

NF-038
105579 01

Formerly Utilized Sites Remedial Action Program (FUSRAP)

ADMINISTRATIVE RECORD

for
Niagara Falls Storage Site





Department of Energy

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

June 25, 1993

Mr. Paul A. Giardina
Radiation Branch Manager
U.S. Environmental Protection Agency
Region II
Jacob K. Javits Federal Building
New York, New York 10278

Dear Mr. Giardina:

FUSRAP-OWNED SITES - NESHAPS 1992 AIR EMISSIONS REPORTS - SUBMITTAL TO EPA REGION II

Enclosed are the Calendar Year 1992 National Emissions Standards for Hazardous Air Pollutants (NESHAPS) Annual Reports for Department of Energy (DOE) Formerly Utilized Sites Remedial Action Program (FUSRAP) sites in Region II. The enclosed reports have been prepared for your information in the spirit of a draft Memorandum of Understanding between DOE and the EPA that addresses, among several issues, the radionuclide NESHAPS requirements under 40 CFR 61, Subparts H and Q.

The annual reports were prepared based on DOE-Headquarters guidance for DOE Field Operations to fulfill the NESHAPS requirements under 40 CFR 61, Part H. Subpart H applies to operations at any facility owned or operated by DOE that may emit any 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.

Sites subject to Subpart H and for which annual reports have been prepared include the following six sites in Region II:

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

The information in the annual reports has been organized by site and source for ease of review.

Subpart Q of 40 CFR 61 applies to sites that store radium-containing material. The results of radon flux monitoring for MISS, MSP, NBS, and NFSS are included within Section IV as supplemental information.

Paul A. Giardina

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June 25, 1991

The CAP88 computer model used to prepare the 1992 annual reports was used for the first time for FUSRAP sites. The CAP88 model is more realistic than the AIRDOS computer model, which has been used for past annual reports, and places emphasis on accurate population distribution for the air dispersion modeling. If no facility modifications take place during 1993, the CAP88 results for 1993 will be virtually identical to the 1992 calculations.

Because the CAP88 calculations for CISS, MISS, MSP, NBS, NFSS, and WISS for 1993 will result in virtually the same outcome as the 1992 calculation, DOE requests a waiver from the reporting and modelling requirements of Subpart H, Sections 61.93(a) and 61.94. Should any significant facility modifications requiring an application for approval under Section 61.96(b) be performed during 1993 or any following calendar year, then the Subpart H modelling and reporting requirements would be met.

If you have any questions, please contact me or Steven K. Oldham at (615) 576-7070.

Sincerely,



William M. Seay, Acting Director
Former Sites Restoration Division

Enclosure

U.S. Department of Energy
Air Emissions Annual Report
(under Subpart H, 40 CFR Section 61.94)
Calendar Year 1992

Site Name: Niagara Falls Storage Site (NFSS), Lewiston, New York

Operations Office Information

Office: Oak Ridge Operations - Former Sites Restoration Division

Address: P.O. Box 2001

Oak Ridge, TN 37831-8723

Contact: Ronald E. Kirk Phone: (615) 576-7477

Site Information

Operator: Bechtel National, Inc.

Address: 1397 Pletcher Road

Lewiston, NY 14092

Contact: Cathy Hickey Phone: (615) 576-1677

Mailing Address: P.O. Box 350

Oak Ridge, TN 37831-0350

Section I. Facility Information - NFSS

Site Description

NFSS occupies approximately 77.0 ha (190 acres) and is located in northwestern New York within the Township of Lewiston. The site is approximately 6.0 km (3.7 mi) south of Lake Ontario and 16 km (9.9 mi) north of the City of Niagara Falls.

Beginning in 1944, the MED used the site for storage of radioactive residues that resulted from the processing of uranium ores (pitchblende) during development of the atomic bomb. Additional residues were brought to the site for several years after World War II.

The primary areas of population near NFSS are the Towns of Lewiston, (population 16,200), Niagara (population 9,650), Porter (population 7,250) and Niagara Falls City (population 71,400). The nearest residence to the site is 1.1 km (0.68 mi) southwest of the site.

Based on National Oceanic and Atmospheric Administration (NOAA) records for Buffalo/Niagara Falls vicinity in 1992, temperature ranged from -21 to 32°C (-6°F to 90°F). Total monthly precipitation ranged from 5.1 to 22.6 cm (2 to 8.9 in.). Average wind speed ranged from 14 to 19 km/hr (8.4 to 11.4 mph).

Source Description

The NFSS waste containment structure has a surface area of approximately 44,516 m² (53,240 yd²). The radioactive residues contained in the structure are covered by 1 m (3 ft) of clay, 0.5 m (1.5 ft) of topsoil, and vegetation. Ninety-nine percent of the pile area was assumed to be covered by the grass vegetation to provide a realistic exposure scenario.

Section II. Air Emissions Data - NFSS

<u>Point Source</u>	<u>Source Control</u>	<u>Efficiency</u>	<u>Distance to Nearest Receptor</u>
None	N.A.	N.A.	N.A.

<u>Grouped Source</u>	<u>Source Control</u>	<u>Efficiency</u>	<u>Distance to Nearest Receptor</u>
None	N.A.	N.A.	N.A.

<u>Non-Point Source</u>	<u>Source Control</u>	<u>Efficiency</u>	<u>Distance to Nearest Receptor</u>
40,460 m ²	Clay, topsoil, and vegetative cover	99.9999 %	510 m

<u>Non-Point Source Radionuclide</u>	<u>Annual Quantity (Ci)</u>
--------------------------------------	-----------------------------

Uranium-238 Decay Chain

Uranium-238	U-238	3.0×10^{-8}
Thorium-234	Th-234	3.0×10^{-8}
Protactinium-234	Pa-234	3.0×10^{-8}
Uranium-234	U-234	3.2×10^{-8}
Thorium-230	Th-230	3.2×10^{-8}
Radium-226	Ra-226	2.3×10^{-6}

Uranium-235 Decay Chain

Uranium-235	U-235	1.4×10^{-9}
Thorium-231	Th-231	1.4×10^{-9}
Protactinium-231	Pa-231	1.4×10^{-9}
Actinium-227	Ac-227	1.4×10^{-9}
Thorium-227	Th-227	1.4×10^{-9}
Francium-223	Fr-223	1.4×10^{-9}
Radium-223	Ra-223	1.4×10^{-9}

N.A. = Not applicable

Section III. Dose Assessments - NFSS

Description of Dose Model

The effective dose equivalent for the maximally exposed individual and the collective population was calculated in a two-step process. The first step consisted of modeling the release of particulates from the site using the methodology given in EPA's "Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination Sites (EPA/600/8-85/002)." The second step involved inputting the particulate release rates, along with local population and meteorological data, into EPA's CAP88-PC computer model.

CAP88-PC uses a modified Gaussian plume equation to estimate the average dispersion of radionuclides released from the site. Exposure assessments are done on a circular grid of distances and directions extending to a radius of 80 km (50 mi) around the site. The location of the nearest receptor is one of the distances for which this assessment is performed. The model reports receptor dose rates based on the distances used as input parameters. These receptor dose rates are based on a continuous exposure scenario. Therefore, in reporting the dose rate to the maximally exposed individual, the computed dose rate is adjusted for an appropriate occupancy scenario.

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. Estimates of the radionuclide concentrations in produce, leafy vegetables, milk and meat consumed by humans, are made by coupling the output of the atmospheric transport models with the U.S. Nuclear Regulatory Commission Regulatory Guide 1.109 terrestrial food chain models. The population density used in the model was based on known land use surrounding the site and 1990 census figures. The effective dose equivalent is calculated by combining the inhalation and ingestion intake rates and the air and ground surface concentrations with dose conversion factors, using the weighting factors in the International Commission on Radiological Protection (ICRP) Publication 26.

Summary of Input Parameters

Average Annual Temperature: 9.0°C (48.2°F).

Total Annual Precipitation: 128 cm (53.4 in).

Wind Speed and Direction: CAP88-PC file IAG0905.WND.

Population Density: 1.24×10^5 people/m²

Location and Direction of Maximally Exposed Individual: 510 m East

Maximally Exposed Individual Occupancy Factor: 22.8 %

Section III (continued)

Compliance Assessment (Calculated on the basis of distance of maximally exposed individual from source and adjusted for a reasonable occupancy scenario.)

Effective Dose Equivalent of Maximally Exposed Individual: 3.0×10^{-5} 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: William M. Seay, Acting Director, Former Sites Restoration Division

Signature:  Date: 6/21/93

REK

Supplemental Information - NFSS

This section is not required by the NESHAPs regulations as part of the Annual Reporting requirements. The supplemental information is included to provide information for DOE guidance development and for future interactions with EPA. The bullet format of this section follows the guidance received from the Office of Environmental Guidance for the preparation of the calendar year 1992 air emissions annual reports for DOE sites.

- The total collective population dose is the sum of the doses from all exposure pathways. Because the only pathway with a significant potential contribution to the collective population dose is airborne contamination, the total population dose is equal to that calculated by CAP88-PC, Version 1.0; 5.86×10^{-3} person-rem/yr (5.86×10^{-5} person-Sv/yr). CAP88-PC output for NFSS emissions in 1992 is provided in Appendix A.
- 40 CFR Part 61 Subpart T, "National Emission Standards for Emissions from the Disposal of Uranium Mill Tailings", is not applicable to FUSRAP sites. Radon flux rate information and monitoring locations demonstrating compliance with the 20 pCi/m²/s (0.74 Bq/m²/s) limit of 40 CFR Part 61 Subpart Q, "National Emission Standards for Radon Emissions from Department of Energy Facilities", is provided in Appendix B.
- There are no sources containing U-232 and Th-232 at NFSS where emissions of Rn-220 could potentially exceed 0.1 mrem/yr to the public or 10% of the non-radon dose to the public.
- NFSS is a storage site with no known non-disposal/non-storage sources of Rn-222. Quarterly and annual average radon concentrations in air at NFSS for 1992 are provided in Appendix C.
- NFSS is not subject to 40 CFR Part 61 Subpart H Section 61.93(b) continuous monitoring requirements.

APPENDIX A

CAP88-PC OUTPUT

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
May 13, 1993 4:50 pm

Facility: NIAGARA FALLS STORAGE SITE
Address:
 City: LEWISTON
 State: NY Zip:

Effective Dose Equivalent
(mrem/year)

1.93E-04

At This Location: 500 Meters Northeast
Source Category: PILE
Source Type: Area
Emission Year: 1992

Comments: MAXIMALLY EXPOSED INDIVIDUAL

Dataset Name: SCENARIO1.DAT
Dataset Date: May 13, 1993 4:49 pm
Wind File: WNDFILES\IAG0905.WND

May 13, 1993 4:50 pm

SYNOPSIS
Page 1

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 500 Meters Northeast
Lifetime Fatal Cancer Risk: 2.27E-09

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	2.61E-05
BREAST	2.60E-05
R MAR	1.78E-04
LUNGS	7.25E-04
THYROID	2.58E-05
ENDOST	2.09E-03
RMNDR	3.46E-05
EFFEC	1.93E-04

May 13, 1993 4:50 pm

SYNOPSIS
Page 2

RADIOMUCLIDE EMISSIONS DURING THE YEAR 1992

Nuclide	Class	Size	Source	
			#1 Ci/y	TOTAL Ci/y
U-235	Y	1.00	1.4E-09	1.4E-09
TH-231	Y	1.00	1.4E-09	1.4E-09
PA-231	Y	1.00	1.4E-09	1.4E-09
AC-227	Y	1.00	1.4E-09	1.4E-09
TH-227	Y	1.00	1.4E-09	1.4E-09
FR-223	D	1.00	1.4E-09	1.4E-09
RA-223	W	1.00	1.4E-09	1.4E-09
U-238	Y	1.00	3.0E-08	3.0E-08
TH-234	Y	1.00	3.0E-08	3.0E-08
PA-234	Y	1.00	3.0E-08	3.0E-08
U-234	Y	1.00	3.2E-08	3.2E-08
TH-230	Y	1.00	3.2E-08	3.2E-08
RA-226	W	1.00	2.3E-06	2.3E-06

SITE INFORMATION

Temperature: 9 degrees C
Precipitation: 128 cm/y
Mixing Height: 1000 m

SOURCE INFORMATION

Source Number: 1

Source Height (m): 0.00
Area (sq m): 4.05E+04

Plume Rise
Pasquill Cat: A B C D E F G
Fixed (m): 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00
(Fixed Rise)

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	1.000	1.000	1.000
Fraction From Assessment Area:	0.000	0.000	0.000
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

500	510	520	530	540	550	560	570	580	590
600	610	620	630	640	650	700	800	1000	1100

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
May 13, 1993 4:50 pm

Facility: NIAGARA FALLS STORAGE SITE
Address:
 City: LEWISTON
 State: NY Zip:

Source Category: PILE
 Source Type: Area
 Emission Year: 1992

Comments: MAXIMALLY EXPOSED INDIVIDUALL

Dataset Name: SCENARIO1.DAT
Dataset Date: May 13, 1993 4:49 pm
Wind File: WNDFILES\IAG0905.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
GONADS	2.61E-05
BREAST	2.60E-05
R MAR	1.78E-04
LUNGS	7.25E-04
THYROID	2.58E-05
ENDOST	2.09E-03
RMNDR	3.46E-05
EFFEC	1.93E-04

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	8.40E-05
INHALATION	1.08E-04
AIR IMMERSION	1.33E-10
GROUND SURFACE	8.66E-07
INTERNAL	1.92E-04
EXTERNAL	8.66E-07
TOTAL	1.93E-04

May 13, 1993 4:50 pm

SUMMARY
Page 2

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
U-235	5.22E-07
TH-231	3.94E-12
PA-231	2.04E-06
AC-227	2.62E-06
TH-227	4.62E-08
FR-223	9.53E-12
RA-223	3.79E-08
U-238	1.06E-05
TH-234	7.73E-09
PA-234	2.69E-10
U-234	1.28E-05
TH-230	2.31E-05
RA-226	1.41E-04
TOTAL	1.93E-04

May 13, 1993 4:50 pm

SUMMARY
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CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
LEUKEMIA	1.80E-10
BONE	1.07E-10
THYROID	4.74E-12
BREAST	4.05E-11
LUNG	1.77E-09
STOMACH	3.22E-11
BOWEL	2.44E-11
LIVER	3.58E-11
PANCREAS	2.39E-11
URINARY	1.82E-11
OTHER	2.92E-11
TOTAL	2.27E-09

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	4.23E-10
INHALATION	1.82E-09
AIR IMMERSION	3.18E-15
GROUND SURFACE	2.02E-11
INTERNAL	2.25E-09
EXTERNAL	2.02E-11
TOTAL	2.27E-09

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-235	6.79E-12
TH-231	1.15E-16
PA-231	1.10E-11
AC-227	2.24E-11
TH-227	1.26E-12
FR-223	1.01E-16
RA-223	8.37E-13
U-238	1.36E-10
TH-234	2.28E-13
PA-234	6.90E-15
U-234	1.63E-10
TH-230	1.89E-10
RA-226	1.74E-09
TOTAL	2.27E-09

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

Direction	Distance (m)							
	500	510	520	530	540	550	560	
N	1.1E-04	1.1E-04	1.1E-04	1.0E-04	1.0E-04	9.7E-05	9.4E-05	
NNW	3.7E-05	3.5E-05	3.3E-05	3.2E-05	3.1E-05	3.0E-05	2.9E-05	
NW	6.5E-05	6.3E-05	6.1E-05	5.9E-05	5.7E-05	5.5E-05	5.3E-05	
WNW	8.4E-05	8.1E-05	7.8E-05	7.5E-05	7.2E-05	7.0E-05	6.8E-05	
W	1.5E-04	1.4E-04	1.4E-04	1.3E-04	1.3E-04	1.2E-04	1.2E-04	
WSW	8.6E-05	8.2E-05	7.9E-05	7.6E-05	7.4E-05	7.1E-05	6.9E-05	
SW	8.5E-05	8.2E-05	8.0E-05	7.7E-05	7.4E-05	7.2E-05	6.9E-05	
SSW	5.7E-05	5.4E-05	5.2E-05	5.0E-05	4.9E-05	4.7E-05	4.5E-05	
S	9.2E-05	8.9E-05	8.6E-05	8.3E-05	8.0E-05	7.8E-05	7.5E-05	
SSE	8.2E-05	7.9E-05	7.6E-05	7.3E-05	7.1E-05	6.8E-05	6.6E-05	
SE	1.3E-04	1.2E-04	1.2E-04	1.2E-04	1.1E-04	1.1E-04	1.1E-04	
ESE	1.2E-04	1.1E-04	1.1E-04	1.1E-04	1.0E-04	9.8E-05	9.5E-05	
E	1.4E-04	1.3E-04	1.3E-04	1.3E-04	1.2E-04	1.2E-04	1.1E-04	
ENE	1.3E-04	1.3E-04	1.2E-04	1.2E-04	1.1E-04	1.1E-04	1.1E-04	
NE	1.9E-04	1.9E-04	1.8E-04	1.7E-04	1.7E-04	1.6E-04	1.6E-04	
NNE	1.3E-04	1.2E-04	1.2E-04	1.1E-04	1.1E-04	1.1E-04	1.0E-04	

Direction	Distance (m)							
	570	580	590	600	610	620	630	
N	9.1E-05	8.8E-05	8.5E-05	8.2E-05	8.0E-05	7.8E-05	7.5E-05	
NNW	2.8E-05	2.7E-05	2.6E-05	2.6E-05	2.5E-05	2.4E-05	2.3E-05	
NW	5.1E-05	4.9E-05	4.8E-05	4.7E-05	4.5E-05	4.4E-05	4.3E-05	
WNW	6.5E-05	6.3E-05	6.1E-05	5.9E-05	5.8E-05	5.6E-05	5.4E-05	
W	1.1E-04	1.1E-04	1.1E-04	1.0E-04	1.0E-04	9.8E-05	9.5E-05	
WSW	6.6E-05	6.4E-05	6.2E-05	6.0E-05	5.9E-05	5.7E-05	5.5E-05	
SW	6.7E-05	6.5E-05	6.3E-05	6.1E-05	5.9E-05	5.7E-05	5.6E-05	
SSW	4.4E-05	4.2E-05	4.1E-05	4.0E-05	3.9E-05	3.8E-05	3.6E-05	
S	7.3E-05	7.0E-05	6.8E-05	6.6E-05	6.4E-05	6.2E-05	6.0E-05	
SSE	6.4E-05	6.2E-05	6.0E-05	5.8E-05	5.6E-05	5.5E-05	5.3E-05	
SE	1.0E-04	9.8E-05	9.5E-05	9.2E-05	9.0E-05	8.7E-05	8.5E-05	
ESE	9.2E-05	8.9E-05	8.6E-05	8.3E-05	8.1E-05	7.9E-05	7.6E-05	
E	1.1E-04	1.1E-04	1.0E-04	1.0E-04	9.7E-05	9.4E-05	9.1E-05	
ENE	1.0E-04	1.0E-04	9.7E-05	9.4E-05	9.1E-05	8.8E-05	8.6E-05	
NE	1.5E-04	1.5E-04	1.4E-04	1.4E-04	1.3E-04	1.3E-04	1.3E-04	
NNE	9.9E-05	9.6E-05	9.3E-05	9.1E-05	8.8E-05	8.5E-05	8.3E-05	

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

Direction	Distance (m)					
	640	650	700	800	1000	1100
N	7.3E-05	7.1E-05	6.2E-05	4.9E-05	3.3E-05	2.8E-05
NNW	2.3E-05	2.2E-05	1.9E-05	1.5E-05	1.0E-05	8.7E-06
NW	4.1E-05	4.0E-05	3.5E-05	2.8E-05	1.8E-05	1.6E-05
WNW	5.3E-05	5.1E-05	4.5E-05	3.5E-05	2.3E-05	2.0E-05
W	9.2E-05	9.0E-05	7.8E-05	6.1E-05	4.1E-05	3.5E-05
WSW	5.4E-05	5.2E-05	4.6E-05	3.6E-05	2.4E-05	2.0E-05
SW	5.4E-05	5.3E-05	4.6E-05	3.6E-05	2.4E-05	2.1E-05
SSW	3.5E-05	3.4E-05	3.0E-05	2.4E-05	1.6E-05	1.4E-05
S	5.9E-05	5.7E-05	5.0E-05	3.9E-05	2.6E-05	2.2E-05
SSE	5.2E-05	5.0E-05	4.4E-05	3.4E-05	2.3E-05	2.0E-05
SE	8.2E-05	8.0E-05	7.0E-05	5.5E-05	3.7E-05	3.1E-05
ESE	7.4E-05	7.2E-05	6.3E-05	5.0E-05	3.3E-05	2.8E-05
E	8.9E-05	8.6E-05	7.6E-05	5.9E-05	4.0E-05	3.4E-05
ENE	8.3E-05	8.1E-05	7.1E-05	5.6E-05	3.7E-05	3.2E-05
NE	1.2E-04	1.2E-04	1.0E-04	8.2E-05	5.5E-05	4.7E-05
NNE	8.1E-05	7.8E-05	6.8E-05	5.4E-05	3.6E-05	3.1E-05

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

Direction	Distance (m)						
	500	510	520	530	540	550	560
N	1.4E-09	1.3E-09	1.3E-09	1.2E-09	1.2E-09	1.1E-09	1.1E-09
NNW	4.4E-10	4.1E-10	3.9E-10	3.8E-10	3.7E-10	3.5E-10	3.4E-10
NW	7.7E-10	7.4E-10	7.1E-10	6.9E-10	6.6E-10	6.4E-10	6.2E-10
WNW	9.9E-10	9.5E-10	9.1E-10	8.8E-10	8.5E-10	8.2E-10	8.0E-10
W	1.7E-09	1.7E-09	1.6E-09	1.5E-09	1.5E-09	1.4E-09	1.4E-09
WSW	1.0E-09	9.7E-10	9.3E-10	9.0E-10	8.7E-10	8.4E-10	8.1E-10
SW	1.0E-09	9.7E-10	9.4E-10	9.0E-10	8.7E-10	8.4E-10	8.1E-10
SSW	6.7E-10	6.3E-10	6.1E-10	5.9E-10	5.7E-10	5.5E-10	5.3E-10
S	1.1E-09	1.0E-09	1.0E-09	9.8E-10	9.4E-10	9.1E-10	8.8E-10
SSE	9.6E-10	9.2E-10	8.9E-10	8.6E-10	8.3E-10	8.0E-10	7.7E-10
SE	1.5E-09	1.5E-09	1.4E-09	1.4E-09	1.3E-09	1.3E-09	1.2E-09
ESE	1.4E-09	1.3E-09	1.3E-09	1.2E-09	1.2E-09	1.2E-09	1.1E-09
E	1.6E-09	1.6E-09	1.5E-09	1.5E-09	1.4E-09	1.4E-09	1.3E-09
ENE	1.6E-09	1.5E-09	1.4E-09	1.4E-09	1.3E-09	1.3E-09	1.3E-09
NE	2.3E-09	2.2E-09	2.1E-09	2.1E-09	2.0E-09	1.9E-09	1.9E-09
NNE	1.5E-09	1.4E-09	1.4E-09	1.3E-09	1.3E-09	1.3E-09	1.2E-09

Direction	Distance (m)						
	570	580	590	600	610	620	630
N	1.1E-09	1.0E-09	1.0E-09	9.7E-10	9.4E-10	9.1E-10	8.8E-10
NNW	3.3E-10	3.2E-10	3.1E-10	3.0E-10	2.9E-10	2.8E-10	2.7E-10
NW	6.0E-10	5.8E-10	5.6E-10	5.4E-10	5.3E-10	5.1E-10	5.0E-10
WNW	7.7E-10	7.4E-10	7.2E-10	7.0E-10	6.7E-10	6.5E-10	6.3E-10
W	1.3E-09	1.3E-09	1.3E-09	1.2E-09	1.2E-09	1.1E-09	1.1E-09
WSW	7.8E-10	7.5E-10	7.3E-10	7.1E-10	6.9E-10	6.7E-10	6.5E-10
SW	7.8E-10	7.6E-10	7.4E-10	7.1E-10	6.9E-10	6.7E-10	6.5E-10
SSW	5.1E-10	5.0E-10	4.8E-10	4.7E-10	4.5E-10	4.4E-10	4.3E-10
S	8.5E-10	8.2E-10	8.0E-10	7.7E-10	7.5E-10	7.3E-10	7.0E-10
SSE	7.4E-10	7.2E-10	7.0E-10	6.8E-10	6.6E-10	6.4E-10	6.2E-10
SE	1.2E-09	1.1E-09	1.1E-09	1.1E-09	1.0E-09	1.0E-09	9.8E-10
ESE	1.1E-09	1.0E-09	1.0E-09	9.7E-10	9.4E-10	9.2E-10	8.9E-10
E	1.3E-09	1.2E-09	1.2E-09	1.2E-09	1.1E-09	1.1E-09	1.1E-09
ENE	1.2E-09	1.2E-09	1.1E-09	1.1E-09	1.1E-09	1.0E-09	1.0E-09
NE	1.8E-09	1.7E-09	1.7E-09	1.6E-09	1.6E-09	1.5E-09	1.5E-09
NNE	1.2E-09	1.1E-09	1.1E-09	1.1E-09	1.0E-09	1.0E-09	9.7E-10

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

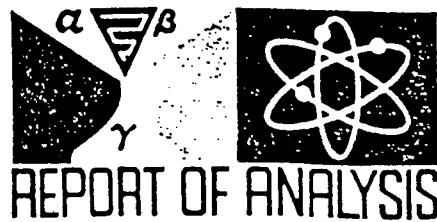
Direction	Distance (m)					
	640	650	700	800	1000	1100
N	8.6E-10	8.3E-10	7.2E-10	5.7E-10	3.7E-10	3.2E-10
NNW	2.6E-10	2.6E-10	2.2E-10	1.8E-10	1.2E-10	9.9E-11
NW	4.8E-10	4.7E-10	4.1E-10	3.2E-10	2.1E-10	1.8E-10
WNW	6.2E-10	6.0E-10	5.2E-10	4.1E-10	2.7E-10	2.3E-10
W	1.1E-09	1.1E-09	9.2E-10	7.1E-10	4.7E-10	4.0E-10
WSW	6.3E-10	6.1E-10	5.3E-10	4.1E-10	2.7E-10	2.3E-10
SW	6.3E-10	6.1E-10	5.4E-10	4.2E-10	2.8E-10	2.4E-10
SSW	4.1E-10	4.0E-10	3.5E-10	2.7E-10	1.8E-10	1.5E-10
S	6.8E-10	6.6E-10	5.8E-10	4.5E-10	3.0E-10	2.5E-10
SSE	6.0E-10	5.8E-10	5.1E-10	4.0E-10	2.6E-10	2.2E-10
SE	9.6E-10	9.3E-10	8.1E-10	6.3E-10	4.2E-10	3.6E-10
ESE	8.6E-10	8.4E-10	7.3E-10	5.7E-10	3.8E-10	3.2E-10
E	1.0E-09	1.0E-09	8.8E-10	6.9E-10	4.6E-10	3.9E-10
ENE	9.7E-10	9.5E-10	8.2E-10	6.4E-10	4.3E-10	3.7E-10
NE	1.4E-09	1.4E-09	1.2E-09	9.5E-10	6.3E-10	5.4E-10
NNE	9.4E-10	9.1E-10	8.0E-10	6.2E-10	4.1E-10	3.5E-10

APPENDIX B

RADON FLUX RATES

CUSTOMER
ATTENTION
ADDRESS
CITY
W.O. NO.

Bechtel National, Inc. - NFSS
Michael Bradshaw
P.O. Box 350
Oak Ridge, TN. 37831-0350
049



TYPE OF ANALYSIS

Radon Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED

6/30/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pCi/M ² /sec	
158-RF-001	6/15-6/16/92	Rn-222	6/18/92	0.09±0.01	
158-RF-002	6/15-6/16/92	Rn-222	6/18/92	0.16±0.01	
158-RF-003	6/15-6/16/92	Rn-222	6/18/92	0.06±0.01	
158-RF-004	6/15-6/16/92	Rn-222	6/18/92	0.20±0.01	
158-RF-005	6/15-6/16/92	Rn-222	6/18/92	0.05±0.01	
158-RF-006	6/15-6/16/92	Rn-222	6/18/92	0.04±0.01	
158-RF-007	6/15-6/16/92	Rn-222	6/18/92	0.10±0.01	
158-RF-008	6/15-6/16/92	Rn-222	6/18/92	0.06±0.01	
158-RF-009	6/15-6/16/92	Rn-222	6/18/92	0.08±0.01	
158-RF-010	6/15-6/16/92	Rn-222	6/18/92	0.04±0.01	
158-RF-011	6/15-6/16/92	Rn-222	6/18/92	0.10±0.01	FQC
158-RF-011	6/15-6/16/92	Rn-222	6/18/92	0.15±0.01	
158-RF-012	6/15-6/16/92	Rn-222	6/18/92	0.09±0.01	
158-RF-013	6/15-6/16/92	Rn-222	6/18/92	0.14±0.01	
158-RF-014	6/15-6/16/92	Rn-222	6/18/92	0.10±0.01	
158-RF-015	6/15-6/16/92	Rn-222	6/18/92	0.09±0.01	
158-RF-016	6/15-6/16/92	Rn-222	6/18/92	0.05±0.01	
158-RF-017	6/15-6/16/92	Rn-222	6/18/92	0.09±0.01	
158-RF-018	6/15-6/16/92	Rn-222	6/18/92	0.13±0.01	
158-RF-019	6/15-6/16/92	Rn-222	6/18/92	0.08±0.01	

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PAGE 1 OF 11 PAGE

EIA Eberline
Mercury Analytical Inc.

7921 PAN AMERICAN FREEWAY, N.E.
BUQUERQUE, NEW MEXICO 87109
(505) 345-3461

APPROVED BY

C. Lee Eberline
KRC/2

6/30/92

DATE

CUSTOMER Bechtel National, Inc. - NFSS
 ATTENTION Michael Bradshaw
 ADDRESS P.O. Box 350
 CITY Oak Ridge, TN. 37831-0350
 W.O. NO. 049



TYPE OF ANALYSIS

Radon Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED

6/30/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pCi/M ² /sec
158-RF-019	6/15-6/16/92	Rn-222	6/18/92	0.08±0.01 LQC
158-RF-020	6/15-6/16/92	Rn-222	6/19/92	0.10±0.01
158-RF-021	6/15-6/16/92	Rn-222	6/19/92	0.05±0.01
158-RF-022	6/15-6/16/92	Rn-222	6/19/92	0.10±0.01
158-RF-023	6/15-6/16/92	Rn-222	6/19/92	0.07±0.01
158-RF-024	6/15-6/16/92	Rn-222	6/19/92	0.08±0.01
158-RF-025	6/15-6/16/92	Rn-222	6/19/92	0.11±0.01
158-RF-026	6/15-6/16/92	Rn-222	6/19/92	0.10±0.01 FQC
158-RF-026	6/15-6/16/92	Rn-222	6/19/92	0.10±0.01
158-RF-027	6/15-6/16/92	Rn-222	6/19/92	0.11±0.01 FQC
158-RF-027	6/15-6/16/92	Rn-222	6/19/92	0.07±0.01
158-RF-028	6/15-6/16/92	Rn-222	6/19/92	0.04±0.01
158-RF-029	6/15-6/16/92	Rn-222	6/19/92	0.08±0.01
158-RF-030	6/15-6/16/92	Rn-222	6/19/92	0.13±0.01
158-RF-031	6/15-6/16/92	Rn-222	6/19/92	0.06±0.01
158-RF-032	6/15-6/16/92	Rn-222	6/19/92	0.23±0.02
158-RF-033	6/15-6/16/92	Rn-222	6/19/92	0.10±0.01
158-RF-034	6/15-6/16/92	Rn-222	6/19/92	0.04±0.01
158-RF-035	6/15-6/16/92	Rn-222	6/19/92	0.08±0.01
158-RF-036	6/15-6/16/92	Rn-222	6/19/92	0.11±0.01

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PAGE 2 OF 11 PAGE

TMA Eberline
 Thermo Analytical Inc.

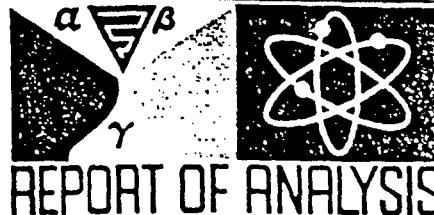
7021 PAN AMERICAN FREEWAY, N.E.
 ALBUQUERQUE, NEW MEXICO 87109
 PHONE (505) 345-3461

APPROVED BY

Chenee Eshel 6/30/92
 SKB

DATE

CUSTOMER Bechtel National, Inc. - NFSS
ATTENTION Michael Bradshaw
ADDRESS P.O. Box 350
CITY Oak Ridge, TN. 37831-0350
W.O. NO. 049



REPORT OF ANALYSIS

TYPE OF ANALYSIS

Radon Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED

6/30/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pCi/M ² /sec
158-RF-037	6/15-6/16/92	Rn-222	6/19/92	0.06±0.01
158-RF-038	6/15-6/16/92	Rn-222	6/19/92	0.06±0.01
158-RF-039	6/15-6/16/92	Rn-222	6/19/92	0.05±0.01
158-RF-039	6/15-6/16/92	Rn-222	6/19/92	0.04±0.01 LQC
158-RF-040	6/15-6/16/92	Rn-222	6/19/92	0.04±0.01
158-RF-041	6/15-6/16/92	Rn-222	6/19/92	0.06±0.01
158-RF-042	6/15-6/16/92	Rn-222	6/19/92	0.03±0.01
158-RF-043	6/15-6/16/92	Rn-222	6/19/92	0.10±0.01
158-RF-044	6/15-6/16/92	Rn-222	6/19/92	0.08±0.01 FQC
158-RF-044	6/15-6/16/92	Rn-222	6/19/92	0.09±0.01
158-RF-045	6/15-6/16/92	Rn-222	6/19/92	0.04±0.01
158-RF-046	6/15-6/16/92	Rn-222	6/19/92	0.04±0.01
158-RF-047	6/15-6/16/92	Rn-222	6/19/92	0.07±0.01
158-RF-048	6/15-6/16/92	Rn-222	6/19/92	0.06±0.01
158-RF-049	6/15-6/16/92	Rn-222	6/19/92	0.08±0.01
158-RF-050	6/15-6/16/92	Rn-222	6/19/92	0.08±0.01
158-RF-050	6/15-6/16/92	Rn-222	6/19/92	0.05±0.01 FQC
158-RF-051	6/15-6/16/92	Rn-222	6/19/92	0.07±0.01
158-RF-052	6/15-6/16/92	Rn-222	6/19/92	0.05±0.01
158-RF-053	6/15-6/16/92	Rn-222	6/19/92	0.06±0.01

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PAGE 3 OF 11 PAGE

TMA Eberline

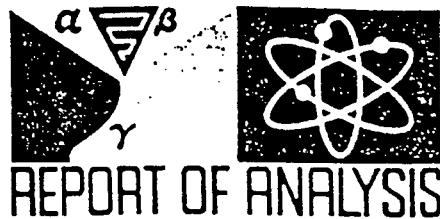
Thermo Analytical Inc.

7021 PAN AMERICAN FREEWAY, N.E.
ALBUQUERQUE, NEW MEXICO 87109
PHONE (505) 345-3461

APPROVED BY

Christee Echols 6/30/92
XO.B

CUSTOMER Bechtel National, Inc. - NFSS
 ATTENTION Michael Bradshaw
 ADDRESS P.O. Box 350
 CITY Oak Ridge, TN. 37831-0350
 W.O. NO. 049



TYPE OF ANALYSIS

Radon Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED

6/30/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pCi/M ² /sec
158-RF-054	6/15-6/16/92	Rn-222	6/19/92	0.28±0.02
158-RF-055	6/15-6/16/92	Rn-222	6/19/92	0.08±0.01
158-RF-055	6/15-6/16/92	Rn-222	6/19/92	0.09±0.01 LQC
158-RF-056	6/15-6/16/92	Rn-222	6/19/92	0.06±0.01
158-RF-057	6/15-6/16/92	Rn-222	6/19/92	0.02±0.01
158-RF-058	6/15-6/16/92	Rn-222	6/20/92	0.02±0.01
158-RF-059	6/15-6/16/92	Rn-222	6/20/92	0.01±0.01
158-RF-060	6/15-6/16/92	Rn-222	6/20/92	0.03±0.01
158-RF-061	6/15-6/16/92	Rn-222	6/20/92	0.03±0.01
158-RF-062	6/15-6/16/92	Rn-222	6/20/92	0.04±0.01
158-RF-063	6/15-6/16/92	Rn-222	6/20/92	0.03±0.01
158-RF-064	6/15-6/16/92	Rn-222	6/20/92	0.04±0.01
158-RF-065	6/15-6/16/92	Rn-222	6/20/92	0.08±0.02
158-RF-066	6/15-6/16/92	Rn-222	6/20/92	0.06±0.01 FQC
158-RF-066	6/15-6/16/92	Rn-222	6/20/92	0.04±0.01
158-RF-067	6/15-6/16/92	Rn-222	6/20/92	0.04±0.01
158-RF-068	6/15-6/16/92	Rn-222	6/20/92	0.02±0.01
158-RF-069	6/15-6/16/92	Rn-222	6/20/92	0.03±0.01 FQC
158-RF-069	6/15-6/16/92	Rn-222	6/20/92	0.03±0.01
158-RF-070	6/15-6/16/92	Rn-222	6/20/92	0.06±0.01

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PAGE 4 OF 11 PAGE

Eberline
Thermo Analytical Inc.

7021 PAN AMERICAN FREEWAY, N.E.
 ALBUQUERQUE, NEW MEXICO 87109
 ONE (505) 345-3461

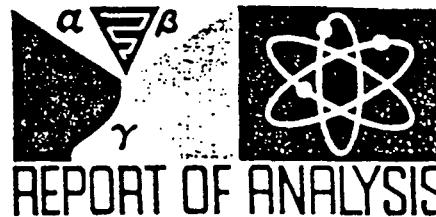
APPROVED BY

Clarie Eckels 6/30/92
 KMB

DATE

CUSTOMER
ATTENTION
ADDRESS
CITY
W.O. NO.

Bechtel National, Inc. - NFSS
Michael Bradshaw
P.O. Box 350
Oak Ridge, TN. 37831-0350
049



TYPE OF ANALYSIS

Radon-Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED

6/30/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pCi/M ² /sec
158-RF-071	6/15-6/16/92	Rn-222	6/20/92	0.07±0.02 LQC
158-RF-071	6/15-6/16/92	Rn-222	6/20/92	0.07±0.02
158-RF-072	6/15-6/16/92	Rn-222	6/20/92	0.18±0.02
158-RF-073	6/15-6/16/92	Rn-222	6/20/92	0.04±0.01
158-RF-074	6/15-6/16/92	Rn-222	6/20/92	0.05±0.01
158-RF-075	6/15-6/16/92	Rn-222	6/20/92	0.02±0.01
158-RF-076	6/15-6/16/92	Rn-222	6/20/92	0.04±0.01
158-RF-077	6/15-6/16/92	Rn-222	6/20/92	0.04±0.01
158-RF-078	6/15-6/16/92	Rn-222	6/20/92	0.04±0.01 FQC
158-RF-078	6/15-6/16/92	Rn-222	6/20/92	0.05±0.01
158-RF-079	6/15-6/16/92	Rn-222	6/20/92	0.10±0.02
158-RF-080	6/15-6/16/92	Rn-222	6/20/92	0.04±0.01
158-RF-081	6/15-6/16/92	Rn-222	6/20/92	0.03±0.01
158-RF-082	6/15-6/16/92	Rn-222	6/20/92	0.08±0.02
158-RF-083	6/15-6/16/92	Rn-222	6/20/92	0.04±0.01 FQC
158-RF-083	6/15-6/16/92	Rn-222	6/20/92	0.05±0.02
158-RF-084	6/15-6/16/92	Rn-222	6/20/92	0.04±0.01
158-RF-085	6/15-6/16/92	Rn-222	6/20/92	0.02±0.01
158-RF-086	6/15-6/16/92	Rn-222	6/20/92	0.11±0.02
158-RF-087	6/15-6/16/92	Rn-222	6/20/92	0.06±0.02

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PAGE 5 OF 11 PAGE

TMA Eberline
Thermo Analytical Inc.

2021 PAN AMERICAN FREEWAY, N.E.
ALBUQUERQUE, NEW MEXICO 87109
PHONE (505) 345-3461

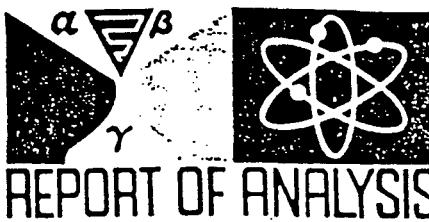
APPROVED BY

Cherie Eckels 6/30/92
DRB

DA

CUSTOMER
ATTENTION
ADDRESS
CITY
W.O. NO.

Bechtel National, Inc. - NFSS
Michael Bradshaw
P.O. Box 350
Oak Ridge, TN. 37831-0350
049



REPORT OF ANALYSIS

TYPE OF ANALYSIS

Radon-Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED

6/30/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pCi/M ² /sec
158-RF-088	6/15-6/16/92	Rn-222	6/20/92	0.10±0.02 FQC
158-RF-088	6/15-6/16/92	Rn-222	6/20/92	0.10±0.02
158-RF-089	6/15-6/16/92	Rn-222	6/20/92	0.11±0.02
158-RF-090	6/15-6/16/92	Rn-222	6/20/92	0.07±0.02 LQC
158-RF-090	6/15-6/16/92	Rn-222	6/20/92	0.07±0.02
158-RF-091	6/15-6/16/92	Rn-222	6/20/92	0.09±0.02
158-RF-092	6/15-6/16/92	Rn-222	6/20/92	0.03±0.01
158-RF-093	6/15-6/16/92	Rn-222	6/20/92	0.03±0.01
158-RF-094	6/15-6/16/92	Rn-222	6/20/92	0.08±0.02
158-RF-095	6/15-6/16/92	Rn-222	6/20/92	0.04±0.01
158-RF-096	6/15-6/16/92	Rn-222	6/20/92	0.03±0.01
158-RF-097	6/15-6/16/92	Rn-222	6/20/92	0.02±0.01
158-RF-098	6/15-6/16/92	Rn-222	6/20/92	0.04±0.01
158-RF-099	6/15-6/16/92	Rn-222	6/20/92	0.14±0.02
158-RF-100	6/15-6/16/92	Rn-222	6/20/92	0.07±0.02
158-RF-101	6/15-6/16/92	Rn-222	6/20/92	0.03±0.01
158-RF-102	6/15-6/16/92	Rn-222	6/20/92	0.04±0.01
158-RF-103	6/15-6/16/92	Rn-222	6/20/92	0.01±0.01
158-RF-104	6/15-6/16/92	Rn-222	6/20/92	0.06±0.02
158-RF-105	6/15-6/16/92	Rn-222	6/20/92	0.05±0.02

REPORTED VIA TELEPHONE

PAGE 6 OF 11 PAGE

TMA Eberline
Thermo Analytical Inc.

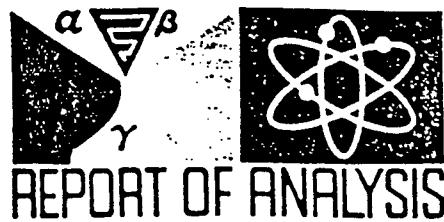
7021 PAN AMERICAN FREEWAY, N.E.
ALBUQUERQUE, NEW MEXICO 87109
PHONE (505) 345-3461

APPROVED BY

C. Lance Eberline 6/30/92
NDR

DAT

CUSTOMER Bechtel National, Inc. - NFSS
ATTENTION Michael Bradshaw
ADDRESS P.O. Box 350
CITY Oak Ridge, TN. 37831-0350
W.O. NO. 049



TYPE OF ANALYSIS

Radon Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED

6/30/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pCi/M ² /sec
158-RF-106	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02
158-RF-107	6/15-6/16/92	Rn-222	6/20/92	0.05±0.02
158-RF-108	6/15-6/16/92	Rn-222	6/20/92	0.10±0.02
158-RF-109	6/15-6/16/92	Rn-222	6/20/92	0.05±0.02 LQC
158-RF-109	6/15-6/16/92	Rn-222	6/20/92	0.06±0.02
158-RF-110	6/15-6/16/92	Rn-222	6/20/92	0.03±0.01
158-RF-111	6/15-6/16/92	Rn-222	6/20/92	0.07±0.02
158-RF-112	6/15-6/16/92	Rn-222	6/20/92	0.08±0.02
158-RF-113	6/15-6/16/92	Rn-222	6/20/92	0.09±0.02
158-RF-114	6/15-6/16/92	Rn-222	6/20/92	0.02±0.01
158-RF-115	6/15-6/16/92	Rn-222	6/20/92	0.02±0.01
158-RF-116	6/15-6/16/92	Rn-222	6/20/92	0.01±0.01
158-RF-117	6/15-6/16/92	Rn-222	6/20/92	0.13±0.02
158-RF-118	6/15-6/16/92	Rn-222	6/20/92	0.02±0.01
158-RF-119	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02
158-RF-120	6/15-6/16/92	Rn-222	6/20/92	0.03±0.02
158-RF-121	6/15-6/16/92	Rn-222	6/20/92	0.03±0.01
158-RF-122	6/15-6/16/92	Rn-222	6/20/92	0.05±0.02
158-RF-123	6/15-6/16/92	Rn-222	6/20/92	0.02±0.01
158-RF-124	6/15-6/16/92	Rn-222	6/20/92	0.03±0.02

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PAGE 7 OF 11 PAGE

Eberline
Thermo Analytical Inc.

7021 PAN AMERICAN FREEWAY, N.E.
BUQUERQUE, NEW MEXICO 87109
ONE (505) 345-3461

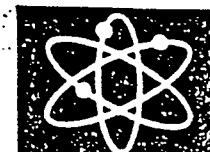
APPROVED BY

C. Renee Echols 6/30/92
R.R.

DATE

CUSTOMER
ATTENTION
ADDRESS
CITY
W.O. NO.

Bechtel National, Inc. - NFSS
Michael Bradshaw
P.O. Box 350
Oak Ridge, TN. 37831-0350
049



REPORT OF ANALYSIS

TYPE OF ANALYSIS

Radon Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED

6/30/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pCi/M ² /sec
158-RF-125	6/15-6/16/92	Rn-222	6/20/92	0.03±0.02
158-RF-126	6/15-6/16/92	Rn-222	6/20/92	0.14±0.02
158-RF-126	6/15-6/16/92	Rn-222	6/20/92	0.06±0.02 FQC
158-RF-127	6/15-6/16/92	Rn-222	6/20/92	0.09±0.02
158-RF-128	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02
158-RF-128	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02 FQC
158-RF-129	6/15-6/16/92	Rn-222	6/20/92	0.16±0.02
158-RF-130	6/15-6/16/92	Rn-222	6/20/92	0.03±0.02 LQC
158-RF-130	6/15-6/16/92	Rn-222	6/20/92	0.03±0.02
158-RF-131	6/15-6/16/92	Rn-222	6/20/92	0.02±0.02
158-RF-132	6/15-6/16/92	Rn-222	6/20/92	0.03±0.02
158-RF-133	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02
158-RF-134	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02
158-RF-135	6/15-6/16/92	Rn-222	6/20/92	0.17±0.02
158-RF-136	6/15-6/16/92	Rn-222	6/20/92	0.03±0.02
158-RF-137	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02
158-RF-138	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02
158-RF-139	6/15-6/16/92	Rn-222	6/20/92	0.01±0.01
158-RF-140	6/15-6/16/92	Rn-222	6/20/92	0.01±0.01
158-RF-141	6/15-6/16/92	Rn-222	6/20/92	0.03±0.02

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PAGE 8 OF 11 PAGE

OMA Eberline
Thermo Analytical Inc.

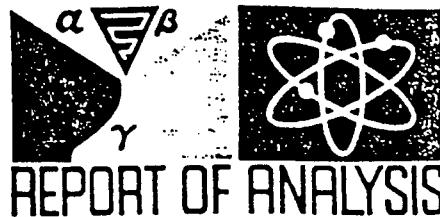
7021 PAN AMERICAN FREEWAY, N.E.
ALBUQUERQUE, NEW MEXICO 87109
PHONE (505) 345-3461

APPROVED BY

C. Renee Eckels 6/30/92

DATE

CUSTOMER Bechtel National, Inc. - NFSS
ATTENTION Michael Bradshaw
ADDRESS P.O. Box 350
CITY Oak Ridge, TN. 37831-0350
W.O. NO. 049



TYPE OF ANALYSIS

Radon-Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED

6/30/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pcCi/M ² /sec
158-RF-142	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02
158-RF-143	6/15-6/16/92	Rn-222	6/20/92	0.05±0.02
158-RF-144	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02 FQC
158-RF-144	6/15-6/16/92	Rn-222	6/20/92	0.06±0.02
158-RF-145	6/15-6/16/92	Rn-222	6/20/92	0.05±0.02
158-RF-146	6/15-6/16/92	Rn-222	6/20/92	0.08±0.02 LQC
158-RF-146	6/15-6/16/92	Rn-222	6/20/92	0.08±0.02
158-RF-147	6/15-6/16/92	Rn-222	6/20/92	0.03±0.02
158-RF-148	6/15-6/16/92	Rn-222	6/20/92	0.03±0.02 FQC
158-RF-148	6/15-6/16/92	Rn-222	6/20/92	0.05±0.01
158-RF-149	6/15-6/16/92	Rn-222	6/20/92	0.02±0.02
158-RF-150	6/15-6/16/92	Rn-222	6/20/92	0.10±0.02
158-RF-151	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02
158-RF-152	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02
158-RF-153	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02
158-RF-154	6/15-6/16/92	Rn-222	6/20/92	0.03±0.02
158-RF-155	6/15-6/16/92	Rn-222	6/20/92	0.03±0.02
158-RF-156	6/15-6/16/92	Rn-222	6/20/92	0.06±0.02
158-RF-157	6/15-6/16/92	Rn-222	6/20/92	0.02±0.02
158-RF-158	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02
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PAGE 9 OF 11 PAGE

TMA Eberline
Thermo Analytical Inc.

2021 PAN AMERICAN FREEWAY, N.E.
ALBUQUERQUE, NEW MEXICO 87109
PHONE (505) 345-3461

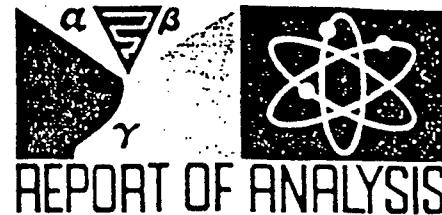
APPROVED BY

C. Renee Echols 6/30/92
PVR

DATE

CUSTOMER
ATTENTION
ADDRESS
CITY
W.O. NO.

Bechtel National, Inc. - NFSS
Michael Bradshaw
P.O. Box 350
Oak Ridge, TN. 37831-0350
049



TYPE OF ANALYSIS

Radon Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED

6/30/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pCi/M ² /sec
158-RF-159	6/15-6/16/92	Rn-222	6/20/92	0.06±0.02
158-RF-160	6/15-6/16/92	Rn-222	6/20/92	0.05±0.02 FQC
158-RF-160	6/15-6/16/92	Rn-222	6/20/92	0.07±0.02
158-RF-161	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02
158-RF-162	6/15-6/16/92	Rn-222	6/20/92	0.08±0.02
158-RF-163	6/15-6/16/92	Rn-222	6/20/92	0.12±0.02
158-RF-164	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02 FQC
158-RF-164	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02
158-RF-165	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02 FQC
158-RF-165	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02
158-RF-166	6/15-6/16/92	Rn-222	6/20/92	0.13±0.02
158-RF-167	6/15-6/16/92	Rn-222	6/20/92	0.06±0.02 LQC
158-RF-167	6/15-6/16/92	Rn-222	6/20/92	0.06±0.02
158-RF-168	6/15-6/16/92	Rn-222	6/20/92	0.07±0.02
158-RF-169	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02
158-RF-170	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02
158-RF-171	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02 FQC
158-RF-171	6/15-6/16/92	Rn-222	6/20/92	0.04±0.02
158-RF-172	6/15-6/16/92	Rn-222	6/20/92	0.05±0.02
158-RF-173	6/15-6/16/92	Rn-222	6/20/92	0.02±0.02

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PAGE 10 OF 11 PAGE

Eberline
Lermo Analytical Inc.

1021 PAN AMERICAN FREEWAY, N.E.
ALBUQUERQUE, NEW MEXICO 87109
PHONE (505) 345-3461

APPROVED BY

C. Renee Echols 6/30/92
DRB

DATE

CUSTOMER
ATTENTION
ADDRESS
CITY
W.O. NO.

Bechtel National, Inc. - NFSS
Michael Bradshaw
P.O. Box 350
Oak Ridge, TN. 37831-0350
049



TYPE OF ANALYSIS

Radon Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED

6/30/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pCi/M ² /sec
158-RF-174	6/15-6/16/92	Rn-222	6/20/92	0.02±0.02
58-RF-175	6/15-6/16/92	Rn-222	6/20/92	0.09±0.02
158-RF-176	6/15-6/16/92	Rn-222	6/20/92	0.05±0.02
58-RF-177	6/15-6/16/92	Rn-222	6/20/92	0.07±0.02
158-RF-178	6/15-6/16/92	Rn-222	6/20/92	0.11±0.02
158-RF-179	6/15-6/16/92	Rn-222	6/20/92	0.25±0.02 LQC
58-RF-179	6/15-6/16/92	Rn-222	6/20/92	0.25±0.02
158-RF-180	6/15-6/16/92	Rn-222	6/20/92	0.06±0.02

REPORTED VIA TELEPHONE

PAGE 11 OF 11 PAGE

TMA Eberline
Thermo Analytical Inc.

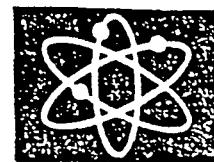
7021 PAN AMERICAN FREEWAY, N.E.
ALBUQUERQUE, NEW MEXICO 87109
PHONE (505) 345-3461

APPROVED BY

C. Lance Eberle 6/30/92
JDRB

DATE

CUSTOMER Bechtel National, Inc. - NFSS
ATTENTION Michael Bradshaw
ADDRESS P.O. Box 350
CITY Oak Ridge, TN. 37831-0350
W.O. NO.



REPORT OF ANALYSIS

TYPE OF ANALYSIS

Radon Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED 11/11/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pCi/M ² /sec
202-RF-001	10/27-10/28/92	Rn-222	10/30/92	0.31±0.07
202-RF-002	10/27-10/28/92	Rn-222	10/30/92	0.83±0.08
202-RF-003	10/27-10/28/92	Rn-222	10/30/92	0.50±0.08
202-RF-004	10/27-10/28/92	Rn-222	10/31/92	0.62±0.09
202-RF-005	10/27-10/28/92	Rn-222	10/31/92	0.46±0.08
202-RF-006	10/27-10/28/92	Rn-222	10/30/92	0.52±0.08
202-RF-007	10/27-10/28/92	Rn-222	10/31/92	0.80±0.09
202-RF-008	10/27-10/28/92	Rn-222	10/31/92	0.43±0.08
202-RF-009	10/27-10/28/92	Rn-222	10/30/92	0.70±0.08
202-RF-010	10/27-10/28/92	Rn-222	10/31/92	1.46±0.10
202-RF-011	10/27-10/28/92	Rn-222	10/31/92	0.95±0.09
202-RF-012	10/27-10/28/92	Rn-222	10/31/92	1.12±0.09
202-RF-013	10/27-10/28/92	Rn-222	10/30/92	1.31±0.09
202-RF-014	10/27-10/28/92	Rn-222	10/30/92	1.26±0.09
202-RF-015	10/27-10/28/92	Rn-222	10/31/92	0.97±0.09
202-RF-016	10/27-10/28/92	Rn-222	10/31/92	0.75±0.09
202-RF-017	10/27-10/28/92	Rn-222	10/30/92	0.74±0.08
202-RF-018	10/27-10/28/92	Rn-222	10/31/92	0.47±0.08
202-RF-019	10/27-10/28/92	Rn-222	10/30/92	0.78±0.08
202-RF-020	10/27-10/28/92	Rn-222	10/31/92	0.92±0.09

REPORTED VIA TELEPHONE

PAGE 1 OF 11 PAGE

TMA Eberline
Thermal Analytical Inc.

7021 PAN AMERICAN FREEWAY, N.E.
ALBUQUERQUE, NEW MEXICO 87109
PHONE (505) 345-3461

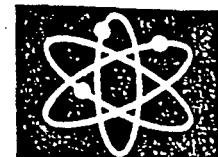
APPROVED BY

11-13-92

11-16-92

CUSTOMER
ATTENTION
ADDRESS
CITY
W.O. NO.

Bechtel National, Inc. - NFSS
Michael Bradshaw
P.O. Box 350
Oak Ridge, TN. 37831-0350



REPORT OF ANALYSIS

TYPE OF ANALYSIS

Radon Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED 11/11/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pCi/M ² /sec
202-RF-021	10/27-10/28/92	Rn-222	10/30/92	0.38±0.07
202-RF-022	10/27-10/28/92	Rn-222	10/31/92	1.34±0.10
202-RF-023	10/27-10/28/92	Rn-222	10/30/92	0.77±0.08
202-RF-024	10/27-10/28/92	Rn-222	10/30/92	1.16±0.09
202-RF-025	10/27-10/28/92	Rn-222	10/31/92	0.97±0.09
202-RF-026	10/27-10/28/92	Rn-222	10/30/92	1.31±0.09
202-RF-027	10/27-10/28/92	Rn-222	10/30/92	1.02±0.08
202-RF-028	10/27-10/28/92	Rn-222	10/30/92	0.92±0.08
202-RF-029	10/27-10/28/92	Rn-222	10/30/92	0.48±0.07
202-RF-030	10/27-10/28/92	Rn-222	10/30/92	0.93±0.08
202-RF-031	10/27-10/28/92	Rn-222	10/30/92	0.80±0.08
202-RF-032	10/27-10/28/92	Rn-222	10/31/92	0.72±0.09
202-RF-033	10/27-10/28/92	Rn-222	10/30/92	0.82±0.08
202-RF-034	10/27-10/28/92	Rn-222	10/31/92	0.77±0.09
202-RF-035	10/27-10/28/92	Rn-222	10/30/92	0.75±0.08
202-RF-036	10/27-10/28/92	Rn-222	10/30/92	0.69±0.08
202-RF-037	10/27-10/28/92	Rn-222	10/30/92	0.67±0.08
202-RF-038	10/27-10/28/92	Rn-222	11/02/92	0.68±0.12
202-RF-039	10/27-10/28/92	Rn-222	11/02/92	0.80±0.12
202-RF-040	10/27-10/28/92	Rn-222	11/02/92	0.74±0.12

REPORTED VIA TELEPHONE

PAGE 2 OF 11 PAGE

TMA Eberline
Thermo Analytical Inc.

921 PAN AMERICAN FREEWAY, N.E.
ALBUQUERQUE, NEW MEXICO 87109
PHONE (505) 345-3461

APPROVED BY

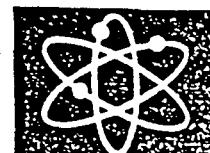
M. Bradshaw

DATE

11-13-

11-16-52

CUSTOMER Bechtel National, Inc. - NFSS
ATTENTION Michael Bradshaw
ADDRESS P.O. Box 350
CITY Oak Ridge, TN. 37831-0350
W.O. NO.



REPORT OF ANALYSIS

TYPE OF ANALYSIS

Radon Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED 11/11/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pCi/M ² /sec
202-RF-041	10/27-10/28/92	Rn-222	10/31/92	1.27±0.10
202-RF-042	10/27-10/28/92	Rn-222	11/02/92	0.89±0.13
202-RF-043	10/27-10/28/92	Rn-222	10/31/92	0.93±0.09
202-RF-044	10/27-10/28/92	Rn-222	11/02/92	0.80±0.12
202-RF-045	10/27-10/28/92	Rn-222	10/31/92	0.90±0.09
202-RF-046	10/27-10/28/92	Rn-222	10/31/92	0.96±0.09
202-RF-047	10/27-10/28/92	Rn-222	11/02/92	0.87±0.13
202-RF-048	10/27-10/28/92	Rn-222	10/31/92	0.93±0.09
202-RF-049	10/27-10/28/92	Rn-222	10/31/92	1.38±0.10
202-RF-050	10/27-10/28/92	Rn-222	11/02/92	0.57±0.12
202-RF-051	10/27-10/28/92	Rn-222	10/31/92	0.69±0.09
202-RF-052	10/27-10/28/92	Rn-222	11/02/92	0.69±0.12
202-RF-053	10/27-10/28/92	Rn-222	10/31/92	0.53±0.08
202-RF-054	10/27-10/28/92	Rn-222	11/02/92	0.95±0.12
202-RF-055	10/27-10/28/92	Rn-222	10/31/92	1.69±0.10
202-RF-056	10/27-10/28/92	Rn-222	10/31/92	0.69±0.09
202-RF-057	10/27-10/28/92	Rn-222	11/02/92	0.60±0.12
202-RF-058	10/27-10/28/92	Rn-222	10/31/92	0.66±0.08
202-RF-059	10/27-10/28/92	Rn-222	10/31/92	0.58±0.08
202-RF-060	10/27-10/28/92	Rn-222	10/31/92	0.51±0.08

REPORTED VIA TELEPHONE

PAGE 3 OF 11 PAGE

TMA Eberline

Thermo Analytical Inc.

7021 PAN AMERICAN FREEWAY, N.E.
ALBUQUERQUE, NEW MEXICO 87109
PHONE (505) 345-3461

APPROVED BY

DAT

11-13-92
11-16-92

CUSTOMER
ATTENTION
ADDRESS
CITY
W.O. NO.

Bechtel National, Inc. - NFSS
Michael Bradshaw
P.O. Box 350
Oak Ridge, TN. 37831-0350



TYPE OF ANALYSIS

Radon Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED 11/11/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pCi/M ² /sec
202-RF-061	10/27-10/28/92	Rn-222	10/31/92	0.81±0.09
202-RF-062	10/27-10/28/92	Rn-222	10/31/92	0.70±0.09
202-RF-063	10/27-10/28/92	Rn-222	10/31/92	1.30±0.10
202-RF-064	10/27-10/28/92	Rn-222	10/31/92	1.10±0.09
202-RF-065	10/27-10/28/92	Rn-222	11/02/92	1.15±0.13
202-RF-066	10/27-10/28/92	Rn-222	11/02/92	0.44±0.12
202-RF-067	10/27-10/28/92	Rn-222	10/31/92	0.31±0.08
202-RF-068	10/27-10/28/92	Rn-222	11/02/92	0.51±0.12
202-RF-069	10/27-10/28/92	Rn-222	10/31/92	0.66±0.09
202-RF-070	10/27-10/28/92	Rn-222	10/31/92	0.49±0.09
202-RF-071	10/27-10/28/92	Rn-222	11/02/92	1.08±0.13
202-RF-072	10/27-10/28/92	Rn-222	11/02/92	1.96±0.14
202-RF-073	10/27-10/28/92	Rn-222	10/31/92	1.12±0.10
202-RF-075	10/27-10/28/92	Rn-222	10/31/92	0.46±0.09
202-RF-076	10/27-10/28/92	Rn-222	11/02/92	0.50±0.12
202-RF-078	10/27-10/28/92	Rn-222	10/31/92	0.44±0.08
202-RF-079	10/27-10/28/92	Rn-222	11/02/92	0.65±0.12
202-RF-080	10/27-10/28/92	Rn-222	10/31/92	0.57±0.09
202-RF-081	10/27-10/28/92	Rn-222	11/02/92	0.65±0.12
202-RF-082	10/27-10/28/92	Rn-222	11/02/92	0.65±0.12

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Eberline
Memorandum Analytical Inc.

7021 PAN AMERICAN FREEWAY, N.E.
BUQUERQUE, NEW MEXICO 87109
(505) 345-3461

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DATE

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11-13-92

CUSTOMER
ATTENTION
ADDRESS
CITY
W.O. NO.

Bechtel National, Inc. - NFSS
Michael Bradshaw
P.O. Box 350
Oak Ridge, TN. 37831-0350



TYPE OF ANALYSIS

Radon Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED 11/11/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pCi/M ² /sec
202-RF-083	10/27-10/28/92	Rn-222	11/02/92	0.46±0.12
202-RF-084	10/27-10/28/92	Rn-222	11/02/92	0.35±0.11
202-RF-085	10/27-10/28/92	Rn-222	10/31/92	0.63±0.08
202-RF-086	10/27-10/28/92	Rn-222	10/31/92	0.46±0.08
202-RF-087	10/27-10/28/92	Rn-222	10/31/92	0.75±0.09
202-RF-088	10/27-10/28/92	Rn-222	10/31/92	0.39±0.08
202-RF-089	10/27-10/28/92	Rn-222	10/31/92	0.63±0.09
202-RF-090	10/27-10/28/92	Rn-222	10/31/92	0.95±0.09
202-RF-091	10/27-10/28/92	Rn-222	10/31/92	0.67±0.09
202-RF-092	10/27-10/28/92	Rn-222	10/31/92	0.60±0.09
202-RF-093	10/27-10/28/92	Rn-222	10/31/92	0.53±0.09
202-RF-094	10/27-10/28/92	Rn-222	10/31/92	0.55±0.09
202-RF-095	10/27-10/28/92	Rn-222	10/30/92	0.36±0.07
202-RF-096	10/27-10/28/92	Rn-222	10/31/92	0.52±0.09
202-RF-097	10/27-10/28/92	Rn-222	10/31/92	0.52±0.08
202-RF-098	10/27-10/28/92	Rn-222	10/31/92	0.58±0.09
202-RF-099	10/27-10/28/92	Rn-222	10/31/92	2.19±0.11
202-RF-100	10/27-10/28/92	Rn-222	10/31/92	1.38±0.10
202-RF-101	10/27-10/28/92	Rn-222	10/31/92	0.66±0.09
202-RF-102	10/27-10/28/92	Rn-222	10/31/92	0.50±0.09

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PAGE 5 OF 11 PAGE

TMA Eberline
Thermo Analytical Inc.

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ALBUQUERQUE, NEW MEXICO 87109
PHONE (505) 345-3461

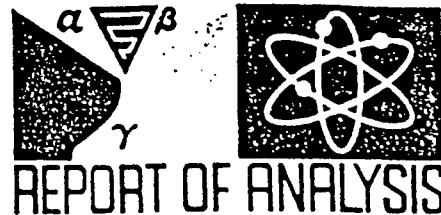
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M. Bradshaw
11/12/92

11-13-

11-14-

CUSTOMER
ATTENTION
ADDRESS
CITY
W.O. NO.

Bechtel National, Inc. - NFSS
Michael Bradshaw
P.O. Box 350
Oak Ridge, TN. 37831-0350



TYPE OF ANALYSIS

Radon Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED 11/11/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pCi/M ² /sec
202-RF-103	10/27-10/28/92	Rn-222	10/31/92	0.32±0.08
2-RF-104	10/27-10/28/92	Rn-222	10/31/92	0.47±0.08
202-RF-105	10/27-10/28/92	Rn-222	10/31/92	0.59±0.09
2-RF-106	10/27-10/28/92	Rn-222	10/31/92	0.61±0.09
2-RF-107	10/27-10/28/92	Rn-222	10/31/92	0.79±0.09
202-RF-108	10/27-10/28/92	Rn-222	11/02/92	1.34±0.13
2-RF-109	10/27-10/28/92	Rn-222	11/02/92	1.12±0.13
202-RF-110	10/27-10/28/92	Rn-222	11/02/92	1.03±0.13
2-RF-111	10/27-10/28/92	Rn-222	10/30/92	0.60±0.07
2-RF-112	10/27-10/28/92	Rn-222	10/30/92	0.57±0.07
02-RF-113	10/27-10/28/92	Rn-222	10/30/92	0.39±0.07
2-RF-114	10/27-10/28/92	Rn-222	10/30/92	0.57±0.07
02-RF-115	10/27-10/28/92	Rn-222	10/30/92	0.67±0.08
2-RF-116	10/27-10/28/92	Rn-222	10/30/92	0.48±0.07
2-RF-117	10/27-10/28/92	Rn-222	10/30/92	1.29±0.09
02-RF-118	10/27-10/28/92	Rn-222	10/30/92	0.99±0.08
2-RF-119	10/27-10/28/92	Rn-222	10/30/92	0.77±0.08
02-RF-120	10/27-10/28/92	Rn-222	10/30/92	0.32±0.07
2-RF-121	10/27-10/28/92	Rn-222	10/30/92	0.55±0.07
2-RF-122	10/27-10/28/92	Rn-222	10/30/92	0.50±0.07

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mermo Analytical Inc.

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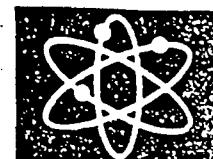
DATE

11-13-92

11-16-92

CUSTOMER
ATTENTION
ADDRESS
CITY
W.O. NO.

Bechtel National, Inc. - NFSS
Michael Bradshaw
P.O. Box 350
Oak Ridge, TN. 37831-0350



REPORT OF ANALYSIS

TYPE OF ANALYSIS

Radon Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED 11/11/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pCi/M ² /sec
202-RF-123	10/27-10/28/92	Rn-222	10/30/92	0.71±0.08
202-RF-124	10/27-10/28/92	Rn-222	10/30/92	0.48±0.07
202-RF-125	10/27-10/28/92	Rn-222	10/30/92	0.80±0.08
202-RF-126	10/27-10/28/92	Rn-222	10/30/92	0.91±0.08
202-RF-127	10/27-10/28/92	Rn-222	10/30/92	1.28±0.09
202-RF-128	10/27-10/28/92	Rn-222	10/30/92	0.90±0.08
202-RF-129	10/27-10/28/92	Rn-222	10/30/92	0.45±0.07
202-RF-130	10/27-10/28/92	Rn-222	10/30/92	0.56±0.07
202-RF-131	10/27-10/28/92	Rn-222	10/30/92	0.45±0.07
202-RF-132	10/27-10/28/92	Rn-222	10/30/92	0.46±0.07
202-RF-133	10/27-10/28/92	Rn-222	10/30/92	0.53±0.07
202-RF-134	10/27-10/28/92	Rn-222	10/30/92	0.45±0.07
202-RF-135	10/27-10/28/92	Rn-222	10/30/92	0.85±0.08
202-RF-136	10/27-10/28/92	Rn-222	10/30/92	0.67±0.07
202-RF-137	10/27-10/28/92	Rn-222	10/30/92	1.00±0.08
202-RF-138	10/27-10/28/92	Rn-222	10/30/92	0.86±0.08
202-RF-139	10/27-10/28/92	Rn-222	10/30/92	0.55±0.07
202-RF-140	10/27-10/28/92	Rn-222	10/30/92	1.08±0.08
202-RF-141	10/27-10/28/92	Rn-222	10/30/92	0.53±0.07
202-RF-142	10/27-10/28/92	Rn-222	10/30/92	0.62±0.07

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Thermo Analytical Inc.

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PHONE (505) 345-3461

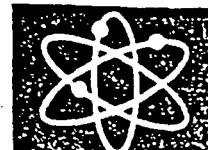
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11-13-

11-16-9

CUSTOMER Bechtel National, Inc. - NFSS
ATTENTION Michael Bradshaw
ADDRESS P.O. Box 350
CITY Oak Ridge, TN. 37831-0350
W.O. NO.



REPORT OF ANALYSIS

TYPE OF ANALYSIS

Radon Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED 11/11/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pCi/M ² /sec
202-RF-143	10/27-10/28/92	Rn-222	10/30/92	0.68±0.08
02-RF-144	10/27-10/28/92	Rn-222	10/30/92	0.79±0.08
202-RF-145	10/27-10/28/92	Rn-222	10/30/92	0.79±0.08
202-RF-146	10/27-10/28/92	Rn-222	10/30/92	0.59±0.07
02-RF-147	10/27-10/28/92	Rn-222	10/30/92	0.75±0.08
202-RF-148	10/27-10/28/92	Rn-222	10/31/92	0.36±0.08
02-RF-149	10/27-10/28/92	Rn-222	10/31/92	0.54±0.08
202-RF-150	10/27-10/28/92	Rn-222	10/30/92	0.69±0.08
202-RF-151	10/27-10/28/92	Rn-222	10/30/92	0.44±0.07
02-RF-152	10/27-10/28/92	Rn-222	10/30/92	0.52±0.08
202-RF-153	10/27-10/28/92	Rn-222	10/30/92	1.05±0.08
02-RF-154	10/27-10/28/92	Rn-222	10/30/92	0.91±0.08
202-RF-155	10/27-10/28/92	Rn-222	10/31/92	0.56±0.08
202-RF-156	10/27-10/28/92	Rn-222	10/30/92	0.63±0.08
02-RF-157	10/27-10/28/92	Rn-222	10/31/92	0.55±0.09
202-RF-158	10/27-10/28/92	Rn-222	10/31/92	0.76±0.09
02-RF-159	10/27-10/28/92	Rn-222	10/31/92	0.45±0.08
202-RF-160	10/27-10/28/92	Rn-222	10/31/92	0.75±0.09
202-RF-161	10/27-10/28/92	Rn-222	10/30/92	0.33±0.07
02-RF-162	10/27-10/28/92	Rn-222	10/30/92	0.69±0.08

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PHONE (505) 345-3461

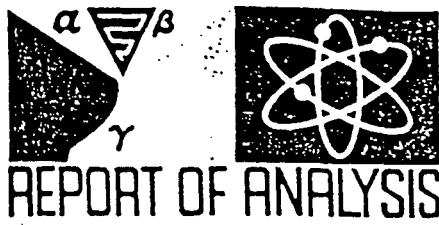
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J. Michael Bradshaw
JMB

DA

11-17-92

11-16-92

CUSTOMER
ATTENTION
ADDRESS
CITY
W.O. NO.
Bechtel National, Inc. - NFSS
Michael Bradshaw
P.O. Box 350
Oak Ridge, TN. 37831-0350



TYPE OF ANALYSIS

Radon Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED 11/11/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pcCi/M ² /sec	
202-RF-163	10/27-10/28/92	Rn-222	10/30/92	0.38±0.07	
202-RF-164	10/27-10/28/92	Rn-222	10/31/92	0.30±0.08	
202-RF-165	10/27-10/28/92	Rn-222	10/31/92	0.33±0.08	
202-RF-166	10/27-10/28/92	Rn-222	10/31/92	0.60±0.09	
202-RF-167	10/27-10/28/92	Rn-222	10/30/92	0.52±0.08	
202-RF-168	10/27-10/28/92	Rn-222	10/30/92	0.74±0.08	
202-RF-169	10/27-10/28/92	Rn-222	10/31/92	0.36±0.08	
202-RF-170	10/27-10/28/92	Rn-222	10/31/92	0.50±0.08	
202-RF-171	10/27-10/28/92	Rn-222	10/31/92	0.53±0.08	
202-RF-172	10/27-10/28/92	Rn-222	10/31/92	1.07±0.10	
202-RF-173	10/27-10/28/92	Rn-222	10/30/92	0.85±0.08	
202-RF-174	10/27-10/28/92	Rn-222	10/31/92	0.83±0.09	
202-RF-175	10/27-10/28/92	Rn-222	10/31/92	0.72±0.09	
202-RF-176	10/27-10/28/92	Rn-222	10/31/92	0.65±0.09	
202-RF-177	10/27-10/28/92	Rn-222	10/30/92	0.68±0.08	
202-RF-178	10/27-10/28/92	Rn-222	10/31/92	1.52±0.10	
202-RF-179	10/27-10/28/92	Rn-222	10/31/92	0.88±0.09	
202-RF-011	10/27-10/28/92	Rn-222	10/30/92	1.10±0.09	QC
202-RF-026	10/27-10/28/92	Rn-222	10/30/92	1.26±0.09	QC
202-RF-027	10/27-10/28/92	Rn-222	10/30/92	1.28±0.09	QC

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Thermo Analytical Inc.

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PHONE (505) 345-3461

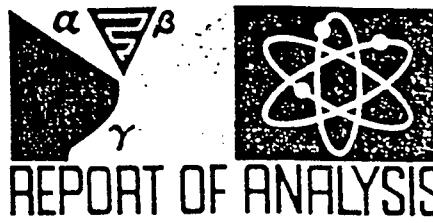
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DATE

11-13-

11-16-9

CUSTOMER Bechtel National, Inc. - NFSS
ATTENTION Michael Bradshaw
ADDRESS P.O. Box 350
CITY Oak Ridge, TN. 37831-0350
W.O. NO.



TYPE OF ANALYSIS

Radon Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED 11/11/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pCi/M ² /sec	
202-RF-038	10/27-10/28/92	Rn-222	11/02/92	0.66±0.12	LQC
02-RF-039	10/27-10/28/92	Rn-222	11/02/92	0.80±0.12	LQC
202-RF-042	10/27-10/28/92	Rn-222	11/02/92	0.94±0.13	LQC
202-RF-044	10/27-10/28/92	Rn-222	10/31/92	1.40±0.10	QC
02-RF-047	10/27-10/28/92	Rn-222	11/02/92	0.89±0.13	LQC
202-RF-050	10/27-10/28/92	Rn-222	11/02/92	0.55±0.12	LQC
02-RF-050	10/27-10/28/92	Rn-222	11/02/92	0.42±0.12	QC
202-RF-057	10/27-10/28/92	Rn-222	11/02/92	0.63±0.12	LQC
202-RF-066	10/27-10/28/92	Rn-222	10/31/92	0.43±0.09	QC
02-RF-069	10/27-10/28/92	Rn-222	11/02/92	1.26±0.13	QC
202-RF-071	10/27-10/28/92	Rn-222	11/02/92	1.16±0.13	LQC
02-RF-076	10/27-10/28/92	Rn-222	11/02/92	0.45±0.12	LQC
202-RF-078	10/27-10/28/92	Rn-222	10/31/92	0.43±0.09	QC
202-RF-083	10/27-10/28/92	Rn-222	11/02/92	0.32±0.11	QC
02-RF-088	10/27-10/28/92	Rn-222	10/31/92	0.83±0.09	QC
202-RF-110	10/27-10/28/92	Rn-222	11/02/92	0.98±0.13	LQC
02-RF-126	10/27-10/28/92	Rn-222	10/30/92	0.90±0.08	QC
202-RF-128	10/27-10/28/92	Rn-222	10/30/92	0.74±0.08	QC
202-RF-141	10/27-10/28/92	Rn-222	10/30/92	0.53±0.07	LQC
02-RF-144	10/27-10/28/92	Rn-222	10/30/92	0.97±0.08	QC

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TMA Eberline
Thermo Analytical Inc.

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ALBUQUERQUE, NEW MEXICO 87109
PHONE (505) 345-3461

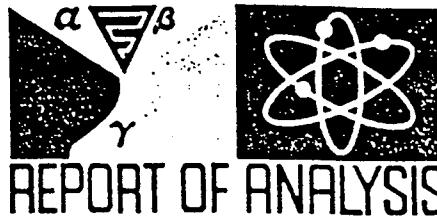
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DATE

11-13-92

11-16-92

CUSTOMER Bechtel National, Inc. - NFSS
ATTENTION Michael Bradshaw
ADDRESS P.O. Box 350
CITY Oak Ridge, TN. 37831-0350
W.O. NO.



TYPE OF ANALYSIS Radon Flux

CUSTOMER ORDER NUMBER

SAMPLES RECEIVED 11/11/92

Customer Identification	Date Collected	Type of Analysis	Date Analyzed	pCi/M ² /sec	QC
202-RF-148	10/27-10/28/92	Rn-222	10/30/92	0.65±0.08	QC
02-RF-160	10/27-10/28/92	Rn-222	10/31/92	0.50±0.08	QC
202-RF-164	10/27-10/28/92	Rn-222	10/30/92	0.26±0.07	QC

NOTE: Sample Numbers 202RF074 and 202RF077 could not be analyzed due to detector damage suffered during shipping, therefore there will not be a Radon Flux Concentration reported.

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-TMA Eberline
-Thermo Analytical Inc.

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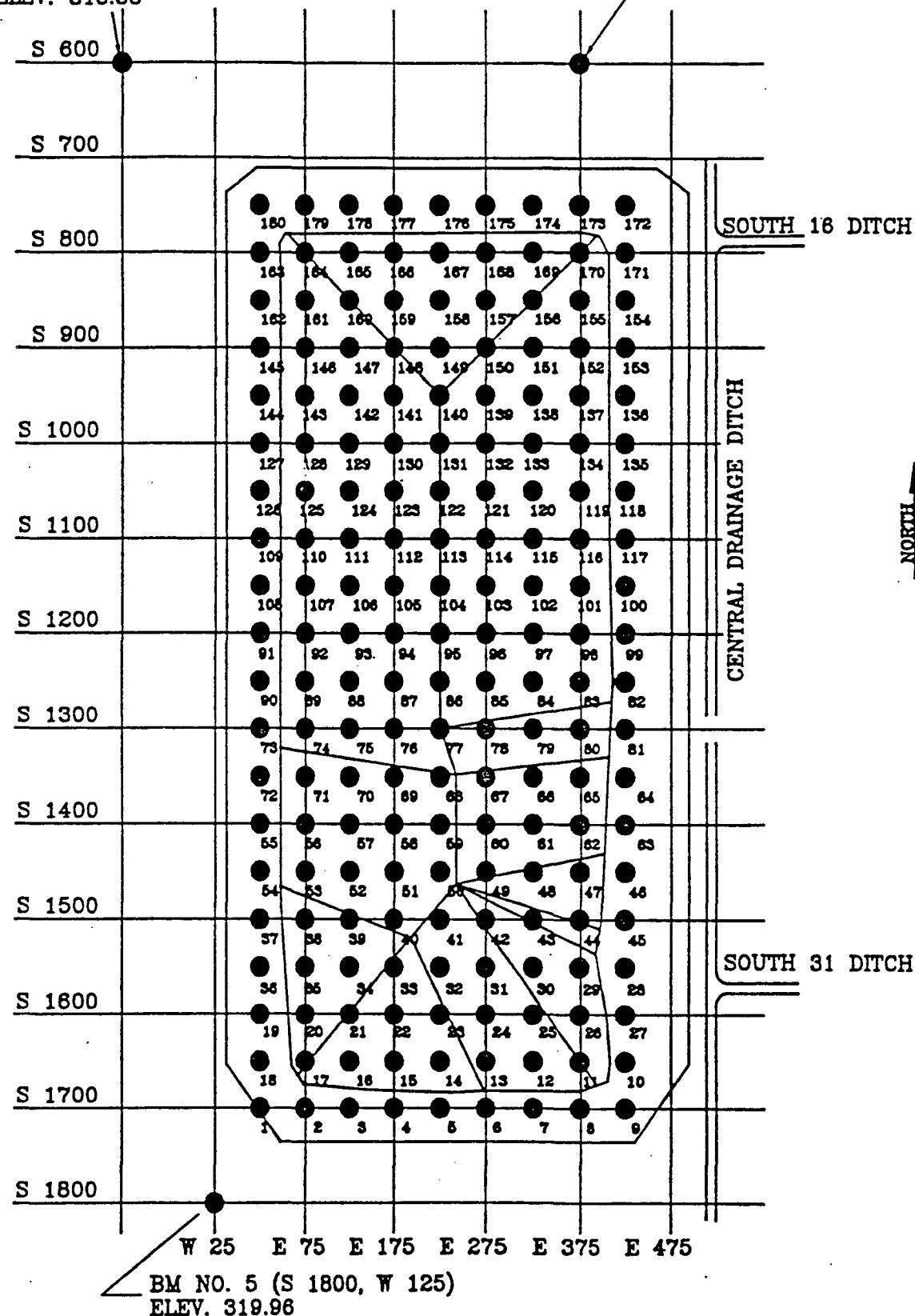
APPROVED BY

DAT

11-13-92
11-16-92

BM NO. 6 (S 600, W 125)
ELEV. 318.38

BM NO. 7 (S 600, E 375)
ELEV. 316.80



SURVEY GRID FOR THE NFSS WASTE CONTAINMENT STRUCTURE

APPENDIX C

RADON CONCENTRATIONS

Table C-1
Average Radon Concentrations at NFSS, 1992^{a,b}

Location ^c	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Average
(Concentrations are in $10^9 \mu\text{Ci}/\text{ml}$)					
Property Line					
1	0.5	0.3	<0.3	<0.3	0.4
7	<0.4	0.5	<0.3	<0.3	0.4
11	<0.4	<0.3	<0.3	<0.3	0.3
12	<0.4	0.4	<0.3	<0.3	0.4
13	<0.4	<0.3	<0.3	<0.3	0.3
15	0.6	0.4	<0.3	<0.3	0.4
28	0.4	0.4	<0.3	<0.3	0.4
29	<0.4	0.3	- ^d	<0.3	0.3
36	<0.4	<0.3	<0.3	<0.3	0.3
122	0.8	0.5	<0.3	<0.3	0.5
123	0.4	0.3	<0.3	<0.3	0.3
			Average		0.4
Quality Control					
32 ^e	<0.4	<0.3	<0.3	<0.3	0.3
Onsite					
8	<0.4	0.4	<0.3	<0.3	0.4
10	<0.4	0.3	0.4	<0.3	0.4
18	<0.4	<0.3	<0.3	<0.3	0.3
21	<0.4	0.5	<0.3	<0.3	0.4
23	<0.4	<0.3	<0.3	<0.3	0.3
24	<0.4	0.4	<0.3	<0.3	0.4
			Average		0.4
Background					
105	<0.4	0.5	<0.3	<0.3	0.4
112	<0.4	<0.3	<0.3	<0.3	0.3
116	<0.4	<0.3	<0.3	<0.3	0.3
120	<0.4	0.3	<0.3	<0.3	0.3
121	0.4	<0.3	<0.3	<0.3	0.3
			Average		0.3

^a1 $\times 10^9 \mu\text{Ci}/\text{ml}$ is equivalent to 0.037 Bq/L and 1 pCi/L. The DOE guideline is 3.0 $\times 10^9 \mu\text{Ci}/\text{ml}$. DOE Guideline is in addition to background.

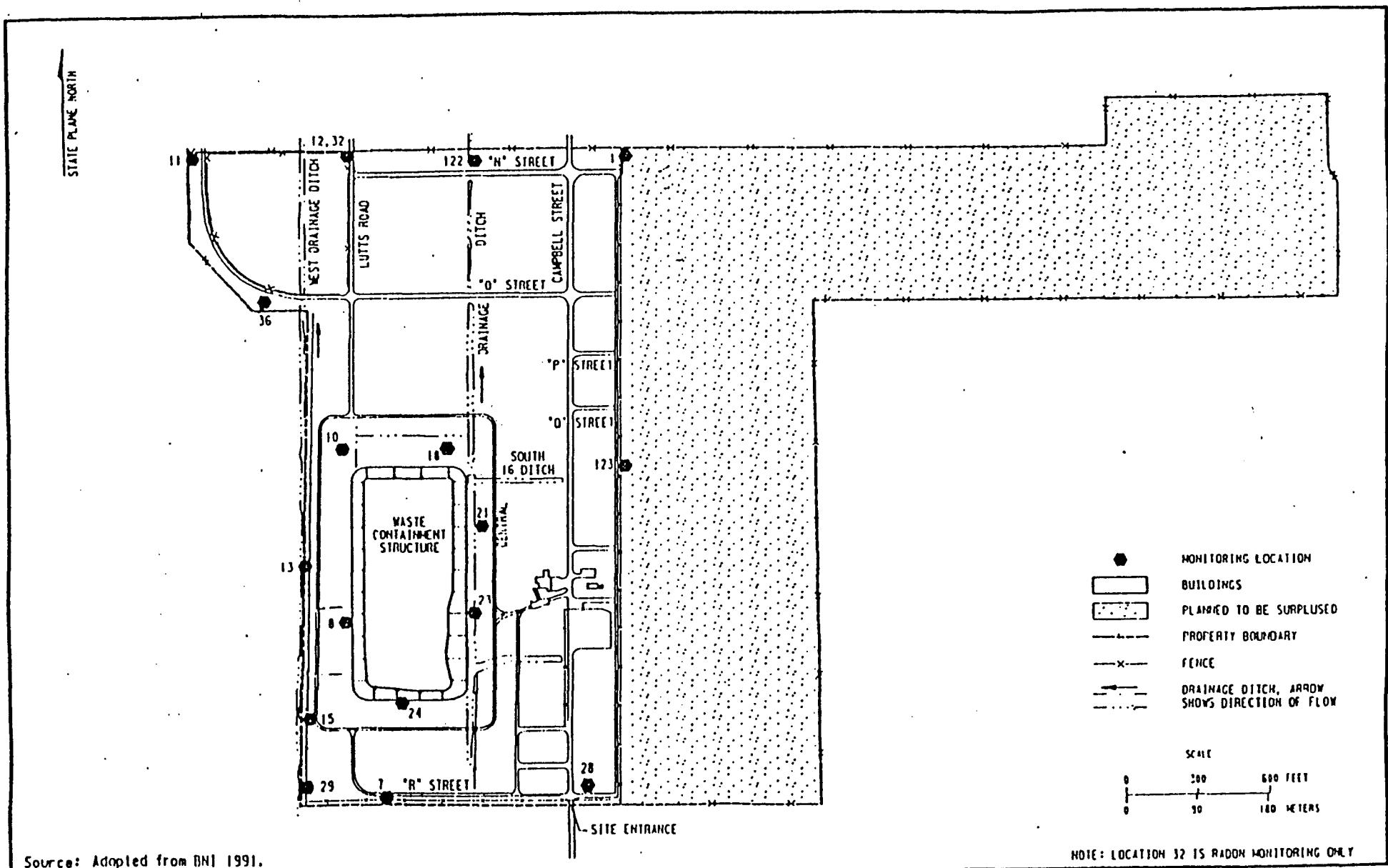
^bBackground has not been subtracted from the reported values.

Note: Concentrations at some stations were below values at background stations.

^cSampling locations are shown in Figures C-1 and C-2.

^dLost when fence moved (housing attached to fence).

^eStation 32 is a quality control station for Station 12.

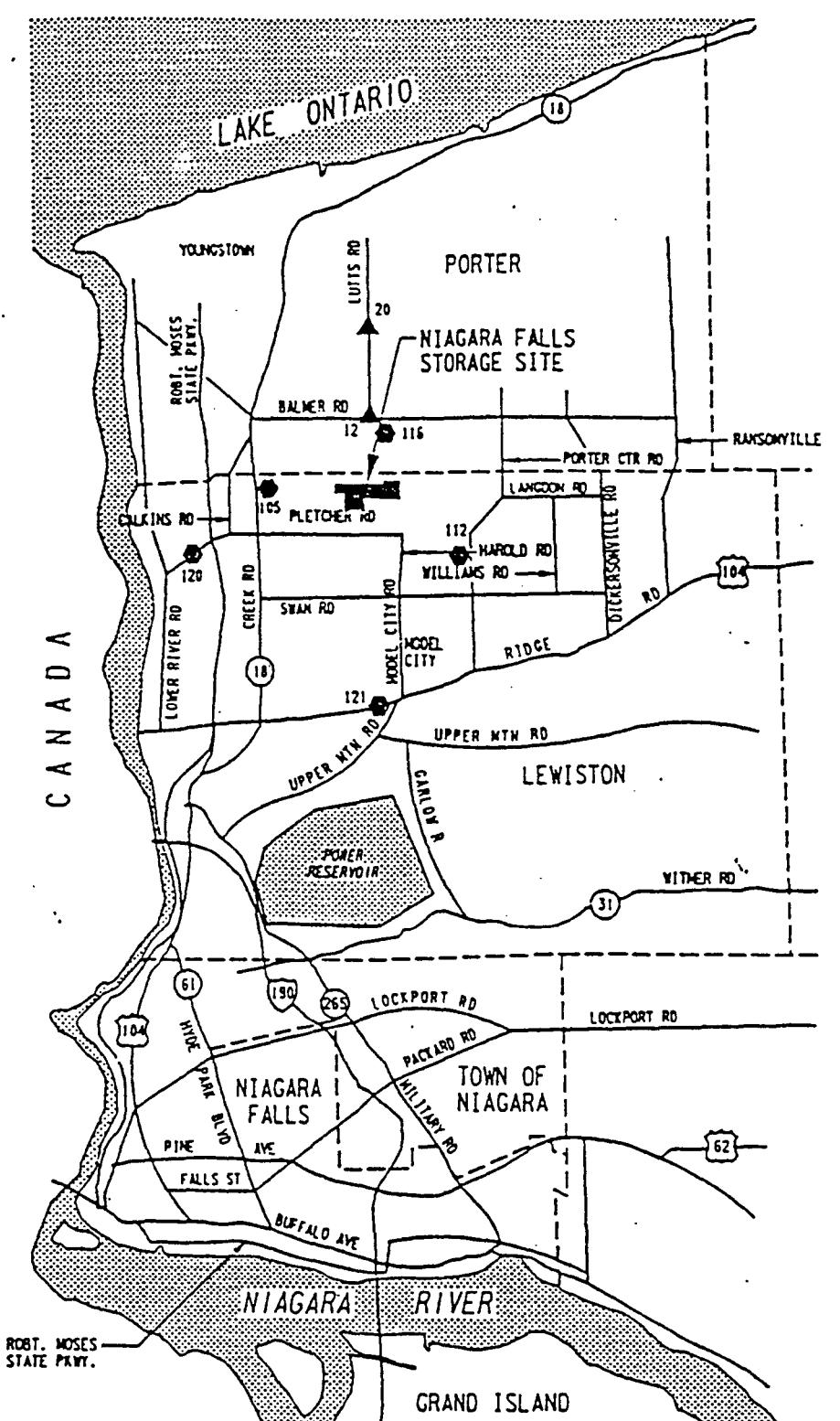


Source: Adopted from BN 1991.

R19F002.DCN GICO

Figure C-1
Onsite and Property-Line Radon and External

STATE PLANE NORTH



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Figure C-2
Offsite Radon, External Gamma Radiation, Surface Water,
and Sediment Monitoring Locations

SCALE
0 1 2 3 MILES
0 1 2 3 KILOMETERS