	1.8E-11	2.2E-11
SSE	2.3E-11	2.6E-11	2.7E-11	3.7E-11	3.8E-11	2.4E-11	2.9E-11
SE	3.6E-11	4.0E-11	4.1E-11	5.4E-11	5.6E-11	3.7E-11	4.3E-11
ESE	5.3E-11	5.8E-11	6.0E-11	8.0E-11	8.2E-11	5.4E-11	6.3E-11
E	6.1E-11	6.7E-11	6.9E-11	9.2E-11	9.4E-11	6.2E-11	7.3E-11
ENE	6.9E-11	7.6E-11	7.8E-11	1.0E-10	1.0E-10	7.0E-11	8.1E-11
NE	7.3E-11	8.2E-11	8.5E-11	1.1E-10	1.2E-10	7.5E-11	8.9E-11
NNE	5.1E-11	5.8E-11	6.1E-11	8.6E-11	8.8E-11	5.3E-11	6.4E-11

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)		
Direction	1311	1027	1316
N	3.7E-11	4.8E-11	3.7E-11
NNW	1.8E-11	2.2E-11	1.8E-11
NW	1.3E-11	1.6E-11	1.3E-11
WNW	1.5E-11	1.9E-11	1.5E-11
W	2.9E-11	3.6E-11	2.9E-11
WSW	5.8E-11	7.4E-11	5.8E-11
SW	3.6E-11	4.7E-11	3.6E-11
SSW	2.8E-11	3.6E-11	2.8E-11
S	2.2E-11	2.8E-11	2.2E-11
SSE	2.9E-11	3.6E-11	2.9E-11
SE	4.3E-11	5.3E-11	4.3E-11
ESE	6.3E-11	7.8E-11	6.3E-11
E	7.3E-11	9.0E-11	7.3E-11
ENE	8.2E-11	9.8E-11	8.1E-11
NE	9.0E-11	1.1E-10	8.9E-11
NNE	6.5E-11	8.3E-11	6.4E-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
Mar 22, 1994 8:43 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)

4.67E-06

At This Location: 1017 Meters East Northeast

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1993

Comments: This is for the 1993 neshap Demonstration
Location: Laundry Facility, Bldg 11, RKR

Dataset Name: CY93-BLDG11-IND
Dataset Date: Mar 22, 1994 8:40 am
Wind File: WNDFILES\FEMP93.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 1017 Meters East Northeast
Lifetime Fatal Cancer Risk: 6.11E-11

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	1.58E-08
BREAST	1.79E-08
R MAR	2.02E-07
LUNGS	3.73E-05
THYROID	1.53E-08
ENDOST	2.86E-06
RMNDR	2.55E-07
EFFEC	4.67E-06

RADIONUCLIDE EMISSIONS DURING THE YEAR 1993

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
U-234	Y	0.30	6.7E-09	6.7E-09
U-235	Y	1.00	1.5E-09	1.5E-09
U-238	Y	0.30	5.5E-09	5.5E-09

SITE INFORMATION

Temperature:	11 degrees C
Precipitation:	98 cm/y
Mixing Height:	965 m

SOURCE INFORMATION

Source Number:	1
Stack Height (m):	3.70
Diameter (m):	0.56
Plume Rise Momentum (m/s): (Exit Velocity)	1.30E+01

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 USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

1301	1736	1677	1375	2342	1017	1061	1252	1132	1735
1264	1094	1095	2250	1724	1330	1337			

FEMP RECEPTOR LOCATOR PROGRAM
Closest Receptor in Sector

SOURCE NAME: SERVICE BUILDING (11)
NORTH/SOUTH COORDINATES: 479900 DATE: August 17
EAST/WEST COORDINATES: 1380700 Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
2	N	1301
28	NNW	1736
4	NW	1677
5	WNW	1375
26	W	2342
6	WSW	1017
7	SW	1061
11	SSW	1252
14	S	1132
15	SSE	1735
16	SE	1264
17	ESE	1094
18	E	1095
30	ENE	2250
19	NE	1724
21	NNE	1330

FEMP RECEPTOR LOCATOR PROGRAM
Distances to all Receptors

SOURCE NAME: SERVICE BUILDING (11)
NORTH/SOUTH COORDINATES: 479900
EAST/WEST COORDINATES: 1380700

DATE: August 17
Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
2	N	1301
1	N	1337
22	N	1639
28	NNW	1736
32	NNW	1805
4	NW	1677
B	NW	1712
C	NW	2031
3	NW	2043
E	NW	2076
D	NW	2123
5	WNW	1375
23	WNW	2098
26	W	2342
A	W	2402
6	WSW	1017
F	WSW	1857
G	WSW	1890
7	SW	1061
8	SW	1106
9	SW	1137
11	SSW	1252
10	SSW	1261
14	S	1132
13	S	1137
12	S	1238
15	SSE	1735
16	SE	1264
29	SE	1351
27	SE	2181
17	ESE	1094
18	E	1095
24	E	1821
30	ENE	2250
31	ENE	2319
25	ENE	2526
19	NE	1724
21	NNE	1330
20	NNE	1729
H	NNE	1850

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Individual Assessment
Mar 22, 1994 8:43 am

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

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1993

Comments: This is for the 1993 neshap Demonstration
Location: Laundry Facility, Bldg 11, RKR

Dataset Name: CY93-BLDG11-IND
Dataset Date: Mar 22, 1994 8:40 am
Wind File: WNDFILES\FEMP93.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
GONADS	1.58E-08
BREAST	1.79E-08
R MAR	2.02E-07
LUNGS	3.73E-05
THYROID	1.53E-08
ENDOST	2.86E-06
RMNDR	2.55E-07
EFFEC	4.67E-06

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	1.79E-07
INHALATION	4.48E-06
AIR IMMERSION	2.23E-13
GROUND SURFACE	7.72E-09
INTERNAL	4.66E-06
EXTERNAL	7.72E-09
TOTAL	4.67E-06

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
U-234	2.51E-06
U-235	3.17E-07
U-238	1.84E-06
TOTAL	4.67E-06

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
LEUKEMIA	2.34E-13
BONE	1.53E-13
THYROID	5.05E-15
BREAST	5.33E-14
LUNG	6.00E-11
STOMACH	2.80E-14
BOWEL	2.63E-14
LIVER	2.85E-14
PANCREAS	1.82E-14
URINARY	5.45E-13
OTHER	2.23E-14
TOTAL	6.11E-11

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	9.35E-13
INHALATION	6.00E-11
AIR IMMERSION	5.19E-18
GROUND SURFACE	1.80E-13
INTERNAL	6.09E-11
EXTERNAL	1.80E-13
TOTAL	6.11E-11

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-234	3.28E-11
U-235	4.15E-12
U-238	2.41E-11
TOTAL	6.11E-11

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	1301	1736	1677	1375	2342	1017	1061
N	9.9E-07	6.5E-07	6.8E-07	9.1E-07	4.1E-07	1.4E-06	1.3E-06
NNW	5.2E-07	3.4E-07	3.6E-07	4.8E-07	2.2E-07	7.3E-07	6.9E-07
NW	4.3E-07	2.9E-07	3.0E-07	4.0E-07	1.9E-07	5.8E-07	5.5E-07
WNW	5.5E-07	3.7E-07	3.9E-07	5.1E-07	2.4E-07	7.5E-07	7.1E-07
W	9.7E-07	6.5E-07	6.8E-07	9.0E-07	4.2E-07	1.3E-06	1.3E-06
WSW	1.5E-06	9.6E-07	1.0E-06	1.4E-06	6.0E-07	2.2E-06	2.0E-06
SW	8.2E-07	5.3E-07	5.5E-07	7.5E-07	3.3E-07	1.2E-06	1.1E-06
SSW	7.0E-07	4.6E-07	4.8E-07	6.5E-07	3.0E-07	1.0E-06	9.4E-07
S	6.4E-07	4.3E-07	4.5E-07	5.9E-07	2.8E-07	9.0E-07	8.5E-07
SSE	9.6E-07	6.4E-07	6.7E-07	8.8E-07	4.1E-07	1.3E-06	1.3E-06
SE	2.1E-06	1.5E-06	1.5E-06	2.0E-06	9.6E-07	2.8E-06	2.7E-06
ESE	3.1E-06	2.2E-06	2.3E-06	2.9E-06	1.4E-06	4.1E-06	3.9E-06
E	3.3E-06	2.3E-06	2.4E-06	3.1E-06	1.5E-06	4.4E-06	4.2E-06
ENE	3.4E-06	2.3E-06	2.4E-06	3.2E-06	1.5E-06	4.7E-06	4.4E-06
NE	3.0E-06	2.0E-06	2.1E-06	2.8E-06	1.3E-06	4.2E-06	4.0E-06
NNE	1.8E-06	1.2E-06	1.2E-06	1.7E-06	7.5E-07	2.5E-06	2.4E-06

	Distance (m)						
Direction	1252	1132	1735	1264	1094	1095	2250
N	1.0E-06	1.2E-06	6.5E-07	1.0E-06	1.3E-06	1.3E-06	4.4E-07
NNW	5.5E-07	6.3E-07	3.4E-07	5.4E-07	6.6E-07	6.6E-07	2.4E-07
NW	4.5E-07	5.1E-07	2.9E-07	4.4E-07	5.3E-07	5.3E-07	2.0E-07
WNW	5.7E-07	6.5E-07	3.7E-07	5.7E-07	6.8E-07	6.8E-07	2.6E-07
W	1.0E-06	1.2E-06	6.5E-07	1.0E-06	1.2E-06	1.2E-06	4.4E-07
WSW	1.6E-06	1.8E-06	9.6E-07	1.6E-06	1.9E-06	1.9E-06	6.4E-07
SW	8.7E-07	1.0E-06	5.3E-07	8.5E-07	1.1E-06	1.1E-06	3.5E-07
SSW	7.4E-07	8.6E-07	4.6E-07	7.3E-07	9.0E-07	9.0E-07	3.1E-07
S	6.8E-07	7.8E-07	4.3E-07	6.7E-07	8.1E-07	8.1E-07	2.9E-07
SSE	1.0E-06	1.2E-06	6.4E-07	9.9E-07	1.2E-06	1.2E-06	4.3E-07
SE	2.2E-06	2.5E-06	1.5E-06	2.2E-06	2.6E-06	2.6E-06	1.0E-06
ESE	3.3E-06	3.7E-06	2.2E-06	3.2E-06	3.8E-06	3.8E-06	1.5E-06
E	3.5E-06	3.9E-06	2.3E-06	3.4E-06	4.1E-06	4.1E-06	1.6E-06
ENE	3.6E-06	4.1E-06	2.3E-06	3.6E-06	4.3E-06	4.3E-06	1.6E-06
NE	3.2E-06	3.6E-06	2.0E-06	3.1E-06	3.8E-06	3.8E-06	1.3E-06
NNE	1.9E-06	2.2E-06	1.2E-06	1.9E-06	2.3E-06	2.3E-06	7.9E-07

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)		
Direction	1724	1330	1337
N	6.5E-07	9.6E-07	9.5E-07
NNW	3.5E-07	5.0E-07	5.0E-07
NW	2.9E-07	4.1E-07	4.1E-07
WNW	3.7E-07	5.3E-07	5.3E-07
W	6.5E-07	9.4E-07	9.3E-07
WSW	9.7E-07	1.4E-06	1.4E-06
SW	5.3E-07	7.9E-07	7.8E-07
SSW	4.6E-07	6.8E-07	6.7E-07
S	4.3E-07	6.2E-07	6.2E-07
SSE	6.4E-07	9.3E-07	9.2E-07
SE	1.5E-06	2.1E-06	2.1E-06
ESE	2.2E-06	3.0E-06	3.0E-06
E	2.3E-06	3.2E-06	3.2E-06
ENE	2.4E-06	3.3E-06	3.3E-06
NE	2.0E-06	2.9E-06	2.9E-06
NNE	1.2E-06	1.7E-06	1.7E-06

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Direction	Distance (m) 1301	1736	1677	1375	2342	1017	1061
N	1.3E-11	8.3E-12	8.8E-12	1.2E-11	5.2E-12	1.8E-11	1.7E-11
NNW	6.6E-12	4.3E-12	4.5E-12	6.1E-12	2.7E-12	9.4E-12	8.9E-12
NW	5.4E-12	3.6E-12	3.8E-12	5.0E-12	2.3E-12	7.5E-12	7.1E-12
WNW	7.0E-12	4.6E-12	4.9E-12	6.5E-12	3.0E-12	9.6E-12	9.1E-12
W	1.3E-11	8.3E-12	8.7E-12	1.2E-11	5.3E-12	1.8E-11	1.7E-11
WSW	1.9E-11	1.2E-11	1.3E-11	1.8E-11	7.6E-12	2.8E-11	2.6E-11
SW	1.1E-11	6.7E-12	7.1E-12	9.7E-12	4.2E-12	1.5E-11	1.4E-11
SSW	9.0E-12	5.8E-12	6.2E-12	8.3E-12	3.7E-12	1.3E-11	1.2E-11
S	8.2E-12	5.4E-12	5.7E-12	7.6E-12	3.5E-12	1.2E-11	1.1E-11
SSE	1.2E-11	8.2E-12	8.6E-12	1.1E-11	5.2E-12	1.7E-11	1.6E-11
SE	2.8E-11	1.9E-11	2.0E-11	2.6E-11	1.2E-11	3.7E-11	3.5E-11
ESE	4.1E-11	2.8E-11	3.0E-11	3.8E-11	1.9E-11	5.4E-11	5.1E-11
E	4.3E-11	3.0E-11	3.1E-11	4.0E-11	1.9E-11	5.8E-11	5.5E-11
ENE	4.5E-11	3.0E-11	3.2E-11	4.2E-11	2.0E-11	6.1E-11	5.8E-11
NE	3.9E-11	2.6E-11	2.7E-11	3.6E-11	1.6E-11	5.5E-11	5.2E-11
NNE	2.3E-11	1.5E-11	1.6E-11	2.2E-11	9.6E-12	3.3E-11	3.1E-11

Direction	Distance (m) 1252	1132	1735	1264	1094	1095	2250
N	1.4E-11	1.6E-11	8.3E-12	1.3E-11	1.6E-11	1.6E-11	5.6E-12
NNW	7.0E-12	8.1E-12	4.3E-12	6.9E-12	8.5E-12	8.5E-12	2.9E-12
NW	5.7E-12	6.5E-12	3.6E-12	5.6E-12	6.8E-12	6.8E-12	2.5E-12
WNW	7.3E-12	8.4E-12	4.6E-12	7.2E-12	8.8E-12	8.8E-12	3.2E-12
W	1.3E-11	1.5E-11	8.3E-12	1.3E-11	1.6E-11	1.6E-11	5.6E-12
WSW	2.1E-11	2.4E-11	1.2E-11	2.0E-11	2.5E-11	2.5E-11	8.1E-12
SW	1.1E-11	1.3E-11	6.7E-12	1.1E-11	1.4E-11	1.4E-11	4.5E-12
SSW	9.5E-12	1.1E-11	5.9E-12	9.4E-12	1.2E-11	1.2E-11	3.9E-12
S	8.7E-12	1.0E-11	5.4E-12	8.6E-12	1.0E-11	1.0E-11	3.7E-12
SSE	1.3E-11	1.5E-11	8.2E-12	1.3E-11	1.6E-11	1.6E-11	5.5E-12
SE	2.9E-11	3.3E-11	1.9E-11	2.9E-11	3.4E-11	3.4E-11	1.3E-11
ESE	4.3E-11	4.8E-11	2.8E-11	4.2E-11	5.0E-11	5.0E-11	2.0E-11
E	4.5E-11	5.1E-11	3.0E-11	4.5E-11	5.3E-11	5.3E-11	2.1E-11
ENE	4.7E-11	5.4E-11	3.0E-11	4.7E-11	5.6E-11	5.6E-11	2.1E-11
NE	4.1E-11	4.8E-11	2.6E-11	4.1E-11	5.0E-11	5.0E-11	1.7E-11
NNE	2.5E-11	2.9E-11	1.5E-11	2.4E-11	3.0E-11	3.0E-11	1.0E-11

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)		
Direction	1724	1330	1337
N	8.4E-12	1.2E-11	1.2E-11
NNW	4.4E-12	6.4E-12	6.4E-12
NW	3.6E-12	5.2E-12	5.2E-12
WNW	4.7E-12	6.8E-12	6.7E-12
W	8.4E-12	1.2E-11	1.2E-11
WSW	1.2E-11	1.9E-11	1.9E-11
SW	6.8E-12	1.0E-11	1.0E-11
SSW	5.9E-12	8.7E-12	8.7E-12
S	5.5E-12	8.0E-12	7.9E-12
SSE	8.2E-12	1.2E-11	1.2E-11
SE	1.9E-11	2.7E-11	2.7E-11
ESE	2.9E-11	4.0E-11	3.9E-11
E	3.0E-11	4.2E-11	4.2E-11
ENE	3.1E-11	4.4E-11	4.3E-11
NE	2.6E-11	3.8E-11	3.8E-11
NNE	1.5E-11	2.3E-11	2.2E-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
Mar 22, 1994 8:42 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)

2.33E-05

At This Location: 921 Meters Northeast

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1993

Comments: This is for the 1993 neshap Demonstration
Location: Bldg 15\MEPA-HEPA stack, IND EDE; RKR

Dataset Name: CY93-15HEPA-IND
Dataset Date: Mar 22, 1994 8:39 am
Wind File: WNDFILES\FEMP93.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 921 Meters Northeast
Lifetime Fatal Cancer Risk: 3.03E-10

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	6.91E-08
BREAST	7.90E-08
R MAR	1.20E-06
LUNGS	1.85E-04
THYROID	6.73E-08
ENDOST	1.71E-05
RMNDR	1.51E-06
EFFEC	2.33E-05

RADIONUCLIDE EMISSIONS DURING THE YEAR 1993

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
U-234	Y	0.30	7.4E-08	7.4E-08
U-235	Y	1.00	8.3E-09	8.3E-09
U-238	Y	0.30	6.7E-08	6.7E-08

SITE INFORMATION

Temperature:	11 degrees C
Precipitation:	98 cm/y
Mixing Height:	965 m

SOURCE INFORMATION

Source Number:	1
Stack Height (m):	14.75
Diameter (m):	0.91
Plume Rise Momentum (m/s): (Exit Velocity)	1.73E+01

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 USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

1317	1802	1617	1305	2247	921	979	1068	1133	1135
1317	1182	1186	2347	1796	1374	1363	1811	1411	

FEMP RECEPTOR LOCATOR PROGRAM
Closest Receptor in Sector

SOURCE NAME: Bldg 15
NORTH/SOUTH COORDINATES: 479840
EAST/WEST COORDINATES: 1380390

DATE: August 18
Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
2	N	1317
32	NNW	1802
4	NW	1617
5	WNW	1305
26	W	2247
6	WSW	921
7	SW	979
9	SSW	1068
13	S	1133
14	SSE	1135
16	SE	1317
17	ESE	1182
18	E	1186
30	ENE	2347
20	NE	1796
21	NNE	1374

FEMP RECEPTOR LOCATOR PROGRAM
Distances to all Receptors

SOURCE NAME: Bldg 15
NORTH/SOUTH COORDINATES: 479840
EAST/WEST COORDINATES: 1380390

DATE: August 18
Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
2	N	1317
1	N	1363
22	N	1643
28	N	1735
32	NNW	1802
C	NNW	1993
3	NNW	2008
4	NW	1617
B	NW	1654
E	NW	2035
D	NW	2083
5	WNW	1305
23	WNW	2013
26	W	2247
A	W	2307
6	WSW	921
F	WSW	1766
G	WSW	1798
7	SW	979
8	SW	1035
9	SSW	1068
11	SSW	1199
10	SSW	1204
13	S	1133
12	S	1207
14	SSE	1135
15	SSE	1763
16	SE	1317
29	SE	1411
27	SE	2239
17	ESE	1182
18	E	1186
24	E	1916
30	ENE	2347
31	ENE	2415
25	ENE	2622
20	NE	1796
19	NE	1811
21	NNE	1374
H	NNE	1913

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Version 1.00

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Individual Assessment
Mar 22, 1994 8:42 am

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

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1993

Comments: This is for the 1993 neshap Demonstration
Location: Bldg 15\MEPA-HEPA stack, IND EDE; RKR

Dataset Name: CY93-15HEPA-IND
Dataset Date: Mar 22, 1994 8:39 am
Wind File: WNDFILES\FEMP93.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
GONADS	6.91E-08
BREAST	7.90E-08
R MAR	1.20E-06
LUNGS	1.85E-04
THYROID	6.73E-08
ENDOST	1.71E-05
RMNDR	1.51E-06
EFFEC	2.33E-05

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	1.08E-06
INHALATION	2.22E-05
AIR IMMERSION	5.52E-13
GROUND SURFACE	2.45E-08
INTERNAL	2.33E-05
EXTERNAL	2.45E-08
TOTAL	2.33E-05

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
U-234	1.25E-05
U-235	7.95E-07
U-238	1.00E-05
TOTAL	2.33E-05

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
LEUKEMIA	1.37E-12
BONE	9.12E-13
THYROID	1.90E-14
BREAST	2.08E-13
LUNG	2.97E-10
STOMACH	1.13E-13
BOWEL	1.27E-13
LIVER	1.12E-13
PANCREAS	7.44E-14
URINARY	3.26E-12
OTHER	9.09E-14
TOTAL	3.03E-10

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	5.67E-12
INHALATION	2.97E-10
AIR IMMERSION	1.29E-17
GROUND SURFACE	5.67E-13
INTERNAL	3.03E-10
EXTERNAL	5.67E-13
TOTAL	3.03E-10

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-234	1.62E-10
U-235	1.04E-11
U-238	1.31E-10
TOTAL	3.03E-10

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	1317	1802	1617	1305	2247	921	979
N	6.7E-06	4.5E-06	5.2E-06	6.8E-06	3.4E-06	1.0E-05	9.7E-06
NNW	3.3E-06	2.3E-06	2.6E-06	3.4E-06	1.8E-06	4.8E-06	4.6E-06
NW	2.3E-06	1.7E-06	1.9E-06	2.4E-06	1.3E-06	3.3E-06	3.2E-06
WNW	2.7E-06	2.0E-06	2.2E-06	2.8E-06	1.6E-06	3.8E-06	3.6E-06
W	5.2E-06	3.7E-06	4.2E-06	5.3E-06	2.9E-06	7.5E-06	7.1E-06
WSW	1.0E-05	7.0E-06	8.0E-06	1.0E-05	5.3E-06	1.6E-05	1.5E-05
SW	6.3E-06	4.1E-06	4.8E-06	6.4E-06	3.1E-06	9.8E-06	9.2E-06
SSW	4.9E-06	3.3E-06	3.8E-06	4.9E-06	2.5E-06	7.5E-06	7.0E-06
S	4.1E-06	2.8E-06	3.2E-06	4.1E-06	2.1E-06	6.0E-06	5.7E-06
SSE	5.2E-06	3.7E-06	4.1E-06	5.2E-06	2.9E-06	7.6E-06	7.1E-06
SE	7.8E-06	5.9E-06	6.5E-06	7.8E-06	5.0E-06	1.1E-05	1.0E-05
ESE	1.1E-05	8.5E-06	9.4E-06	1.2E-05	7.1E-06	1.7E-05	1.6E-05
E	1.3E-05	9.7E-06	1.1E-05	1.3E-05	7.9E-06	1.9E-05	1.8E-05
ENE	1.5E-05	1.1E-05	1.2E-05	1.5E-05	8.9E-06	2.0E-05	1.9E-05
NE	1.6E-05	1.1E-05	1.3E-05	1.6E-05	9.0E-06	2.3E-05	2.2E-05
NNE	1.2E-05	7.9E-06	9.1E-06	1.2E-05	6.0E-06	1.8E-05	1.7E-05

	Distance (m)						
Direction	1068	1133	1135	1317	1182	1186	2347
N	8.7E-06	8.1E-06	8.1E-06	6.7E-06	7.7E-06	7.7E-06	3.2E-06
NNW	4.2E-06	3.9E-06	3.9E-06	3.3E-06	3.8E-06	3.7E-06	1.7E-06
NW	2.9E-06	2.7E-06	2.7E-06	2.3E-06	2.6E-06	2.6E-06	1.3E-06
WNW	3.4E-06	3.2E-06	3.2E-06	2.7E-06	3.0E-06	3.0E-06	1.5E-06
W	6.5E-06	6.1E-06	6.1E-06	5.2E-06	5.8E-06	5.8E-06	2.8E-06
WSW	1.3E-05	1.2E-05	1.2E-05	1.0E-05	1.2E-05	1.2E-05	5.0E-06
SW	8.2E-06	7.7E-06	7.6E-06	6.3E-06	7.3E-06	7.2E-06	2.9E-06
SSW	6.3E-06	5.9E-06	5.9E-06	4.9E-06	5.6E-06	5.6E-06	2.3E-06
S	5.2E-06	4.8E-06	4.8E-06	4.1E-06	4.6E-06	4.6E-06	2.0E-06
SSE	6.5E-06	6.1E-06	6.1E-06	5.2E-06	5.8E-06	5.8E-06	2.8E-06
SE	9.5E-06	9.0E-06	9.0E-06	7.8E-06	8.6E-06	8.6E-06	4.8E-06
ESE	1.4E-05	1.3E-05	1.3E-05	1.1E-05	1.3E-05	1.3E-05	6.9E-06
E	1.6E-05	1.5E-05	1.5E-05	1.3E-05	1.5E-05	1.5E-05	7.6E-06
ENE	1.8E-05	1.7E-05	1.7E-05	1.5E-05	1.6E-05	1.6E-05	8.5E-06
NE	2.0E-05	1.9E-05	1.9E-05	1.6E-05	1.8E-05	1.8E-05	8.6E-06
NNE	1.5E-05	1.4E-05	1.4E-05	1.2E-05	1.3E-05	1.3E-05	5.6E-06

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)				
Direction	1796	1374	1363	1811	1411
N	4.5E-06	6.4E-06	6.4E-06	4.5E-06	6.1E-06
NNW	2.3E-06	3.2E-06	3.2E-06	2.3E-06	3.1E-06
NW	1.7E-06	2.2E-06	2.3E-06	1.7E-06	2.2E-06
WNW	2.0E-06	2.6E-06	2.6E-06	2.0E-06	2.6E-06
W	3.7E-06	5.0E-06	5.0E-06	3.7E-06	4.8E-06
WSW	7.0E-06	9.8E-06	9.9E-06	6.9E-06	9.5E-06
SW	4.2E-06	6.0E-06	6.0E-06	4.1E-06	5.8E-06
SSW	3.3E-06	4.6E-06	4.7E-06	3.3E-06	4.5E-06
S	2.8E-06	3.9E-06	3.9E-06	2.8E-06	3.7E-06
SSE	3.7E-06	5.0E-06	5.0E-06	3.7E-06	4.8E-06
SE	5.9E-06	7.5E-06	7.5E-06	5.9E-06	7.3E-06
ESE	8.5E-06	1.1E-05	1.1E-05	8.5E-06	1.1E-05
E	9.7E-06	1.3E-05	1.3E-05	9.6E-06	1.2E-05
ENE	1.1E-05	1.4E-05	1.4E-05	1.1E-05	1.4E-05
NE	1.2E-05	1.5E-05	1.6E-05	1.1E-05	1.5E-05
NNE	7.9E-06	1.1E-05	1.1E-05	7.8E-06	1.1E-05

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Direction	Distance (m) 1317	1802	1617	1305	2247	921	979
N	8.7E-11	5.7E-11	6.6E-11	8.8E-11	4.3E-11	1.4E-10	1.3E-10
NNW	4.2E-11	2.9E-11	3.3E-11	4.3E-11	2.2E-11	6.2E-11	5.9E-11
NW	2.9E-11	2.1E-11	2.3E-11	3.0E-11	1.6E-11	4.2E-11	4.0E-11
WNW	3.5E-11	2.5E-11	2.8E-11	3.5E-11	2.0E-11	4.9E-11	4.6E-11
W	6.7E-11	4.7E-11	5.3E-11	6.8E-11	3.7E-11	9.6E-11	9.1E-11
WSW	1.3E-10	9.0E-11	1.0E-10	1.4E-10	6.8E-11	2.0E-10	1.9E-10
SW	8.1E-11	5.3E-11	6.2E-11	8.2E-11	3.9E-11	1.3E-10	1.2E-10
SSW	6.3E-11	4.2E-11	4.8E-11	6.4E-11	3.1E-11	9.8E-11	9.1E-11
S	5.2E-11	3.5E-11	4.0E-11	5.2E-11	2.7E-11	7.8E-11	7.3E-11
SSE	6.7E-11	4.7E-11	5.3E-11	6.7E-11	3.7E-11	9.8E-11	9.2E-11
SE	1.0E-10	7.6E-11	8.3E-11	1.0E-10	6.3E-11	1.4E-10	1.3E-10
ESE	1.5E-10	1.1E-10	1.2E-10	1.5E-10	9.2E-11	2.1E-10	2.0E-10
E	1.7E-10	1.2E-10	1.4E-10	1.7E-10	1.0E-10	2.5E-10	2.3E-10
ENE	1.9E-10	1.4E-10	1.6E-10	1.9E-10	1.1E-10	2.6E-10	2.5E-10
NE	2.1E-10	1.5E-10	1.7E-10	2.1E-10	1.2E-10	3.0E-10	2.9E-10
NNE	1.5E-10	1.0E-10	1.2E-10	1.5E-10	7.7E-11	2.4E-10	2.2E-10

Direction	Distance (m) 1068	1133	1135	1317	1182	1186	2347
N	1.1E-10	1.0E-10	1.0E-10	8.7E-11	1.0E-10	9.9E-11	4.1E-11
NNW	5.4E-11	5.0E-11	5.0E-11	4.2E-11	4.8E-11	4.8E-11	2.1E-11
NW	3.7E-11	3.5E-11	3.5E-11	2.9E-11	3.3E-11	3.3E-11	1.5E-11
WNW	4.3E-11	4.0E-11	4.0E-11	3.5E-11	3.9E-11	3.8E-11	1.9E-11
W	8.4E-11	7.9E-11	7.8E-11	6.7E-11	7.5E-11	7.5E-11	3.5E-11
WSW	1.7E-10	1.6E-10	1.6E-10	1.3E-10	1.5E-10	1.5E-10	6.4E-11
SW	1.1E-10	9.9E-11	9.9E-11	8.1E-11	9.4E-11	9.3E-11	3.7E-11
SSW	8.2E-11	7.6E-11	7.6E-11	6.3E-11	7.2E-11	7.2E-11	2.9E-11
S	6.6E-11	6.2E-11	6.2E-11	5.2E-11	5.9E-11	5.9E-11	2.5E-11
SSE	8.4E-11	7.9E-11	7.9E-11	6.7E-11	7.5E-11	7.5E-11	3.5E-11
SE	1.2E-10	1.2E-10	1.2E-10	1.0E-10	1.1E-10	1.1E-10	6.1E-11
ESE	1.8E-10	1.7E-10	1.7E-10	1.5E-10	1.7E-10	1.6E-10	8.8E-11
E	2.1E-10	2.0E-10	2.0E-10	1.7E-10	1.9E-10	1.9E-10	9.9E-11
ENE	2.3E-10	2.2E-10	2.2E-10	1.9E-10	2.1E-10	2.1E-10	1.1E-10
NE	2.6E-10	2.5E-10	2.5E-10	2.1E-10	2.4E-10	2.4E-10	1.1E-10
NNE	2.0E-10	1.8E-10	1.8E-10	1.5E-10	1.7E-10	1.7E-10	7.3E-11

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)				
Direction	1796	1374	1363	1811	1411
N	5.8E-11	8.2E-11	8.3E-11	5.7E-11	7.9E-11
NNW	2.9E-11	4.0E-11	4.1E-11	2.9E-11	3.9E-11
NW	2.1E-11	2.8E-11	2.8E-11	2.1E-11	2.7E-11
WNW	2.5E-11	3.3E-11	3.3E-11	2.5E-11	3.2E-11
W	4.8E-11	6.4E-11	6.4E-11	4.7E-11	6.2E-11
WSW	9.1E-11	1.3E-10	1.3E-10	9.0E-11	1.2E-10
SW	5.3E-11	7.7E-11	7.8E-11	5.3E-11	7.4E-11
SSW	4.2E-11	5.9E-11	6.0E-11	4.1E-11	5.7E-11
S	3.5E-11	4.9E-11	5.0E-11	3.5E-11	4.8E-11
SSE	4.7E-11	6.4E-11	6.4E-11	4.7E-11	6.2E-11
SE	7.6E-11	9.6E-11	9.7E-11	7.5E-11	9.4E-11
ESE	1.1E-10	1.4E-10	1.4E-10	1.1E-10	1.4E-10
E	1.3E-10	1.6E-10	1.6E-10	1.2E-10	1.6E-10
ENE	1.4E-10	1.8E-10	1.8E-10	1.4E-10	1.8E-10
NE	1.5E-10	2.0E-10	2.0E-10	1.5E-10	2.0E-10
NNE	1.0E-10	1.4E-10	1.5E-10	1.0E-10	1.4E-10

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
Mar 11, 1994 12:46 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)

2.38E-03

At This Location: 921 Meters Northeast

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1993

Comments: This is for the 1993 neshap Demonstration
Location: Analytical Lab (15), Non-HEPA stacks

Dataset Name: CY93-15GEN-IND
Dataset Date: Mar 11, 1994 10:11 am
Wind File: WNDFILES\FEMP93.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 921 Meters Northeast
Lifetime Fatal Cancer Risk: 2.99E-08

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	9.70E-06
BREAST	1.10E-05
R MAR	3.75E-04
LUNGS	1.76E-02
THYROID	9.44E-06
ENDOST	5.00E-03
RMNDR	2.55E-04
EFFEC	2.38E-03

RADIONUCLIDE EMISSIONS DURING THE YEAR 1993

Nuclide	Class	Size	Source #1 Ci/y	Source #2 Ci/y	TOTAL Ci/y
U-234	Y	1.00	6.5E-06	6.5E-06	1.3E-05
U-235	Y	1.00	3.5E-07	3.5E-07	7.0E-07
U-236	Y	1.00	2.6E-07	2.6E-07	5.1E-07
U-238	Y	1.00	7.4E-06	7.4E-06	1.5E-05
RA-226	W	1.00	4.7E-09	4.7E-09	9.3E-09
RA-228	W	1.00	1.9E-08	1.9E-08	3.7E-08
TH-228	Y	1.00	2.0E-07	2.0E-07	4.0E-07
TH-230	Y	1.00	5.8E-07	5.8E-07	1.2E-06
TH-232	Y	1.00	3.1E-08	3.1E-08	6.2E-08
TH-234	Y	1.00	2.9E-05	2.9E-05	5.8E-05

SITE INFORMATION

Temperature:	11 degrees C
Precipitation:	98 cm/y
Mixing Height:	965 m

SOURCE INFORMATION

Source Number:	1	2
Stack Height (m):	16.80	16.28
Diameter (m):	1.32	1.22
Plume Rise Momentum (m/s): (Exit Velocity)	1.72E+01	1.52E+01

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 USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

1317	1802	1617	1305	2247	921	979	1068	1133	1135
1317	1182	1186	2347	1796	1374	1363	1811	1411	

FEMP RECEPTOR LOCATOR PROGRAM
Distances to all Receptors

SOURCE NAME: Bldg 15
NORTH/SOUTH COORDINATES: 479840
EAST/WEST COORDINATES: 1380390

DATE: August 18
Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
2	N	1317
1	N	1363
22	N	1643
28	N	1735
32	NNW	1802
C	NNW	1993
3	NNW	2008
4	NW	1617
B	NW	1654
E	NW	2035
D	NW	2083
5	WNW	1305
23	WNW	2013
26	W	2247
A	W	2307
6	WSW	921
F	WSW	1766
G	WSW	1798
7	SW	979
8	SW	1035
9	SSW	1068
11	SSW	1199
10	SSW	1204
13	S	1133
12	S	1207
14	SSE	1135
15	SSE	1763
16	SE	1317
29	SE	1411
27	SE	2239
17	ESE	1182
18	E	1186
24	E	1916
30	ENE	2347
31	ENE	2415
25	ENE	2622
20	NE	1796
19	NE	1811
21	NNE	1374
H	NNE	1913

FEMP RECEPTOR LOCATOR PROGRAM
Closest Receptor in Sector

SOURCE NAME: Bldg 15
NORTH/SOUTH COORDINATES: 479840
EAST/WEST COORDINATES: 1380390

DATE: August 18
Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
2	N	1317
32	NNW	1802
4	NW	1617
5	WNW	1305
26	W	2247
6	WSW	921
7	SW	979
9	SSW	1068
13	S	1133
14	SSE	1135
16	SE	1317
17	ESE	1182
18	E	1186
30	ENE	2347
20	NE	1796
21	NNE	1374

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Individual Assessment
Mar 11, 1994 12:46 am

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

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1993

Comments: This is for the 1993 neshap Demonstration
Location: Analytical Lab (15), Non-HEPA stacks

Dataset Name: CY93-15GEN-IND
Dataset Date: Mar 11, 1994 10:11 am
Wind File: WNDFILES\FEMP93.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
GONADS	9.70E-06
BREAST	1.10E-05
R MAR	3.75E-04
LUNGS	1.76E-02
THYROID	9.44E-06
ENDOST	5.00E-03
RMNDR	2.55E-04
EFFEC	2.38E-03

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	1.86E-04
INHALATION	2.19E-03
AIR IMMERSION	1.84E-10
GROUND SURFACE	1.95E-06
INTERNAL	2.38E-03
EXTERNAL	1.95E-06
TOTAL	2.38E-03

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
U-234	1.03E-03
U-235	5.24E-05
U-236	3.79E-05
U-238	1.03E-03
RA-226	1.19E-07
RA-228	2.01E-07
TH-228	5.54E-05
TH-230	1.63E-04
TH-232	1.24E-05
TH-234	3.24E-06
TOTAL	2.38E-03

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
LEUKEMIA	3.76E-10
BONE	2.49E-10
THYROID	2.18E-12
BREAST	2.47E-11
LUNG	2.86E-08
STOMACH	1.64E-11
BOWEL	4.28E-11
LIVER	1.83E-11
PANCREAS	9.53E-12
URINARY	5.33E-10
OTHER	1.17E-11
TOTAL	2.99E-08

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	9.85E-10
INHALATION	2.89E-08
AIR IMMERSION	4.10E-15
GROUND SURFACE	4.49E-11
INTERNAL	2.99E-08
EXTERNAL	4.49E-11
TOTAL	2.99E-08

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-234	1.30E-08
U-235	6.81E-10
U-236	4.80E-10
U-238	1.31E-08
RA-226	1.40E-12
RA-228	1.91E-12
TH-228	1.11E-09
TH-230	1.33E-09
TH-232	6.99E-11
TH-234	8.98E-11
TOTAL	2.99E-08

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	1317	1802	1617	1305	2247	921	979
N	7.9E-04	5.4E-04	6.1E-04	7.9E-04	4.1E-04	1.2E-03	1.1E-03
NNW	3.8E-04	2.7E-04	3.1E-04	3.8E-04	2.1E-04	5.1E-04	4.9E-04
NW	2.6E-04	2.0E-04	2.2E-04	2.7E-04	1.6E-04	3.5E-04	3.4E-04
WNW	3.0E-04	2.3E-04	2.5E-04	3.0E-04	1.8E-04	3.9E-04	3.8E-04
W	5.7E-04	4.2E-04	4.7E-04	5.8E-04	3.3E-04	7.7E-04	7.4E-04
WSW	1.2E-03	8.1E-04	9.3E-04	1.2E-03	6.2E-04	1.7E-03	1.6E-03
SW	7.4E-04	5.0E-04	5.8E-04	7.5E-04	3.8E-04	1.1E-03	1.0E-03
SSW	5.7E-04	3.9E-04	4.5E-04	5.8E-04	3.0E-04	8.4E-04	7.9E-04
S	4.7E-04	3.3E-04	3.7E-04	4.7E-04	2.6E-04	6.6E-04	6.2E-04
SSE	5.8E-04	4.2E-04	4.7E-04	5.9E-04	3.3E-04	8.1E-04	7.7E-04
SE	8.3E-04	6.2E-04	6.8E-04	8.4E-04	5.1E-04	1.1E-03	1.1E-03
ESE	1.3E-03	9.1E-04	1.0E-03	1.3E-03	7.3E-04	1.8E-03	1.7E-03
E	1.4E-03	1.0E-03	1.2E-03	1.5E-03	8.3E-04	2.0E-03	1.9E-03
ENE	1.5E-03	1.2E-03	1.3E-03	1.6E-03	9.3E-04	2.0E-03	1.9E-03
NE	1.8E-03	1.3E-03	1.4E-03	1.8E-03	1.0E-03	2.4E-03	2.3E-03
NNE	1.4E-03	9.3E-04	1.1E-03	1.4E-03	7.0E-04	2.0E-03	1.9E-03

	Distance (m)						
Direction	1068	1133	1135	1317	1182	1186	2347
N	1.0E-03	9.3E-04	9.3E-04	7.9E-04	8.9E-04	8.9E-04	3.8E-04
NNW	4.6E-04	4.3E-04	4.3E-04	3.8E-04	4.2E-04	4.2E-04	2.0E-04
NW	3.2E-04	3.0E-04	3.0E-04	2.6E-04	2.9E-04	2.9E-04	1.5E-04
WNW	3.6E-04	3.4E-04	3.4E-04	3.0E-04	3.3E-04	3.3E-04	1.8E-04
W	6.9E-04	6.6E-04	6.5E-04	5.7E-04	6.3E-04	6.3E-04	3.2E-04
WSW	1.5E-03	1.4E-03	1.4E-03	1.2E-03	1.3E-03	1.3E-03	5.9E-04
SW	9.4E-04	8.8E-04	8.8E-04	7.4E-04	8.4E-04	8.4E-04	3.6E-04
SSW	7.2E-04	6.8E-04	6.8E-04	5.7E-04	6.5E-04	6.4E-04	2.8E-04
S	5.8E-04	5.4E-04	5.4E-04	4.7E-04	5.2E-04	5.2E-04	2.4E-04
SSE	7.1E-04	6.7E-04	6.7E-04	5.8E-04	6.5E-04	6.4E-04	3.1E-04
SE	1.0E-03	9.6E-04	9.6E-04	8.3E-04	9.2E-04	9.2E-04	4.9E-04
ESE	1.6E-03	1.5E-03	1.5E-03	1.3E-03	1.4E-03	1.4E-03	7.0E-04
E	1.8E-03	1.7E-03	1.7E-03	1.4E-03	1.6E-03	1.6E-03	8.0E-04
ENE	1.8E-03	1.7E-03	1.7E-03	1.5E-03	1.7E-03	1.7E-03	8.9E-04
NE	2.1E-03	2.0E-03	2.0E-03	1.8E-03	2.0E-03	1.9E-03	9.5E-04
NNE	1.7E-03	1.6E-03	1.6E-03	1.4E-03	1.5E-03	1.5E-03	6.7E-04

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)				
Direction	1796	1374	1363	1811	1411
N	5.4E-04	7.5E-04	7.6E-04	5.3E-04	7.2E-04
NNW	2.7E-04	3.6E-04	3.7E-04	2.7E-04	3.5E-04
NW	2.0E-04	2.5E-04	2.6E-04	1.9E-04	2.5E-04
WNW	2.3E-04	2.9E-04	2.9E-04	2.2E-04	2.8E-04
W	4.2E-04	5.5E-04	5.5E-04	4.1E-04	5.3E-04
WSW	8.2E-04	1.1E-03	1.1E-03	8.1E-04	1.1E-03
SW	5.0E-04	7.0E-04	7.1E-04	5.0E-04	6.8E-04
SSW	3.9E-04	5.4E-04	5.5E-04	3.9E-04	5.3E-04
S	3.3E-04	4.5E-04	4.5E-04	3.3E-04	4.3E-04
SSE	4.2E-04	5.5E-04	5.6E-04	4.1E-04	5.4E-04
SE	6.2E-04	8.0E-04	8.1E-04	6.1E-04	7.8E-04
ESE	9.1E-04	1.2E-03	1.2E-03	9.0E-04	1.2E-03
E	1.0E-03	1.4E-03	1.4E-03	1.0E-03	1.3E-03
ENE	1.2E-03	1.5E-03	1.5E-03	1.1E-03	1.4E-03
NE	1.3E-03	1.7E-03	1.7E-03	1.3E-03	1.6E-03
NNE	9.3E-04	1.3E-03	1.3E-03	9.2E-04	1.3E-03

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	1317	1802	1617	1305	2247	921	979
N	9.8E-09	6.6E-09	7.6E-09	9.9E-09	4.9E-09	1.4E-08	1.4E-08
NNW	4.6E-09	3.3E-09	3.7E-09	4.6E-09	2.5E-09	6.3E-09	6.0E-09
NW	3.1E-09	2.3E-09	2.5E-09	3.2E-09	1.8E-09	4.2E-09	4.1E-09
WNW	3.6E-09	2.6E-09	2.9E-09	3.6E-09	2.1E-09	4.7E-09	4.6E-09
W	7.0E-09	5.1E-09	5.7E-09	7.1E-09	4.0E-09	9.5E-09	9.2E-09
WSW	1.5E-08	1.0E-08	1.2E-08	1.5E-08	7.7E-09	2.1E-08	2.0E-08
SW	9.2E-09	6.2E-09	7.1E-09	9.3E-09	4.6E-09	1.4E-08	1.3E-08
SSW	7.1E-09	4.8E-09	5.5E-09	7.1E-09	3.6E-09	1.0E-08	9.9E-09
S	5.7E-09	4.0E-09	4.5E-09	5.8E-09	3.0E-09	8.1E-09	7.7E-09
SSE	7.1E-09	5.1E-09	5.7E-09	7.2E-09	4.0E-09	1.0E-08	9.6E-09
SE	1.0E-08	7.6E-09	8.4E-09	1.0E-08	6.2E-09	1.4E-08	1.4E-08
ESE	1.6E-08	1.1E-08	1.3E-08	1.6E-08	9.0E-09	2.2E-08	2.1E-08
E	1.8E-08	1.3E-08	1.4E-08	1.8E-08	1.0E-08	2.5E-08	2.4E-08
ENE	1.9E-08	1.4E-08	1.6E-08	1.9E-08	1.2E-08	2.5E-08	2.4E-08
NE	2.2E-08	1.6E-08	1.8E-08	2.2E-08	1.2E-08	3.0E-08	2.9E-08
NNE	1.7E-08	1.2E-08	1.3E-08	1.7E-08	8.7E-09	2.5E-08	2.4E-08

	Distance (m)						
Direction	1068	1133	1135	1317	1182	1186	2347
N	1.2E-08	1.2E-08	1.2E-08	9.8E-09	1.1E-08	1.1E-08	4.7E-09
NNW	5.6E-09	5.3E-09	5.3E-09	4.6E-09	5.1E-09	5.1E-09	2.4E-09
NW	3.8E-09	3.6E-09	3.6E-09	3.1E-09	3.5E-09	3.5E-09	1.7E-09
WNW	4.3E-09	4.1E-09	4.1E-09	3.6E-09	3.9E-09	3.9E-09	2.0E-09
W	8.5E-09	8.1E-09	8.1E-09	7.0E-09	7.8E-09	7.7E-09	3.8E-09
WSW	1.8E-08	1.7E-08	1.7E-08	1.5E-08	1.7E-08	1.6E-08	7.3E-09
SW	1.2E-08	1.1E-08	1.1E-08	9.2E-09	1.0E-08	1.0E-08	4.3E-09
SSW	9.0E-09	8.4E-09	8.4E-09	7.1E-09	8.0E-09	8.0E-09	3.4E-09
S	7.1E-09	6.7E-09	6.7E-09	5.7E-09	6.4E-09	6.4E-09	2.9E-09
SSE	8.8E-09	8.3E-09	8.3E-09	7.1E-09	8.0E-09	8.0E-09	3.8E-09
SE	1.3E-08	1.2E-08	1.2E-08	1.0E-08	1.1E-08	1.1E-08	5.9E-09
ESE	1.9E-08	1.8E-08	1.8E-08	1.6E-08	1.7E-08	1.7E-08	8.6E-09
E	2.2E-08	2.1E-08	2.1E-08	1.8E-08	2.0E-08	2.0E-08	9.8E-09
ENE	2.3E-08	2.2E-08	2.2E-08	1.9E-08	2.1E-08	2.1E-08	1.1E-08
NE	2.7E-08	2.5E-08	2.5E-08	2.2E-08	2.4E-08	2.4E-08	1.2E-08
NNE	2.2E-08	2.0E-08	2.0E-08	1.7E-08	1.9E-08	1.9E-08	8.2E-09

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)				
Direction	1796	1374	1363	1811	1411
N	6.6E-09	9.3E-09	9.4E-09	6.6E-09	9.0E-09
NNW	3.3E-09	4.4E-09	4.4E-09	3.2E-09	4.3E-09
NW	2.3E-09	3.0E-09	3.0E-09	2.3E-09	2.9E-09
WNW	2.7E-09	3.4E-09	3.5E-09	2.6E-09	3.4E-09
W	5.1E-09	6.7E-09	6.8E-09	5.0E-09	6.5E-09
WSW	1.0E-08	1.4E-08	1.4E-08	1.0E-08	1.4E-08
SW	6.2E-09	8.7E-09	8.8E-09	6.1E-09	8.4E-09
SSW	4.8E-09	6.7E-09	6.8E-09	4.8E-09	6.5E-09
S	4.0E-09	5.5E-09	5.5E-09	4.0E-09	5.3E-09
SSE	5.1E-09	6.8E-09	6.9E-09	5.0E-09	6.6E-09
SE	7.6E-09	9.9E-09	9.9E-09	7.5E-09	9.6E-09
ESE	1.1E-08	1.5E-08	1.5E-08	1.1E-08	1.5E-08
E	1.3E-08	1.7E-08	1.7E-08	1.3E-08	1.7E-08
ENE	1.4E-08	1.8E-08	1.9E-08	1.4E-08	1.8E-08
NE	1.6E-08	2.1E-08	2.1E-08	1.6E-08	2.1E-08
NNE	1.2E-08	1.6E-08	1.6E-08	1.2E-08	1.6E-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
Mar 11, 1994 1:03 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)

4.89E-03

At This Location: 969 Meters East Northeast

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1993

Comments: This is for the 1993 neshap Demonstration
Location: Plant 8, 1=PROCESS, 2=BLDG VENT

Dataset Name: CY93-PLT8-IND
Dataset Date: Mar 11, 1994 9:50 am
Wind File: WNDFILES\FEMP93.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 969 Meters East Northeast
Lifetime Fatal Cancer Risk: 6.38E-08

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	1.55E-05
BREAST	1.77E-05
R MAR	3.79E-04
LUNGS	3.79E-02
THYROID	1.51E-05
ENDOST	5.24E-03
RMNDR	4.25E-04
EFFEC	4.89E-03

RADIONUCLIDE EMISSIONS DURING THE YEAR 1993

Nuclide	Class	Size	Source #1 Ci/y	Source #2 Ci/y	TOTAL Ci/y
U-234	Y	1.00	9.9E-06	1.0E-08	1.0E-05
U-235	Y	1.00	5.3E-07	5.6E-10	5.3E-07
U-236	Y	1.00	3.6E-07	3.8E-10	3.6E-07
U-238	Y	1.00	1.3E-05	1.4E-08	1.3E-05
RA-226	Y	1.00	8.9E-09	9.3E-12	8.9E-09
RA-228	Y	1.00	3.6E-08	3.7E-11	3.6E-08
TH-228	Y	1.00	3.8E-07	3.9E-10	3.8E-07
TH-230	Y	1.00	2.7E-08	2.8E-11	2.7E-08
TH-232	Y	1.00	5.9E-08	6.2E-11	5.9E-08
TH-234	Y	1.00	5.5E-05	5.8E-08	5.5E-05

SITE INFORMATION

Temperature:	11 degrees C
Precipitation:	98 cm/y
Mixing Height:	965 m

SOURCE INFORMATION

Source Number:	1	2
Stack Height (m):	13.72	15.60
Diameter (m):	0.20	1.00
Plume Rise Momentum (m/s): (Exit Velocity)	1.31E+01	1.14E+01

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 USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

1207	1631	1561	1265	2273	969	1070	1137	1238	1236
1382	1186	1897	2372	1695	1265	1252	1190	1731	1468

FEMP RECEPTOR LOCATOR PROGRAM
Closest Receptor in Sector

SOURCE NAME: Plant 8
NORTH/SOUTH COORDINATES: 480199
EAST/WEST COORDINATES: 1380454

DATE: August 18
Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
2	N	1207
28	NNW	1631
4	NW	1561
5	WNW	1265
26	W	2273
6	WSW	969
7	SW	1070
8	SSW	1137
13	S	1238
14	SSE	1236
16	SE	1382
18	ESE	1186
24	E	1897
31	ENE	2372
20	NE	1695
21	NNE	1265

FEMP RECEPTOR LOCATOR PROGRAM
Distances to all Receptors

SOURCE NAME: Plant 8
NORTH/SOUTH COORDINATES: 480199
EAST/WEST COORDINATES: 1380454

DATE: August 18
Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
2	N	1207
1	N	1252
22	N	1537
28	NNW	1631
32	NNW	1699
3	NNW	1926
4	NW	1561
B	NW	1596
C	NW	1913
E	NW	1958
D	NW	2005
5	WNW	1265
23	WNW	2001
26	W	2273
A	W	2333
6	WSW	969
F	WSW	1839
G	WSW	1870
7	SW	1070
8	SSW	1137
9	SSW	1171
11	SSW	1308
10	SSW	1312
13	S	1238
12	S	1318
14	SSE	1236
15	SSE	1850
16	SE	1382
29	SE	1468
27	SE	2298
18	ESE	1186
17	ESE	1190
24	E	1897
30	E	2305
31	ENE	2372
25	ENE	2573
20	NE	1695
19	NE	1731
21	NNE	1265
H	NNE	1809

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Individual Assessment
Mar 11, 1994 1:03 pm

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

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1993

Comments: This is for the 1993 neshap Demonstration
Location: Plant 8, 1=PROCESS, 2=BLDG VENT

Dataset Name: CY93-PLT8-IND
Dataset Date: Mar 11, 1994 9:50 am
Wind File: WNDFILES\FEMP93.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
GONADS	1.55E-05
BREAST	1.77E-05
R MAR	3.79E-04
LUNGS	3.79E-02
THYROID	1.51E-05
ENDOST	5.24E-03
RMNDR	4.25E-04
EFFEC	4.89E-03

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	3.01E-04
INHALATION	4.59E-03
AIR IMMERSION	4.58E-10
GROUND SURFACE	3.07E-06
INTERNAL	4.89E-03
EXTERNAL	3.07E-06
TOTAL	4.89E-03

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
U-234	2.08E-03
U-235	1.06E-04
U-236	7.19E-05
U-238	2.43E-03
RA-226	1.96E-06
RA-228	9.20E-06
TH-228	1.43E-04
TH-230	1.00E-05
TH-232	3.21E-05
TH-234	6.98E-06
TOTAL	4.89E-03

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
LEUKEMIA	4.25E-10
BONE	2.79E-10
THYROID	3.49E-12
BREAST	3.97E-11
LUNG	6.20E-08
STOMACH	2.72E-11
BOWEL	7.93E-11
LIVER	2.50E-11
PANCREAS	1.54E-11
URINARY	8.85E-10
OTHER	1.88E-11
TOTAL	6.38E-08

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	1.62E-09
INHALATION	6.21E-08
AIR IMMERSION	1.02E-14
GROUND SURFACE	7.04E-11
INTERNAL	6.38E-08
EXTERNAL	7.04E-11
TOTAL	6.38E-08

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-234	2.66E-08
U-235	1.39E-09
U-236	9.22E-10
U-238	3.15E-08
RA-226	2.46E-11
RA-228	8.50E-11
TH-228	2.87E-09
TH-230	8.22E-11
TH-232	1.81E-10
TH-234	2.17E-10
TOTAL	6.38E-08

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	1207	1631	1561	1265	2273	969	1070
N	1.2E-03	7.7E-04	8.2E-04	1.1E-03	4.8E-04	1.5E-03	1.3E-03
NNW	6.1E-04	4.1E-04	4.3E-04	5.7E-04	2.6E-04	7.9E-04	7.0E-04
NW	5.0E-04	3.5E-04	3.7E-04	4.8E-04	2.3E-04	6.4E-04	5.8E-04
WNW	6.4E-04	4.4E-04	4.6E-04	6.0E-04	2.9E-04	8.1E-04	7.3E-04
W	1.1E-03	7.6E-04	8.1E-04	1.1E-03	4.8E-04	1.5E-03	1.3E-03
WSW	1.7E-03	1.1E-03	1.2E-03	1.6E-03	6.9E-04	2.3E-03	2.0E-03
SW	9.8E-04	6.4E-04	6.8E-04	9.2E-04	4.0E-04	1.3E-03	1.2E-03
SSW	8.4E-04	5.6E-04	5.9E-04	7.8E-04	3.5E-04	1.1E-03	9.8E-04
S	7.5E-04	5.1E-04	5.4E-04	7.1E-04	3.3E-04	9.8E-04	8.7E-04
SSE	1.1E-03	7.4E-04	7.9E-04	1.0E-03	4.8E-04	1.4E-03	1.3E-03
SE	2.4E-03	1.7E-03	1.8E-03	2.3E-03	1.1E-03	2.9E-03	2.7E-03
ESE	3.5E-03	2.5E-03	2.6E-03	3.3E-03	1.6E-03	4.3E-03	3.9E-03
E	3.8E-03	2.6E-03	2.8E-03	3.6E-03	1.7E-03	4.6E-03	4.2E-03
ENE	3.9E-03	2.7E-03	2.8E-03	3.7E-03	1.7E-03	4.9E-03	4.4E-03
NE	3.4E-03	2.3E-03	2.4E-03	3.2E-03	1.4E-03	4.4E-03	3.9E-03
NNE	2.1E-03	1.4E-03	1.5E-03	1.9E-03	8.6E-04	2.7E-03	2.4E-03

	Distance (m)						
Direction	1137	1238	1236	1382	1186	1897	2372
N	1.2E-03	1.1E-03	1.1E-03	9.6E-04	1.2E-03	6.2E-04	4.5E-04
NNW	6.5E-04	5.9E-04	5.9E-04	5.1E-04	6.2E-04	3.4E-04	2.5E-04
NW	5.4E-04	4.9E-04	4.9E-04	4.3E-04	5.1E-04	2.9E-04	2.2E-04
WNW	6.8E-04	6.2E-04	6.2E-04	5.4E-04	6.5E-04	3.6E-04	2.7E-04
W	1.2E-03	1.1E-03	1.1E-03	9.5E-04	1.1E-03	6.2E-04	4.6E-04
WSW	1.9E-03	1.7E-03	1.7E-03	1.4E-03	1.8E-03	9.0E-04	6.5E-04
SW	1.1E-03	9.5E-04	9.5E-04	8.1E-04	1.0E-03	5.1E-04	3.7E-04
SSW	9.0E-04	8.1E-04	8.1E-04	7.0E-04	8.5E-04	4.5E-04	3.3E-04
S	8.1E-04	7.3E-04	7.3E-04	6.4E-04	7.7E-04	4.2E-04	3.1E-04
SSE	1.2E-03	1.1E-03	1.1E-03	9.2E-04	1.1E-03	6.1E-04	4.5E-04
SE	2.5E-03	2.3E-03	2.3E-03	2.0E-03	2.4E-03	1.4E-03	1.0E-03
ESE	3.7E-03	3.4E-03	3.4E-03	3.0E-03	3.6E-03	2.1E-03	1.5E-03
E	4.0E-03	3.7E-03	3.7E-03	3.2E-03	3.8E-03	2.2E-03	1.6E-03
ENE	4.1E-03	3.8E-03	3.8E-03	3.3E-03	4.0E-03	2.2E-03	1.6E-03
NE	3.7E-03	3.3E-03	3.3E-03	2.9E-03	3.5E-03	1.9E-03	1.3E-03
NNE	2.2E-03	2.0E-03	2.0E-03	1.7E-03	2.1E-03	1.1E-03	8.1E-04

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)					
Direction	1695	1265	1252	1190	1731	1468
N	7.3E-04	1.1E-03	1.1E-03	1.2E-03	7.1E-04	8.9E-04
NNW	3.9E-04	5.7E-04	5.8E-04	6.2E-04	3.8E-04	4.7E-04
NW	3.3E-04	4.8E-04	4.8E-04	5.1E-04	3.3E-04	4.0E-04
WNW	4.2E-04	6.0E-04	6.1E-04	6.5E-04	4.1E-04	5.0E-04
W	7.2E-04	1.1E-03	1.1E-03	1.1E-03	7.0E-04	8.7E-04
WSW	1.1E-03	1.6E-03	1.6E-03	1.8E-03	1.0E-03	1.3E-03
SW	6.0E-04	9.2E-04	9.3E-04	1.0E-03	5.9E-04	7.4E-04
SSW	5.3E-04	7.8E-04	8.0E-04	8.5E-04	5.1E-04	6.4E-04
S	4.9E-04	7.1E-04	7.2E-04	7.7E-04	4.7E-04	5.9E-04
SSE	7.1E-04	1.0E-03	1.0E-03	1.1E-03	6.9E-04	8.5E-04
SE	1.6E-03	2.3E-03	2.3E-03	2.4E-03	1.6E-03	1.9E-03
ESE	2.4E-03	3.3E-03	3.4E-03	3.5E-03	2.3E-03	2.8E-03
E	2.5E-03	3.6E-03	3.6E-03	3.8E-03	2.5E-03	3.0E-03
ENE	2.6E-03	3.7E-03	3.7E-03	3.9E-03	2.5E-03	3.1E-03
NE	2.2E-03	3.2E-03	3.2E-03	3.5E-03	2.1E-03	2.6E-03
NNE	1.3E-03	1.9E-03	2.0E-03	2.1E-03	1.3E-03	1.6E-03

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	1207	1631	1561	1265	2273	969	1070
N	1.5E-08	9.8E-09	1.0E-08	1.4E-08	6.0E-09	2.0E-08	1.7E-08
NNW	7.6E-09	5.1E-09	5.4E-09	7.2E-09	3.2E-09	1.0E-08	8.9E-09
NW	6.3E-09	4.3E-09	4.5E-09	5.9E-09	2.7E-09	8.1E-09	7.3E-09
WNW	8.0E-09	5.5E-09	5.8E-09	7.6E-09	3.5E-09	1.0E-08	9.3E-09
W	1.4E-08	9.7E-09	1.0E-08	1.4E-08	6.0E-09	1.9E-08	1.7E-08
WSW	2.2E-08	1.4E-08	1.5E-08	2.1E-08	8.7E-09	3.0E-08	2.6E-08
SW	1.3E-08	8.1E-09	8.6E-09	1.2E-08	4.9E-09	1.7E-08	1.5E-08
SSW	1.1E-08	7.0E-09	7.4E-09	1.0E-08	4.3E-09	1.4E-08	1.3E-08
S	9.6E-09	6.4E-09	6.8E-09	9.0E-09	4.0E-09	1.3E-08	1.1E-08
SSE	1.4E-08	9.5E-09	1.0E-08	1.3E-08	5.9E-09	1.8E-08	1.6E-08
SE	3.1E-08	2.2E-08	2.3E-08	2.9E-08	1.4E-08	3.8E-08	3.5E-08
ESE	4.6E-08	3.2E-08	3.4E-08	4.3E-08	2.1E-08	5.6E-08	5.1E-08
E	4.9E-08	3.4E-08	3.6E-08	4.6E-08	2.2E-08	6.0E-08	5.5E-08
ENE	5.1E-08	3.5E-08	3.7E-08	4.8E-08	2.2E-08	6.4E-08	5.8E-08
NE	4.4E-08	3.0E-08	3.2E-08	4.2E-08	1.8E-08	5.8E-08	5.1E-08
NNE	2.7E-08	1.8E-08	1.9E-08	2.5E-08	1.1E-08	3.5E-08	3.1E-08

	Distance (m)						
Direction	1137	1238	1236	1382	1186	1897	2372
N	1.6E-08	1.4E-08	1.4E-08	1.2E-08	1.5E-08	7.8E-09	5.6E-09
NNW	8.3E-09	7.4E-09	7.4E-09	6.4E-09	7.8E-09	4.1E-09	3.0E-09
NW	6.8E-09	6.1E-09	6.1E-09	5.3E-09	6.4E-09	3.5E-09	2.6E-09
WNW	8.6E-09	7.8E-09	7.8E-09	6.8E-09	8.2E-09	4.4E-09	3.3E-09
W	1.5E-08	1.4E-08	1.4E-08	1.2E-08	1.5E-08	7.8E-09	5.7E-09
WSW	2.4E-08	2.1E-08	2.2E-08	1.8E-08	2.3E-08	1.2E-08	8.2E-09
SW	1.4E-08	1.2E-08	1.2E-08	1.0E-08	1.3E-08	6.4E-09	4.6E-09
SSW	1.2E-08	1.0E-08	1.0E-08	8.8E-09	1.1E-08	5.6E-09	4.0E-09
S	1.0E-08	9.3E-09	9.3E-09	8.0E-09	9.8E-09	5.2E-09	3.8E-09
SSE	1.5E-08	1.4E-08	1.4E-08	1.2E-08	1.4E-08	7.7E-09	5.6E-09
SE	3.3E-08	3.0E-08	3.0E-08	2.7E-08	3.1E-08	1.8E-08	1.3E-08
ESE	4.8E-08	4.4E-08	4.4E-08	3.9E-08	4.6E-08	2.7E-08	2.0E-08
E	5.2E-08	4.8E-08	4.8E-08	4.2E-08	5.0E-08	2.8E-08	2.1E-08
ENE	5.4E-08	4.9E-08	4.9E-08	4.3E-08	5.2E-08	2.9E-08	2.1E-08
NE	4.8E-08	4.3E-08	4.3E-08	3.7E-08	4.5E-08	2.4E-08	1.7E-08
NNE	2.9E-08	2.6E-08	2.6E-08	2.2E-08	2.7E-08	1.4E-08	1.0E-08

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)					
Direction	1695	1265	1252	1190	1731	1468
N	9.2E-09	1.4E-08	1.4E-08	1.5E-08	9.0E-09	1.1E-08
NNW	4.8E-09	7.2E-09	7.3E-09	7.8E-09	4.7E-09	5.9E-09
NW	4.1E-09	5.9E-09	6.0E-09	6.4E-09	4.0E-09	4.9E-09
WNW	5.2E-09	7.6E-09	7.7E-09	8.2E-09	5.0E-09	6.3E-09
W	9.2E-09	1.4E-08	1.4E-08	1.5E-08	8.9E-09	1.1E-08
WSW	1.4E-08	2.1E-08	2.1E-08	2.3E-08	1.3E-08	1.7E-08
SW	7.6E-09	1.2E-08	1.2E-08	1.3E-08	7.4E-09	9.4E-09
SSW	6.6E-09	1.0E-08	1.0E-08	1.1E-08	6.4E-09	8.1E-09
S	6.1E-09	9.0E-09	9.1E-09	9.8E-09	5.9E-09	7.4E-09
SSE	9.0E-09	1.3E-08	1.3E-08	1.4E-08	8.7E-09	1.1E-08
SE	2.1E-08	2.9E-08	3.0E-08	3.1E-08	2.0E-08	2.5E-08
ESE	3.1E-08	4.3E-08	4.4E-08	4.6E-08	3.0E-08	3.7E-08
E	3.3E-08	4.6E-08	4.7E-08	5.0E-08	3.2E-08	3.9E-08
ENE	3.3E-08	4.8E-08	4.8E-08	5.1E-08	3.2E-08	4.0E-08
NE	2.8E-08	4.2E-08	4.2E-08	4.5E-08	2.7E-08	3.4E-08
NNE	1.7E-08	2.5E-08	2.6E-08	2.7E-08	1.6E-08	2.1E-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
Mar 11, 1994 12:59 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)

1.61E-05

At This Location: 921 Meters East Northeast

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1993

Comments: This is for the 1993 neshap Demonstration
Location: Analytical Lab (15), Perc. Stacks(10)

Dataset Name: CY93-15PERC-IND
Dataset Date: Mar 11, 1994 10:12 am
Wind File: WNDFILES\FEMP93.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 921 Meters East Northeast
Lifetime Fatal Cancer Risk: 2.05E-10

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	4.90E-08
BREAST	5.58E-08
R MAR	2.18E-06
LUNGS	1.21E-04
THYROID	4.77E-08
ENDOST	2.88E-05
RMNDR	1.26E-06
EFFEC	1.61E-05

RADIONUCLIDE EMISSIONS DURING THE YEAR 1993

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
U-234	Y	1.00	2.6E-08	2.6E-08
U-235	Y	1.00	1.4E-09	1.4E-09
U-236	Y	1.00	1.0E-09	1.0E-09
U-238	Y	1.00	2.9E-08	2.9E-08
RA-226	W	1.00	1.9E-11	1.9E-11
RA-228	W	1.00	7.5E-11	7.5E-11
TH-228	Y	1.00	7.9E-10	7.9E-10
TH-230	Y	1.00	2.3E-09	2.3E-09
TH-232	Y	1.00	1.2E-10	1.2E-10
TH-234	Y	1.00	1.2E-07	1.2E-07

SITE INFORMATION

Temperature:	11 degrees C
Precipitation:	98 cm/y
Mixing Height:	965 m

SOURCE INFORMATION

Source Number:	1
Stack Height (m):	11.00
Diameter (m):	0.25
Plume Rise Momentum (m/s): (Exit Velocity)	9.34E+00

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 USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

1317	1802	1617	1305	2247	921	979	1068	1133	1135
1317	1182	1186	2347	1796	1374	1363	1811	1411	

FEMP RECEPTOR LOCATOR PROGRAM
Closest Receptor in Sector

SOURCE NAME: Bldg 15
NORTH/SOUTH COORDINATES: 479840
EAST/WEST COORDINATES: 1380390

DATE: August 18
Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
2	N	1317
32	NNW	1802
4	NW	1617
5	WNW	1305
26	W	2247
6	WSW	921
7	SW	979
9	SSW	1068
13	S	1133
14	SSE	1135
16	SE	1317
17	ESE	1182
18	E	1186
30	ENE	2347
20	NE	1796
21	NNE	1374

FEMP RECEPTOR LOCATOR PROGRAM
Distances to all Receptors

SOURCE NAME: Bldg 15
NORTH/SOUTH COORDINATES: 479840
EAST/WEST COORDINATES: 1380390

DATE: August 18
Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
2	N	1317
1	N	1363
22	N	1643
28	N	1735
32	NNW	1802
C	NNW	1993
3	NNW	2008
4	NW	1617
B	NW	1654
E	NW	2035
D	NW	2083
5	WNW	1305
23	WNW	2013
26	W	2247
A	W	2307
6	WSW	921
F	WSW	1766
G	WSW	1798
7	SW	979
8	SW	1035
9	SSW	1068
11	SSW	1199
10	SSW	1204
13	S	1133
12	S	1207
14	SSE	1135
15	SSE	1763
16	SE	1317
29	SE	1411
27	SE	2239
17	ESE	1182
18	E	1186
24	E	1916
30	ENE	2347
31	ENE	2415
25	ENE	2622
20	NE	1796
19	NE	1811
21	NNE	1374
H	NNE	1913

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Individual Assessment
Mar 11, 1994 12:59 am

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

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1993

Comments: This is for the 1993 neshap Demonstration
Location: Analytical Lab (15), Perc. Stacks(10)

Dataset Name: CY93-15PERC-IND
Dataset Date: Mar 11, 1994 10:12 am
Wind File: WNDFILES\FEMP93.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
GONADS	4.90E-08
BREAST	5.58E-08
R MAR	2.18E-06
LUNGS	1.21E-04
THYROID	4.77E-08
ENDOST	2.88E-05
RMNDR	1.26E-06
EFFEC	1.61E-05

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	9.02E-07
INHALATION	1.52E-05
AIR IMMERSION	1.27E-12
GROUND SURFACE	9.73E-09
INTERNAL	1.61E-05
EXTERNAL	9.73E-09
TOTAL	1.61E-05

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
U-234	6.96E-06
U-235	3.49E-07
U-236	2.55E-07
U-238	6.92E-06
RA-226	6.72E-10
RA-228	1.08E-09
TH-228	3.81E-07
TH-230	1.12E-06
TH-232	8.54E-08
TH-234	1.81E-08
TOTAL	1.61E-05

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
LEUKEMIA	2.14E-12
BONE	1.41E-12
THYROID	1.10E-14
BREAST	1.24E-13
LUNG	1.98E-10
STOMACH	8.27E-14
BOWEL	2.18E-13
LIVER	1.01E-13
PANCREAS	4.81E-14
URINARY	2.61E-12
OTHER	5.88E-14
TOTAL	2.05E-10

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	4.79E-12
INHALATION	2.00E-10
AIR IMMERSION	2.83E-17
GROUND SURFACE	2.24E-13
INTERNAL	2.04E-10
EXTERNAL	2.24E-13
TOTAL	2.05E-10

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-234	8.93E-11
U-235	4.58E-12
U-236	3.28E-12
U-238	8.96E-11
RA-226	8.88E-15
RA-228	1.10E-14
TH-228	7.63E-12
TH-230	9.18E-12
TH-232	4.81E-13
TH-234	5.71E-13
TOTAL	2.05E-10

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	1317	1802	1617	1305	2247	921	979
N	2.9E-06	1.8E-06	2.1E-06	2.9E-06	1.3E-06	4.7E-06	4.3E-06
NNW	1.5E-06	9.8E-07	1.1E-06	1.5E-06	7.2E-07	2.5E-06	2.3E-06
NW	1.3E-06	8.6E-07	9.9E-07	1.3E-06	6.4E-07	2.0E-06	1.9E-06
WNW	1.6E-06	1.1E-06	1.2E-06	1.7E-06	7.9E-07	2.6E-06	2.4E-06
W	2.9E-06	1.8E-06	2.2E-06	2.9E-06	1.3E-06	4.6E-06	4.3E-06
WSW	4.2E-06	2.6E-06	3.1E-06	4.3E-06	1.9E-06	7.1E-06	6.5E-06
SW	2.4E-06	1.5E-06	1.7E-06	2.4E-06	1.1E-06	4.0E-06	3.7E-06
SSW	2.1E-06	1.3E-06	1.5E-06	2.1E-06	9.6E-07	3.4E-06	3.1E-06
S	1.9E-06	1.2E-06	1.4E-06	1.9E-06	9.0E-07	3.1E-06	2.8E-06
SSE	2.8E-06	1.8E-06	2.1E-06	2.8E-06	1.3E-06	4.5E-06	4.1E-06
SE	6.5E-06	4.2E-06	4.9E-06	6.5E-06	3.1E-06	9.8E-06	9.2E-06
ESE	9.6E-06	6.3E-06	7.3E-06	9.7E-06	4.6E-06	1.4E-05	1.4E-05
E	1.0E-05	6.6E-06	7.7E-06	1.0E-05	4.8E-06	1.6E-05	1.5E-05
ENE	1.0E-05	6.6E-06	7.7E-06	1.0E-05	4.8E-06	1.6E-05	1.5E-05
NE	8.7E-06	5.5E-06	6.5E-06	8.8E-06	4.0E-06	1.4E-05	1.3E-05
NNE	5.2E-06	3.3E-06	3.9E-06	5.3E-06	2.4E-06	8.5E-06	7.9E-06

	Distance (m)						
Direction	1068	1133	1135	1317	1182	1186	2347
N	3.9E-06	3.6E-06	3.5E-06	2.9E-06	3.4E-06	3.3E-06	1.2E-06
NNW	2.0E-06	1.9E-06	1.9E-06	1.5E-06	1.8E-06	1.8E-06	6.8E-07
NW	1.7E-06	1.6E-06	1.6E-06	1.3E-06	1.5E-06	1.5E-06	6.0E-07
WNW	2.2E-06	2.0E-06	2.0E-06	1.6E-06	1.9E-06	1.9E-06	7.5E-07
W	3.8E-06	3.5E-06	3.5E-06	2.9E-06	3.3E-06	3.3E-06	1.3E-06
WSW	5.7E-06	5.3E-06	5.2E-06	4.2E-06	4.9E-06	4.9E-06	1.8E-06
SW	3.2E-06	3.0E-06	2.9E-06	2.4E-06	2.8E-06	2.8E-06	1.0E-06
SSW	2.8E-06	2.6E-06	2.5E-06	2.1E-06	2.4E-06	2.4E-06	9.0E-07
S	2.5E-06	2.3E-06	2.3E-06	1.9E-06	2.2E-06	2.2E-06	8.5E-07
SSE	3.7E-06	3.4E-06	3.4E-06	2.8E-06	3.2E-06	3.2E-06	1.2E-06
SE	8.3E-06	7.8E-06	7.8E-06	6.5E-06	7.4E-06	7.4E-06	2.9E-06
ESE	1.2E-05	1.2E-05	1.2E-05	9.6E-06	1.1E-05	1.1E-05	4.3E-06
E	1.3E-05	1.2E-05	1.2E-05	1.0E-05	1.2E-05	1.2E-05	4.5E-06
ENE	1.3E-05	1.3E-05	1.3E-05	1.0E-05	1.2E-05	1.2E-05	4.5E-06
NE	1.2E-05	1.1E-05	1.1E-05	8.7E-06	1.0E-05	1.0E-05	3.7E-06
NNE	7.0E-06	6.4E-06	6.4E-06	5.2E-06	6.1E-06	6.0E-06	2.2E-06

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)				
Direction	1796	1374	1363	1811	1411
N	1.8E-06	2.7E-06	2.7E-06	1.8E-06	2.6E-06
NNW	9.9E-07	1.4E-06	1.4E-06	9.8E-07	1.4E-06
NW	8.6E-07	1.2E-06	1.2E-06	8.5E-07	1.2E-06
WNW	1.1E-06	1.6E-06	1.6E-06	1.1E-06	1.5E-06
W	1.9E-06	2.7E-06	2.7E-06	1.8E-06	2.6E-06
WSW	2.6E-06	4.0E-06	4.0E-06	2.6E-06	3.8E-06
SW	1.5E-06	2.2E-06	2.3E-06	1.5E-06	2.1E-06
SSW	1.3E-06	1.9E-06	2.0E-06	1.3E-06	1.9E-06
S	1.2E-06	1.8E-06	1.8E-06	1.2E-06	1.7E-06
SSE	1.8E-06	2.6E-06	2.7E-06	1.8E-06	2.5E-06
SE	4.2E-06	6.1E-06	6.2E-06	4.2E-06	5.9E-06
ESE	6.3E-06	9.1E-06	9.2E-06	6.3E-06	8.8E-06
E	6.7E-06	9.6E-06	9.7E-06	6.6E-06	9.3E-06
ENE	6.7E-06	9.7E-06	9.8E-06	6.6E-06	9.4E-06
NE	5.6E-06	8.2E-06	8.3E-06	5.5E-06	7.9E-06
NNE	3.3E-06	4.9E-06	5.0E-06	3.3E-06	4.7E-06

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Direction	Distance (m) 1317	1802	1617	1305	2247	921	979
N	3.6E-11	2.3E-11	2.7E-11	3.6E-11	1.6E-11	6.0E-11	5.5E-11
NNW	1.9E-11	1.2E-11	1.4E-11	1.9E-11	8.4E-12	3.1E-11	2.8E-11
NW	1.6E-11	1.0E-11	1.2E-11	1.6E-11	7.3E-12	2.5E-11	2.3E-11
WNW	2.0E-11	1.3E-11	1.5E-11	2.0E-11	9.3E-12	3.2E-11	3.0E-11
W	3.6E-11	2.3E-11	2.7E-11	3.6E-11	1.6E-11	5.8E-11	5.4E-11
WSW	5.3E-11	3.3E-11	3.9E-11	5.4E-11	2.3E-11	9.0E-11	8.2E-11
SW	2.9E-11	1.8E-11	2.1E-11	3.0E-11	1.3E-11	5.0E-11	4.6E-11
SSW	2.6E-11	1.6E-11	1.9E-11	2.6E-11	1.1E-11	4.3E-11	3.9E-11
S	2.4E-11	1.5E-11	1.8E-11	2.4E-11	1.1E-11	3.8E-11	3.5E-11
SSE	3.5E-11	2.2E-11	2.6E-11	3.5E-11	1.6E-11	5.6E-11	5.2E-11
SE	8.2E-11	5.3E-11	6.2E-11	8.3E-11	3.8E-11	1.2E-10	1.2E-10
ESE	1.2E-10	8.0E-11	9.3E-11	1.2E-10	5.8E-11	1.8E-10	1.7E-10
E	1.3E-10	8.4E-11	9.8E-11	1.3E-10	6.1E-11	2.0E-10	1.9E-10
ENE	1.3E-10	8.4E-11	9.8E-11	1.3E-10	6.0E-11	2.0E-10	1.9E-10
NE	1.1E-10	7.0E-11	8.2E-11	1.1E-10	5.0E-11	1.8E-10	1.7E-10
NNE	6.6E-11	4.1E-11	4.8E-11	6.7E-11	2.9E-11	1.1E-10	9.9E-11

Direction	Distance (m) 1068	1133	1135	1317	1182	1186	2347
N	4.8E-11	4.5E-11	4.4E-11	3.6E-11	4.2E-11	4.2E-11	1.5E-11
NNW	2.5E-11	2.3E-11	2.3E-11	1.9E-11	2.2E-11	2.2E-11	7.9E-12
NW	2.1E-11	1.9E-11	1.9E-11	1.6E-11	1.8E-11	1.8E-11	6.9E-12
WNW	2.7E-11	2.5E-11	2.5E-11	2.0E-11	2.3E-11	2.3E-11	8.7E-12
W	4.8E-11	4.4E-11	4.4E-11	3.6E-11	4.2E-11	4.1E-11	1.5E-11
WSW	7.2E-11	6.6E-11	6.6E-11	5.3E-11	6.2E-11	6.2E-11	2.2E-11
SW	4.0E-11	3.7E-11	3.7E-11	2.9E-11	3.5E-11	3.4E-11	1.2E-11
SSW	3.5E-11	3.2E-11	3.2E-11	2.6E-11	3.0E-11	3.0E-11	1.1E-11
S	3.1E-11	2.9E-11	2.9E-11	2.4E-11	2.7E-11	2.7E-11	1.0E-11
SSE	4.7E-11	4.3E-11	4.3E-11	3.5E-11	4.1E-11	4.0E-11	1.5E-11
SE	1.1E-10	9.9E-11	9.8E-11	8.2E-11	9.4E-11	9.3E-11	3.6E-11
ESE	1.6E-10	1.5E-10	1.5E-10	1.2E-10	1.4E-10	1.4E-10	5.4E-11
E	1.7E-10	1.6E-10	1.6E-10	1.3E-10	1.5E-10	1.5E-10	5.7E-11
ENE	1.7E-10	1.6E-10	1.6E-10	1.3E-10	1.5E-10	1.5E-10	5.6E-11
NE	1.5E-10	1.4E-10	1.4E-10	1.1E-10	1.3E-10	1.3E-10	4.6E-11
NNE	8.8E-11	8.1E-11	8.1E-11	6.6E-11	7.7E-11	7.6E-11	2.7E-11

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)				
Direction	1796	1374	1363	1811	1411
N	2.3E-11	3.4E-11	3.4E-11	2.2E-11	3.2E-11
NNW	1.2E-11	1.7E-11	1.8E-11	1.2E-11	1.7E-11
NW	1.0E-11	1.5E-11	1.5E-11	1.0E-11	1.4E-11
WNW	1.3E-11	1.9E-11	1.9E-11	1.3E-11	1.8E-11
W	2.3E-11	3.4E-11	3.4E-11	2.3E-11	3.2E-11
WSW	3.3E-11	5.0E-11	5.0E-11	3.2E-11	4.8E-11
SW	1.8E-11	2.8E-11	2.8E-11	1.8E-11	2.6E-11
SSW	1.6E-11	2.4E-11	2.4E-11	1.6E-11	2.3E-11
S	1.5E-11	2.2E-11	2.2E-11	1.5E-11	2.1E-11
SSE	2.2E-11	3.3E-11	3.3E-11	2.2E-11	3.2E-11
SE	5.3E-11	7.7E-11	7.8E-11	5.3E-11	7.4E-11
ESE	8.0E-11	1.2E-10	1.2E-10	7.9E-11	1.1E-10
E	8.4E-11	1.2E-10	1.2E-10	8.3E-11	1.2E-10
ENE	8.4E-11	1.2E-10	1.2E-10	8.3E-11	1.2E-10
NE	7.0E-11	1.0E-10	1.1E-10	6.9E-11	1.0E-10
NNE	4.1E-11	6.2E-11	6.2E-11	4.1E-11	5.9E-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
Mar 11, 1994 1:09 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)

2.14E-06

At This Location: 858 Meters East Northeast

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1993

Comments: Compliance Demo: CY1993, Water Plant Lab hoods
Source: APTO Application run, Individual EDE

Dataset Name: CY93-20-IND
Dataset Date: Mar 11, 1994 10:12 am
Wind File: WNDFILES\FEMP93.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 858 Meters East Northeast
Lifetime Fatal Cancer Risk: 2.80E-11

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	6.36E-09
BREAST	7.26E-09
R MAR	1.56E-07
LUNGS	1.67E-05
THYROID	6.18E-09
ENDOST	2.16E-06
RMNDR	1.74E-07
EFFEC	2.14E-06

RADIONUCLIDE EMISSIONS DURING THE YEAR 1993

Nuclide	Class	Size	Source #1 Ci/y	Source #2 Ci/y	TOTAL Ci/y
U-234	Y	1.00	1.4E-09	1.4E-09	2.8E-09
U-235	Y	1.00	7.6E-11	7.6E-11	1.5E-10
U-236	Y	1.00	5.2E-11	5.2E-11	1.0E-10
U-238	Y	1.00	1.9E-09	1.9E-09	3.7E-09
RA-226	W	1.00	1.3E-12	1.3E-12	2.5E-12
RA-228	W	1.00	5.1E-12	5.1E-12	1.0E-11
TH-228	Y	1.00	5.4E-11	5.4E-11	1.1E-10
TH-230	Y	1.00	3.8E-12	3.8E-12	7.6E-12
TH-232	Y	1.00	8.5E-12	8.5E-12	1.7E-11
TH-234	Y	1.00	7.9E-09	7.9E-09	1.6E-08

SITE INFORMATION

Temperature: 11 degrees C
Precipitation: 98 cm/y
Mixing Height: 965 m

FEMP RECEPTOR LOCATOR PROGRAM
Closest Receptor in Sector

SOURCE NAME: Water Plant
NORTH/SOUTH COORDINATES: 481375
EAST/WEST COORDINATES: 1380812

DATE: August 18
Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
2	N	858
22	NNW	1209
C	NW	1711
5	WNW	1244
23	W	2052
6	WSW	1225
7	SW	1417
8	SSW	1501
14	S	1572
16	SSE	1607
17	SE	1248
18	ESE	1218
30	E	2160
19	ENE	1459
20	NE	1345
21	NNE	890

FEMP RECEPTOR LOCATOR PROGRAM
Distances to all Receptors

SOURCE NAME: Water Plant
NORTH/SOUTH COORDINATES: 481375 DATE: August 18
EAST/WEST COORDINATES: 1380812 Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
2	N	858
1	N	886
22	NNW	1209
28	NNW	1314
32	NNW	1387
C	NW	1711
3	NW	1712
E	NW	1766
D	NW	1806
5	WNW	1244
4	WNW	1466
B	WNW	1490
23	W	2052
6	WSW	1225
26	WSW	2438
A	WSW	2496
7	SW	1417
F	SW	2135
G	SW	2164
8	SSW	1501
9	SSW	1537
11	SSW	1683
10	SSW	1686
14	S	1572
13	S	1583
12	S	1687
16	SSE	1607
15	SSE	2137
17	SE	1248
29	SE	1665
27	SE	2485
18	ESE	1218
24	ESE	1834
30	E	2160
31	E	2217
25	E	2397
19	ENE	1459
20	NE	1345
H	NE	1451
21	NNE	890

SOURCE INFORMATION

Source Number:	1	2
Stack Height (m):	8.53	8.53
Diameter (m):	0.30	0.30
Plume Rise Momentum (m/s): (Exit Velocity)	9.45E+00	7.87E+00

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 USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

858	1209	1711	1244	2052	1225	1417	1501	1572	1607
1248	1218	2160	1459	1345	890	886			

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Individual Assessment
Mar 11, 1994 1:09 pm

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

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1993

Comments: Compliance Demo: CY1993, Water Plant Lab hoods
Source: APTO Application run, Individual EDE

Dataset Name: CY93-20-IND
Dataset Date: Mar 11, 1994 10:12 am
Wind File: WNDFILES\FEMP93.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
GONADS	6.36E-09
BREAST	7.26E-09
R MAR	1.56E-07
LUNGS	1.67E-05
THYROID	6.18E-09
ENDOST	2.16E-06
RMNDR	1.74E-07
EFFEC	2.14E-06

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	1.23E-07
INHALATION	2.02E-06
AIR IMMERSION	2.02E-13
GROUND SURFACE	1.27E-09
INTERNAL	2.14E-06
EXTERNAL	1.27E-09
TOTAL	2.14E-06

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
U-234	9.09E-07
U-235	4.62E-08
U-236	3.15E-08
U-238	1.07E-06
RA-226	1.09E-10
RA-228	1.74E-10
TH-228	6.29E-08
TH-230	4.40E-09
TH-232	1.41E-08
TH-234	2.94E-09
TOTAL	2.14E-06

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
LEUKEMIA	1.75E-13
BONE	1.15E-13
THYROID	1.43E-15
BREAST	1.63E-14
LUNG	2.73E-11
STOMACH	1.12E-14
BOWEL	3.27E-14
LIVER	1.03E-14
PANCREAS	6.29E-15
URINARY	3.61E-13
OTHER	7.69E-15
TOTAL	2.80E-11

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	6.60E-13
INHALATION	2.73E-11
AIR IMMERSION	4.48E-18
GROUND SURFACE	2.92E-14
INTERNAL	2.80E-11
EXTERNAL	2.92E-14
TOTAL	2.80E-11

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-234	1.17E-11
U-235	6.07E-13
U-236	4.05E-13
U-238	1.39E-11
RA-226	1.45E-15
RA-228	1.79E-15
TH-228	1.26E-12
TH-230	3.61E-14
TH-232	7.96E-14
TH-234	9.39E-14
TOTAL	2.80E-11

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	858	1209	1711	1244	2052	1225	1417
N	6.2E-07	3.8E-07	2.2E-07	3.6E-07	1.7E-07	3.7E-07	3.0E-07
NNW	3.2E-07	2.0E-07	1.2E-07	1.9E-07	9.3E-08	1.9E-07	1.6E-07
NW	2.7E-07	1.7E-07	1.1E-07	1.6E-07	8.3E-08	1.7E-07	1.4E-07
WNW	3.4E-07	2.2E-07	1.3E-07	2.1E-07	1.0E-07	2.1E-07	1.7E-07
W	6.1E-07	3.8E-07	2.3E-07	3.6E-07	1.7E-07	3.7E-07	3.0E-07
WSW	9.2E-07	5.5E-07	3.2E-07	5.2E-07	2.4E-07	5.4E-07	4.3E-07
SW	5.2E-07	3.1E-07	1.8E-07	2.9E-07	1.4E-07	3.0E-07	2.4E-07
SSW	4.4E-07	2.7E-07	1.6E-07	2.6E-07	1.2E-07	2.6E-07	2.1E-07
S	4.0E-07	2.5E-07	1.5E-07	2.4E-07	1.2E-07	2.4E-07	2.0E-07
SSE	5.9E-07	3.7E-07	2.2E-07	3.5E-07	1.7E-07	3.6E-07	2.9E-07
SE	1.3E-06	8.5E-07	5.2E-07	8.2E-07	4.0E-07	8.4E-07	6.9E-07
ESE	1.9E-06	1.3E-06	7.8E-07	1.2E-06	5.9E-07	1.3E-06	1.0E-06
E	2.1E-06	1.3E-06	8.2E-07	1.3E-06	6.2E-07	1.3E-06	1.1E-06
ENE	2.1E-06	1.4E-06	8.2E-07	1.3E-06	6.2E-07	1.3E-06	1.1E-06
NE	1.9E-06	1.1E-06	6.8E-07	1.1E-06	5.1E-07	1.1E-06	9.0E-07
NNE	1.1E-06	6.8E-07	4.0E-07	6.5E-07	3.0E-07	6.7E-07	5.4E-07

	Distance (m)						
Direction	1501	1572	1607	1248	1218	2160	1459
N	2.7E-07	2.5E-07	2.5E-07	3.6E-07	3.7E-07	1.6E-07	2.8E-07
NNW	1.5E-07	1.4E-07	1.3E-07	1.9E-07	2.0E-07	8.7E-08	1.5E-07
NW	1.3E-07	1.2E-07	1.2E-07	1.6E-07	1.7E-07	7.7E-08	1.3E-07
WNW	1.6E-07	1.5E-07	1.4E-07	2.1E-07	2.1E-07	9.6E-08	1.7E-07
W	2.7E-07	2.6E-07	2.5E-07	3.6E-07	3.7E-07	1.6E-07	2.9E-07
WSW	3.9E-07	3.7E-07	3.5E-07	5.2E-07	5.4E-07	2.2E-07	4.1E-07
SW	2.2E-07	2.1E-07	2.0E-07	2.9E-07	3.0E-07	1.3E-07	2.3E-07
SSW	2.0E-07	1.8E-07	1.8E-07	2.6E-07	2.7E-07	1.1E-07	2.0E-07
S	1.8E-07	1.7E-07	1.7E-07	2.4E-07	2.5E-07	1.1E-07	1.9E-07
SSE	2.7E-07	2.5E-07	2.4E-07	3.5E-07	3.6E-07	1.6E-07	2.8E-07
SE	6.3E-07	5.9E-07	5.7E-07	8.2E-07	8.5E-07	3.7E-07	6.6E-07
ESE	9.4E-07	8.8E-07	8.6E-07	1.2E-06	1.3E-06	5.5E-07	9.8E-07
E	1.0E-06	9.3E-07	9.0E-07	1.3E-06	1.3E-06	5.8E-07	1.0E-06
ENE	9.9E-07	9.3E-07	9.0E-07	1.3E-06	1.3E-06	5.7E-07	1.0E-06
NE	8.3E-07	7.7E-07	7.5E-07	1.1E-06	1.1E-06	4.7E-07	8.7E-07
NNE	4.9E-07	4.6E-07	4.4E-07	6.5E-07	6.7E-07	2.8E-07	5.1E-07

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)		
Direction	1345	890	886
N	3.2E-07	5.9E-07	5.9E-07
NNW	1.7E-07	3.1E-07	3.1E-07
NW	1.5E-07	2.6E-07	2.6E-07
WNW	1.9E-07	3.3E-07	3.3E-07
W	3.2E-07	5.8E-07	5.8E-07
WSW	4.7E-07	8.7E-07	8.8E-07
SW	2.6E-07	4.9E-07	4.9E-07
SSW	2.3E-07	4.2E-07	4.2E-07
S	2.1E-07	3.8E-07	3.8E-07
SSE	3.2E-07	5.6E-07	5.7E-07
SE	7.4E-07	1.3E-06	1.3E-06
ESE	1.1E-06	1.9E-06	1.9E-06
E	1.2E-06	2.0E-06	2.0E-06
ENE	1.2E-06	2.0E-06	2.1E-06
NE	9.8E-07	1.8E-06	1.8E-06
NNE	5.8E-07	1.1E-06	1.1E-06

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Direction	Distance (m) 858	1209	1711	1244	2052	1225	1417
N	8.0E-12	4.8E-12	2.8E-12	4.6E-12	2.1E-12	4.7E-12	3.8E-12
NNW	4.1E-12	2.5E-12	1.5E-12	2.4E-12	1.1E-12	2.4E-12	2.0E-12
NW	3.4E-12	2.1E-12	1.3E-12	2.0E-12	9.8E-13	2.1E-12	1.7E-12
WNW	4.4E-12	2.7E-12	1.6E-12	2.6E-12	1.2E-12	2.7E-12	2.2E-12
W	7.9E-12	4.8E-12	2.9E-12	4.6E-12	2.2E-12	4.7E-12	3.8E-12
WSW	1.2E-11	7.1E-12	4.1E-12	6.8E-12	3.1E-12	6.9E-12	5.5E-12
SW	6.7E-12	3.9E-12	2.3E-12	3.7E-12	1.7E-12	3.8E-12	3.1E-12
SSW	5.7E-12	3.4E-12	2.0E-12	3.3E-12	1.5E-12	3.3E-12	2.7E-12
S	5.2E-12	3.2E-12	1.9E-12	3.0E-12	1.4E-12	3.1E-12	2.5E-12
SSE	7.7E-12	4.7E-12	2.8E-12	4.5E-12	2.1E-12	4.6E-12	3.7E-12
SE	1.7E-11	1.1E-11	6.8E-12	1.1E-11	5.1E-12	1.1E-11	8.9E-12
ESE	2.5E-11	1.7E-11	1.0E-11	1.6E-11	7.7E-12	1.6E-11	1.3E-11
E	2.7E-11	1.8E-11	1.1E-11	1.7E-11	8.1E-12	1.7E-11	1.4E-11
ENE	2.8E-11	1.8E-11	1.1E-11	1.7E-11	8.0E-12	1.7E-11	1.4E-11
NE	2.4E-11	1.5E-11	8.8E-12	1.4E-11	6.6E-12	1.5E-11	1.2E-11
NNE	1.5E-11	8.8E-12	5.2E-12	8.4E-12	3.9E-12	8.6E-12	6.9E-12

Direction	Distance (m) 1501	1572	1607	1248	1218	2160	1459
N	3.5E-12	3.2E-12	3.1E-12	4.6E-12	4.8E-12	2.0E-12	3.6E-12
NNW	1.8E-12	1.7E-12	1.6E-12	2.4E-12	2.5E-12	1.0E-12	1.9E-12
NW	1.6E-12	1.5E-12	1.4E-12	2.0E-12	2.1E-12	9.1E-13	1.6E-12
WNW	2.0E-12	1.9E-12	1.8E-12	2.6E-12	2.7E-12	1.1E-12	2.1E-12
W	3.5E-12	3.3E-12	3.2E-12	4.6E-12	4.8E-12	2.0E-12	3.7E-12
WSW	5.1E-12	4.7E-12	4.5E-12	6.7E-12	7.0E-12	2.8E-12	5.3E-12
SW	2.8E-12	2.6E-12	2.5E-12	3.7E-12	3.9E-12	1.6E-12	2.9E-12
SSW	2.5E-12	2.3E-12	2.2E-12	3.3E-12	3.4E-12	1.4E-12	2.6E-12
S	2.3E-12	2.1E-12	2.1E-12	3.0E-12	3.1E-12	1.3E-12	2.4E-12
SSE	3.4E-12	3.2E-12	3.1E-12	4.5E-12	4.7E-12	2.0E-12	3.6E-12
SE	8.2E-12	7.7E-12	7.4E-12	1.1E-11	1.1E-11	4.7E-12	8.5E-12
ESE	1.2E-11	1.2E-11	1.1E-11	1.6E-11	1.6E-11	7.1E-12	1.3E-11
E	1.3E-11	1.2E-11	1.2E-11	1.7E-11	1.7E-11	7.5E-12	1.4E-11
ENE	1.3E-11	1.2E-11	1.2E-11	1.7E-11	1.8E-11	7.4E-12	1.4E-11
NE	1.1E-11	1.0E-11	9.7E-12	1.4E-11	1.5E-11	6.1E-12	1.1E-11
NNE	6.3E-12	5.9E-12	5.7E-12	8.4E-12	8.7E-12	3.6E-12	6.6E-12

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)		
Direction	1345	890	886
N	4.1E-12	7.6E-12	7.6E-12
NNW	2.1E-12	3.9E-12	3.9E-12
NW	1.8E-12	3.2E-12	3.3E-12
WNW	2.3E-12	4.2E-12	4.2E-12
W	4.1E-12	7.5E-12	7.5E-12
WSW	6.0E-12	1.1E-11	1.1E-11
SW	3.3E-12	6.3E-12	6.4E-12
SSW	2.9E-12	5.4E-12	5.4E-12
S	2.7E-12	4.9E-12	4.9E-12
SSE	4.0E-12	7.3E-12	7.3E-12
SE	9.6E-12	1.6E-11	1.7E-11
ESE	1.4E-11	2.4E-11	2.5E-11
E	1.5E-11	2.6E-11	2.6E-11
ENE	1.5E-11	2.7E-11	2.7E-11
NE	1.3E-11	2.3E-11	2.3E-11
NNE	7.5E-12	1.4E-11	1.4E-11

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S Y N O P S I S R E P O R T

Non-Radon Individual Assessment
Mar 11, 1994 1:07 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)

1.13E-05

At This Location: 930 Meters North Northeast

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1993

Comments: This is for the 1993 neshap Demonstration
Location: Health & Safety Fume hoods; RKR

Dataset Name: CY93-53-IND
Dataset Date: Mar 11, 1994 10:12 am
Wind File: WNDFILES\FEMP93.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 930 Meters North Northeast
Lifetime Fatal Cancer Risk: 1.38E-10

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	6.69E-08
BREAST	7.59E-08
R MAR	2.24E-06
LUNGS	7.96E-05
THYROID	6.51E-08
ENDOST	3.03E-05
RMNDR	1.82E-06
EFFEC	1.13E-05

RADIONUCLIDE EMISSIONS DURING THE YEAR 1993

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
U-234	Y	1.00	2.1E-07	2.1E-07
U-235	Y	1.00	1.1E-08	1.1E-08
U-236	Y	1.00	8.1E-09	8.1E-09
U-238	Y	1.00	2.3E-07	2.3E-07
RA-226	W	1.00	1.5E-10	1.5E-10
RA-228	W	1.00	5.9E-10	5.9E-10
TH-228	Y	1.00	6.3E-09	6.3E-09
TH-230	Y	1.00	1.8E-08	1.8E-08
TH-232	Y	1.00	9.9E-10	9.9E-10
TH-234	Y	1.00	9.2E-07	9.2E-07

SITE INFORMATION

Temperature:	11 degrees C
Precipitation:	98 cm/y
Mixing Height:	965 m

SOURCE INFORMATION

Source Number:	1
Stack Height (m):	14.90
Diameter (m):	8.69
Plume Rise Momentum (m/s): (Exit Velocity)	7.16E+00

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 USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

1335	1711	1826	1534	1169	1985	1167	1241	1077	1637
1132	929	930	2102	1625	1682	1375	1358	1209	

FEMP RECEPTOR LOCATOR PROGRAM
Closest Receptor in Sector

SOURCE NAME: Building 53
NORTH/SOUTH COORDINATES: 479780
EAST/WEST COORDINATES: 1381230

DATE: August 18
Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
21	N	1335
22	NNW	1711
4	NW	1826
5	WNW	1534
6	W	1169
F	WSW	1985
7	SW	1167
12	SSW	1241
14	S	1077
15	SSE	1637
16	SE	1132
17	ESE	929
18	E	930
30	ENE	2102
19	NE	1625
20	NNE	1682

FEMP RECEPTOR LOCATOR PROGRAM
Distances to all Receptors

SOURCE NAME: Building 53
NORTH/SOUTH COORDINATES: 479780
EAST/WEST COORDINATES: 1381230

DATE: August 18
Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
21	N	1335
2	N	1358
1	N	1375
22	NNW	1711
28	NNW	1815
32	NNW	1887
4	NW	1826
B	NW	1860
C	NW	2158
3	NW	2166
E	NW	2206
D	NW	2251
5	WNW	1534
23	WNW	2263
6	W	1169
26	W	2502
A	W	2562
F	WSW	1985
G	WSW	2018
7	SW	1167
8	SW	1188
9	SW	1214
10	SW	1312
12	SSW	1241
11	SSW	1296
14	S	1077
13	S	1095
15	SSE	1637
16	SE	1132
29	SE	1209
27	SE	2039
17	ESE	929
18	E	930
24	E	1661
30	ENE	2102
31	ENE	2173
25	ENE	2384
19	NE	1625
20	NNE	1682
H	NNE	1811

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D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Individual Assessment
Mar 11, 1994 1:07 pm

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

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1993

Comments: This is for the 1993 neshap Demonstration
Location: Health & Safety Fume hoods; RKR

Dataset Name: CY93-53-IND
Dataset Date: Mar 11, 1994 10:12 am
Wind File: WNDFILES\FEMP93.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
GONADS	6.69E-08
BREAST	7.59E-08
R MAR	2.24E-06
LUNGS	7.96E-05
THYROID	6.51E-08
ENDOST	3.03E-05
RMNDR	1.82E-06
EFFEC	1.13E-05

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	1.34E-06
INHALATION	9.95E-06
AIR IMMERSION	8.33E-13
GROUND SURFACE	1.32E-08
INTERNAL	1.13E-05
EXTERNAL	1.32E-08
TOTAL	1.13E-05

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
U-234	4.90E-06
U-235	2.53E-07
U-236	1.80E-07
U-238	4.89E-06
RA-226	7.34E-10
RA-228	1.31E-09
TH-228	2.51E-07
TH-230	7.46E-07
TH-232	5.67E-08
TH-234	2.02E-08
TOTAL	1.13E-05

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
LEUKEMIA	2.31E-12
BONE	1.54E-12
THYROID	1.50E-14
BREAST	1.69E-13
LUNG	1.30E-10
STOMACH	1.13E-13
BOWEL	2.94E-13
LIVER	1.16E-13
PANCREAS	6.57E-14
URINARY	3.83E-12
OTHER	8.04E-14
TOTAL	1.38E-10

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	7.12E-12
INHALATION	1.31E-10
AIR IMMERSION	1.86E-17
GROUND SURFACE	3.03E-13
INTERNAL	1.38E-10
EXTERNAL	3.03E-13
TOTAL	1.38E-10

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-234	6.02E-11
U-235	3.24E-12
U-236	2.22E-12
U-238	6.07E-11
RA-226	7.35E-15
RA-228	1.15E-14
TH-228	5.01E-12
TH-230	6.05E-12
TH-232	3.18E-13
TH-234	4.70E-13
TOTAL	1.38E-10

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	1335	1711	1826	1534	1169	1985	1167
N	6.0E-06	5.2E-06	4.9E-06	5.5E-06	6.3E-06	4.6E-06	6.3E-06
NNW	2.0E-06	1.9E-06	1.9E-06	2.0E-06	2.0E-06	1.9E-06	2.0E-06
NW	1.4E-06	1.3E-06	1.3E-06	1.4E-06	1.5E-06	1.2E-06	1.5E-06
WNW	1.5E-06	1.4E-06	1.3E-06	1.4E-06	1.6E-06	1.3E-06	1.6E-06
W	3.2E-06	2.8E-06	2.7E-06	3.0E-06	3.5E-06	2.6E-06	3.5E-06
WSW	8.1E-06	6.9E-06	6.6E-06	7.4E-06	8.7E-06	6.1E-06	8.7E-06
SW	5.9E-06	4.9E-06	4.6E-06	5.3E-06	6.4E-06	4.3E-06	6.5E-06
SSW	4.9E-06	3.9E-06	3.7E-06	4.3E-06	5.4E-06	3.4E-06	5.4E-06
S	3.5E-06	2.9E-06	2.8E-06	3.2E-06	3.9E-06	2.6E-06	3.9E-06
SSE	4.4E-06	3.5E-06	3.3E-06	3.9E-06	4.9E-06	3.1E-06	4.9E-06
SE	5.7E-06	4.6E-06	4.4E-06	5.1E-06	6.3E-06	4.1E-06	6.3E-06
ESE	8.3E-06	7.2E-06	6.9E-06	7.7E-06	8.9E-06	6.5E-06	8.9E-06
E	8.8E-06	7.6E-06	7.3E-06	8.1E-06	9.5E-06	6.9E-06	9.5E-06
ENE	7.6E-06	6.7E-06	6.5E-06	7.1E-06	8.2E-06	6.2E-06	8.2E-06
NE	9.4E-06	8.4E-06	8.2E-06	8.8E-06	9.9E-06	7.8E-06	9.9E-06
NNE	1.0E-05	8.7E-06	8.3E-06	9.3E-06	1.1E-05	7.8E-06	1.1E-05

	Distance (m)						
Direction	1241	1077	1637	1132	929	930	2102
N	6.1E-06	6.4E-06	5.3E-06	6.3E-06	6.5E-06	6.5E-06	4.4E-06
NNW	2.0E-06	2.0E-06	2.0E-06	2.0E-06	2.0E-06	2.0E-06	1.8E-06
NW	1.5E-06	1.5E-06	1.3E-06	1.5E-06	1.5E-06	1.5E-06	1.2E-06
WNW	1.6E-06	1.7E-06	1.4E-06	1.7E-06	1.8E-06	1.8E-06	1.3E-06
W	3.4E-06	3.6E-06	2.9E-06	3.5E-06	3.8E-06	3.8E-06	2.5E-06
WSW	8.4E-06	9.0E-06	7.1E-06	8.8E-06	9.5E-06	9.5E-06	5.9E-06
SW	6.2E-06	6.8E-06	5.1E-06	6.6E-06	7.1E-06	7.1E-06	4.0E-06
SSW	5.2E-06	5.7E-06	4.1E-06	5.5E-06	6.0E-06	6.0E-06	3.2E-06
S	3.7E-06	4.1E-06	3.0E-06	4.0E-06	4.5E-06	4.5E-06	2.5E-06
SSE	4.7E-06	5.3E-06	3.7E-06	5.1E-06	5.8E-06	5.8E-06	3.0E-06
SE	6.0E-06	6.7E-06	4.8E-06	6.4E-06	7.3E-06	7.3E-06	3.9E-06
ESE	8.6E-06	9.3E-06	7.4E-06	9.1E-06	9.8E-06	9.8E-06	6.2E-06
E	9.2E-06	9.9E-06	7.8E-06	9.6E-06	1.1E-05	1.1E-05	6.7E-06
ENE	7.9E-06	8.5E-06	6.8E-06	8.3E-06	9.1E-06	9.1E-06	6.0E-06
NE	9.6E-06	1.0E-05	8.6E-06	1.0E-05	1.1E-05	1.1E-05	7.6E-06
NNE	1.0E-05	1.1E-05	8.9E-06	1.1E-05	1.1E-05	1.1E-05	7.4E-06

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)				
Direction	1625	1682	1375	1358	1209
N	5.3E-06	5.2E-06	5.9E-06	5.9E-06	6.2E-06
NNW	2.0E-06	2.0E-06	2.0E-06	2.0E-06	2.0E-06
NW	1.3E-06	1.3E-06	1.4E-06	1.4E-06	1.5E-06
WNW	1.4E-06	1.4E-06	1.5E-06	1.5E-06	1.6E-06
W	2.9E-06	2.9E-06	3.2E-06	3.2E-06	3.4E-06
WSW	7.1E-06	7.0E-06	7.9E-06	8.0E-06	8.5E-06
SW	5.1E-06	4.9E-06	5.8E-06	5.8E-06	6.3E-06
SSW	4.1E-06	4.0E-06	4.8E-06	4.8E-06	5.3E-06
S	3.0E-06	3.0E-06	3.5E-06	3.5E-06	3.8E-06
SSE	3.7E-06	3.6E-06	4.3E-06	4.3E-06	4.8E-06
SE	4.8E-06	4.7E-06	5.5E-06	5.6E-06	6.1E-06
ESE	7.4E-06	7.3E-06	8.2E-06	8.2E-06	8.8E-06
E	7.9E-06	7.7E-06	8.7E-06	8.7E-06	9.3E-06
ENE	6.9E-06	6.7E-06	7.5E-06	7.5E-06	8.0E-06
NE	8.6E-06	8.5E-06	9.3E-06	9.3E-06	9.7E-06
NNE	9.0E-06	8.8E-06	9.9E-06	1.0E-05	1.1E-05

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Direction	Distance (m) 1335	1711	1826	1534	1169	1985	1167
N	7.3E-11	6.3E-11	6.0E-11	6.7E-11	7.6E-11	5.6E-11	7.6E-11
NNW	2.3E-11	2.2E-11	2.2E-11	2.3E-11	2.3E-11	2.1E-11	2.3E-11
NW	1.5E-11	1.4E-11	1.4E-11	1.5E-11	1.6E-11	1.3E-11	1.6E-11
WNW	1.7E-11	1.5E-11	1.4E-11	1.6E-11	1.8E-11	1.4E-11	1.8E-11
W	3.8E-11	3.3E-11	3.2E-11	3.5E-11	4.0E-11	3.0E-11	4.0E-11
WSW	9.9E-11	8.4E-11	8.0E-11	9.1E-11	1.1E-10	7.5E-11	1.1E-10
SW	7.2E-11	5.9E-11	5.6E-11	6.5E-11	7.9E-11	5.2E-11	7.9E-11
SSW	5.9E-11	4.7E-11	4.5E-11	5.3E-11	6.5E-11	4.1E-11	6.6E-11
S	4.2E-11	3.5E-11	3.3E-11	3.8E-11	4.7E-11	3.1E-11	4.7E-11
SSE	5.3E-11	4.2E-11	4.0E-11	4.7E-11	6.0E-11	3.7E-11	6.0E-11
SE	6.7E-11	5.5E-11	5.2E-11	6.0E-11	7.5E-11	4.8E-11	7.5E-11
ESE	1.0E-10	8.6E-11	8.3E-11	9.2E-11	1.1E-10	7.8E-11	1.1E-10
E	1.1E-10	9.1E-11	8.8E-11	9.8E-11	1.1E-10	8.3E-11	1.1E-10
ENE	9.0E-11	7.9E-11	7.7E-11	8.4E-11	9.6E-11	7.3E-11	9.6E-11
NE	1.1E-10	1.0E-10	9.9E-11	1.1E-10	1.2E-10	9.5E-11	1.2E-10
NNE	1.2E-10	1.1E-10	1.0E-10	1.1E-10	1.3E-10	9.6E-11	1.3E-10

Direction	Distance (m) 1241	1077	1637	1132	929	930	2102
N	7.5E-11	7.8E-11	6.5E-11	7.7E-11	7.9E-11	7.9E-11	5.4E-11
NNW	2.3E-11	2.3E-11	2.2E-11	2.3E-11	2.2E-11	2.2E-11	2.1E-11
NW	1.6E-11	1.6E-11	1.5E-11	1.6E-11	1.7E-11	1.7E-11	1.3E-11
WNW	1.7E-11	1.9E-11	1.5E-11	1.8E-11	2.0E-11	2.0E-11	1.3E-11
W	3.9E-11	4.2E-11	3.4E-11	4.1E-11	4.4E-11	4.4E-11	2.9E-11
WSW	1.0E-10	1.1E-10	8.7E-11	1.1E-10	1.2E-10	1.2E-10	7.2E-11
SW	7.6E-11	8.3E-11	6.2E-11	8.0E-11	8.7E-11	8.7E-11	4.9E-11
SSW	6.3E-11	6.9E-11	4.9E-11	6.7E-11	7.4E-11	7.3E-11	3.9E-11
S	4.5E-11	5.0E-11	3.6E-11	4.8E-11	5.5E-11	5.5E-11	2.9E-11
SSE	5.7E-11	6.4E-11	4.4E-11	6.1E-11	7.1E-11	7.0E-11	3.5E-11
SE	7.1E-11	7.9E-11	5.7E-11	7.6E-11	8.6E-11	8.6E-11	4.6E-11
ESE	1.0E-10	1.1E-10	8.9E-11	1.1E-10	1.2E-10	1.2E-10	7.5E-11
E	1.1E-10	1.2E-10	9.4E-11	1.2E-10	1.3E-10	1.3E-10	8.0E-11
ENE	9.3E-11	1.0E-10	8.1E-11	9.8E-11	1.1E-10	1.1E-10	7.1E-11
NE	1.2E-10	1.2E-10	1.0E-10	1.2E-10	1.3E-10	1.3E-10	9.2E-11
NNE	1.3E-10	1.3E-10	1.1E-10	1.3E-10	1.4E-10	1.4E-10	9.1E-11

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)				
Direction	1625	1682	1375	1358	1209
N	6.5E-11	6.4E-11	7.2E-11	7.2E-11	7.6E-11
NNW	2.2E-11	2.2E-11	2.3E-11	2.3E-11	2.3E-11
NW	1.5E-11	1.4E-11	1.5E-11	1.5E-11	1.6E-11
WNW	1.5E-11	1.5E-11	1.6E-11	1.7E-11	1.7E-11
W	3.4E-11	3.3E-11	3.7E-11	3.7E-11	4.0E-11
WSW	8.7E-11	8.5E-11	9.7E-11	9.8E-11	1.0E-10
SW	6.2E-11	6.0E-11	7.1E-11	7.1E-11	7.7E-11
SSW	5.0E-11	4.8E-11	5.8E-11	5.8E-11	6.4E-11
S	3.6E-11	3.5E-11	4.1E-11	4.2E-11	4.6E-11
SSE	4.4E-11	4.3E-11	5.2E-11	5.2E-11	5.8E-11
SE	5.7E-11	5.5E-11	6.6E-11	6.6E-11	7.3E-11
ESE	8.9E-11	8.7E-11	9.8E-11	9.9E-11	1.0E-10
E	9.4E-11	9.2E-11	1.0E-10	1.0E-10	1.1E-10
ENE	8.1E-11	8.0E-11	8.8E-11	8.9E-11	9.4E-11
NE	1.0E-10	1.0E-10	1.1E-10	1.1E-10	1.2E-10
NNE	1.1E-10	1.1E-10	1.2E-10	1.2E-10	1.3E-10

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
Mar 11, 1994 1:01 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)

3.18E-02

At This Location: 641 Meters East

Source Category: REMEDIATION SITE
Source Type: Area
Emission Year: 1993

Comments: This is for the 1993 neshap Demonstration
Location: Waste Pit 5; IND. RKR

Dataset Name: CY93-PITS-IND
Dataset Date: Mar 11, 1994 9:45 am
Wind File: WNDFILES\FEMP93.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 641 Meters East
Lifetime Fatal Cancer Risk: 2.75E-07

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	1.05E-04
BREAST	1.10E-04
R MAR	2.89E-02
LUNGS	1.45E-01
THYROID	1.04E-04
ENDOST	3.60E-01
RMNDR	4.28E-04
EFFEC	3.18E-02

RADIONUCLIDE EMISSIONS DURING THE YEAR 1993

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
U-234	Y	1.00	1.9E-06	1.9E-06
U-235	Y	1.00	7.8E-08	7.8E-08
U-236	Y	1.00	1.9E-07	1.9E-07
U-238	Y	1.00	1.4E-06	1.4E-06
RA-226	W	1.00	1.2E-06	1.2E-06
RA-228	W	1.00	1.5E-07	1.5E-07
TH-228	Y	1.00	2.0E-07	2.0E-07
TH-230	Y	1.00	2.2E-05	2.2E-05
TH-232	Y	1.00	1.5E-07	1.5E-07
TH-234	Y	1.00	1.4E-06	1.4E-06

SITE INFORMATION

Temperature:	11 degrees C
Precipitation:	98 cm/y
Mixing Height:	965 m

SOURCE INFORMATION

Source Number: 1

Source Height (m): 1.00
Area (sq m): 1.62E+02

Plume Rise
Momentum (m/s): 0.00E+00
(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 USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

1043	1182	1225	855	641	1948	1885	980	1372	1907
2116	1825	2743	1669	789	989	915	1849	1948	2198

FEMP RECEPTOR LOCATOR PROGRAM
Closest Receptor in Sector

SOURCE NAME: Waste Pit 5
NORTH/SOUTH COORDINATES: 482050 DATE: August 18
EAST/WEST COORDINATES: 1378910 Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
28	N	1043
C	NNW	1182
E	NW	1225
4	WNW	855
5	W	641
26	WSW	1948
F	SW	1885
6	SSW	980
7	S	1372
13	SSE	1907
16	SE	2116
18	ESE	1825
30	E	2743
20	ENE	1669
2	NE	789
22	NNE	989

FEMP RECEPTOR LOCATOR PROGRAM
Distances to all Receptors

SOURCE NAME:Waste Pit 5
NORTH/SOUTH COORDINATES: 482050 DATE: August 18
EAST/WEST COORDINATES: 1378910 Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
28	N	1043
32	N	1095
C	NNW	1182
3	NNW	1198
E	NW	1225
D	NW	1272
4	WNW	855
B	WNW	882
5	W	641
23	W	1469
26	WSW	1948
A	WSW	2003
F	SW	1885
G	SW	1906
6	SSW	980
7	S	1372
8	S	1528
9	S	1572
10	S	1777
11	S	1796
12	S	1904
13	SSE	1907
14	SSE	1921
15	SSE	2571
16	SE	2116
29	SE	2198
27	SE	3028
18	ESE	1825
17	ESE	1849
24	ESE	2446
30	E	2743
31	E	2795
25	E	2959
20	ENE	1669
19	ENE	1948
2	NE	789
1	NE	915
21	NE	1086
H	NE	1730
22	NNE	989

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Individual Assessment
Mar 11, 1994 1:01 pm

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

Source Category: REMEDIATION SITE
Source Type: Area
Emission Year: 1993

Comments: This is for the 1993 neshap Demonstration
Location: Waste Pit 5; IND. RKR

Dataset Name: CY93-PITS-IND
Dataset Date: Mar 11, 1994 9:45 am
Wind File: WNDFILES\FEMP93.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
GONADS	1.05E-04
BREAST	1.10E-04
R MAR	2.89E-02
LUNGS	1.45E-01
THYROID	1.04E-04
ENDOST	3.60E-01
RMNDR	4.28E-04
EFFEC	3.18E-02

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	5.43E-04
INHALATION	3.12E-02
AIR IMMERSION	1.27E-10
GROUND SURFACE	3.79E-06
INTERNAL	3.18E-02
EXTERNAL	3.79E-06
TOTAL	3.18E-02

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
U-234	1.35E-03
U-235	5.27E-05
U-236	1.32E-04
U-238	9.01E-04
RA-226	1.10E-04
RA-228	5.33E-06
TH-228	2.57E-04
TH-230	2.87E-02
TH-232	2.85E-04
TH-234	5.55E-07
TOTAL	3.18E-02

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
LEUKEMIA	2.44E-08
BONE	1.60E-08
THYROID	1.76E-11
BREAST	1.67E-10
LUNG	2.33E-07
STOMACH	1.20E-10
BOWEL	1.26E-10
LIVER	7.52E-10
PANCREAS	8.58E-11
URINARY	4.17E-10
OTHER	1.05E-10
TOTAL	2.75E-07

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	2.09E-09
INHALATION	2.73E-07
AIR IMMERSION	2.88E-15
GROUND SURFACE	8.54E-11
INTERNAL	2.75E-07
EXTERNAL	8.54E-11
TOTAL	2.75E-07

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-234	1.74E-08
U-235	6.94E-10
U-236	1.70E-09
U-238	1.17E-08
RA-226	1.54E-09
RA-228	5.63E-11
TH-228	5.15E-09
TH-230	2.36E-07
TH-232	1.60E-09
TH-234	1.86E-11
TOTAL	2.75E-07

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	1043	1182	1225	855	641	1948	1885
N	3.2E-03	2.6E-03	2.4E-03	4.7E-03	8.1E-03	1.1E-03	1.2E-03
NNW	1.6E-03	1.3E-03	1.2E-03	2.4E-03	4.1E-03	5.7E-04	6.0E-04
NW	1.4E-03	1.1E-03	1.1E-03	2.1E-03	3.6E-03	4.9E-04	5.2E-04
WNW	1.8E-03	1.5E-03	1.4E-03	2.6E-03	4.6E-03	6.2E-04	6.6E-04
W	3.2E-03	2.6E-03	2.4E-03	4.7E-03	8.2E-03	1.1E-03	1.2E-03
WSW	4.6E-03	3.7E-03	3.5E-03	6.7E-03	1.2E-02	1.6E-03	1.7E-03
SW	2.6E-03	2.1E-03	1.9E-03	3.7E-03	6.3E-03	8.9E-04	9.4E-04
SSW	2.3E-03	1.8E-03	1.7E-03	3.3E-03	5.6E-03	7.8E-04	8.3E-04
S	2.1E-03	1.7E-03	1.6E-03	3.0E-03	5.3E-03	7.3E-04	7.7E-04
SSE	3.2E-03	2.5E-03	2.4E-03	4.6E-03	8.0E-03	1.1E-03	1.1E-03
SE	7.7E-03	6.2E-03	5.8E-03	1.1E-02	2.0E-02	2.6E-03	2.7E-03
ESE	1.2E-02	9.4E-03	8.8E-03	1.7E-02	3.0E-02	3.9E-03	4.1E-03
E	1.2E-02	9.9E-03	9.3E-03	1.8E-02	3.2E-02	4.1E-03	4.3E-03
ENE	1.2E-02	9.7E-03	9.1E-03	1.8E-02	3.1E-02	4.0E-03	4.3E-03
NE	1.0E-02	8.1E-03	7.6E-03	1.5E-02	2.6E-02	3.4E-03	3.6E-03
NNE	5.9E-03	4.8E-03	4.5E-03	8.6E-03	1.5E-02	2.0E-03	2.1E-03

	Distance (m)						
Direction	980	1372	1907	2116	1825	2743	1669
N	3.6E-03	2.0E-03	1.1E-03	9.6E-04	1.2E-03	6.2E-04	1.4E-03
NNW	1.8E-03	1.0E-03	5.9E-04	5.0E-04	6.4E-04	3.3E-04	7.4E-04
NW	1.6E-03	8.9E-04	5.1E-04	4.3E-04	5.5E-04	2.8E-04	6.4E-04
WNW	2.0E-03	1.1E-03	6.5E-04	5.4E-04	7.0E-04	3.5E-04	8.1E-04
W	3.6E-03	2.0E-03	1.1E-03	9.5E-04	1.2E-03	6.1E-04	1.4E-03
WSW	5.2E-03	2.9E-03	1.6E-03	1.4E-03	1.8E-03	8.9E-04	2.1E-03
SW	2.9E-03	1.6E-03	9.2E-04	7.7E-04	9.9E-04	5.1E-04	1.2E-03
SSW	2.5E-03	1.4E-03	8.1E-04	6.8E-04	8.7E-04	4.5E-04	1.0E-03
S	2.3E-03	1.3E-03	7.6E-04	6.4E-04	8.2E-04	4.2E-04	9.5E-04
SSE	3.5E-03	2.0E-03	1.1E-03	9.4E-04	1.2E-03	6.1E-04	1.4E-03
SE	8.7E-03	4.8E-03	2.7E-03	2.2E-03	2.9E-03	1.4E-03	3.4E-03
ESE	1.3E-02	7.2E-03	4.0E-03	3.3E-03	4.3E-03	2.1E-03	5.1E-03
E	1.4E-02	7.6E-03	4.2E-03	3.5E-03	4.6E-03	2.2E-03	5.4E-03
ENE	1.4E-02	7.5E-03	4.2E-03	3.5E-03	4.5E-03	2.2E-03	5.3E-03
NE	1.1E-02	6.2E-03	3.5E-03	2.9E-03	3.8E-03	1.9E-03	4.4E-03
NNE	6.6E-03	3.7E-03	2.1E-03	1.7E-03	2.3E-03	1.1E-03	2.6E-03

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)					
Direction	789	989	915	1849	1948	2198
N	5.4E-03	3.5E-03	4.1E-03	1.2E-03	1.1E-03	9.0E-04
NNW	2.7E-03	1.8E-03	2.1E-03	6.2E-04	5.7E-04	4.7E-04
NW	2.4E-03	1.6E-03	1.8E-03	5.4E-04	4.9E-04	4.0E-04
WNW	3.1E-03	2.0E-03	2.3E-03	6.8E-04	6.2E-04	5.1E-04
W	5.5E-03	3.5E-03	4.1E-03	1.2E-03	1.1E-03	8.9E-04
WSW	7.8E-03	5.1E-03	5.9E-03	1.7E-03	1.6E-03	1.3E-03
SW	4.3E-03	2.8E-03	3.2E-03	9.7E-04	8.9E-04	7.3E-04
SSW	3.8E-03	2.5E-03	2.9E-03	8.6E-04	7.8E-04	6.4E-04
S	3.6E-03	2.3E-03	2.7E-03	8.0E-04	7.3E-04	6.0E-04
SSE	5.4E-03	3.5E-03	4.0E-03	1.2E-03	1.1E-03	8.8E-04
SE	1.3E-02	8.5E-03	9.9E-03	2.8E-03	2.6E-03	2.1E-03
ESE	2.0E-02	1.3E-02	1.5E-02	4.2E-03	3.9E-03	3.1E-03
E	2.1E-02	1.4E-02	1.6E-02	4.5E-03	4.1E-03	3.3E-03
ENE	2.1E-02	1.3E-02	1.6E-02	4.4E-03	4.0E-03	3.3E-03
NE	1.7E-02	1.1E-02	1.3E-02	3.7E-03	3.4E-03	2.7E-03
NNE	1.0E-02	6.5E-03	7.5E-03	2.2E-03	2.0E-03	1.6E-03

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Direction	Distance (m) 1043	1182	1225	855	641	1948	1885
N	2.8E-08	2.2E-08	2.1E-08	4.0E-08	7.0E-08	9.4E-09	9.9E-09
NNW	1.4E-08	1.1E-08	1.1E-08	2.0E-08	3.5E-08	4.8E-09	5.1E-09
NW	1.2E-08	9.7E-09	9.2E-09	1.8E-08	3.1E-08	4.1E-09	4.3E-09
WNW	1.6E-08	1.3E-08	1.2E-08	2.3E-08	4.0E-08	5.2E-09	5.5E-09
W	2.8E-08	2.2E-08	2.1E-08	4.1E-08	7.1E-08	9.3E-09	9.9E-09
WSW	4.0E-08	3.2E-08	3.0E-08	5.8E-08	1.0E-07	1.4E-08	1.4E-08
SW	2.2E-08	1.8E-08	1.7E-08	3.2E-08	5.5E-08	7.5E-09	8.0E-09
SSW	1.9E-08	1.6E-08	1.5E-08	2.8E-08	4.9E-08	6.6E-09	7.0E-09
S	1.8E-08	1.5E-08	1.4E-08	2.6E-08	4.6E-08	6.2E-09	6.5E-09
SSE	2.7E-08	2.2E-08	2.1E-08	4.0E-08	6.9E-08	9.2E-09	9.7E-09
SE	6.7E-08	5.4E-08	5.0E-08	9.8E-08	1.7E-07	2.2E-08	2.3E-08
ESE	1.0E-07	8.1E-08	7.6E-08	1.5E-07	2.6E-07	3.3E-08	3.5E-08
E	1.1E-07	8.5E-08	8.0E-08	1.6E-07	2.8E-07	3.5E-08	3.7E-08
ENE	1.0E-07	8.4E-08	7.9E-08	1.5E-07	2.7E-07	3.5E-08	3.7E-08
NE	8.6E-08	7.0E-08	6.5E-08	1.3E-07	2.2E-07	2.9E-08	3.1E-08
NNE	5.1E-08	4.1E-08	3.9E-08	7.4E-08	1.3E-07	1.7E-08	1.8E-08

Direction	Distance (m) 980	1372	1907	2116	1825	2743	1669
N	3.1E-08	1.7E-08	9.7E-09	8.1E-09	1.1E-08	5.2E-09	1.2E-08
NNW	1.6E-08	8.7E-09	5.0E-09	4.2E-09	5.4E-09	2.7E-09	6.2E-09
NW	1.4E-08	7.5E-09	4.2E-09	3.6E-09	4.6E-09	2.3E-09	5.3E-09
WNW	1.7E-08	9.7E-09	5.4E-09	4.5E-09	5.9E-09	2.9E-09	6.9E-09
W	3.1E-08	1.7E-08	9.7E-09	8.1E-09	1.0E-08	5.2E-09	1.2E-08
WSW	4.5E-08	2.5E-08	1.4E-08	1.2E-08	1.5E-08	7.6E-09	1.8E-08
SW	2.5E-08	1.4E-08	7.8E-09	6.5E-09	8.4E-09	4.2E-09	9.8E-09
SSW	2.2E-08	1.2E-08	6.9E-09	5.8E-09	7.4E-09	3.7E-09	8.6E-09
S	2.0E-08	1.1E-08	6.4E-09	5.4E-09	6.9E-09	3.5E-09	8.1E-09
SSE	3.0E-08	1.7E-08	9.5E-09	8.0E-09	1.0E-08	5.1E-09	1.2E-08
SE	7.5E-08	4.1E-08	2.3E-08	1.9E-08	2.5E-08	1.2E-08	2.9E-08
ESE	1.1E-07	6.2E-08	3.5E-08	2.9E-08	3.7E-08	1.8E-08	4.4E-08
E	1.2E-07	6.5E-08	3.6E-08	3.0E-08	3.9E-08	1.9E-08	4.6E-08
ENE	1.2E-07	6.5E-08	3.6E-08	3.0E-08	3.9E-08	1.9E-08	4.6E-08
NE	9.7E-08	5.4E-08	3.0E-08	2.5E-08	3.2E-08	1.6E-08	3.8E-08
NNE	5.7E-08	3.2E-08	1.8E-08	1.5E-08	1.9E-08	9.6E-09	2.3E-08

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)					
Direction	789	989	915	1849	1948	2198
N	4.7E-08	3.0E-08	3.5E-08	1.0E-08	9.4E-09	7.6E-09
NNW	2.4E-08	1.5E-08	1.8E-08	5.2E-09	4.8E-09	3.9E-09
NW	2.1E-08	1.3E-08	1.5E-08	4.5E-09	4.1E-09	3.3E-09
WNW	2.7E-08	1.7E-08	2.0E-08	5.7E-09	5.2E-09	4.3E-09
W	4.7E-08	3.1E-08	3.6E-08	1.0E-08	9.3E-09	7.6E-09
WSW	6.8E-08	4.4E-08	5.1E-08	1.5E-08	1.4E-08	1.1E-08
SW	3.7E-08	2.4E-08	2.8E-08	8.2E-09	7.5E-09	6.1E-09
SSW	3.3E-08	2.1E-08	2.5E-08	7.3E-09	6.6E-09	5.4E-09
S	3.1E-08	2.0E-08	2.3E-08	6.8E-09	6.2E-09	5.0E-09
SSE	4.6E-08	3.0E-08	3.5E-08	1.0E-08	9.2E-09	7.5E-09
SE	1.1E-07	7.4E-08	8.6E-08	2.4E-08	2.2E-08	1.8E-08
ESE	1.7E-07	1.1E-07	1.3E-07	3.7E-08	3.3E-08	2.7E-08
E	1.8E-07	1.2E-07	1.4E-07	3.8E-08	3.5E-08	2.8E-08
ENE	1.8E-07	1.2E-07	1.3E-07	3.8E-08	3.5E-08	2.8E-08
NE	1.5E-07	9.5E-08	1.1E-07	3.2E-08	2.9E-08	2.3E-08
NNE	8.7E-08	5.6E-08	6.5E-08	1.9E-08	1.7E-08	1.4E-08

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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
Mar 11, 1994 1:06 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)

1.70E-03

At This Location: 948 Meters North Northeast

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1993

Comments: This is for the 1993 neshap Demonstration
Location: Cooling Tower-IND. RKR

Dataset Name: CY93-CT-IND
Dataset Date: Mar 11, 1994 10:12 am
Wind File: WNDFILES\FEMP93.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 948 Meters North Northeast
Lifetime Fatal Cancer Risk: 2.13E-08

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	1.02E-05
BREAST	1.16E-05
R MAR	2.43E-04
LUNGS	1.23E-02
THYROID	9.94E-06
ENDOST	3.39E-03
RMNDR	2.90E-04
EFFEC	1.70E-03

RADIONUCLIDE EMISSIONS DURING THE YEAR 1993

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
U-234	Y	1.00	3.1E-05	3.1E-05
U-235	Y	1.00	1.6E-06	1.6E-06
U-236	Y	1.00	1.1E-06	1.1E-06
U-238	Y	1.00	4.1E-05	4.1E-05
RA-226	W	1.00	2.8E-08	2.8E-08
RA-228	W	1.00	1.1E-07	1.1E-07
TH-228	Y	1.00	1.2E-06	1.2E-06
TH-230	Y	1.00	8.2E-08	8.2E-08
TH-232	Y	1.00	1.8E-07	1.8E-07
TH-234	Y	1.00	1.7E-04	1.7E-04

SITE INFORMATION

Temperature: 11 degrees C
Precipitation: 98 cm/y
Mixing Height: 965 m

SOURCE INFORMATION

Source Number:	1
Stack Height (m):	14.90
Diameter (m):	8.69
Plume Rise Momentum (m/s): (Exit Velocity)	7.16E+00

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 USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

924	1277	1776	1287	2087	1218	1385	1462	1506	1538
1597	1161	2132	1460	1374	940	948	1189		

FEMP RECEPTOR LOCATOR PROGRAM
Closest Receptor in Sector

SOURCE NAME: Cooling Tower
NORTH/SOUTH COORDINATES: 481170
EAST/WEST COORDINATES: 1380910

DATE: August 18
Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
2	N	924
22	NNW	1277
C	NW	1776
5	WNW	1287
23	W	2087
6	WSW	1218
7	SW	1385
8	SSW	1462
14	S	1506
16	SSE	1538
29	SE	1597
18	ESE	1161
30	E	2132
19	ENE	1460
20	NE	1374
21	NNE	940

FEMP RECEPTOR LOCATOR PROGRAM
Distances to all Receptors

SOURCE NAME:Cooling Tower
NORTH/SOUTH COORDINATES: 481170 DATE: August 18
EAST/WEST COORDINATES: 1380910 Program run by:

RECEPTOR	SECTOR	DISTANCE(m)
2	N	924
1	N	948
22	NNW	1277
28	NNW	1383
32	NNW	1456
C	NW	1776
3	NW	1778
E	NW	1830
D	NW	1871
5	WNW	1287
4	WNW	1520
B	WNW	1545
23	W	2087
A	W	2512
6	WSW	1218
26	WSW	2453
7	SW	1385
F	SW	2121
G	SW	2150
8	SSW	1462
9	SSW	1496
11	SSW	1634
10	SSW	1639
14	S	1506
13	S	1519
12	S	1630
16	SSE	1538
15	SSE	2068
29	SE	1597
27	SE	2418
18	ESE	1161
17	ESE	1189
24	ESE	1792
30	E	2132
31	E	2191
25	E	2376
19	ENE	1460
20	NE	1374
H	NE	1485
21	NNE	940

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Individual Assessment
Mar 11, 1994 1:06 pm

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

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1993

Comments: This is for the 1993 neshap Demonstration
Location: Cooling Tower-IND. RKR

Dataset Name: CY93-CT-IND
Dataset Date: Mar 11, 1994 10:12 am
Wind File: WNDFILES\FEMP93.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
GONADS	1.02E-05
BREAST	1.16E-05
R MAR	2.43E-04
LUNGS	1.23E-02
THYROID	9.94E-06
ENDOST	3.39E-03
RMNDR	2.90E-04
EFFEC	1.70E-03

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	2.10E-04
INHALATION	1.49E-03
AIR IMMERSION	1.48E-10
GROUND SURFACE	1.95E-06
INTERNAL	1.70E-03
EXTERNAL	1.95E-06
TOTAL	1.70E-03

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
U-234	7.22E-04
U-235	3.76E-05
U-236	2.51E-05
U-238	8.50E-04
RA-226	1.36E-07
RA-228	2.44E-07
TH-228	4.68E-05
TH-230	3.30E-06
TH-232	1.05E-05
TH-234	3.73E-06
TOTAL	1.70E-03

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
LEUKEMIA	2.75E-10
BONE	1.81E-10
THYROID	2.27E-12
BREAST	2.57E-11
LUNG	2.01E-08
STOMACH	1.76E-11
BOWEL	5.04E-11
LIVER	1.53E-11
PANCREAS	1.00E-11
URINARY	6.09E-10
OTHER	1.23E-11
TOTAL	2.13E-08

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	1.13E-09
INHALATION	2.02E-08
AIR IMMERSION	3.30E-15
GROUND SURFACE	4.47E-11
INTERNAL	2.13E-08
EXTERNAL	4.47E-11
TOTAL	2.13E-08

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-234	8.88E-09
U-235	4.81E-10
U-236	3.08E-10
U-238	1.06E-08
RA-226	1.37E-12
RA-228	2.14E-12
TH-228	9.33E-10
TH-230	2.68E-11
TH-232	5.90E-11
TH-234	8.69E-11
TOTAL	2.13E-08

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	924	1277	1776	1287	2087	1218	1385
N	9.8E-04	9.1E-04	7.6E-04	9.1E-04	6.7E-04	9.3E-04	8.8E-04
NNW	3.0E-04	3.1E-04	2.9E-04	3.1E-04	2.7E-04	3.1E-04	3.1E-04
NW	2.3E-04	2.2E-04	2.0E-04	2.2E-04	1.9E-04	2.2E-04	2.1E-04
WNW	2.8E-04	2.4E-04	2.1E-04	2.4E-04	1.9E-04	2.4E-04	2.3E-04
W	5.7E-04	5.0E-04	4.2E-04	5.0E-04	3.8E-04	5.1E-04	4.8E-04
WSW	1.4E-03	1.2E-03	1.0E-03	1.2E-03	8.9E-04	1.3E-03	1.2E-03
SW	1.1E-03	9.2E-04	7.1E-04	9.1E-04	6.1E-04	9.5E-04	8.7E-04
SSW	9.1E-04	7.6E-04	5.7E-04	7.6E-04	4.9E-04	7.9E-04	7.1E-04
S	6.8E-04	5.5E-04	4.3E-04	5.5E-04	3.8E-04	5.7E-04	5.2E-04
SSE	8.8E-04	6.9E-04	5.2E-04	6.9E-04	4.5E-04	7.2E-04	6.4E-04
SE	1.1E-03	8.9E-04	6.8E-04	8.8E-04	5.9E-04	9.2E-04	8.3E-04
ESE	1.5E-03	1.3E-03	1.1E-03	1.3E-03	9.4E-04	1.3E-03	1.2E-03
E	1.6E-03	1.4E-03	1.1E-03	1.4E-03	1.0E-03	1.4E-03	1.3E-03
ENE	1.4E-03	1.2E-03	9.9E-04	1.2E-03	9.1E-04	1.2E-03	1.1E-03
NE	1.6E-03	1.4E-03	1.2E-03	1.4E-03	1.1E-03	1.5E-03	1.4E-03
NNE	1.7E-03	1.5E-03	1.3E-03	1.5E-03	1.1E-03	1.6E-03	1.5E-03

	Distance (m)						
Direction	1462	1506	1538	1597	1161	2132	1460
N	8.6E-04	8.4E-04	8.3E-04	8.1E-04	9.5E-04	6.6E-04	8.6E-04
NNW	3.0E-04	3.0E-04	3.0E-04	3.0E-04	3.1E-04	2.7E-04	3.0E-04
NW	2.1E-04	2.1E-04	2.1E-04	2.1E-04	2.3E-04	1.8E-04	2.1E-04
WNW	2.2E-04	2.2E-04	2.2E-04	2.2E-04	2.5E-04	1.9E-04	2.3E-04
W	4.7E-04	4.6E-04	4.5E-04	4.4E-04	5.2E-04	3.7E-04	4.7E-04
WSW	1.1E-03	1.1E-03	1.1E-03	1.1E-03	1.3E-03	8.7E-04	1.2E-03
SW	8.3E-04	8.1E-04	8.0E-04	7.8E-04	9.7E-04	6.0E-04	8.3E-04
SSW	6.8E-04	6.6E-04	6.5E-04	6.3E-04	8.1E-04	4.8E-04	6.8E-04
S	5.0E-04	4.9E-04	4.8E-04	4.7E-04	5.9E-04	3.7E-04	5.0E-04
SSE	6.1E-04	6.0E-04	5.9E-04	5.7E-04	7.5E-04	4.4E-04	6.2E-04
SE	7.9E-04	7.8E-04	7.6E-04	7.4E-04	9.5E-04	5.8E-04	7.9E-04
ESE	1.2E-03	1.2E-03	1.2E-03	1.1E-03	1.3E-03	9.3E-04	1.2E-03
E	1.3E-03	1.2E-03	1.2E-03	1.2E-03	1.4E-03	9.9E-04	1.3E-03
ENE	1.1E-03	1.1E-03	1.1E-03	1.0E-03	1.2E-03	9.0E-04	1.1E-03
NE	1.4E-03	1.3E-03	1.3E-03	1.3E-03	1.5E-03	1.1E-03	1.4E-03
NNE	1.4E-03	1.4E-03	1.4E-03	1.4E-03	1.6E-03	1.1E-03	1.4E-03

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)			
Direction	1374	940	948	1189
N	8.8E-04	9.9E-04	9.9E-04	9.4E-04
NNW	3.1E-04	3.0E-04	3.0E-04	3.1E-04
NW	2.2E-04	2.3E-04	2.3E-04	2.2E-04
WNW	2.3E-04	2.8E-04	2.8E-04	2.5E-04
W	4.8E-04	5.7E-04	5.7E-04	5.2E-04
WSW	1.2E-03	1.4E-03	1.4E-03	1.3E-03
SW	8.7E-04	1.1E-03	1.1E-03	9.6E-04
SSW	7.2E-04	9.1E-04	9.0E-04	8.0E-04
S	5.2E-04	6.8E-04	6.8E-04	5.8E-04
SSE	6.5E-04	8.7E-04	8.7E-04	7.3E-04
SE	8.3E-04	1.1E-03	1.1E-03	9.4E-04
ESE	1.2E-03	1.5E-03	1.5E-03	1.3E-03
E	1.3E-03	1.6E-03	1.6E-03	1.4E-03
ENE	1.1E-03	1.4E-03	1.4E-03	1.2E-03
NE	1.4E-03	1.6E-03	1.6E-03	1.5E-03
NNE	1.5E-03	1.7E-03	1.7E-03	1.6E-03

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Direction	Distance (m) 924	1277	1776	1287	2087	1218	1385
N	1.2E-08	1.1E-08	9.5E-09	1.1E-08	8.3E-09	1.2E-08	1.1E-08
NNW	3.4E-09	3.6E-09	3.4E-09	3.6E-09	3.2E-09	3.6E-09	3.6E-09
NW	2.6E-09	2.4E-09	2.2E-09	2.4E-09	2.0E-09	2.5E-09	2.4E-09
WNW	3.1E-09	2.6E-09	2.3E-09	2.6E-09	2.1E-09	2.7E-09	2.5E-09
W	6.8E-09	6.0E-09	5.0E-09	5.9E-09	4.5E-09	6.1E-09	5.7E-09
WSW	1.8E-08	1.6E-08	1.3E-08	1.6E-08	1.1E-08	1.6E-08	1.5E-08
SW	1.3E-08	1.2E-08	8.8E-09	1.1E-08	7.6E-09	1.2E-08	1.1E-08
SSW	1.1E-08	9.5E-09	7.1E-09	9.4E-09	6.0E-09	9.8E-09	8.9E-09
S	8.4E-09	6.8E-09	5.2E-09	6.7E-09	4.5E-09	7.0E-09	6.4E-09
SSE	1.1E-08	8.5E-09	6.3E-09	8.5E-09	5.4E-09	8.9E-09	7.9E-09
SE	1.3E-08	1.1E-08	8.2E-09	1.1E-08	7.1E-09	1.1E-08	1.0E-08
ESE	1.8E-08	1.6E-08	1.3E-08	1.6E-08	1.2E-08	1.6E-08	1.5E-08
E	1.9E-08	1.7E-08	1.4E-08	1.7E-08	1.2E-08	1.7E-08	1.6E-08
ENE	1.6E-08	1.4E-08	1.2E-08	1.4E-08	1.1E-08	1.5E-08	1.4E-08
NE	2.0E-08	1.8E-08	1.5E-08	1.8E-08	1.4E-08	1.8E-08	1.7E-08
NNE	2.1E-08	1.9E-08	1.6E-08	1.9E-08	1.4E-08	2.0E-08	1.9E-08

Direction	Distance (m) 1462	1506	1538	1597	1161	2132	1460
N	1.1E-08	1.1E-08	1.0E-08	1.0E-08	1.2E-08	8.2E-09	1.1E-08
NNW	3.5E-09	3.5E-09	3.5E-09	3.5E-09	3.5E-09	3.2E-09	3.5E-09
NW	2.3E-09	2.3E-09	2.3E-09	2.3E-09	2.5E-09	2.0E-09	2.3E-09
WNW	2.5E-09	2.4E-09	2.4E-09	2.4E-09	2.8E-09	2.1E-09	2.5E-09
W	5.6E-09	5.5E-09	5.4E-09	5.3E-09	6.3E-09	4.4E-09	5.6E-09
WSW	1.4E-08	1.4E-08	1.4E-08	1.4E-08	1.6E-08	1.1E-08	1.4E-08
SW	1.0E-08	1.0E-08	1.0E-08	9.7E-09	1.2E-08	7.5E-09	1.0E-08
SSW	8.5E-09	8.3E-09	8.1E-09	7.8E-09	1.0E-08	5.9E-09	8.5E-09
S	6.1E-09	5.9E-09	5.8E-09	5.7E-09	7.3E-09	4.4E-09	6.1E-09
SSE	7.5E-09	7.3E-09	7.2E-09	7.0E-09	9.2E-09	5.3E-09	7.5E-09
SE	9.6E-09	9.4E-09	9.2E-09	8.9E-09	1.2E-08	7.0E-09	9.6E-09
ESE	1.5E-08	1.4E-08	1.4E-08	1.4E-08	1.7E-08	1.1E-08	1.5E-08
E	1.5E-08	1.5E-08	1.5E-08	1.5E-08	1.8E-08	1.2E-08	1.5E-08
ENE	1.3E-08	1.3E-08	1.3E-08	1.3E-08	1.5E-08	1.1E-08	1.3E-08
NE	1.7E-08	1.7E-08	1.6E-08	1.6E-08	1.8E-08	1.4E-08	1.7E-08
NNE	1.8E-08	1.8E-08	1.8E-08	1.7E-08	2.0E-08	1.4E-08	1.8E-08

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)			
Direction	1374	940	948	1189
N	1.1E-08	1.2E-08	1.2E-08	1.2E-08
NNW	3.6E-09	3.4E-09	3.4E-09	3.6E-09
NW	2.4E-09	2.6E-09	2.6E-09	2.5E-09
WNW	2.5E-09	3.1E-09	3.1E-09	2.7E-09
W	5.7E-09	6.8E-09	6.8E-09	6.2E-09
WSW	1.5E-08	1.8E-08	1.8E-08	1.6E-08
SW	1.1E-08	1.3E-08	1.3E-08	1.2E-08
SSW	8.9E-09	1.1E-08	1.1E-08	1.0E-08
S	6.4E-09	8.4E-09	8.3E-09	7.2E-09
SSE	8.0E-09	1.1E-08	1.1E-08	9.1E-09
SE	1.0E-08	1.3E-08	1.3E-08	1.1E-08
ESE	1.5E-08	1.8E-08	1.8E-08	1.6E-08
E	1.6E-08	1.9E-08	1.9E-08	1.7E-08
ENE	1.4E-08	1.6E-08	1.6E-08	1.5E-08
NE	1.7E-08	1.9E-08	1.9E-08	1.8E-08
NNE	1.9E-08	2.1E-08	2.1E-08	2.0E-08