M-637

Formerly Utilized Sites Remedial Action Program (FUSRAP)

ADMINISTRATIVE RECORD

for the Maywood Site, New Jersey

US Army Corps of Engineers.

Department of Energy

Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, Tennessee 37831-8723

191-LQA-GET-00025
M-637

June 25, 1997

Mr. Paul A. Giardina, Chief
Radiation Branch
Environmental Protection Agency
Region II
290 Broadway
New York, New York 10007

Dear Mr. Giardina:

FUSRAP 1996 NESHAP ANNUAL REPORTS - SUBMITTAL TO EPA REGION II

Enclosed are the Calendar Year 1996 National Emission Standards for Hazardous Air Pollutants (NESHAP) Annual Reports for the applicable Department of Energy (DOE) Formerly Utilized Sites Remedial Action Program (FUSRAP) sites in the Environmental Protection Agency's (EPA's) Region II. The enclosed reports have been prepared for your information in the spirit of the final Memorandum of Understanding (April 4, 1995) between DOE and EPA that addresses, among several issues, the radionuclide NESHAP requirements under 40 CFR 61, Subparts H and Q.

The annual reports were prepared based on DOE-Headquarter's guidance for DOE Oak Ridge Operations to fulfill the NESHAP requirements under 40 CFR 61, Part H. Subpart H applies to any DOE-owned facility that may emit radionuclides, other than radon, into the air. Radionuclide emission rates for non-radon emitters were calculated using the EPA-approved dose model CAP88-PC, as directed in 40 CFR Section 61.93.

The FUSRAP sites subject to Subpart H in EPA Region II and for which annual reports have been prepared include:

Colonie Interim Storage Site (CISS)
Maywood Interim Storage Site (MISS)
Middlesex Sampling Plant (MSP)
New Brunswick Site (NBS)
Wayne Interim Storage Site (WISS)

Following the 1993 reporting year, NESHAP reporting for the Niagara Falls Storage Site (NFSS) was discontinued. Because conditions at the site are relatively static and there are efficient engineering controls (i.e., the waste containment structure), DOE concluded that Subpart H was no longer applicable at the site and reporting was discontinued.

U.S. Department of Energy
Air Emissions Annual Report
(under Subpart H, 40 CFR Section 61.94)
Calendar Year 1996

Site Name: Maywood Interim Storage Site (MISS), Maywood, New Jersey

Operations Office Information

Office: Oak Ridge Operations - Former Sites Restoration Division

Address: P.O. Box 2001

Oak Ridge, TN 37831-8723

Contact: John Michael Japp Phone: (423) 241-6344

Site Information

Operator: Bechtel National, Inc.

Site Address: 100 West Hunter Avenue

Maywood, NJ 07607

Contact: Steven G. Wilkinson Phone: (201) 843-7080

Mailing Address: 100 West Hunter Avenue

Maywood, NJ 07607

Section I. Facility Information - MISS

Site Description

The Maywood Interim Storage Site (MISS) occupies approximately 4.7 ha (11.7 acres) in the Borough of Maywood and the Township of Rochelle Park in Bergen County, New Jersey (Figure 1). MISS lies 19 km (12 mi) north-northwest of New York City and 21 km (13 mi) northeast of Newark, New Jersey. Land use in the vicinity is primarily commercial and residential. The nearest commercial building is 90 m (295 ft) north-northwest. The nearest residence is 90 m (295 ft) northeast. The nearest schools are 0.8 km (0.5 mi) northeast and northwest. There is no farm land in the vicinity of MISS.

Based on the National Oceanic and Atmospheric Administration (NOAA) records for the Newark, NJ, vicinity in 1996, monthly average temperature ranged from -1.3°C (29.7°F) in January to 23.3°C (74.0°F) in August. Total monthly precipitation ranged from 5.87 cm (2.31 in) in November to 21.01 cm (8.27 in) in July. Monthly average wind speed ranged from 10.9 kph (6.8 mph) from the southwest in August to 18.8 kph (11.7 mph) from the northwest in February.

Source Description

MISS was established to provide storage for low level radioactive soils found in the vicinity of the former Maywood Chemical Works. From 1916 through 1959, the Maywood Chemical Works processed monazite sand (a thorium-containing ore) for industrial uses. Process wastes were placed in surface impoundments onsite. Some of these process wastes migrated offsite via surface water drainage and also were later used as mulch and fill on nearby properties, contaminating them with radioactive thorium.

After the enactment of the Atomic Energy Act of 1954, the Atomic Energy Commission (AEC) issued a license to the Maywood Chemical Works for the processing and manufacture of radioactive material. The Maywood Chemical Works stopped processing thorium in 1959 and shortly thereafter was sold to the Stepan Company. Based on AEC inspections and information, remedial actions were performed by the Stepan Company to consolidate some of the radioactively contaminated soil

Subsequent radiological surveys from 1980 to 1984 identified additional areas of contamination, both onsite and offsite. In 1984, the Department of Energy (DOE) negotiated a lease for Stepan Company land on which MISS would be established. The land was transferred in 1985 to DOE ownership and currently provides interim storage for contaminated materials removed from vicinity properties.

Model Source Description

The computer program used to model potential offsite exposure from airborne emissions is the Clean Air Act Assessment Package - 1988 - Personal Computer (CAP88-PC) program (version 1.00). Airborne emissions contributing to offsite exposure could occur from areas where the radioactively contaminated soil is exposed to the elements and from operations that generate airborne emissions. During 1996, the following potential sources of airborne emissions existed at MISS:

1. In situ, contaminated areas totaling 63,118 m^2 (679,397 ft^2) of MISS and the adjacent Stepan Company property were exposed to wind erosion throughout 1996.

2. From August 5 to December 11, 1996, approximately 465 m^2 (5,000 ft^2) of the interim storage pile was opened and 30,122,979 kg (66,409,800 lbs) of contaminated soil [approximately 15,270 m^3 (19,960 yd^3)] were removed and shipped offsite to a disposal facility. The unexposed portion of the storage pile, which was covered with an anchored non-erodible synthetic membrane during the year, was not considered a source of airborne emissions.

3. From May 27 to December 11, 1996, approximately 15,986,148 kg (35,243,424 lbs) of contaminated vicinity property (VP) soil [approximately 8,330 m^3 (10,890 yd^3)] were brought to MISS and transferred from dump trucks to gondola railcars for shipment offsite to a disposal facility. Half of the soil was first spread out over a 929 m^2 (10,000 ft^2) area for drying.

4. From May 27 to December 11, 1996, all of the VP soil indicated above passed through a 465 m^2 (5,000 ft^2) transfer pile during loading operations.

The simulated airborne emission from these potential sources is used by CAP88-PC to estimate the annual dose from airborne particulates to the population within 80 km (50 mi) of the site (Appendix A). In addition, for user-defined distances from the center of the site, CAP88-PC estimates individual effective dose equivalents in all compass directions (Appendix B). For specific potentially exposed individuals (workers and residents) at known distances and compass directions from the site (Figure 1), the user can compare the calculated effective dose equivalents. The individual (worker and resident) corresponding to the maximum effective dose equivalent is identified as the hypothetical maximally exposed individual. Because dose from airborne emissions is dependent on prevailing wind direction in addition to proximity to the site, the hypothetical maximally exposed individual is not necessarily the person nearest the site. Although several potential receptors are evaluated by the model, only the hypothetical maximally exposed worker and resident are discussed in this report.

The individual effective dose equivalents given in the CAP88-PC output are based on the default assumption that the receptor occupies the location 100 percent of the time (i.e., 24 hours per day, 7 days per week, 52 weeks per year). The occupancy factor of 100 percent, although conservative, is considered to be appropriate for a resident. To estimate the dose to an employee working normal hours, an occupancy factor of 23 percent (i.e., 8 hours per day, 5 days per week, 50 weeks per year) is applied to the CAP88-PC result.

Section II. Air Emissions Data - MISS

Point Sources	Type Control	Efficiency	Distance to Hypothetical Maximally Exposed Individual
none	not applicable	not applicable	not applicable

Non-Point Sources	Type Control	Efficiency	Distance to Hypothetical Maximally Exposed Individual
in situ soil	vegetative cover	99 percent	135 m (443 ft) NE (resident) 90 m (295 ft) NNW (employee)
storage pile opening	dust suppression by water spray: off-hours pile coverage	no credit taken for dust controls	135 m (443 ft) NE (resident) 90 m (295 ft) NNW (employee)
VP soil drying area	none	none	135 m (443 ft) NE (resident) 90 m (295 ft) NNW (employee)
VP soil transfer pile	dust suppression by water spray: off-hours pile coverage	no credit taken for dust controls	135 m (443 ft) NE (resident) 90 m (295 ft) NNW (employee)

Non-Point Source Radionuclides	Annual Quantity Released (Ci)			
	in situ soil	storage pile opening	VP soil drying area	VP soil transfer pile
U-238	1.4×10^{-9}	4.8×10^{-8}	2.0×10^{-6}	2.5×10^{-8}
Th-234	1.4×10^{-9}	4.8×10^{-8}	2.0×10^{-6}	2.5×10^{-8}
Pa-234m	1.4×10^{-9}	4.8×10^{-8}	2.0×10^{-6}	2.5×10^{-8}
Pa-234	1.4×10^{-9}	4.8×10^{-8}	2.0×10^{-6}	2.5×10^{-8}
U-234	1.5×10^{-9}	5.1×10^{-8}	2.2×10^{-6}	2.7×10^{-8}
Th-230	1.5×10^{-9}	5.1×10^{-8}	2.2×10^{-6}	2.7×10^{-8}
Ra-226	2.2×10^{-10}	6.8×10^{-9}	2.4×10^{-7}	2.9×10^{-9}
U-235	6.7×10^{-11}	2.2×10^{-9}	9.5×10^{-8}	1.2×10^{-9}
Th-231	6.7×10^{-11}	2.2×10^{-9}	9.5×10^{-8}	1.2×10^{-9}
Pa-231	6.7×10^{-11}	2.2×10^{-9}	9.5×10^{-8}	1.2×10^{-9}
Ac-227	6.7×10^{-11}	2.2×10^{-9}	9.5×10^{-8}	1.2×10^{-9}
Th-227	6.6×10^{-11}	2.2×10^{-9}	9.4×10^{-8}	1.2×10^{-9}
Fr-223	9.3×10^{-13}	3.1×10^{-11}	1.3×10^{-9}	1.6×10^{-11}
Ra-223	6.7×10^{-11}	2.2×10^{-9}	9.5×10^{-8}	1.2×10^{-9}
Th-232	1.3×10^{-9}	5.1×10^{-8}	2.9×10^{-6}	3.6×10^{-8}
Ra-228	1.3×10^{-9}	5.1×10^{-8}	2.9×10^{-6}	3.6×10^{-8}
Ac-228	1.3×10^{-9}	5.1×10^{-8}	2.9×10^{-6}	3.6×10^{-8}
Th-228	1.3×10^{-9}	5.1×10^{-8}	2.9×10^{-6}	3.6×10^{-8}
Ra-224	1.3×10^{-9}	5.1×10^{-8}	2.9×10^{-6}	3.6×10^{-8}

Group Sources	Type Control	Efficiency	Distance to Hypothetical Maximally Exposed Individual
none	not applicable	not applicable	not applicable

NOTE: 1 curie (Ci) = 3.7×10^{10} Becquerel (Bq)

Section III. Dose Assessments - MISS

Description of Dose Model

The effective dose equivalent for the collective population and the hypothetical maximally exposed individual was calculated in a two step process. The first step was to model the release of particulate from the site using the methodology given in the U.S. Environmental Protection Agency's (EPA) "Estimation of Air Impacts from Area Sources of Particulate Matter Emissions at Superfund Sites" (EPA-451/R-93-004). The second step was to input these particulate release rates, along with local population and meteorological data, into the CAP88-PC program (EPA 402-B-92-001). The CAP88-PC model uses a modified Gaussian plume equation to estimate the average dispersion of radionuclides released from a site. Assessments are done for a circular grid of distances and directions for a radius of 80 km (50 mi) around the site. The program computes radionuclide concentrations in air, rates of deposition on ground surfaces, concentrations in food, and intake rates to people from ingestion of food produced in the assessment area. By coupling the output of the atmospheric transport models with the terrestrial food chain models from the U.S. Nuclear Regulatory Commission Regulatory Guide 1.109 ("Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I"), the program estimates the radionuclide concentrations in produce, leafy vegetables, milk, and meat consumed by humans. The population distribution array used in the computer model was calculated from known land uses surrounding the site and 1990 census figures. The program calculates the effective dose equivalents by combining the inhalation and ingestion intake rates and the air and ground surface concentrations with dose conversion factors, using the weighting factors in "Recommendations of the International Commission on Radiological Protection" (ICRP Publication 26, 1977).

Summary of Input Parameters

Average Annual Temperature: 12.0°C (53.6°F)
Total Annual Precipitation: 147.50 cm (58.07 in.)
Wind Speed and Direction: CAP88-PC file LEA0189
Population Distribution: calculated from 1990 census

Compliance Assessment

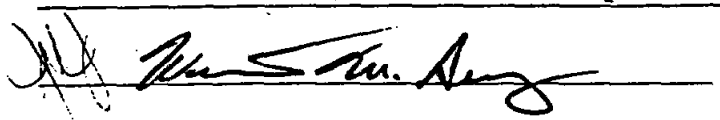
Effective Dose Equivalent of Hypothetical Maximally Exposed Individuals (refer to output in Appendix B):

Resident 135 m NE of MISS (100% occupancy): 8.6×10^{-4} mSv/yr (8.6×10^{-2} mrem/yr)
Employee 90 m NNW of MISS (23% occupancy): 2.3×10^{-4} mSv/yr (2.3×10^{-2} mrem/yr)

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/Title: William M. Seay, FUSRAP Group Leader

Signature:  Date: 6/25/97

Section IV. Supplemental Information - MISS

This section is not required by the annual reporting requirements under subpart H. 40 CFR Part 61 of the NESHAP regulations. This supplemental information, and that which is provided in Appendices C and D, is included to provide information for DOE guidance development and for future interactions with the EPA.

- The total collective population dose is the sum of the doses from all exposure pathways. The only pathway with a potentially significant effect on the collective population within an 80 km (50 mi) radius of the site is airborne contamination. The CAP88-PC population assessment (Appendix A) estimates the collective population dose as 1.28×10^{-3} person-Sv/yr (1.28×10^{-1} person-rem/yr).

- DOE order 5400.5, "Radiation Protection of the Public and the Environment," limits concentrations in air of both radon-220 and radon-222 to 0.111 Bq/L (3.0 pCi/L) above background. If both isotopes are present, the sum of the ratios of the concentration of each isotope to the allowable limit must be less than one. Radon detector locations are shown in Figures C-1 and C-2. At each location, two types of detectors are exposed. One detector type, the RadTrack®, allows both isotopes of radon to enter. The other detector type, the RadTrack®-modified, contains a membrane that specifically excludes radon-220. Radon-222 concentrations are reported as received from the laboratory, that is, the data is obtained from the RadTrack® detectors. Radon-220 concentrations are calculated from the RadTrack® and RadTrack®-modified data. Both radon-220 and radon-222 concentrations are shown in Table C-1. During the first half of 1996, generally consistent with results from previous years, radon-220 concentrations exceeded the DOE limit at locations 5, 22, 30, and 31, ranging from 0.125 Bq/L (3.39 pCi/L) to 0.143 Bq/L (3.87 pCi/L). Locations 22, 30, and 31 are situated around the location of the former thorium processing building, which is roughly in the area of the field immediately east of building 76. Location 5 is to the west of building 76, adjacent to a capped former retention pond.

  Radon mitigation activities were completed in May of 1996 and consisted of covering the grassy area east of building 76 with a reinforced impermeable plastic layer overlain with gravel. During the second half of 1996, only locations 5 (5.70 pCi/L) and 31 (3.53 pCi/L) exceeded the DOE radon-220 limit, while the remaining locations ranged from nondetect to 0.078 Bq/L (2.12 pCi/L). At locations where concentrations of radon-220 did not exceed the isotopic limit, the mixture of the two isotopes was in compliance with the sum-of-the-ratios criterion for mixtures of radionuclides. As with most low concentrations of gases in an open, unconfined area, the radon emitted from this area dissipates quickly and does not significantly affect the offsite, general population. The closest residential inhabitants are located north of the site, and in 1996, locations 32 and 33 were installed to examine radon gas concentrations in this area. Radon-220 results at these two new locations were well below the DOE limit and were significantly lower than the concentrations detected onsite. Radon-222 concentrations were well below the DOE limit, ranging from nondetect to 0.026 Bq/L (0.70 pCi/L).

- 40 CFR Part 61 Subpart Q, "National Emission Standards for Radon Emissions from Department of Energy Facilities," limits radon-222 flux rate to 0.740 Bq/m^2/s (20 pCi/m^2/s). It was measured using activated charcoal canisters placed at 15-m intervals across the surface of the storage pile for a 24 hour exposure period. Radon-222 flux results for 1996 are presented in Table D-1; measurement locations are shown in Figure D-1. Analytical results from measurements obtained at MISS in 1996 were all less than or equal to 0.0004 Bq/m^2/s (0.01 pCi/m^2/s). These results are significantly less than the limit and

compare favorably with results from previous years. Upon completion of pile removal (December 1996), as agreed upon by DOE and EPA, radon flux monitoring was permanently discontinued.

- 40 CFR Part 61 Subpart T, "National Emission Standards for Radon Emissions from the Disposal of Uranium Mill Tailings," is not applicable to this site.

- 40 CFR Part 61 Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities." Section 61.93(b) requirements for continuous monitoring from point sources (stacks or vents) are not applicable to this site.

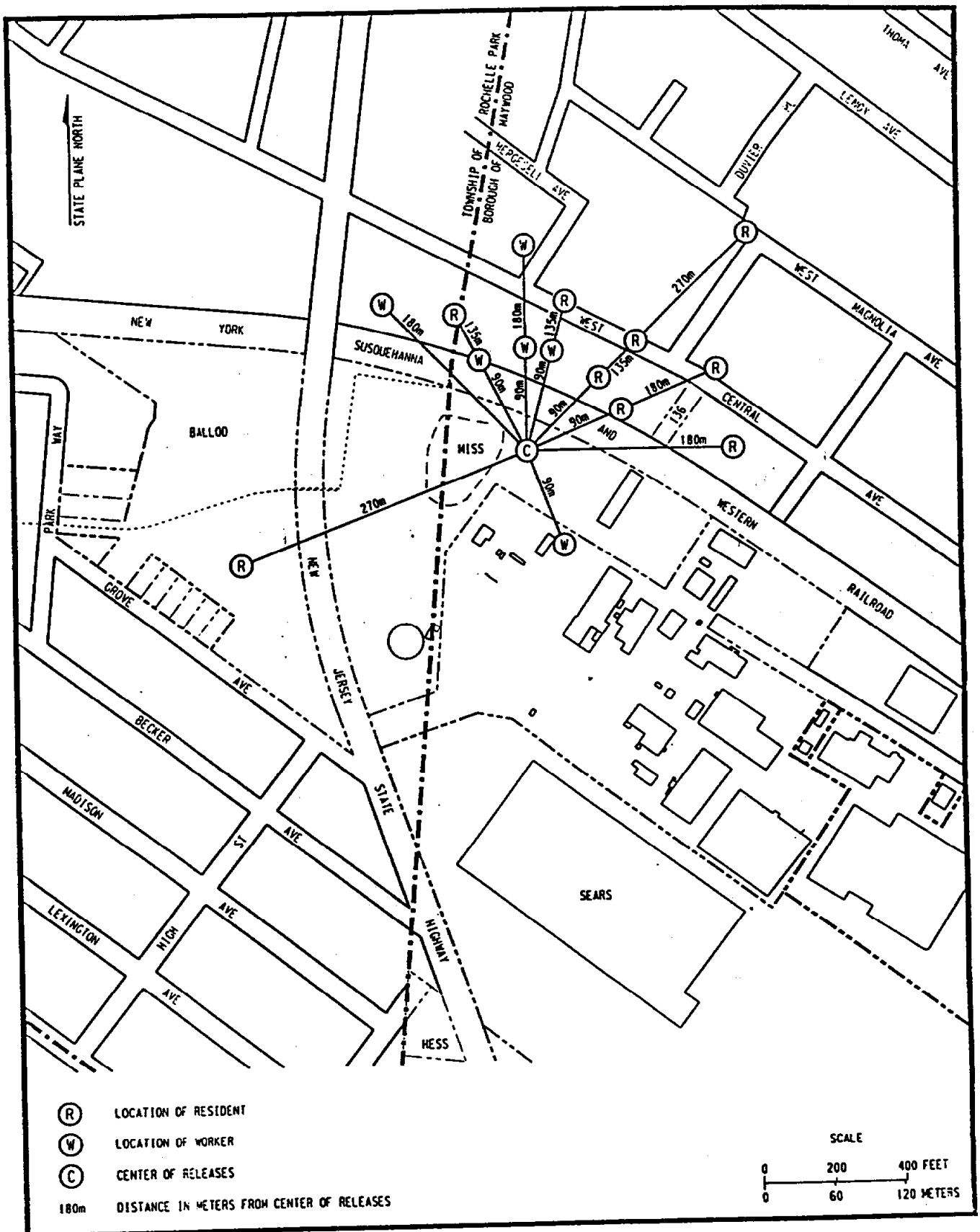


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Figure 1
Maywood Interim Storage Site
Site Plan and Potential Receptor Locations

APPENDIX A

CAP88-PC OUTPUT

(collective population within 80 km)

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 Population Assessment
Feb 13, 1997 2:19 pm

Facility: Maywood Interim Storage Site
Address: 100 West Hunter Avenue
City: Maywood
State: NJ Zip: 07607

Source Category: Airborne Radioactive Particulates
Source Type: Area
Emission Year: 1996

Comments: Bechtel National Inc. for
U.S. Department of Energy

Dataset Name: MISS
Dataset Date: Feb 13, 1997 2:19 pm
Wind File: WNDFILES\LEA0189.WND
Population File: POPFILES\MISS.POP

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Collective Population (person-rem/y)
GONADS	6.60E-04
BREAST	5.06E-04
R MAR	6.10E-02
LUNGS	8.11E-01
THYROID	4.60E-04
ENDOST	7.59E-01
RMNDR	1.97E-03
EFFEC	1.28E-01

RADIONUCLIDE EMISSIONS DURING THE YEAR 1996

Nuclide	Class	Size	Source #1 Ci/y	Source #2 Ci/y	Source #3 Ci/y	Source #4 Ci/y	TOTAL Ci/y
U-238	Y	1.00	1.4E-09	4.8E-08	2.0E-06	2.5E-08	2.1E-06
TH-234	Y	1.00	1.4E-09	4.8E-08	2.0E-06	2.5E-08	2.1E-06
PA-234M	Y	1.00	1.4E-09	4.8E-08	2.0E-06	2.5E-08	2.1E-06
PA-234	Y	1.00	1.4E-09	4.8E-08	2.0E-06	2.5E-08	2.1E-06
U-234	Y	1.00	1.5E-09	5.1E-08	2.2E-06	2.7E-08	2.3E-06
TH-230	Y	1.00	1.5E-09	5.1E-08	2.2E-06	2.7E-08	2.3E-06
RA-226	W	1.00	2.2E-10	6.8E-09	2.4E-07	2.9E-09	2.5E-07
U-235	Y	1.00	6.7E-11	2.2E-09	9.5E-08	1.2E-09	9.9E-08
TH-231	Y	1.00	6.7E-11	2.2E-09	9.5E-08	1.2E-09	9.9E-08
PA-231	Y	1.00	6.7E-11	2.2E-09	9.5E-08	1.2E-09	9.9E-08
AC-227	Y	1.00	6.7E-11	2.2E-09	9.5E-08	1.2E-09	9.9E-08
TH-227	Y	1.00	6.6E-11	2.2E-09	9.4E-08	1.2E-09	9.7E-08
FR-223	D	1.00	9.3E-13	3.1E-11	1.3E-09	1.6E-11	1.4E-09
RA-223	W	1.00	6.7E-11	2.2E-09	9.5E-08	1.2E-09	9.9E-08
TH-232	Y	1.00	1.3E-09	5.1E-08	2.9E-06	3.6E-08	3.0E-06
RA-228	W	1.00	1.3E-09	5.1E-08	2.9E-06	3.6E-08	3.0E-06
AC-228	Y	1.00	1.3E-09	5.1E-08	2.9E-06	3.6E-08	3.0E-06
TH-228	Y	1.00	1.3E-09	5.1E-08	2.9E-06	3.6E-08	3.0E-06
RA-224	W	1.00	1.3E-09	5.1E-08	2.9E-06	3.6E-08	3.0E-06

SITE INFORMATION

Temperature: 12 degrees C
Precipitation: 148 cm/y
Mixing Height: .1000 m

SOURCE INFORMATION

Source Number:	1	2	3	4
Source Height (m):	0.00	0.00	0.00	0.00
Area (sq m):	6.31E+04	4.65E+02	9.29E+02	4.65E+02

Plume Rise Pasquill Cat:	A	B	C	D	E	F	G
Zero:	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	0.076	0.000	0.008
Fraction From Assessment Area:	0.924	1.000	0.992
Fraction Imported:	0.000	0.000	0.000

Beef Cattle Density:	4.25E-02
Milk Cattle Density:	3.29E-02
Land Fraction Cultivated for Vegetable Crops:	1.82E-02

POPULATION DATA

Direction	Distance (m) 250	750	1500	2500	3500	4500	7500
N	67	201	802	1337	1872	2407	20057
NNW	67	201	802	1337	1872	2407	20057
NW	67	201	802	1337	1872	2407	20057
WNW	67	201	802	1337	1872	2407	18015
W	67	201	802	1337	1872	2407	15973
WSW	67	201	802	1337	1872	2407	15973
SW	67	201	802	1337	1872	2407	16228
SSW	67	201	802	1337	1872	2407	20057
S	67	201	802	1337	1872	2407	20057
SSE	67	201	802	1337	1872	2407	25914
SE	67	201	802	1337	1872	2407	20057
ESE	67	201	802	1337	1872	2407	20057
E	67	201	802	1337	1872	2407	20057
ENE	67	201	802	1337	1872	2407	20057
NE	67	201	802	1337	1872	2407	20057
NNE	67	201	802	1337	1872	2407	20057

Direction	Distance (m) 15000	25000	35000	45000	55000	65000	75000
N	74537	60196	70814	29909	28375	32864	31652
NNW	80228	100151	38356	25800	31534	37267	40828
NW	78697	106487	126587	47978	25581	31795	32885
WNW	56704	65308	91431	43632	20950	24760	25044
W	64114	84087	47693	59939	47949	40968	30281
WSW	112233	167453	56447	59420	70303	59251	29756
SW	120063	227594	237745	147380	112163	79165	127971
SSW	142152	249194	283497	211897	153403	180380	385790
S	236424	356896	290094	27391	48812	100953	91523
SSE	537391	974408	1119592	38176	0	0	0
SE	813384	678682	772130	363126	35070	0	0
ESE	837313	483781	278841	306070	279511	103569	51542
E	566935	290745	57469	146563	75595	89339	103084
ENE	84525	76576	79890	60083	55076	65090	75104
NE	65381	57432	102568	129885	161178	126989	143397
NNE	65457	30109	80543	125688	76318	38109	40796

APPENDIX B

CAP88-PC OUTPUT

(hypothetical maximally exposed individual)

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
Jun 11, 1997 11:20 am

Facility: Maywood Interim Storage Site
Address: 100 West Hunter Avenue
City: Maywood
State: NJ Zip: 07607

Source Category: Airborne Radioactive Particulate
Source Type: Area
Emission Year: 1996

Comments: Bechtel National Inc. for
U.S. Department of Energy

Dataset Name: MISS
Dataset Date: Jun 11, 1997 11:20 am
Wind File: C:\CAP88PC2\WNDFILES\LEA0189.WND

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

	Distance (m)			
Direction	90	135	180	270
N	9.5E-02	1.9E-02	1.0E-02	5.5E-03
NNW	1.0E-01	1.6E-02	8.6E-03	5.2E-03
NW	7.8E-02	4.2E-02	2.2E-02	4.4E-03
WNW	9.1E-02	5.6E-02	2.9E-02	1.0E-02
W	7.2E-02	5.9E-02	3.0E-02	1.3E-02
WSW	8.6E-02	4.6E-02	2.4E-02	1.4E-02
SW	9.6E-02	5.3E-02	2.7E-02	1.1E-02
SSW	8.1E-02	4.2E-02	2.2E-02	1.3E-02
S	8.3E-02	5.1E-02	2.6E-02	1.0E-02
SSE	9.3E-02	5.7E-02	2.9E-02	1.2E-02
SE	7.8E-02	4.8E-02	2.5E-02	1.3E-02
ESE	1.5E-01	4.9E-02	2.5E-02	1.2E-02
E	3.5E-02	5.5E-02	2.8E-02	1.2E-02
ENE	3.3E-02	4.6E-02	2.4E-02	1.3E-02
NE	2.7E-02	8.6E-02	4.4E-02	1.1E-02
NNE	7.2E-02	2.1E-02	1.1E-02	2.0E-02

APPENDIX C

RADON CONCENTRATIONS

Table C-1
1996 Radon Gas Concentrations
Maywood Interim Storage Site

Monitoring Location[a]		Average Concentration (pCi/L) 01/29/96 to 07/29/96[b] Radon-220[c]	01/29/96 to 07/29/96[b] Radon-222	07/29/96 to 01/15/97[b] Radon-220[c]	07/29/96 to 01/15/97[b] Radon-222
MISS perimeter	4	0.88	0.30	1.42	0.20*
	4[d]	0.70	0.20	0.85	0.50
	5	3.87	0.40	5.70	0.40
	10	1.06	0.20	1.06	0.20*
	12	0.76	0.40	0.79	0.30
	20	1.12	0.30	1.64	0.20*
	21	1.89	0.30	1.95	0.50
	22	3.39	0.70	0.11	0.20*
	23	1.54	0.50	0.94	0.20*
	24	1.58	0.20	2.12	0.20*
	25	1.13	0.20*	0.98	0.20*
	30	3.59	0.50	1.13	0.20*
	31	3.69	0.50	3.53	0.20*
	32	-0.02[e]	0.20	-0.27[e]	0.40
	33	0.41	0.30	0.63	0.20*
Background	19	-0.04[e]	0.20	0.01	0.20
	26	0.04	0.20*	0.01	0.20*

a. Monitoring locations are shown in Figures C-1 and C-2.
b. Detectors were installed and removed on the dates listed with the following exceptions:
first semiannual locations 32 and 33 were monitored from 02/26/96 to 07/29/96
second semiannual locations 26, 32. and 33 were monitored from 07/29/96 to 01/16/97
c. 1996 radon-220 gas concentrations were calculated using data from RadTrack® and RadTrack®-modified detectors.
d. A quality control duplicate is collected at the same time and location and is analyzed by the same method for use in evaluation of precision in sampling and analysis.
e. A negative value may result when calculating radon-220 concentrations if no measurable radon-220 was present at that location.

Notes:
1.) The DOE limits for radon-220 and radon-222 are both 0.111 Bq/L (3.0 pCi/L) above background. The sum of the ratios of the concentration of each isotope to its limit must also be less than one.
2.) (*) Indicates detection limit is reported. Actual result is less than this value.
3.) 1 pCi = 0.037 Bq

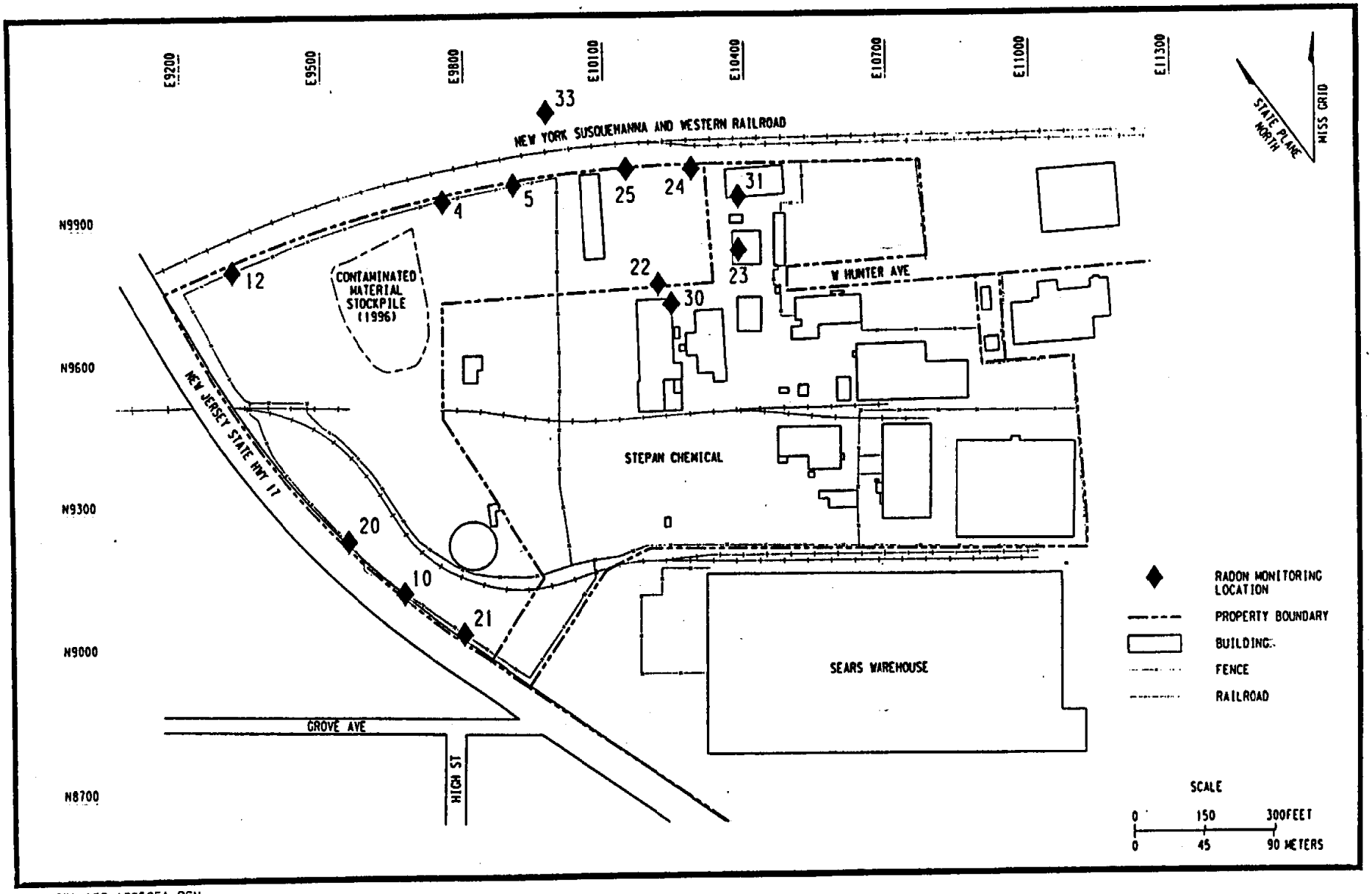

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Figure C-1
Radon Monitoring Locations at MISS

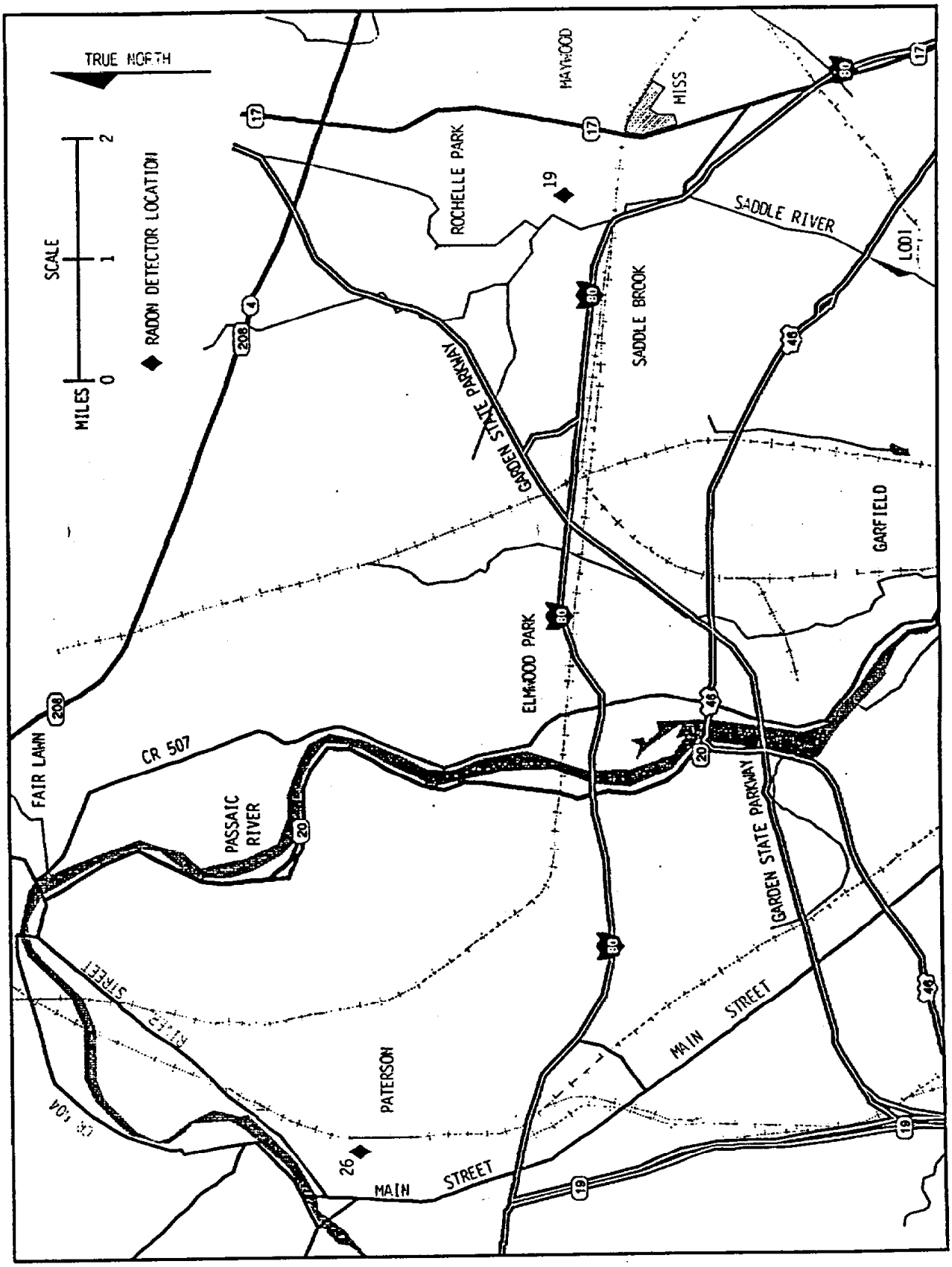

Figure C-2
Background Radon Monitoring Locations at MISS

APPENDIX D

RADON FLUX RATES

Table D-1
1996 Radon Flux Rates
Maywood Interim Storage Site

Sample ID	Radon Flux[a] pCi/m^2/s
138-01	-0.01 ± 0.02
138-02	-0.01 ± 0.02
138-03	-0.01 ± 0.02
138-04	-0.02 ± 0.02
138-05	0.00 ± 0.02
138-06	0.01 ± 0.02
138-07	-0.01 ± 0.02
138-08	-0.01 ± 0.02
138-09	-0.01 ± 0.02
138-10	0.01 ± 0.02
138-10[b]	0.01 ± 0.02
138-11	0.00 ± 0.02
138-12	0.00 ± 0.02
138-13	0.01 ± 0.02
138-14	0.01 ± 0.02
138-14[b]	0.01 ± 0.02

a. Radon-222 flux measurements were taken during the third quarter in July, 1996. Negative results occur as an artifact of measurement and indicate that the measured radon flux is indistinguishable from instrument background.

b. These canisters are quality control replicates counted twice in the laboratory for use in evaluation of analytical precision.

Note: The EPA limit for radon-222 flux is 0.740 Bq/m^2/s (20 pCi/m^2/s).

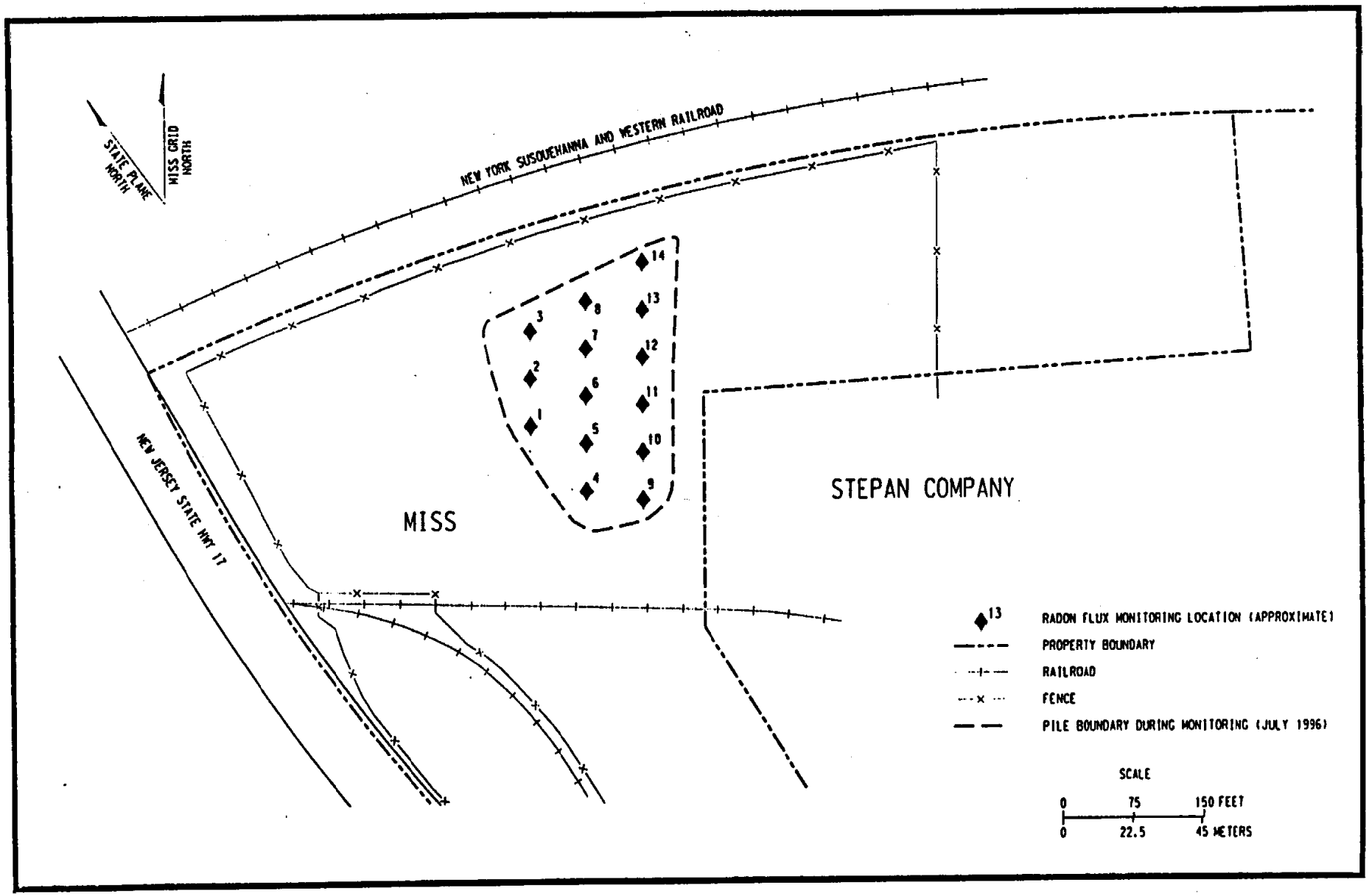

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Figure D-1
Approximate Radon-222 Flux Monitoring Locations at MISS