

700-C Fan 40-hr Test Result Brief: Emissions Samples and Dose Estimates

From October 27, 2021 through November 1, 2021, a test and balance of the underground ventilation system, during 700-C fan operation, was conducted at the Waste Isolation Pilot Plant (WIPP). The 700-C fan exhausts unfiltered air from the WIPP underground, and except for a four-hour test in January 2021 to evaluate operational capability, had been shut down since February 2014. The increased airflow from the 700-C fan will improve air quality to WIPP underground workers, and allow for increased overall facility efficiency. The DOE-CBFO and NWP performed augmented sampling during this 40-hour test.

Although several sampling systems were used to collect particulate air samples during the 40-hour test period, the samplers at the fan face were used for estimating public dose:

- **700-C fan face samplers** – consists of two shrouded probes (upper and lower) located at the exhaust screen of the 700-C fan. Each probe was connected to sample collection filters. For a conservative calculation, the highest reported data (from the upper probe only) were used to determine public dose. These samplers operated for the entire 40-hour test duration.
- **Station A** – a legacy sampling system consisting of skid-mounted fixed air samplers (FAS) that collect samples of airborne particulates exiting the exhaust shaft during ventilation. These at one time were the emission samplers of record, located about 135 feet (41 meters) horizontally from the fan face. Each skid is connected to a shrouded probe which is suspended in the exhaust shaft. Exhaust air from the underground passes Station A before reaching the 700-C fan face filters. These Station A samplers did not represent emissions to the outside air, therefore are not required in the estimation of public dose for this test. Station A is required to be in service during routine 700-C fan operations.

The measured radionuclide emissions are presented in Table 1. A more technical presentation is given in the report, 02RC-003, *700-C Fan Test Periodic Confirmatory Measurement Report for the U.S. Department of Energy Waste Isolation Pilot Plant, December 2021*. The data in Table 1 is reformatted in different units in Table 2 (for Am-241 and Pu-239/240, which together represent over 99% of the dose from detected radionuclides in this test), to make comparisons with data using International System of Units, as is found in reports from other WIPP stakeholder organizations.

Table 1. 700-C Fan 40-Hour Test Total Measured Emissions

NWP Sample Location	Am-241 (Ci)	Pu-239/240 (Ci)	Pu-238 (Ci)	U-233/234 (Ci)	U-238 (Ci)	Sr-90 (Ci)	Cs-137 (Ci)
700-C Fan Face Sampler (Upper Probe)	9.78E-08	1.15E-08	9.28E-09	< 4.91E-09	< 4.76E-09	< 9.40E-08	< 8.95E-07

* "<" signifies minimum detection level value: radionuclide not detected in this sample set.

Table 2. 700-C Fan Test Measured Radioactivity Comparisons

Radionuclide	NWP Location	Total Activity ¹ (Ci)	Total Activity ¹ (TBq)	Am-241/Pu-239/240 Ratio*
Am-241	Upper Probe	9.78E-08	3.62E-09	8.50
Pu-239/240	Upper Probe	1.15E-08	4.25E-10	

¹The total activity for the upper screen samples has been corrected to account for sample losses due to particles sticking to the insides of the sample lines.

* The ratio of Am-241 to Pu-239/240 is consistent with the contents of the February 2014 breached container.

The EPA's CAP88-PC computer model was used to estimate the dose to the maximally exposed individual (MEI) member of the public. This software is not typically used for estimating dose to a member of the public over such a short period of time; however, the EPA guidance for 40 CFR Part 191, Subpart A, allows the use of this software for special cases such as demonstrating compliance for a short-term situation. The MEI for the test conditions was considered to be at approximately 0.5 miles (786 meters) west-northwest of the 700-C fan. During this 700-C fan test, there were no restrictions on construction projects (i.e., the SSCVS and Utility Shaft projects were not shut

down). A non-WIPP business workspace (i.e., a construction office trailer at the nearest occupied point of the Utility Shaft project) is located 0.5 mile (786 m) from the 700-C fan emission point in the west-northwest direction. This location is outside the Exclusive Use Area fence line. The occupant of this temporary office space was designated as the maximally exposed individual during the test. For the annual effluent monitoring report, the maximally exposed individual will be determined based on annual meteorology data.

Since the test period calculation is based on the primary wind direction observed during the course of the test, existing pre-determined Action Levels based on annual meteorology were not of use. On-site airborne radioactivity limits based on worker safety were monitored by the Radiological Controls group. The public dose calculation results are presented in Table 3.

Table 3. Calculated Dose to the Public from the 700-C Fan Test

700-C Fan Four-Hour Test Dose	
Estimated Dose to the MEI for the 40-Hr 700-C Fan Test	7.39E-06 mrem
700-C Fan One-Year Hypothetical Extrapolated Dose and Regulatory Limits	
Estimated Dose to the MEI for the 700-C Fan One-Year Operation (hypothetical, with wind direction similar to the 40-Hr test period)	1.62E-03 mrem [based on a 40-hour test extrapolated to 24 hours per day, 365 days in a year.]
Regulatory Limit (40 CFR Part 191, Subpart A)	25 mrem/yr
Regulatory Limit (40 CFR Part 61, Subpart H)	10 mrem/yr
Regulatory Threshold for Periodic Sampling for the WIPP Facility (40 CFR Part 61, Subpart H)	0.1 mrem/yr

Summary

The analysis of the results for the 40-hour flow-balancing 700-C fan test indicates that a small amount of detectable radiological emission occurred. The estimated dose to the MEI was calculated to be 7.39E-06 millirem during calendar year 2021 for this test only. If the fan were hypothetically to run for a full calendar year at this emission level and under these specific meteorological conditions, the dose to that un-badged worker would be 1.62E-03 mrem. These values may be compared to the 25 mrem/year limit to a member of the public at the WIPP facility [40 CFR 191, Subpart A], and the 10 mrem/year limit from radiological air emissions to a member of the public from a DOE facility [40 CFR 61, Subpart H]. Either test result is far less than 1% of the 10 millirem/year value (<0.1mrem/year) limit, the WIPP facility authorized operating threshold level.

The potential radiation dose from this emission was far less than that received from naturally occurring sources. Radioactive potassium and other natural radionuclides found in a human body contribute about 29 mrem/year (from Radiation Sources and Doses | Radiation Protection | US EPA), approximately 3,920,000 times more than the radiation a member of the public might have received from this test. The radiation from the fan test emission is also about the same amount as one would receive from cosmic radiation by standing on the 10,700 foot high Albuquerque, New Mexico, Sandia Peak for about two seconds.

700-C Fan Test

Periodic Confirmatory Measurement Report for the U.S. Department of Energy Waste Isolation Pilot Plant

02RC-003
Revision 0
December 2021



This document was prepared by Nuclear Waste Partnerships, LLC
on behalf of the U.S. Department of Energy

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700-C Fan Test
Periodic Confirmatory Measurement Report for the
U.S. Department of Energy
Waste Isolation Pilot Plant

02RC-003, Revision 0

December 2021

In accordance 40 CFR 61, Subpart H, Memorandum of
Understanding Dated May 16, 1995, and
40 CFR 191, Subpart A

REVISION HISTORY

Revision	Change Description
0	New document.

EXECUTIVE SUMMARY

From October 27, 2021 through November 1, 2021, a test and balance of the underground ventilation system, during 700-C fan operation, was conducted at the Waste Isolation Pilot Plant (WIPP). The 700-C fan is one of three legacy ventilation fans that were in operation prior to the February 14, 2014, radiological event. Following the February 14, 2014, radiological event, the 700 series fans were shut down and the air exiting the exhaust shaft was directed through a high efficiency particulate air filtration system. Operation of the filtration system reduced the overall ventilation flowrate in the WIPP underground. In an effort to increase the overall ventilation rate, activities to resume operation of the 700-C fan were initiated. One of those activities included a test and balance of the underground ventilation system during 700-C fan operation. This report provides a summary of the emissions data used to calculate the dose to the maximally exposed individual (i.e., member of the public) resulting from this test. The resulting committed effective dose equivalent to the maximally exposed individual from the 700-C fan test was approximately 0.007% of the lowest regulatory limit (i.e., 0.1 mrem).

700-C FAN TEST PERIODIC CONFIRMATORY MEASUREMENT REPORT FOR THE U.S. DEPARTMENT OF ENERGY WASTE ISOLATION PILOT PLANT

This report provides the results of the 700-C fan test conducted from October 27, 2021 through November 1, 2021 at the Waste Isolation Pilot Plant (WIPP). This data will be incorporated into the 2021 Annual Periodic Confirmatory Measurement Report to satisfy the reporting requirements established by the Memorandum of Understanding between the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE) dated May 16, 1995 (DOE 1995). The Memorandum of Understanding is applicable to the provisions of Title 40 of the Code of Federal Regulations (CFR) Part 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities" for radionuclides at the WIPP. In addition, the data provided in this report will be used to demonstrate DOE compliance with the standards provided in 40 CFR Part 191, Subpart A, "Environmental Standards for Management and Storage." Emission monitoring and compliance procedures for DOE facilities (40 CFR §61.93[a]) require the use of CAP88-PC (Clean Air Act Assessment Package – 1988), AIRDOS-PC (Atmospheric Dispersion of Radionuclides – Personal Computer) computer models, or other approved procedures, to calculate effective dose equivalent values to members of the public. The CAP88-PC computer model is a set of computer programs, databases, and associated utility programs for estimating dose and risk from radionuclide emissions to the air (Trinity 2019). The CAP88-PC, Version 4.1, dose assessment computer model was used to estimate the dose provided in this report.

REPORT SUMMARY

This document provides the results of the 700-C fan test and the effective committed dose equivalent to the maximally exposed individual. The CAP88-PC dose assessment computer model was used to estimate the doses reported in this document. Copies of the output data from CAP88-PC are provided as Attachment A.

Reporting Period: October 27, 2021 through November 1, 2021

Compliance:

Calculations made using the above-referenced code indicate that the committed effective dose equivalent (EDE) to the maximally exposed individual (i.e., member of the public) resulting from the 700-C fan test at this facility is **7.39E-06** millirem per year (mrem/yr). The maximally exposed individual is an un-badged worker at the Utility Shaft construction site, the nearest occupied point of which is the Utility Shaft construction office trailer is located. This un-badged worker is considered the maximally exposed individual since this worker does not receive WIPP-specific general employee training and thus, is considered a member of the public. The Utility Shaft construction office trailer is located 0.5 miles (786 meters [m]) west-northwest of the WIPP. This value is in compliance with the 10 mrem/yr emission standard stated in 40 CFR §61.92 and below the 0.1 mrem/yr requirement for periodic confirmatory monitoring. The maximum dose to the critical organ (bone surface) of this individual is estimated to be 1.65E-04 mrem/yr. In addition, both estimates are below the 25 mrem/yr and 75 mrem/yr limit for whole body and critical organ, respectively, as stated in the 40 CFR 191, Subpart A, standards.

1.0 FACILITY NAME AND LOCATION

Facility: Waste Isolation Pilot Plant

Facility Location: 26 miles (42 km) East of Carlsbad, New Mexico 88220
Lat. 32.372, Long. -103.792

2.0 RADIOACTIVE MATERIALS USED

The waste managed at the WIPP facility contains contact-handled (CH) and remote-handled (RH) transuranic (TRU) radionuclides. The CH and RH TRU radionuclides with the highest potential to deliver a dose to an off-site receptor are ^{238}Pu , $^{239/240}\text{Pu}$, ^{241}Am , ^{90}Sr , ^{137}Cs , $^{233/234}\text{U}$, and ^{238}U . Operations at the WIPP facility do not involve handling loose radioactive material. Waste containers are sealed. They have filtered gas pressure relief vents that were installed at the waste-generating facilities. The drums remain sealed during WIPP disposal operations. Removable contamination on the exterior surfaces of containers is restricted to minimal levels in accordance with DOE/WIPP-02-3122, *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant* (DOE 2020), and should not present a significant source of radionuclide release in airborne effluents. During normal operating conditions, there is essentially no potential for airborne emissions of radionuclides contained in the CH and RH TRU waste managed at the WIPP facility.

Since the February 2014 radiological event, there is a potential limited source term, comprised primarily of ^{241}Am and a lesser amount of $^{239/240}\text{Pu}$ and ^{238}Pu that remains underground and entrained in the ventilation ductwork.

A summary of 700-C fan test radiological air emission source term quantities by radionuclide are shown in Table 1. Data from Table 1, *Summary of Radionuclide Effluents from Station H (Upper Probe)*, was used in calculating the dose to the maximally exposed individual and was derived from the laboratory data provided in Attachment B. The data from the upper probe (i.e., U2) of the Station H sampling system was used since it was the more conservative data. Data from Station A and Station H, lower probe (i.e., L1), is provided in Attachment B for informational purposes only.

SUMMARY OF EMISSIONS FROM 700-C FAN OPERATION

Table 1. Summary of Radionuclide Effluents from Station H (Upper Probe)

Sampler	Radionuclide	Activity Released (Ci)	Particle Size (µm) ¹	Class (F, M, S) ²
U2	²³⁸ Pu	9.28E-09	1	M
U2	^{239/240} Pu	1.15E-08	1	M
U2	²⁴¹ Am	9.78E-08	1	M
U2	⁹⁰ Sr	9.40E-08	1	M
U2	¹³⁷ Cs	8.95E-07	1	F
U2	^{233/234} U	4.91E-09	1	M
U2	²³⁸ U	4.76E-09	1	M

1 The default particle size in micrometers for inhaled particles.

2 Absorption Type: These are established to describe the absorption type of the materials from the respiratory tract into the blood for inhaled particles. The absorption types are F (fast), M (moderate), S (slow), as defined in ICRP Publication 66 (ICRP 1994), and Federal Guidance Report No. 13 (EPA 1999). Default values are recommended unless specific documented information supports use of another type.

3.0 BACKGROUND

Prior to February 14, 2014, the WIPP underground ventilation system was comprised of three large fans (700 series fans) which exhausted unfiltered air from the underground. During normal operations, two of the three fans were in operation with a nominal air flow of 425,000 cubic feet per minute (CFM) and the third fan was in standby mode. In normal ventilation mode (i.e., unfiltered), the air exiting the exhaust shaft was sampled at Station A.

On February 14, 2014, an underground continuous air monitor measured airborne radioactivity near the location where waste was being placed within the WIPP underground. The underground ventilation system switched to a filtered mode of operation. The filtered mode, which utilizes high-efficiency particulate air (HEPA) filtration control devices, reduced air flow to 60,000 CFM. In filtration mode, the air exiting the exhaust shaft is sampled at Station B.

As a direct result of the February 14, 2014, radiological event at the WIPP, the DOE developed and implemented temporary (Interim and Supplemental Ventilation Systems) ventilation system projects which improved filtered ventilation air flow to 114,000 CFM, and began construction of a permanent (Safety Significant Confinement Ventilation System [SSCVS]) ventilation system project to achieve a higher ventilation rate in the underground to support simultaneous full-scale TRU waste disposal and associated mining. Currently, the SSCVS project is not expected to be completed until 2025.

The 700-C fan was first tested (since the February 2014 shutdown) on January 31, 2021. The results of this test are documented in 02RC-002. A second, more comprehensive test was performed from October 27, 2021 through November 1, 2021. The results from the second test are provided in this report. The primary purpose of the second test was to perform a test and balance of the underground ventilation system during 700-C fan operation.

4.0 DESCRIPTION OF 700-C FAN OPERATIONS

The 700-C fan test occurring from October 27, 2021 through November 1, 2021 consisted of running the 700-C fan for approximately 40 hours to perform a test and balance of the underground ventilation system. Operation of the 700-C fan will approximately double the current ventilation air flow through the underground. The 700-C fan will provide approximately 280,000 CFM of unfiltered airflow. The increased airflow is more than half the airflow in the repository prior to the 2014 event. The increased airflow from the 700-C fan will reduce airborne salt dust and other respirable contaminants to WIPP underground workers. It will allow for increased overall efficiency for bolting, ground control, and prompt placement of TRU waste received on-site.

5.0 700-C FAN EMISSION POINT

For the 700-C fan test, the DOE performed sampling at Station A and the 700-C fan exhaust outlet (i.e., Station H) (see *Attachment C, Figures*). Station A sampled the unfiltered air from the underground. Station H sampled the unfiltered air from the underground and the associated ductwork.

6.0 EFFLUENT CONTROLS

6.1 Air Sampling and Analysis

Approved and controlled operating procedures are used at the WIPP facility to ensure uniform methods are used to collect, package, and transport air sampler filters. The use of such procedures provides a means for demonstrating quality assurance of air emission data. The 700-C fan filters were collected to identify possible radionuclide emissions. Filters from these sampling locations were analyzed for ^{238}Pu , $^{239/240}\text{Pu}$, ^{241}Am , ^{90}Sr , ^{137}Cs , $^{233/234}\text{U}$, and ^{238}U . These radionuclides comprise about 99% of the radioactive content deemed present within the WIPP Waste Inventory (DOE 2004).

6.1.1 Station A Sampling System

Station A consists of skid-mounted fixed air samplers (FASs) which collect representative samples of airborne particulates (ANSI/HPS N13.1 – 1999). Each emission point FAS has two independent vacuum pumps: one vacuum pump supplies the vacuum and the other functions as a backup. In the event of an external power failure, an uninterruptible power supply provides sufficient power to run each emission point FAS for approximately 30 minutes. Diesel generators are available to supply electrical power should the electrical outage last longer than 30 minutes.

6.1.2 Station H Sampling System

At the 700-C fan exhaust outlet, two shrouded probes sampled the 700-C fan exhaust. Each probe is attached to three PSU-2 air samplers. Each PSU-2 sampler includes a pump that pulls 2 scfm through the filter. The PSU-2 samplers are powered by a couple of small gasoline generators. These samplers were used at this location to collect representative samples of airborne particulates (ANSI/HPS N13.1 – 1999).

7.0 DISTANCES TO NEAREST RECEPTORS FROM RELEASE POINTS

The WIPP facility is located in a low population density area that has less than 30 permanent residents living within a nominal 10-mile (16.1-km) radius (DOE 2021). The area surrounding the WIPP facility is used primarily for livestock grazing and

development of potash, oil, and gas resources. Land within the WIPP site boundary up to the Exclusive Use Area is leased for grazing, which is the only significant agricultural activity in the vicinity of the WIPP facility. Development of the natural resources results in a transient (nonpermanent) population consisting primarily of workers at two potash mines, and numerous oil and gas wells located within 10 miles (16.1 km) of the WIPP facility.

During this 700-C fan test, there were no restrictions on construction projects (i.e., the SSCVS and Utility Shaft projects were not shut down). A non-WIPP business workspace (i.e., a construction office trailer at the nearest occupied point of the Utility Shaft project) is located 0.5 mile (786 m) from the 700-C fan emission point in the west-northwest direction. This location is outside the Exclusive Use Area fence line. The occupant of this temporary office space was designated as the maximally exposed individual during the test. For the annual report, the maximally exposed individual will be determined based on annual meteorology data.

The nearest farm producing vegetables is approximately 14 miles (23 km) from the WIPP site in the southwest sector of the facility; milk produced commercially is approximately 45 miles (72 km) from the WIPP site in the northeast sector; and beef cattle are raised on the WIPP lands immediately outside the WIPP Exclusive Use Area.

8.0 INPUT DATA FOR CAP88-PC DOSE ASSESSMENT COMPUTER MODEL

Radionuclides from Station H Samplers:	See Table 1, <i>Summary of Radionuclide Effluents from Station H (Upper Probe)</i>
Emission Point Data:	See Table 2, <i>Characteristics of the Underground Exhaust Emission Point</i>
Meteorological Data File:	700C40H.wnd (wind data for this test period)
Population Data File:	WIPP2018.pop (Population data for WIPP region, updated 2020, no changes from CY 2018)
Test Period Precipitation:	0 centimeters per year (cm/yr) ¹
Test Period Ambient Temperature:	15.11°C (average temperature during this test period)
Lid (Mixing) Height:	1,000 m (default)
Agricultural Scenario:	Local (default)
Absolute Humidity:	8 grams per cubic meter (g/m ³) (default)

Table 2. Characteristics of the Underground Exhaust Emission Point

Characteristics	Exhaust
Effective Station Height (m)	7.27
Station Dimensions (m)	4.9 x 3.5
Effective Station Diameter (m)	4.66
Station Area (m ²)	17.02
Flow Rate (ft ³ /min)	2.8 × 10 ⁴ (max)
Flow Rate (m ³ /min)	7.9 × 10 ³ (max)
Exit Velocity (m/s)	7.8 (max)
Effective Exit Velocity (m/s)	5.49 (max)
Orientation	45° Angle
Shape	Rectangle
HEPA Filtered	No

9.0 Calculations and Formulas

To account for depositional losses in the sample transport lines for Station H, transmission factors were applied to the laboratory data. The transmission factors are

¹ No precipitation was observed during the test period. A value of 0.01 cm/yr was used in CAP88-PC since a value of zero cannot be entered into the software.

provided in Table 3. The original laboratory data and adjusted data is presented in Attachment B. To calculate the adjusted value using the transmission factor, each data point is divided by the transmission factor. The Station A sampling system data does not require transmission factors to be applied.

Table 3. Station H System Transmission Factors

Sample Line Description	Sampler Description	Transmission Factor
Upper Splitter	U2	0.6760
Lower Splitter	L1	0.7518

REFERENCES

40 CFR 61, "National Emission Standards for Hazardous Air Pollutants," Subpart H. "National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities." *Code of Federal Regulations*. U.S. Government Printing Office, Washington, D.C.

40 CFR 191, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Wastes," Subpart A, "Environmental Standards for Management and Storage," *Code of Federal Regulations*. U.S. Government Printing Office, Washington, D.C.

ANSI/HPS N13.1 – 1969, "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities." American National Standards Institute, New York; 1969.

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DOE 2004. U.S. Department of Energy. *Title 40 CFR Part 191, Subparts B and C, Compliance Recertification Application for the Waste Isolation Pilot Plant, Appendix TRU WASTE*, DOE/WIPP 2004-3231, March 2004, Carlsbad, NM.

DOE 2021. *Waste Isolation Pilot Plant Land Management Plan*, DOE/WIPP-93-004, Reprint H, August 27, 2021. DOE-CBFO, Carlsbad, NM.

EPA 1999. *Federal Guidance Report No. 13, Cancer Risk Coefficients for Environmental Exposure to Radionuclides*, EPA 402-R-99-001, September 1999. Office of Radiation and Indoor Air, U.S. Environmental Protection Agency, Washington, D.C.

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ICRP 1994. *Human Respiratory Tract Model for Radiological Protection*. ICRP Publication 66. Ann. ICRP 24 (1-3).

DOE 2020. *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, DOE/WIPP-02-3122, August 14, 2020. DOE-CBFO, Carlsbad, NM.

Trinity 2019. *CAP88-PC Version 4.1 User Guide*, January 2019. Trinity Engineering Associates, Inc. Cincinnati, OH.

Attachment A

CAP88-PC Version 4.1 Output Data for the Maximum Exposed Individual at the U.S. Department of Energy Waste Isolation Pilot Plant

October 27, 2021 through November 1, 2021

To confirm compliance with 40 CFR 191, Subpart A,
and with 40 CFR 61, Subpart H, and Memorandum of
Understanding dated May 16, 1995

CAP88-PC Version 4.1 Output Data for the
Maximum Exposed Individual at the
U.S. Department of Energy Waste Isolation Pilot Plant
Utility Shaft Construction Office
(0.5 mile [786 meters] WNW)

SYNOPSIS REPORT

700-C Fan Test, Periodic Confirmatory Measurement Report for the
U.S. Department of Energy Waste Isolation Pilot Plant

C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

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

Non-Radon Individual Assessment
Mon Dec 06 11:15:08 2021

Facility: Waste Isolation Pilot Plant
Address: 26 Miles (42 km) East of Carlsbad, NM 88220
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2021
DOSE Age Group: Adult

Comments: NESHAPs Report for CY 2021 (Oct 27-Nov 1, 2021)
700-C Fan Operation 40 Hour Test

Effective Dose Equivalent
(mrem)

7.39E-06

At This Location: 786 Meters West Northwest

Dataset Name: N_Ind21S5_700C_4
Dataset Date: Dec 6, 2021 11:15 AM
Wind File: C:\Users\urquida\Documents\CAP88\Wind Files\700C40H.wnd

700-C Fan Test, Periodic Confirmatory Measurement Report for the
U.S. Department of Energy Waste Isolation Pilot Plant

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MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 786 Meters West Northwest
Lifetime Fatal Cancer Risk: 2.45E-12

ORGAN DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Organ	Dose Equivalent (mrem)
Adrenals	3.24E-06
UB_Wall	3.39E-06
Bone_Sur	1.65E-04
Brain	3.05E-06
Breasts	3.15E-06
St_Wall	3.25E-06
SI_Wall	3.29E-06
ULI_Wall	3.41E-06
LLI_Wall	3.86E-06
Kidneys	3.81E-06
Liver	1.64E-05
Muscle	3.35E-06
Ovaries	6.02E-06
Pancreas	3.25E-06
R_Marrow	1.03E-05
Skin	9.96E-06
Spleen	3.27E-06
Testes	6.01E-06
Thymus	3.21E-06
Thyroid	3.36E-06
GB_Wall	3.22E-06
Ht_Wall	3.28E-06
Uterus	3.33E-06
ET_Reg	3.59E-06
Lung	5.84E-06
Effectiv	7.39E-06

RADIONUCLIDE EMISSIONS DURING THE YEAR 2021

Nuclide	Type	Size	Source #1 Ci/y	TOTAL Ci/y
Pu-238	M	1.000	9.3E-09	9.3E-09
Pu-239	M	1.000	1.2E-08	1.2E-08
Am-241	M	1.000	9.8E-08	9.8E-08
Sr-90	M	1.000	9.4E-08	9.4E-08
Cs-137	F	1.000	9.0E-07	9.0E-07

700-C Fan Test, Periodic Confirmatory Measurement Report for the
U.S. Department of Energy Waste Isolation Pilot Plant

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Nuclide	Type	Size	Source	TOTAL
			#1 Ci/y	Ci/y
U-233	M	1.000	4.9E-09	4.9E-09
U-238	M	1.000	4.8E-09	4.8E-09

SITE INFORMATION

Temperature: 15.110 degrees C
Precipitation: 0.010 cm/y
Humidity: 8.000 g/cu m
Mixing Height: 1000.0 m

User specified location of max exposed individual.
(ILOC, JLOC): WNW, 786 meters

700-C Fan Test, Periodic Confirmatory Measurement Report for the
U.S. Department of Energy Waste Isolation Pilot Plant

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SOURCE INFORMATION

Source Number: 1

Stack Height (m): 7.27
Diameter (m): 4.66

Plume Rise
Momentum (m/s): 5.49
(Exit Velocity)

ADJUSTED AGRICULTURAL DATA

	Vegetable	Milk	Meat
	-----	-----	-----
Fraction Home Produced:	1.0000	1.0000	1.0000
Fraction From Assessment Area:	0.0000	0.0000	0.0000
Fraction Imported:	0.0000	0.0000	0.0000

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

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

330	490	539	592	652	707	786
822	860	945	5100	5250	5400	7500
8850	11520	15610	16670	47000	70000	

GENERAL DATA

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RADIONUCLIDE-DEPENDENT PARAMETERS FOR RELEASED ISOTOPES

Nuclide	Clearance Type	Particle Size (microns)	Scavenging Coefficient (per second)	Dry Deposition Velocity (m/s)
Pu-238	M	1.000	1.00E-09	1.80E-03
Pu-239	M	1.000	1.00E-09	1.80E-03
Am-241	M	1.000	1.00E-09	1.80E-03
Sr-90	M	1.000	1.00E-09	1.80E-03
Cs-137	F	1.000	1.00E-09	1.80E-03
U-233	M	1.000	1.00E-09	1.80E-03
U-238	M	1.000	1.00E-09	1.80E-03

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RADIONUCLIDE-DEPENDENT PARAMETERS FOR RELEASED ISOTOPES

Nuclide	DECAY CONSTANT (PER DAY)			TRANSFER COEFFICIENT	
	Radio- active	Surface	Water	Milk (1)	Meat (2)
Pu-238	2.16E-05	5.48E-05	0.00E+00	1.00E-06	1.00E-04
Pu-239	7.87E-08	5.48E-05	0.00E+00	1.00E-06	1.00E-04
Am-241	4.39E-06	5.48E-05	0.00E+00	2.00E-06	5.00E-05
Sr-90	6.59E-05	5.48E-05	0.00E+00	2.00E-03	1.00E-02
Cs-137	6.29E-05	5.48E-05	0.00E+00	1.00E-02	5.00E-02
U-233	1.19E-08	5.48E-05	0.00E+00	4.00E-04	8.00E-04
U-238	4.25E-13	5.48E-05	0.00E+00	4.00E-04	8.00E-04

FOOTNOTES:

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

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RADIONUCLIDE-DEPENDENT PARAMETERS FOR RELEASED ISOTOPES

Nuclide	CONCENTRATION UPTAKE FACTOR		GI UPTAKE FRACTION	
	Forage (1)	Edible (2)	Inhalation	Ingestion
Pu-238	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Pu-239	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Am-241	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Sr-90	4.00E+00	3.00E-01	1.00E-01	3.00E-01
Cs-137	1.00E+00	2.00E-01	1.00E+00	1.00E+00
U-233	1.00E-01	2.00E-03	2.00E-02	2.00E-02
U-238	1.00E-01	2.00E-03	2.00E-02	2.00E-02

- 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)
-

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VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

HUMAN INHALATION RATE	
Cubic meters/yr	5.26E+03
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

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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

ENTERED INGESTION RATIOS:
IMMEDIATE SURROUNDING AREA/TOTAL WITHIN AREA
Vegetables 1.00E+00
Meat 1.00E+00
Milk 1.00E+00

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) 7.62E+01
Milk ingestion (L/y) 5.30E+01
Meat ingestion (kg/y) 8.40E+01
Leafy vegetable ingestion (kg/y) 7.79E+00

SWIMMING PARAMETERS
Fraction of time spent swimming 0.00E+00
Dilution factor for water (cm) 1.00E+00

WEATHER DATA

**700-C Fan Test, Periodic Confirmatory Measurement Report for the
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HARMONIC AVERAGE WIND SPEEDS (WIND TOWARDS)

Pasquill Stability Class								
Dir	A	B	C	D	E	F	G	Wind Freq
N	2.800	3.420	1.450	3.540	1.860	2.570	0.000	0.053
NNW	1.620	2.570	0.000	3.080	2.280	2.570	0.000	0.057
NW	2.570	0.000	2.570	1.450	3.690	3.610	0.000	0.104
WNW	1.190	0.000	2.570	2.570	3.120	2.870	0.000	0.063
W	2.570	2.980	3.830	3.770	5.230	2.570	0.000	0.108
WSW	2.570	2.570	4.370	4.370	4.730	4.370	0.000	0.089
SW	2.110	1.710	1.860	2.570	2.980	0.000	0.000	0.044
SSW	3.720	4.370	3.720	2.160	3.320	3.030	0.000	0.095
S	1.190	2.020	2.520	2.620	3.240	0.000	0.000	0.085
SSE	1.190	2.980	3.020	3.940	2.980	0.000	0.000	0.053
SE	1.860	0.000	0.000	2.570	0.000	2.570	0.000	0.019
ESE	1.930	3.240	2.830	0.000	0.000	0.000	0.000	0.057
E	2.280	2.870	1.310	0.000	0.000	0.000	0.000	0.044
ENE	2.700	2.800	1.190	0.000	2.570	0.000	0.000	0.053
NE	1.660	2.570	0.900	2.570	0.000	0.000	0.000	0.047
NNE	2.570	0.770	1.010	1.190	2.570	0.000	0.000	0.030

ARITHMETIC AVERAGE WIND SPEEDS (WIND TOWARDS)

Pasquill Stability Class							
Dir	A	B	C	D	E	F	G
N	2.930	3.650	1.970	3.770	2.570	2.570	0.000
NNW	2.120	2.570	0.000	3.290	2.720	2.570	0.000
NW	2.570	0.000	2.570	1.970	3.900	3.830	0.000
WNW	1.670	0.000	2.570	2.570	3.340	3.020	0.000
W	2.570	3.170	4.010	5.510	5.780	2.570	0.000
WSW	2.570	2.570	4.370	4.370	5.080	4.370	0.000
SW	3.290	3.170	2.570	2.570	3.170	0.000	0.000
SSW	3.920	4.370	3.920	2.570	3.550	3.230	0.000
S	1.670	3.470	3.930	3.830	3.470	0.000	0.000
SSE	1.670	3.170	3.460	4.630	3.170	0.000	0.000
SE	2.570	0.000	0.000	2.570	0.000	2.570	0.000
ESE	2.310	3.470	2.970	0.000	0.000	0.000	0.000
E	2.570	3.020	2.570	0.000	0.000	0.000	0.000
ENE	2.780	2.930	1.670	0.000	2.570	0.000	0.000
NE	2.270	2.570	1.130	2.570	0.000	0.000	0.000
NNE	2.570	0.770	1.370	1.670	2.570	0.000	0.000

700-C Fan Test, Periodic Confirmatory Measurement Report for the
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FREQUENCIES OF STABILITY CLASSES (WIND TOWARDS)

Pasquill Stability Class							
Dir	A	B	C	D	E	F	G
N	0.2000	0.2000	0.2398	0.1200	0.2002	0.0401	0.0000
NNW	0.1483	0.0740	0.0000	0.1852	0.4444	0.1481	0.0000
NW	0.0816	0.0000	0.0613	0.0613	0.3877	0.4081	0.0000
WNW	0.1333	0.0000	0.0667	0.0667	0.4667	0.2667	0.0000
W	0.0196	0.0589	0.0981	0.3334	0.4509	0.0392	0.0000
WSW	0.0715	0.0239	0.0239	0.0239	0.8331	0.0239	0.0000
SW	0.2382	0.2855	0.2382	0.0952	0.1429	0.0000	0.0000
SSW	0.0890	0.1111	0.0890	0.2222	0.2444	0.2444	0.0000
S	0.0501	0.1001	0.3749	0.4249	0.0501	0.0000	0.0000
SSE	0.2400	0.1200	0.2801	0.2398	0.1200	0.0000	0.0000
SE	0.5556	0.0000	0.0000	0.3332	0.0000	0.1112	0.0000
ESE	0.5185	0.1481	0.3334	0.0000	0.0000	0.0000	0.0000
E	0.7141	0.1906	0.0954	0.0000	0.0000	0.0000	0.0000
ENE	0.6798	0.2000	0.0802	0.0000	0.0401	0.0000	0.0000
NE	0.5454	0.0909	0.2273	0.1364	0.0000	0.0000	0.0000
NNE	0.4997	0.0715	0.2142	0.1431	0.0715	0.0000	0.0000
TOTAL	0.2284	0.0952	0.1460	0.1565	0.2727	0.1015	0.0000

ADDITIONAL WEATHER INFORMATION

Average Air Temperature: 15.1 degrees C
288.27 K
Precipitation: 0.0 cm/y
Humidity: 8.0 g/cu m
Lid Height: 1000.0 meters
Surface Roughness Length: 0.010 meters
Height Of Wind Measurements: 10.0 meters
Average Wind Speed: 3.409 m/s

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

DOSE AND RISK SUMMARIES

700-C Fan Test, Periodic Confirmatory Measurement Report for the
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D O S E A N D R I S K S U M M A R I E S

Non-Radon Individual Assessment
Mon Dec 06 11:15:08 2021

Facility: Waste Isolation Pilot Plant
Address: 26 Miles (42 km) East of Carlsbad, NM 88220
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2021
DOSE Age Group: Adult

Comments: NESHAPs Report for CY 2021 (Oct 27-Nov 1, 2021)
700-C Fan Operation 40 Hour Test

Dataset Name: N_Ind21S5_700C_4
Dataset Date: Dec 6, 2021 11:15 AM
Wind File: C:\Users\urquida\Documents\CAP88\Wind Files\700C40H.wnd

700-C Fan Test, Periodic Confirmatory Measurement Report for the
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ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenals	3.24E-06
UB_Wall	3.39E-06
Bone_Sur	1.65E-04
Brain	3.05E-06
Breasts	3.15E-06
St_Wall	3.25E-06
SI_Wall	3.29E-06
ULI_Wall	3.41E-06
LLI_Wall	3.86E-06
Kidneys	3.81E-06
Liver	1.64E-05
Muscle	3.35E-06
Ovaries	6.02E-06
Pancreas	3.25E-06
R_Marrow	1.03E-05
Skin	9.96E-06
Spleen	3.27E-06
Testes	6.01E-06
Thymus	3.21E-06
Thyroid	3.36E-06
GB_Wall	3.22E-06
Ht_Wall	3.28E-06
Uterus	3.33E-06
ET_Reg	3.59E-06
Lung	5.84E-06
Effectiv	7.39E-06

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)
INGESTION	1.92E-06
INHALATION	3.91E-06
AIR IMMERSION	7.83E-11
GROUND SURFACE	1.56E-06
INTERNAL	5.82E-06
EXTERNAL	1.56E-06
TOTAL	7.39E-06

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NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
Pu-238	3.36E-07
U-234	4.04E-15
Th-230	1.14E-18
Ra-226	1.15E-19
Rn-222	6.40E-21
Po-218	1.14E-25
Pb-214	4.18E-18
At-218	4.30E-25
Bi-214	2.44E-17
Rn-218	2.49E-27
Po-214	1.35E-21
Tl-210	9.53E-21
Pb-210	1.43E-20
Bi-210	2.31E-19
Hg-206	0.00E+00
Po-210	5.91E-23
Tl-206	5.40E-25
Pu-239	4.55E-07
U-235m	6.55E-19
U-235	3.37E-16
Th-231	3.44E-17
Pa-231	4.52E-20
Ac-227	1.34E-22
Th-227	6.38E-20
Fr-223	6.02E-22
Ra-223	7.13E-20
Rn-219	3.09E-20
At-219	0.00E+00
Bi-215	1.08E-25
Po-215	9.43E-23
Pb-211	6.06E-20
Bi-211	2.50E-20
Tl-207	3.14E-20
Po-211	1.20E-23
Am-241	3.21E-06
Np-237	1.48E-13
Pa-233	1.22E-12
U-233	1.21E-08
Th-229	7.17E-12
Ra-225	1.02E-12
Ac-225	1.22E-12
Fr-221	2.48E-12
At-217	2.10E-14
Bi-213	1.51E-11
Po-213	3.23E-15
Tl-209	3.90E-12
Pb-209	2.94E-13
Sr-90	2.30E-07
Y-90	3.12E-08
Cs-137	1.60E-06

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NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
Ba-137m	1.51E-06
U-238	9.57E-09
Th-234	2.27E-10
Pa-234m	3.10E-09
Pa-234	6.11E-11
TOTAL	7.39E-06

700-C Fan Test, Periodic Confirmatory Measurement Report for the
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CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
Esophagu	3.28E-14
Stomach	1.20E-13
Colon	3.37E-13
Liver	1.90E-13
LUNG	6.35E-13
Bone	9.59E-14
Skin	9.69E-15
Breast	1.27E-13
Ovary	6.57E-14
Bladder	8.08E-14
Kidneys	1.92E-14
Thyroid	9.28E-15
Leukemia	2.87E-13
Residual	4.38E-13
Total	2.45E-12
TOTAL	2.45E-12

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	9.51E-13
INHALATION	6.67E-13
AIR IMMERSION	4.26E-17
GROUND SURFACE	8.27E-13
INTERNAL	1.62E-12
EXTERNAL	8.27E-13
TOTAL	2.45E-12

700-C Fan Test, Periodic Confirmatory Measurement Report for the
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NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Pu-238	6.06E-14
U-234	1.39E-21
Th-230	4.85E-25
Ra-226	6.25E-26
Rn-222	3.49E-27
Po-218	5.11E-32
Pb-214	2.24E-24
At-218	5.30E-32
Bi-214	1.29E-23
Rn-218	1.36E-33
Po-214	7.43E-28
Tl-210	5.09E-27
Pb-210	6.41E-27
Bi-210	2.56E-26
Hg-206	0.00E+00
Po-210	3.24E-29
Tl-206	6.07E-32
Pu-239	7.42E-14
U-235m	4.76E-25
U-235	1.83E-22
Th-231	1.57E-23
Pa-231	2.36E-26
Ac-227	5.00E-29
Th-227	3.46E-26
Fr-223	2.24E-28
Ra-223	3.85E-26
Rn-219	1.69E-26
At-219	0.00E+00
Bi-215	4.82E-32
Po-215	5.17E-29
Pb-211	2.17E-26
Bi-211	1.36E-26
Tl-207	4.04E-27
Po-211	6.58E-30
Am-241	5.28E-13
Np-237	7.28E-20
Pa-233	6.59E-19
U-233	1.20E-14
Th-229	3.80E-18
Ra-225	4.60E-19
Ac-225	6.42E-19
Fr-221	1.35E-18
At-217	1.14E-20
Bi-213	6.55E-18
Po-213	1.76E-21
Tl-209	2.08E-18
Pb-209	3.88E-20
Sr-90	1.35E-13
Y-90	3.72E-15
Cs-137	8.07E-13

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NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Ba-137m	8.16E-13
U-238	9.38E-15
Th-234	1.17E-16
Pa-234m	5.43E-16
Pa-234	3.32E-17
TOTAL	2.45E-12

**700-C Fan Test, Periodic Confirmatory Measurement Report for the
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INDIVIDUAL EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

Distance (m)

Direction	330	490	539	592	652	707	786
N	1.5E-05	1.0E-05	9.3E-06	8.4E-06	7.5E-06	6.8E-06	5.9E-06
NNW	1.0E-05	9.8E-06	9.4E-06	8.9E-06	8.4E-06	7.8E-06	7.2E-06
NW	1.4E-05	1.4E-05	1.4E-05	1.4E-05	1.3E-05	1.3E-05	1.2E-05
WNW	1.1E-05	1.0E-05	9.5E-06	9.0E-06	8.5E-06	8.0E-06	7.4E-06
W	3.1E-05	2.1E-05	1.8E-05	1.6E-05	1.4E-05	1.3E-05	1.1E-05
WSW	2.0E-05	1.7E-05	1.5E-05	1.4E-05	1.2E-05	1.1E-05	9.6E-06
SW	1.6E-05	9.3E-06	8.1E-06	7.0E-06	6.1E-06	5.3E-06	4.5E-06
SSW	1.7E-05	1.4E-05	1.3E-05	1.3E-05	1.2E-05	1.1E-05	1.0E-05
S	3.6E-05	2.2E-05	1.9E-05	1.6E-05	1.4E-05	1.2E-05	1.0E-05
SSE	1.7E-05	1.0E-05	8.8E-06	7.6E-06	6.5E-06	5.8E-06	4.8E-06
SE	4.6E-06	2.9E-06	2.6E-06	2.3E-06	2.0E-06	1.8E-06	1.6E-06
ESE	1.6E-05	8.2E-06	6.9E-06	5.8E-06	4.9E-06	4.2E-06	3.4E-06
E	1.2E-05	6.1E-06	5.1E-06	4.3E-06	3.5E-06	3.0E-06	2.5E-06
ENE	1.2E-05	6.5E-06	5.6E-06	4.8E-06	4.0E-06	3.5E-06	2.9E-06
NE	1.5E-05	9.7E-06	8.6E-06	7.5E-06	6.5E-06	5.8E-06	4.9E-06
NNE	8.1E-06	6.2E-06	5.7E-06	5.1E-06	4.5E-06	4.1E-06	3.5E-06

Distance (m)

Direction	822	860	945	5100	5250	5400	7500
N	5.6E-06	5.2E-06	4.6E-06	3.6E-07	3.4E-07	3.3E-07	2.0E-07
NNW	6.9E-06	6.6E-06	6.0E-06	6.4E-07	6.1E-07	5.9E-07	3.7E-07
NW	1.2E-05	1.1E-05	1.0E-05	1.2E-06	1.1E-06	1.1E-06	7.0E-07
WNW	7.1E-06	6.9E-06	6.3E-06	7.2E-07	6.9E-07	6.7E-07	4.2E-07
W	1.0E-05	9.5E-06	8.2E-06	6.6E-07	6.3E-07	6.1E-07	3.8E-07
WSW	9.0E-06	8.4E-06	7.3E-06	6.0E-07	5.8E-07	5.5E-07	3.5E-07
SW	4.2E-06	3.9E-06	3.3E-06	1.9E-07	1.8E-07	1.8E-07	1.1E-07
SSW	9.7E-06	9.3E-06	8.5E-06	9.2E-07	8.8E-07	8.5E-07	5.3E-07
S	9.6E-06	8.9E-06	7.6E-06	4.7E-07	4.5E-07	4.3E-07	2.6E-07
SSE	4.5E-06	4.2E-06	3.6E-06	2.2E-07	2.1E-07	2.0E-07	1.2E-07
SE	1.5E-06	1.4E-06	1.2E-06	1.1E-07	1.1E-07	1.1E-07	6.7E-08
ESE	3.1E-06	2.9E-06	2.4E-06	1.1E-07	1.0E-07	9.7E-08	6.0E-08
E	2.3E-06	2.1E-06	1.7E-06	7.5E-08	7.2E-08	6.9E-08	4.4E-08
ENE	2.7E-06	2.5E-06	2.1E-06	1.1E-07	1.0E-07	9.7E-08	6.1E-08
NE	4.5E-06	4.2E-06	3.6E-06	1.9E-07	1.8E-07	1.8E-07	1.1E-07
NNE	3.3E-06	3.1E-06	2.7E-06	1.7E-07	1.7E-07	1.6E-07	9.5E-08

700-C Fan Test, Periodic Confirmatory Measurement Report for the
U.S. Department of Energy Waste Isolation Pilot Plant

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INDIVIDUAL EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

Direction	Distance (m)					
	8850	11520	15610	16670	47000	70000
N	1.6E-07	1.1E-07	7.6E-08	6.9E-08	1.9E-08	1.0E-08
NNW	3.0E-07	2.1E-07	1.5E-07	1.4E-07	3.6E-08	1.9E-08
NW	5.5E-07	3.9E-07	2.8E-07	2.5E-07	7.0E-08	3.7E-08
WNW	3.4E-07	2.4E-07	1.7E-07	1.6E-07	4.3E-08	2.3E-08
W	3.0E-07	2.1E-07	1.4E-07	1.3E-07	3.5E-08	2.0E-08
WSW	2.8E-07	2.0E-07	1.4E-07	1.3E-07	3.8E-08	2.2E-08
SW	8.4E-08	5.9E-08	4.1E-08	3.7E-08	1.1E-08	6.4E-09
SSW	4.2E-07	3.0E-07	2.1E-07	1.9E-07	5.0E-08	2.6E-08
S	2.0E-07	1.3E-07	8.6E-08	7.8E-08	1.8E-08	1.0E-08
SSE	9.9E-08	6.9E-08	4.7E-08	4.3E-08	1.2E-08	7.0E-09
SE	5.4E-08	3.8E-08	2.6E-08	2.4E-08	6.0E-09	3.2E-09
ESE	4.8E-08	3.4E-08	2.4E-08	2.2E-08	7.2E-09	4.7E-09
E	3.6E-08	2.7E-08	1.9E-08	1.8E-08	5.8E-09	3.8E-09
ENE	5.0E-08	3.6E-08	2.6E-08	2.4E-08	7.6E-09	4.9E-09
NE	8.3E-08	5.7E-08	3.8E-08	3.4E-08	9.7E-09	6.1E-09
NNE	7.5E-08	5.1E-08	3.4E-08	3.1E-08	7.8E-09	4.6E-09

**700-C Fan Test, Periodic Confirmatory Measurement Report for the
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INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Distance (m)							
Direction	330	490	539	592	652	707	786
N	4.9E-12	3.4E-12	3.1E-12	2.8E-12	2.5E-12	2.2E-12	2.0E-12
NNW	3.5E-12	3.3E-12	3.1E-12	3.0E-12	2.8E-12	2.6E-12	2.4E-12
NW	4.6E-12	4.7E-12	4.6E-12	4.5E-12	4.3E-12	4.2E-12	3.9E-12
WNW	3.6E-12	3.3E-12	3.1E-12	3.0E-12	2.8E-12	2.7E-12	2.4E-12
W	1.0E-11	6.9E-12	6.1E-12	5.4E-12	4.7E-12	4.2E-12	3.6E-12
WSW	6.6E-12	5.5E-12	5.0E-12	4.5E-12	4.0E-12	3.6E-12	3.2E-12
SW	5.2E-12	3.1E-12	2.7E-12	2.3E-12	2.0E-12	1.8E-12	1.5E-12
SSW	5.6E-12	4.7E-12	4.5E-12	4.2E-12	3.9E-12	3.7E-12	3.4E-12
S	1.2E-11	7.1E-12	6.2E-12	5.4E-12	4.6E-12	4.1E-12	3.4E-12
SSE	5.7E-12	3.3E-12	2.9E-12	2.5E-12	2.2E-12	1.9E-12	1.6E-12
SE	1.5E-12	9.6E-13	8.5E-13	7.5E-13	6.6E-13	5.9E-13	5.2E-13
ESE	5.4E-12	2.7E-12	2.3E-12	1.9E-12	1.6E-12	1.4E-12	1.1E-12
E	4.1E-12	2.0E-12	1.7E-12	1.4E-12	1.2E-12	1.0E-12	8.2E-13
ENE	4.0E-12	2.2E-12	1.8E-12	1.6E-12	1.3E-12	1.2E-12	9.6E-13
NE	4.9E-12	3.2E-12	2.8E-12	2.5E-12	2.2E-12	1.9E-12	1.6E-12
NNE	2.7E-12	2.1E-12	1.9E-12	1.7E-12	1.5E-12	1.4E-12	1.2E-12

Distance (m)							
Direction	822	860	945	5100	5250	5400	7500
N	1.8E-12	1.7E-12	1.5E-12	1.2E-13	1.1E-13	1.1E-13	6.6E-14
NNW	2.3E-12	2.2E-12	2.0E-12	2.1E-13	2.0E-13	2.0E-13	1.2E-13
NW	3.8E-12	3.7E-12	3.4E-12	3.9E-13	3.8E-13	3.6E-13	2.3E-13
WNW	2.4E-12	2.3E-12	2.1E-12	2.4E-13	2.3E-13	2.2E-13	1.4E-13
W	3.4E-12	3.1E-12	2.7E-12	2.2E-13	2.1E-13	2.0E-13	1.2E-13
WSW	3.0E-12	2.8E-12	2.4E-12	2.0E-13	1.9E-13	1.8E-13	1.2E-13
SW	1.4E-12	1.3E-12	1.1E-12	6.4E-14	6.1E-14	5.8E-14	3.5E-14
SSW	3.2E-12	3.1E-12	2.8E-12	3.0E-13	2.9E-13	2.8E-13	1.8E-13
S	3.2E-12	3.0E-12	2.5E-12	1.6E-13	1.5E-13	1.4E-13	8.5E-14
SSE	1.5E-12	1.4E-12	1.2E-12	7.3E-14	7.0E-14	6.7E-14	4.1E-14
SE	4.9E-13	4.6E-13	4.1E-13	3.8E-14	3.6E-14	3.5E-14	2.2E-14
ESE	1.0E-12	9.5E-13	7.9E-13	3.5E-14	3.3E-14	3.2E-14	2.0E-14
E	7.5E-13	6.9E-13	5.7E-13	2.5E-14	2.4E-14	2.3E-14	1.4E-14
ENE	8.9E-13	8.2E-13	6.9E-13	3.5E-14	3.4E-14	3.2E-14	2.0E-14
NE	1.5E-12	1.4E-12	1.2E-12	6.4E-14	6.1E-14	5.8E-14	3.5E-14
NNE	1.1E-12	1.0E-12	9.0E-13	5.8E-14	5.5E-14	5.3E-14	3.2E-14

700-C Fan Test, Periodic Confirmatory Measurement Report for the
U.S. Department of Energy Waste Isolation Pilot Plant

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

Direction	Distance (m)					
	8850	11520	15610	16670	47000	70000
N	5.2E-14	3.7E-14	2.5E-14	2.3E-14	6.2E-15	3.3E-15
NNW	9.8E-14	7.0E-14	4.9E-14	4.5E-14	1.2E-14	6.2E-15
NW	1.8E-13	1.3E-13	9.1E-14	8.4E-14	2.3E-14	1.2E-14
WNW	1.1E-13	8.0E-14	5.6E-14	5.2E-14	1.4E-14	7.5E-15
W	9.8E-14	6.9E-14	4.7E-14	4.3E-14	1.2E-14	6.5E-15
WSW	9.1E-14	6.5E-14	4.6E-14	4.3E-14	1.3E-14	7.4E-15
SW	2.8E-14	2.0E-14	1.3E-14	1.2E-14	3.5E-15	2.1E-15
SSW	1.4E-13	9.9E-14	6.8E-14	6.3E-14	1.6E-14	8.5E-15
S	6.6E-14	4.4E-14	2.8E-14	2.6E-14	6.0E-15	3.4E-15
SSE	3.3E-14	2.3E-14	1.5E-14	1.4E-14	3.9E-15	2.3E-15
SE	1.8E-14	1.3E-14	8.5E-15	7.8E-15	2.0E-15	1.1E-15
ESE	1.6E-14	1.1E-14	7.9E-15	7.3E-15	2.4E-15	1.6E-15
E	1.2E-14	8.8E-15	6.2E-15	5.8E-15	1.9E-15	1.3E-15
ENE	1.7E-14	1.2E-14	8.5E-15	7.9E-15	2.5E-15	1.6E-15
NE	2.7E-14	1.9E-14	1.2E-14	1.1E-14	3.2E-15	2.0E-15
NNE	2.5E-14	1.7E-14	1.1E-14	1.0E-14	2.6E-15	1.5E-15

CHI/Q TABLES

700-C Fan Test, Periodic Confirmatory Measurement Report for the
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C A P 8 8 - P C

Version 4.1

Clean Air Act Assessment Package - 1988

C H I / Q T A B L E S

Non-Radon Individual Assessment
Mon Dec 06 11:15:08 2021

Facility: Waste Isolation Pilot Plant
Address: 26 Miles (42 km) East of Carlsbad, NM 88220
City: Carlsbad
State: NM Zip: 88220

Source Category: Stack
Source Type: Stack
Emission Year: 2021

Comments: NESHAPs Report for CY 2021 (Oct 27-Nov 1, 2021)
700-C Fan Operation 40 Hour Test

Dataset Name: N_Ind21S5_700C_4
Dataset Date: Dec 6, 2021 11:15 AM
Wind File: C:\Users\urquida\Documents\CAP88\Wind Files\700C40H.wnd

**700-C Fan Test, Periodic Confirmatory Measurement Report for the
U.S. Department of Energy Waste Isolation Pilot Plant**

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CHI/Q
Page 1

GROUND-LEVEL CHI/Q VALUES FOR Pu-238
 SOLUBILITY: M
 CHEMFORM: Particulate
 SIZE: 1.000
 CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	330	490	539	592	652	707	786
N	2.552E-06	1.788E-06	1.617E-06	1.457E-06	1.300E-06	1.176E-06	1.026E-06
NNW	1.824E-06	1.711E-06	1.639E-06	1.553E-06	1.454E-06	1.365E-06	1.246E-06
NW	2.397E-06	2.463E-06	2.423E-06	2.366E-06	2.287E-06	2.203E-06	2.073E-06
WNW	1.918E-06	1.738E-06	1.655E-06	1.568E-06	1.475E-06	1.394E-06	1.286E-06
W	5.375E-06	3.621E-06	3.212E-06	2.836E-06	2.481E-06	2.210E-06	1.892E-06
WSW	3.468E-06	2.871E-06	2.628E-06	2.379E-06	2.124E-06	1.918E-06	1.663E-06
SW	2.751E-06	1.621E-06	1.411E-06	1.226E-06	1.056E-06	9.286E-07	7.819E-07
SSW	2.952E-06	2.495E-06	2.348E-06	2.202E-06	2.052E-06	1.927E-06	1.764E-06
S	6.205E-06	3.751E-06	3.266E-06	2.836E-06	2.442E-06	2.146E-06	1.806E-06
SSE	2.999E-06	1.756E-06	1.526E-06	1.324E-06	1.139E-06	1.001E-06	8.427E-07
SE	8.076E-07	5.032E-07	4.448E-07	3.934E-07	3.466E-07	3.118E-07	2.718E-07
ESE	2.854E-06	1.434E-06	1.204E-06	1.012E-06	8.441E-07	7.242E-07	5.917E-07
E	2.134E-06	1.056E-06	8.842E-07	7.413E-07	6.172E-07	5.287E-07	4.311E-07
ENE	2.124E-06	1.134E-06	9.683E-07	8.267E-07	7.008E-07	6.089E-07	5.054E-07
NE	2.587E-06	1.688E-06	1.490E-06	1.307E-06	1.134E-06	1.001E-06	8.456E-07
NNE	1.413E-06	1.081E-06	9.837E-07	8.876E-07	7.908E-07	7.129E-07	6.173E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	9.665E-07	9.089E-07	7.967E-07	6.233E-08	5.970E-08	5.724E-08	3.495E-08
NNW	1.195E-06	1.144E-06	1.039E-06	1.111E-07	1.068E-07	1.027E-07	6.494E-08
NW	2.011E-06	1.945E-06	1.798E-06	2.065E-07	1.985E-07	1.911E-07	1.212E-07
WNW	1.239E-06	1.192E-06	1.093E-06	1.250E-07	1.203E-07	1.158E-07	7.367E-08
W	1.770E-06	1.654E-06	1.432E-06	1.149E-07	1.102E-07	1.058E-07	6.567E-08
WSW	1.561E-06	1.463E-06	1.272E-06	1.044E-07	1.002E-07	9.633E-08	6.054E-08
SW	7.261E-07	6.734E-07	5.741E-07	3.361E-08	3.210E-08	3.071E-08	1.833E-08
SSW	1.695E-06	1.626E-06	1.483E-06	1.602E-07	1.539E-07	1.480E-07	9.306E-08
S	1.677E-06	1.555E-06	1.326E-06	8.222E-08	7.853E-08	7.511E-08	4.465E-08
SSE	7.825E-07	7.256E-07	6.186E-07	3.837E-08	3.675E-08	3.525E-08	2.169E-08
SE	2.565E-07	2.420E-07	2.141E-07	1.978E-08	1.903E-08	1.832E-08	1.173E-08
ESE	5.430E-07	4.978E-07	4.150E-07	1.837E-08	1.759E-08	1.686E-08	1.038E-08
E	3.954E-07	3.622E-07	3.015E-07	1.298E-08	1.246E-08	1.197E-08	7.585E-09
ENE	4.667E-07	4.304E-07	3.631E-07	1.841E-08	1.766E-08	1.695E-08	1.061E-08
NE	7.859E-07	7.292E-07	6.218E-07	3.342E-08	3.194E-08	3.056E-08	1.836E-08
NNE	5.793E-07	5.426E-07	4.712E-07	3.042E-08	2.907E-08	2.781E-08	1.661E-08

700-C Fan Test, Periodic Confirmatory Measurement Report for the
U.S. Department of Energy Waste Isolation Pilot Plant

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CHI/Q
Page 2

GROUND-LEVEL CHI/Q VALUES FOR Pu-238
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	8850	11520	15610	16670	47000	70000
N	2.748E-08	1.923E-08	1.314E-08	1.209E-08	3.235E-09	1.751E-09
NNW	5.155E-08	3.669E-08	2.552E-08	2.356E-08	6.304E-09	3.278E-09
NW	9.614E-08	6.855E-08	4.797E-08	4.434E-08	1.224E-08	6.486E-09
WNW	5.855E-08	4.187E-08	2.936E-08	2.715E-08	7.484E-09	3.937E-09
W	5.175E-08	3.626E-08	2.471E-08	2.273E-08	6.052E-09	3.410E-09
WSW	4.794E-08	3.438E-08	2.428E-08	2.251E-08	6.622E-09	3.875E-09
SW	1.467E-08	1.032E-08	7.058E-09	6.500E-09	1.858E-09	1.118E-09
SSW	7.371E-08	5.200E-08	3.577E-08	3.294E-08	8.640E-09	4.487E-09
S	3.467E-08	2.328E-08	1.490E-08	1.353E-08	3.139E-09	1.795E-09
SSE	1.716E-08	1.200E-08	8.119E-09	7.460E-09	2.045E-09	1.213E-09
SE	9.357E-09	6.587E-09	4.461E-09	4.098E-09	1.044E-09	5.576E-10
ESE	8.370E-09	5.992E-09	4.163E-09	3.850E-09	1.253E-09	8.260E-10
E	6.279E-09	4.613E-09	3.278E-09	3.046E-09	1.016E-09	6.691E-10
ENE	8.687E-09	6.327E-09	4.477E-09	4.155E-09	1.331E-09	8.450E-10
NE	1.438E-08	9.889E-09	6.553E-09	5.997E-09	1.687E-09	1.058E-09
NNE	1.302E-08	8.897E-09	5.844E-09	5.335E-09	1.362E-09	7.990E-10

700-C Fan Test, Periodic Confirmatory Measurement Report for the
U.S. Department of Energy Waste Isolation Pilot Plant

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CHI/Q
Page 3

GROUND-LEVEL CHI/Q VALUES FOR Pu-239
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	330	490	539	592	652	707	786
N	2.552E-06	1.788E-06	1.617E-06	1.457E-06	1.300E-06	1.176E-06	1.026E-06
NNW	1.824E-06	1.711E-06	1.639E-06	1.553E-06	1.454E-06	1.365E-06	1.246E-06
NW	2.397E-06	2.463E-06	2.423E-06	2.366E-06	2.287E-06	2.203E-06	2.073E-06
WNW	1.918E-06	1.738E-06	1.655E-06	1.568E-06	1.475E-06	1.394E-06	1.286E-06
W	5.375E-06	3.621E-06	3.212E-06	2.836E-06	2.481E-06	2.210E-06	1.892E-06
WSW	3.468E-06	2.871E-06	2.628E-06	2.379E-06	2.124E-06	1.918E-06	1.663E-06
SW	2.751E-06	1.621E-06	1.411E-06	1.226E-06	1.056E-06	9.286E-07	7.819E-07
SSW	2.952E-06	2.495E-06	2.348E-06	2.202E-06	2.052E-06	1.927E-06	1.764E-06
S	6.205E-06	3.751E-06	3.266E-06	2.836E-06	2.442E-06	2.146E-06	1.806E-06
SSE	2.999E-06	1.756E-06	1.526E-06	1.324E-06	1.139E-06	1.001E-06	8.427E-07
SE	8.076E-07	5.032E-07	4.448E-07	3.934E-07	3.466E-07	3.118E-07	2.718E-07
ESE	2.854E-06	1.434E-06	1.204E-06	1.012E-06	8.441E-07	7.242E-07	5.917E-07
E	2.134E-06	1.056E-06	8.842E-07	7.413E-07	6.172E-07	5.287E-07	4.311E-07
ENE	2.124E-06	1.134E-06	9.683E-07	8.267E-07	7.008E-07	6.089E-07	5.054E-07
NE	2.587E-06	1.688E-06	1.490E-06	1.307E-06	1.134E-06	1.001E-06	8.456E-07
NNE	1.413E-06	1.081E-06	9.837E-07	8.876E-07	7.908E-07	7.129E-07	6.173E-07

Distance (meters)

Dir	822	860	945	5100	5250	5400	7500
N	9.665E-07	9.089E-07	7.967E-07	6.233E-08	5.970E-08	5.724E-08	3.495E-08
NNW	1.195E-06	1.144E-06	1.039E-06	1.111E-07	1.068E-07	1.027E-07	6.494E-08
NW	2.011E-06	1.945E-06	1.798E-06	2.065E-07	1.985E-07	1.911E-07	1.212E-07
WNW	1.239E-06	1.192E-06	1.093E-06	1.250E-07	1.203E-07	1.158E-07	7.367E-08
W	1.770E-06	1.654E-06	1.432E-06	1.149E-07	1.102E-07	1.058E-07	6.567E-08
WSW	1.561E-06	1.463E-06	1.272E-06	1.044E-07	1.002E-07	9.633E-08	6.054E-08
SW	7.261E-07	6.734E-07	5.741E-07	3.361E-08	3.210E-08	3.071E-08	1.833E-08
SSW	1.695E-06	1.626E-06	1.483E-06	1.602E-07	1.539E-07	1.480E-07	9.306E-08
S	1.677E-06	1.555E-06	1.326E-06	8.222E-08	7.853E-08	7.511E-08	4.465E-08
SSE	7.825E-07	7.256E-07	6.186E-07	3.837E-08	3.675E-08	3.525E-08	2.169E-08
SE	2.565E-07	2.420E-07	2.141E-07	1.978E-08	1.903E-08	1.832E-08	1.173E-08
ESE	5.430E-07	4.978E-07	4.150E-07	1.837E-08	1.759E-08	1.686E-08	1.038E-08
E	3.954E-07	3.622E-07	3.015E-07	1.298E-08	1.246E-08	1.197E-08	7.585E-09
ENE	4.667E-07	4.304E-07	3.631E-07	1.841E-08	1.766E-08	1.695E-08	1.061E-08
NE	7.859E-07	7.292E-07	6.218E-07	3.342E-08	3.194E-08	3.056E-08	1.836E-08
NNE	5.793E-07	5.426E-07	4.712E-07	3.042E-08	2.907E-08	2.781E-08	1.661E-08

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CHI/Q
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GROUND-LEVEL CHI/Q VALUES FOR Pu-239
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	8850	11520	15610	16670	47000	70000
N	2.748E-08	1.923E-08	1.314E-08	1.209E-08	3.235E-09	1.751E-09
NNW	5.155E-08	3.669E-08	2.552E-08	2.356E-08	6.304E-09	3.278E-09
NW	9.614E-08	6.855E-08	4.797E-08	4.434E-08	1.224E-08	6.486E-09
WNW	5.855E-08	4.187E-08	2.936E-08	2.715E-08	7.484E-09	3.937E-09
W	5.175E-08	3.626E-08	2.471E-08	2.273E-08	6.052E-09	3.410E-09
WSW	4.794E-08	3.438E-08	2.428E-08	2.251E-08	6.622E-09	3.875E-09
SW	1.467E-08	1.032E-08	7.058E-09	6.500E-09	1.858E-09	1.118E-09
SSW	7.371E-08	5.200E-08	3.577E-08	3.294E-08	8.640E-09	4.487E-09
S	3.467E-08	2.328E-08	1.490E-08	1.353E-08	3.139E-09	1.795E-09
SSE	1.716E-08	1.200E-08	8.119E-09	7.460E-09	2.045E-09	1.213E-09
SE	9.357E-09	6.587E-09	4.461E-09	4.098E-09	1.044E-09	5.576E-10
ESE	8.370E-09	5.992E-09	4.163E-09	3.850E-09	1.253E-09	8.260E-10
E	6.279E-09	4.613E-09	3.278E-09	3.046E-09	1.016E-09	6.691E-10
ENE	8.687E-09	6.327E-09	4.477E-09	4.155E-09	1.331E-09	8.450E-10
NE	1.438E-08	9.889E-09	6.553E-09	5.997E-09	1.687E-09	1.059E-09
NNE	1.302E-08	8.897E-09	5.844E-09	5.335E-09	1.362E-09	7.991E-10

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CHI/Q
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GROUND-LEVEL CHI/Q VALUES FOR Am-241
 SOLUBILITY: M
 CHEMFORM: Particulate
 SIZE: 1.000
 CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	330	490	539	592	652	707	786
N	2.552E-06	1.788E-06	1.617E-06	1.457E-06	1.300E-06	1.176E-06	1.026E-06
NNW	1.824E-06	1.711E-06	1.639E-06	1.553E-06	1.454E-06	1.365E-06	1.246E-06
NW	2.397E-06	2.463E-06	2.423E-06	2.366E-06	2.287E-06	2.203E-06	2.073E-06
WNW	1.918E-06	1.738E-06	1.655E-06	1.568E-06	1.475E-06	1.394E-06	1.286E-06
W	5.375E-06	3.621E-06	3.212E-06	2.836E-06	2.481E-06	2.210E-06	1.892E-06
WSW	3.468E-06	2.871E-06	2.628E-06	2.379E-06	2.124E-06	1.918E-06	1.663E-06
SW	2.751E-06	1.621E-06	1.411E-06	1.226E-06	1.056E-06	9.286E-07	7.819E-07
SSW	2.952E-06	2.495E-06	2.348E-06	2.202E-06	2.052E-06	1.927E-06	1.764E-06
S	6.205E-06	3.751E-06	3.266E-06	2.836E-06	2.442E-06	2.146E-06	1.806E-06
SSE	2.999E-06	1.756E-06	1.526E-06	1.324E-06	1.139E-06	1.001E-06	8.427E-07
SE	8.076E-07	5.032E-07	4.448E-07	3.934E-07	3.466E-07	3.118E-07	2.718E-07
ESE	2.854E-06	1.434E-06	1.204E-06	1.012E-06	8.441E-07	7.242E-07	5.917E-07
E	2.134E-06	1.056E-06	8.842E-07	7.413E-07	6.172E-07	5.287E-07	4.311E-07
ENE	2.124E-06	1.134E-06	9.683E-07	8.267E-07	7.008E-07	6.089E-07	5.054E-07
NE	2.587E-06	1.688E-06	1.490E-06	1.307E-06	1.134E-06	1.001E-06	8.456E-07
NNE	1.413E-06	1.081E-06	9.837E-07	8.876E-07	7.908E-07	7.129E-07	6.173E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	9.665E-07	9.089E-07	7.967E-07	6.233E-08	5.970E-08	5.724E-08	3.495E-08
NNW	1.195E-06	1.144E-06	1.039E-06	1.111E-07	1.068E-07	1.027E-07	6.494E-08
NW	2.011E-06	1.945E-06	1.798E-06	2.065E-07	1.985E-07	1.911E-07	1.212E-07
WNW	1.239E-06	1.192E-06	1.093E-06	1.250E-07	1.203E-07	1.158E-07	7.367E-08
W	1.770E-06	1.654E-06	1.432E-06	1.149E-07	1.102E-07	1.058E-07	6.567E-08
WSW	1.561E-06	1.463E-06	1.272E-06	1.044E-07	1.002E-07	9.633E-08	6.054E-08
SW	7.261E-07	6.734E-07	5.741E-07	3.361E-08	3.210E-08	3.071E-08	1.833E-08
SSW	1.695E-06	1.626E-06	1.483E-06	1.602E-07	1.539E-07	1.480E-07	9.306E-08
S	1.677E-06	1.555E-06	1.326E-06	8.222E-08	7.853E-08	7.511E-08	4.465E-08
SSE	7.825E-07	7.256E-07	6.186E-07	3.837E-08	3.675E-08	3.525E-08	2.169E-08
SE	2.565E-07	2.420E-07	2.141E-07	1.978E-08	1.903E-08	1.832E-08	1.173E-08
ESE	5.430E-07	4.978E-07	4.150E-07	1.837E-08	1.759E-08	1.686E-08	1.038E-08
E	3.954E-07	3.622E-07	3.015E-07	1.298E-08	1.246E-08	1.197E-08	7.585E-09
ENE	4.667E-07	4.304E-07	3.631E-07	1.841E-08	1.766E-08	1.695E-08	1.061E-08
NE	7.859E-07	7.292E-07	6.218E-07	3.342E-08	3.194E-08	3.056E-08	1.836E-08
NNE	5.793E-07	5.426E-07	4.712E-07	3.042E-08	2.907E-08	2.781E-08	1.661E-08

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CHI/Q
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GROUND-LEVEL CHI/Q VALUES FOR Am-241
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	8850	11520	15610	16670	47000	70000
N	2.748E-08	1.923E-08	1.314E-08	1.209E-08	3.235E-09	1.751E-09
NNW	5.155E-08	3.669E-08	2.552E-08	2.356E-08	6.304E-09	3.278E-09
NW	9.614E-08	6.855E-08	4.797E-08	4.434E-08	1.224E-08	6.486E-09
WNW	5.855E-08	4.187E-08	2.936E-08	2.715E-08	7.484E-09	3.937E-09
W	5.175E-08	3.626E-08	2.471E-08	2.273E-08	6.052E-09	3.410E-09
WSW	4.794E-08	3.438E-08	2.428E-08	2.251E-08	6.622E-09	3.875E-09
SW	1.467E-08	1.032E-08	7.058E-09	6.500E-09	1.858E-09	1.118E-09
SSW	7.371E-08	5.200E-08	3.577E-08	3.294E-08	8.640E-09	4.487E-09
S	3.467E-08	2.328E-08	1.490E-08	1.353E-08	3.139E-09	1.795E-09
SSE	1.716E-08	1.200E-08	8.119E-09	7.460E-09	2.045E-09	1.213E-09
SE	9.357E-09	6.587E-09	4.461E-09	4.098E-09	1.044E-09	5.576E-10
ESE	8.370E-09	5.992E-09	4.163E-09	3.850E-09	1.253E-09	8.260E-10
E	6.279E-09	4.613E-09	3.278E-09	3.046E-09	1.016E-09	6.691E-10
ENE	8.687E-09	6.327E-09	4.477E-09	4.155E-09	1.331E-09	8.450E-10
NE	1.438E-08	9.889E-09	6.553E-09	5.997E-09	1.687E-09	1.059E-09
NNE	1.302E-08	8.897E-09	5.844E-09	5.335E-09	1.362E-09	7.990E-10

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CHIQ
Page 7

GROUND-LEVEL CHI/Q VALUES FOR Sr-90
 SOLUBILITY: M
 CHEMFORM: Particulate
 SIZE: 1.000
 CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	330	490	539	592	652	707	786
N	2.552E-06	1.788E-06	1.617E-06	1.457E-06	1.300E-06	1.176E-06	1.026E-06
NNW	1.824E-06	1.711E-06	1.639E-06	1.553E-06	1.454E-06	1.365E-06	1.246E-06
NW	2.397E-06	2.463E-06	2.423E-06	2.366E-06	2.287E-06	2.203E-06	2.073E-06
WNW	1.918E-06	1.738E-06	1.655E-06	1.568E-06	1.475E-06	1.394E-06	1.286E-06
W	5.375E-06	3.621E-06	3.212E-06	2.836E-06	2.481E-06	2.210E-06	1.892E-06
WSW	3.468E-06	2.871E-06	2.628E-06	2.379E-06	2.124E-06	1.918E-06	1.663E-06
SW	2.751E-06	1.621E-06	1.411E-06	1.226E-06	1.056E-06	9.286E-07	7.819E-07
SSW	2.952E-06	2.495E-06	2.348E-06	2.202E-06	2.052E-06	1.927E-06	1.764E-06
S	6.205E-06	3.751E-06	3.266E-06	2.836E-06	2.442E-06	2.146E-06	1.806E-06
SSE	2.999E-06	1.756E-06	1.526E-06	1.324E-06	1.139E-06	1.001E-06	8.427E-07
SE	8.076E-07	5.032E-07	4.448E-07	3.934E-07	3.466E-07	3.118E-07	2.718E-07
ESE	2.854E-06	1.434E-06	1.204E-06	1.012E-06	8.441E-07	7.242E-07	5.917E-07
E	2.134E-06	1.056E-06	8.842E-07	7.413E-07	6.172E-07	5.287E-07	4.311E-07
ENE	2.124E-06	1.134E-06	9.683E-07	8.267E-07	7.008E-07	6.089E-07	5.054E-07
NE	2.587E-06	1.688E-06	1.490E-06	1.307E-06	1.134E-06	1.001E-06	8.456E-07
NNE	1.413E-06	1.081E-06	9.837E-07	8.876E-07	7.908E-07	7.129E-07	6.173E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	9.665E-07	9.089E-07	7.967E-07	6.233E-08	5.970E-08	5.724E-08	3.495E-08
NNW	1.195E-06	1.144E-06	1.039E-06	1.111E-07	1.068E-07	1.027E-07	6.494E-08
NW	2.011E-06	1.945E-06	1.798E-06	2.065E-07	1.985E-07	1.911E-07	1.212E-07
WNW	1.239E-06	1.192E-06	1.093E-06	1.250E-07	1.203E-07	1.158E-07	7.367E-08
W	1.770E-06	1.654E-06	1.432E-06	1.149E-07	1.102E-07	1.058E-07	6.567E-08
WSW	1.561E-06	1.463E-06	1.272E-06	1.044E-07	1.002E-07	9.633E-08	6.054E-08
SW	7.261E-07	6.734E-07	5.741E-07	3.361E-08	3.210E-08	3.071E-08	1.833E-08
SSW	1.695E-06	1.626E-06	1.483E-06	1.602E-07	1.539E-07	1.480E-07	9.306E-08
S	1.677E-06	1.555E-06	1.326E-06	8.222E-08	7.853E-08	7.511E-08	4.465E-08
SSE	7.825E-07	7.256E-07	6.186E-07	3.837E-08	3.675E-08	3.525E-08	2.169E-08
SE	2.565E-07	2.420E-07	2.141E-07	1.978E-08	1.903E-08	1.832E-08	1.173E-08
ESE	5.430E-07	4.978E-07	4.150E-07	1.837E-08	1.759E-08	1.686E-08	1.038E-08
E	3.954E-07	3.622E-07	3.015E-07	1.298E-08	1.246E-08	1.197E-08	7.585E-09
ENE	4.667E-07	4.304E-07	3.631E-07	1.841E-08	1.766E-08	1.695E-08	1.061E-08
NE	7.859E-07	7.292E-07	6.218E-07	3.342E-08	3.194E-08	3.056E-08	1.836E-08
NNE	5.793E-07	5.426E-07	4.712E-07	3.042E-08	2.907E-08	2.781E-08	1.661E-08

700-C Fan Test, Periodic Confirmatory Measurement Report for the
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CHI/Q
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GROUND-LEVEL CHI/Q VALUES FOR Sr-90
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	8850	11520	15610	16670	47000	70000
N	2.748E-08	1.923E-08	1.314E-08	1.209E-08	3.235E-09	1.751E-09
NNW	5.155E-08	3.669E-08	2.552E-08	2.356E-08	6.303E-09	3.278E-09
NW	9.614E-08	6.855E-08	4.797E-08	4.434E-08	1.224E-08	6.486E-09
WNW	5.855E-08	4.187E-08	2.936E-08	2.715E-08	7.484E-09	3.937E-09
W	5.175E-08	3.626E-08	2.471E-08	2.273E-08	6.052E-09	3.410E-09
WSW	4.794E-08	3.438E-08	2.428E-08	2.251E-08	6.622E-09	3.875E-09
SW	1.467E-08	1.032E-08	7.058E-09	6.500E-09	1.858E-09	1.118E-09
SSW	7.371E-08	5.200E-08	3.577E-08	3.294E-08	8.640E-09	4.487E-09
S	3.467E-08	2.328E-08	1.490E-08	1.353E-08	3.139E-09	1.795E-09
SSE	1.716E-08	1.200E-08	8.119E-09	7.460E-09	2.045E-09	1.213E-09
SE	9.357E-09	6.587E-09	4.461E-09	4.097E-09	1.044E-09	5.576E-10
ESE	8.370E-09	5.992E-09	4.163E-09	3.850E-09	1.253E-09	8.260E-10
E	6.278E-09	4.613E-09	3.278E-09	3.046E-09	1.016E-09	6.691E-10
ENE	8.686E-09	6.327E-09	4.477E-09	4.155E-09	1.331E-09	8.450E-10
NE	1.438E-08	9.889E-09	6.553E-09	5.997E-09	1.687E-09	1.058E-09
NNE	1.302E-08	8.896E-09	5.844E-09	5.335E-09	1.362E-09	7.990E-10

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CHI/Q
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GROUND-LEVEL CHI/Q VALUES FOR Cs-137
 SOLUBILITY: F
 CHEMFORM: Particulate
 SIZE: 1.000
 CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	330	490	539	592	652	707	786
N	2.552E-06	1.788E-06	1.617E-06	1.457E-06	1.300E-06	1.176E-06	1.026E-06
NNW	1.824E-06	1.711E-06	1.639E-06	1.553E-06	1.454E-06	1.365E-06	1.246E-06
NW	2.397E-06	2.463E-06	2.423E-06	2.366E-06	2.287E-06	2.203E-06	2.073E-06
WNW	1.918E-06	1.738E-06	1.655E-06	1.568E-06	1.475E-06	1.394E-06	1.286E-06
W	5.375E-06	3.621E-06	3.212E-06	2.836E-06	2.481E-06	2.210E-06	1.892E-06
WSW	3.468E-06	2.871E-06	2.628E-06	2.379E-06	2.124E-06	1.918E-06	1.663E-06
SW	2.751E-06	1.621E-06	1.411E-06	1.226E-06	1.056E-06	9.286E-07	7.819E-07
SSW	2.952E-06	2.495E-06	2.348E-06	2.202E-06	2.052E-06	1.927E-06	1.764E-06
S	6.205E-06	3.751E-06	3.266E-06	2.836E-06	2.442E-06	2.146E-06	1.806E-06
SSE	2.999E-06	1.756E-06	1.526E-06	1.324E-06	1.139E-06	1.001E-06	8.427E-07
SE	8.076E-07	5.032E-07	4.448E-07	3.934E-07	3.466E-07	3.118E-07	2.718E-07
ESE	2.854E-06	1.434E-06	1.204E-06	1.012E-06	8.441E-07	7.242E-07	5.917E-07
E	2.134E-06	1.056E-06	8.842E-07	7.413E-07	6.172E-07	5.287E-07	4.311E-07
ENE	2.124E-06	1.134E-06	9.683E-07	8.267E-07	7.008E-07	6.089E-07	5.054E-07
NE	2.587E-06	1.688E-06	1.490E-06	1.307E-06	1.134E-06	1.001E-06	8.456E-07
NNE	1.413E-06	1.081E-06	9.837E-07	8.876E-07	7.908E-07	7.129E-07	6.173E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	9.665E-07	9.089E-07	7.967E-07	6.233E-08	5.970E-08	5.724E-08	3.495E-08
NNW	1.195E-06	1.144E-06	1.039E-06	1.111E-07	1.068E-07	1.027E-07	6.494E-08
NW	2.011E-06	1.945E-06	1.798E-06	2.065E-07	1.985E-07	1.911E-07	1.212E-07
WNW	1.239E-06	1.192E-06	1.093E-06	1.250E-07	1.203E-07	1.158E-07	7.367E-08
W	1.770E-06	1.654E-06	1.432E-06	1.149E-07	1.102E-07	1.058E-07	6.567E-08
WSW	1.561E-06	1.463E-06	1.272E-06	1.044E-07	1.002E-07	9.633E-08	6.054E-08
SW	7.261E-07	6.734E-07	5.741E-07	3.361E-08	3.210E-08	3.071E-08	1.833E-08
SSW	1.695E-06	1.626E-06	1.483E-06	1.602E-07	1.539E-07	1.480E-07	9.306E-08
S	1.677E-06	1.555E-06	1.326E-06	8.222E-08	7.853E-08	7.511E-08	4.465E-08
SSE	7.825E-07	7.256E-07	6.186E-07	3.837E-08	3.675E-08	3.525E-08	2.169E-08
SE	2.565E-07	2.420E-07	2.141E-07	1.978E-08	1.903E-08	1.832E-08	1.173E-08
ESE	5.430E-07	4.978E-07	4.150E-07	1.837E-08	1.759E-08	1.686E-08	1.038E-08
E	3.954E-07	3.622E-07	3.015E-07	1.298E-08	1.246E-08	1.197E-08	7.585E-09
ENE	4.667E-07	4.304E-07	3.631E-07	1.841E-08	1.766E-08	1.695E-08	1.061E-08
NE	7.859E-07	7.292E-07	6.218E-07	3.342E-08	3.194E-08	3.056E-08	1.836E-08
NNE	5.793E-07	5.426E-07	4.712E-07	3.042E-08	2.907E-08	2.781E-08	1.661E-08

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GROUND-LEVEL CHI/Q VALUES FOR Cs-137
SOLUBILITY: F
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	8850	11520	15610	16670	47000	70000
N	2.748E-08	1.923E-08	1.314E-08	1.209E-08	3.235E-09	1.751E-09
NNW	5.155E-08	3.669E-08	2.552E-08	2.356E-08	6.303E-09	3.278E-09
NW	9.614E-08	6.855E-08	4.797E-08	4.434E-08	1.224E-08	6.486E-09
WNW	5.855E-08	4.187E-08	2.936E-08	2.715E-08	7.484E-09	3.937E-09
W	5.175E-08	3.626E-08	2.471E-08	2.273E-08	6.052E-09	3.410E-09
WSW	4.794E-08	3.438E-08	2.428E-08	2.251E-08	6.622E-09	3.875E-09
SW	1.467E-08	1.032E-08	7.058E-09	6.500E-09	1.858E-09	1.118E-09
SSW	7.371E-08	5.200E-08	3.577E-08	3.294E-08	8.640E-09	4.487E-09
S	3.467E-08	2.328E-08	1.490E-08	1.353E-08	3.139E-09	1.795E-09
SSE	1.716E-08	1.200E-08	8.119E-09	7.460E-09	2.045E-09	1.213E-09
SE	9.357E-09	6.587E-09	4.461E-09	4.097E-09	1.044E-09	5.576E-10
ESE	8.370E-09	5.992E-09	4.163E-09	3.850E-09	1.253E-09	8.260E-10
E	6.278E-09	4.613E-09	3.278E-09	3.046E-09	1.016E-09	6.691E-10
ENE	8.687E-09	6.327E-09	4.477E-09	4.155E-09	1.331E-09	8.450E-10
NE	1.438E-08	9.889E-09	6.553E-09	5.997E-09	1.687E-09	1.058E-09
NNE	1.302E-08	8.896E-09	5.844E-09	5.335E-09	1.362E-09	7.990E-10

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CHI/Q
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GROUND-LEVEL CHI/Q VALUES FOR U-233
 SOLUBILITY: M
 CHEMFORM: Particulate
 SIZE: 1.000
 CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	330	490	539	592	652	707	786
N	2.552E-06	1.788E-06	1.617E-06	1.457E-06	1.300E-06	1.176E-06	1.026E-06
NNW	1.824E-06	1.711E-06	1.639E-06	1.553E-06	1.454E-06	1.365E-06	1.246E-06
NW	2.397E-06	2.463E-06	2.423E-06	2.366E-06	2.287E-06	2.203E-06	2.073E-06
WNW	1.918E-06	1.738E-06	1.655E-06	1.568E-06	1.475E-06	1.394E-06	1.286E-06
W	5.375E-06	3.621E-06	3.212E-06	2.836E-06	2.481E-06	2.210E-06	1.892E-06
WSW	3.468E-06	2.871E-06	2.628E-06	2.379E-06	2.124E-06	1.918E-06	1.663E-06
SW	2.751E-06	1.621E-06	1.411E-06	1.226E-06	1.056E-06	9.286E-07	7.819E-07
SSW	2.952E-06	2.495E-06	2.348E-06	2.202E-06	2.052E-06	1.927E-06	1.764E-06
S	6.205E-06	3.751E-06	3.266E-06	2.836E-06	2.442E-06	2.146E-06	1.806E-06
SSE	2.999E-06	1.756E-06	1.526E-06	1.324E-06	1.139E-06	1.001E-06	8.427E-07
SE	8.076E-07	5.032E-07	4.448E-07	3.934E-07	3.466E-07	3.118E-07	2.718E-07
ESE	2.854E-06	1.434E-06	1.204E-06	1.012E-06	8.441E-07	7.242E-07	5.917E-07
E	2.134E-06	1.056E-06	8.842E-07	7.413E-07	6.172E-07	5.287E-07	4.311E-07
ENE	2.124E-06	1.134E-06	9.683E-07	8.267E-07	7.008E-07	6.089E-07	5.054E-07
NE	2.587E-06	1.688E-06	1.490E-06	1.307E-06	1.134E-06	1.001E-06	8.456E-07
NNE	1.413E-06	1.081E-06	9.837E-07	8.876E-07	7.908E-07	7.129E-07	6.173E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	9.665E-07	9.089E-07	7.967E-07	6.233E-08	5.970E-08	5.724E-08	3.495E-08
NNW	1.195E-06	1.144E-06	1.039E-06	1.111E-07	1.068E-07	1.027E-07	6.494E-08
NW	2.011E-06	1.945E-06	1.798E-06	2.065E-07	1.985E-07	1.911E-07	1.212E-07
WNW	1.239E-06	1.192E-06	1.093E-06	1.250E-07	1.203E-07	1.158E-07	7.367E-08
W	1.770E-06	1.654E-06	1.432E-06	1.149E-07	1.102E-07	1.058E-07	6.567E-08
WSW	1.561E-06	1.463E-06	1.272E-06	1.044E-07	1.002E-07	9.633E-08	6.054E-08
SW	7.261E-07	6.734E-07	5.741E-07	3.361E-08	3.210E-08	3.071E-08	1.833E-08
SSW	1.695E-06	1.626E-06	1.483E-06	1.602E-07	1.539E-07	1.480E-07	9.306E-08
S	1.677E-06	1.555E-06	1.326E-06	8.222E-08	7.853E-08	7.511E-08	4.465E-08
SSE	7.825E-07	7.256E-07	6.186E-07	3.837E-08	3.675E-08	3.525E-08	2.169E-08
SE	2.565E-07	2.420E-07	2.141E-07	1.978E-08	1.903E-08	1.832E-08	1.173E-08
ESE	5.430E-07	4.978E-07	4.150E-07	1.837E-08	1.759E-08	1.686E-08	1.038E-08
E	3.954E-07	3.622E-07	3.015E-07	1.298E-08	1.246E-08	1.197E-08	7.585E-09
ENE	4.667E-07	4.304E-07	3.631E-07	1.841E-08	1.766E-08	1.695E-08	1.061E-08
NE	7.859E-07	7.292E-07	6.218E-07	3.342E-08	3.194E-08	3.056E-08	1.836E-08
NNE	5.793E-07	5.426E-07	4.712E-07	3.042E-08	2.907E-08	2.781E-08	1.661E-08

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GROUND-LEVEL CHI/Q VALUES FOR U-233
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	8850	11520	15610	16670	47000	70000
N	2.748E-08	1.923E-08	1.314E-08	1.209E-08	3.235E-09	1.751E-09
NNW	5.155E-08	3.669E-08	2.552E-08	2.356E-08	6.304E-09	3.278E-09
NW	9.614E-08	6.855E-08	4.797E-08	4.434E-08	1.224E-08	6.486E-09
WNW	5.855E-08	4.187E-08	2.936E-08	2.715E-08	7.484E-09	3.937E-09
W	5.175E-08	3.626E-08	2.471E-08	2.273E-08	6.052E-09	3.410E-09
WSW	4.794E-08	3.438E-08	2.428E-08	2.251E-08	6.622E-09	3.875E-09
SW	1.467E-08	1.032E-08	7.058E-09	6.500E-09	1.858E-09	1.118E-09
SSW	7.371E-08	5.200E-08	3.577E-08	3.294E-08	8.640E-09	4.487E-09
S	3.467E-08	2.328E-08	1.490E-08	1.353E-08	3.139E-09	1.795E-09
SSE	1.716E-08	1.200E-08	8.119E-09	7.460E-09	2.045E-09	1.213E-09
SE	9.357E-09	6.587E-09	4.461E-09	4.098E-09	1.044E-09	5.576E-10
ESE	8.370E-09	5.992E-09	4.163E-09	3.850E-09	1.253E-09	8.260E-10
E	6.279E-09	4.613E-09	3.278E-09	3.046E-09	1.016E-09	6.691E-10
ENE	8.687E-09	6.327E-09	4.477E-09	4.155E-09	1.331E-09	8.450E-10
NE	1.438E-08	9.889E-09	6.553E-09	5.997E-09	1.687E-09	1.059E-09
NNE	1.302E-08	8.897E-09	5.844E-09	5.335E-09	1.362E-09	7.991E-10

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CHI/Q
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GROUND-LEVEL CHI/Q VALUES FOR U-238
 SOLUBILITY: M
 CHEMFORM: Particulate
 SIZE: 1.000
 CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	330	490	539	592	652	707	786
N	2.552E-06	1.788E-06	1.617E-06	1.457E-06	1.300E-06	1.176E-06	1.026E-06
NNW	1.824E-06	1.711E-06	1.639E-06	1.553E-06	1.454E-06	1.365E-06	1.246E-06
NW	2.397E-06	2.463E-06	2.423E-06	2.366E-06	2.287E-06	2.203E-06	2.073E-06
WNW	1.918E-06	1.738E-06	1.655E-06	1.568E-06	1.475E-06	1.394E-06	1.286E-06
W	5.375E-06	3.621E-06	3.212E-06	2.836E-06	2.481E-06	2.210E-06	1.892E-06
WSW	3.468E-06	2.871E-06	2.628E-06	2.379E-06	2.124E-06	1.918E-06	1.663E-06
SW	2.751E-06	1.621E-06	1.411E-06	1.226E-06	1.056E-06	9.286E-07	7.819E-07
SSW	2.952E-06	2.495E-06	2.348E-06	2.202E-06	2.052E-06	1.927E-06	1.764E-06
S	6.205E-06	3.751E-06	3.266E-06	2.836E-06	2.442E-06	2.146E-06	1.806E-06
SSE	2.999E-06	1.756E-06	1.526E-06	1.324E-06	1.139E-06	1.001E-06	8.427E-07
SE	8.076E-07	5.032E-07	4.448E-07	3.934E-07	3.466E-07	3.118E-07	2.718E-07
ESE	2.854E-06	1.434E-06	1.204E-06	1.012E-06	8.441E-07	7.242E-07	5.917E-07
E	2.134E-06	1.056E-06	8.842E-07	7.413E-07	6.172E-07	5.287E-07	4.311E-07
ENE	2.124E-06	1.134E-06	9.683E-07	8.267E-07	7.008E-07	6.089E-07	5.054E-07
NE	2.587E-06	1.688E-06	1.490E-06	1.307E-06	1.134E-06	1.001E-06	8.456E-07
NNE	1.413E-06	1.081E-06	9.837E-07	8.876E-07	7.908E-07	7.129E-07	6.173E-07

	Distance (meters)						
Dir	822	860	945	5100	5250	5400	7500
N	9.665E-07	9.089E-07	7.967E-07	6.233E-08	5.970E-08	5.724E-08	3.495E-08
NNW	1.195E-06	1.144E-06	1.039E-06	1.111E-07	1.068E-07	1.027E-07	6.494E-08
NW	2.011E-06	1.945E-06	1.798E-06	2.065E-07	1.985E-07	1.911E-07	1.212E-07
WNW	1.239E-06	1.192E-06	1.093E-06	1.250E-07	1.203E-07	1.158E-07	7.367E-08
W	1.770E-06	1.654E-06	1.432E-06	1.149E-07	1.102E-07	1.058E-07	6.567E-08
WSW	1.561E-06	1.463E-06	1.272E-06	1.044E-07	1.002E-07	9.633E-08	6.054E-08
SW	7.261E-07	6.734E-07	5.741E-07	3.361E-08	3.210E-08	3.071E-08	1.833E-08
SSW	1.695E-06	1.626E-06	1.483E-06	1.602E-07	1.539E-07	1.480E-07	9.306E-08
S	1.677E-06	1.555E-06	1.326E-06	8.222E-08	7.853E-08	7.511E-08	4.465E-08
SSE	7.825E-07	7.256E-07	6.186E-07	3.837E-08	3.675E-08	3.525E-08	2.169E-08
SE	2.565E-07	2.420E-07	2.141E-07	1.978E-08	1.903E-08	1.832E-08	1.173E-08
ESE	5.430E-07	4.978E-07	4.150E-07	1.837E-08	1.759E-08	1.686E-08	1.038E-08
E	3.954E-07	3.622E-07	3.015E-07	1.298E-08	1.246E-08	1.197E-08	7.585E-09
ENE	4.667E-07	4.304E-07	3.631E-07	1.841E-08	1.766E-08	1.695E-08	1.061E-08
NE	7.859E-07	7.292E-07	6.218E-07	3.342E-08	3.194E-08	3.056E-08	1.836E-08
NNE	5.793E-07	5.426E-07	4.712E-07	3.042E-08	2.907E-08	2.781E-08	1.661E-08

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CHI/Q
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GROUND-LEVEL CHI/Q VALUES FOR U-238
SOLUBILITY: M
CHEMFORM: Particulate
SIZE: 1.000
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	8850	11520	15610	16670	47000	70000
N	2.748E-08	1.923E-08	1.314E-08	1.209E-08	3.235E-09	1.751E-09
NNW	5.155E-08	3.669E-08	2.552E-08	2.356E-08	6.304E-09	3.278E-09
NW	9.614E-08	6.855E-08	4.797E-08	4.434E-08	1.224E-08	6.486E-09
WNW	5.855E-08	4.187E-08	2.936E-08	2.715E-08	7.484E-09	3.937E-09
W	5.175E-08	3.626E-08	2.471E-08	2.273E-08	6.052E-09	3.410E-09
WSW	4.794E-08	3.438E-08	2.428E-08	2.251E-08	6.622E-09	3.875E-09
SW	1.467E-08	1.032E-08	7.058E-09	6.500E-09	1.858E-09	1.118E-09
SSW	7.371E-08	5.200E-08	3.577E-08	3.294E-08	8.640E-09	4.487E-09
S	3.467E-08	2.328E-08	1.490E-08	1.353E-08	3.139E-09	1.795E-09
SSE	1.716E-08	1.200E-08	8.119E-09	7.460E-09	2.045E-09	1.213E-09
SE	9.357E-09	6.587E-09	4.461E-09	4.098E-09	1.044E-09	5.576E-10
ESE	8.370E-09	5.992E-09	4.163E-09	3.850E-09	1.253E-09	8.260E-10
E	6.279E-09	4.613E-09	3.278E-09	3.046E-09	1.016E-09	6.691E-10
ENE	8.687E-09	6.327E-09	4.477E-09	4.155E-09	1.331E-09	8.450E-10
NE	1.438E-08	9.889E-09	6.553E-09	5.997E-09	1.687E-09	1.059E-09
NNE	1.302E-08	8.897E-09	5.844E-09	5.335E-09	1.362E-09	7.991E-10

Attachment B
700-C Fan Emissions Data

Sampler	Description	Am-241			Am-241 (Corrected)		
		Activity	2 σ TPU	MDC	Activity	2 σ TPU	MDC
		pCi/sample	pCi/sample	pCi/sample	pCi/sample	pCi/sample	pCi/sample
A33	Station A, Skid 3, Leg 3	4.70E-01	2.45E-01	3.38E-02	N/A	N/A	N/A
U2	700-C Fan Face Sampler, Upper Probe	4.72E-01	1.86E-01	3.12E-02	6.98E-01	2.75E-01	4.62E-02
L1	700-C Fan Face Sampler, Lower Probe	4.02E-01	1.54E-01	3.02E-02	5.35E-01	2.05E-01	4.02E-02

Sampler	Description	Pu-239/240			Pu-239/240 (Corrected)		
		Activity	2 σ TPU	MDC	Activity	2 σ TPU	MDC
		pCi/sample	pCi/sample	pCi/sample	pCi/sample	pCi/sample	pCi/sample
A33	Station A, Skid 3, Leg 3	4.27E-02	3.40E-02	2.71E-02	N/A	N/A	N/A
U2	700-C Fan Face Sampler, Upper Probe	5.55E-02	3.57E-02	2.49E-02	8.21E-02	5.28E-02	3.68E-02
L1	700-C Fan Face Sampler, Lower Probe	5.17E-02	3.23E-02	2.45E-02	6.88E-02	4.30E-02	3.26E-02

Sampler	Description	Pu-238			Pu-238 (Corrected)		
		Activity	2 σ TPU	MDC	Activity	2 σ TPU	MDC
		pCi/sample	pCi/sample	pCi/sample	pCi/sample	pCi/sample	pCi/sample
A33	Station A, Skid 3, Leg 3	1.30E-01	7.27E-02	2.23E-02	N/A	N/A	N/A
U2	700-C Fan Face Sampler, Upper Probe	4.48E-02	3.21E-02	2.40E-02	6.63E-02	4.75E-02	3.55E-02
L1	700-C Fan Face Sampler, Lower Probe	6.11E-02	3.57E-02	1.94E-02	8.13E-02	4.75E-02	2.58E-02

Sampler	Description	U-233/234			U-233/234 (Corrected)		
		Activity	2 σ TPU	MDC	Activity	2 σ TPU	MDC
		pCi/sample	pCi/sample	pCi/sample	pCi/sample	pCi/sample	pCi/sample
A33	Station A, Skid 3, Leg 3	-3.34E-03	2.58E-02	5.47E-02	N/A	N/A	N/A
U2	700-C Fan Face Sampler, Upper Probe	5.55E-04	2.37E-02	5.05E-02	8.21E-04	3.51E-02	7.47E-02
L1	700-C Fan Face Sampler, Lower Probe	5.48E-03	2.47E-02	4.93E-02	7.29E-03	3.29E-02	6.56E-02

Sampler	Description	U-238			U-238 (Corrected)		
		Activity	2 σ TPU	MDC	Activity	2 σ TPU	MDC
		pCi/sample	pCi/sample	pCi/sample	pCi/sample	pCi/sample	pCi/sample
A33	Station A, Skid 3, Leg 3	-1.58E-02	1.60E-02	4.98E-02	N/A	N/A	N/A
U2	700-C Fan Face Sampler, Upper Probe	9.33E-03	2.30E-02	4.49E-02	1.38E-02	3.40E-02	6.64E-02
L1	700-C Fan Face Sampler, Lower Probe	4.30E-03	2.12E-02	4.44E-02	5.72E-03	2.82E-02	5.91E-02

Attachment B
700-C Fan Emissions Data

Sampler	Description	Cs-137			Cs-137 (Corrected)		
		Activity	2 σ TPU	MDC	Activity	2 σ TPU	MDC
		pCi/sample	pCi/sample	pCi/sample	pCi/sample	pCi/sample	pCi/sample
A33	Station A, Skid 3, Leg 3	-2.95E+00	4.80E+00	8.28E+00	N/A	N/A	N/A
U2	700-C Fan Face Sampler, Upper Probe	1.55E+00	4.32E+00	7.26E+00	2.29E+00	6.39E+00	1.07E+01
L1	700-C Fan Face Sampler, Lower Probe	-2.44E+00	4.40E+00	7.13E+00	-3.25E+00	5.85E+00	9.48E+00

Sampler	Description	Sr-90			Sr-90 (Corrected)		
		Activity	2 σ TPU	MDC	Activity	2 σ TPU	MDC
		pCi/sample	pCi/sample	pCi/sample	pCi/sample	pCi/sample	pCi/sample
A33	Station A, Skid 3, Leg 3	3.42E-01	5.34E-01	7.69E-01	N/A	N/A	N/A
U2	700-C Fan Face Sampler, Upper Probe	-8.21E-02	4.54E-01	7.60E-01	-1.21E-01	6.72E-01	1.12E+00
L1	700-C Fan Face Sampler, Lower Probe	1.31E-01	4.40E-01	7.56E-01	1.74E-01	5.85E-01	1.01E+00

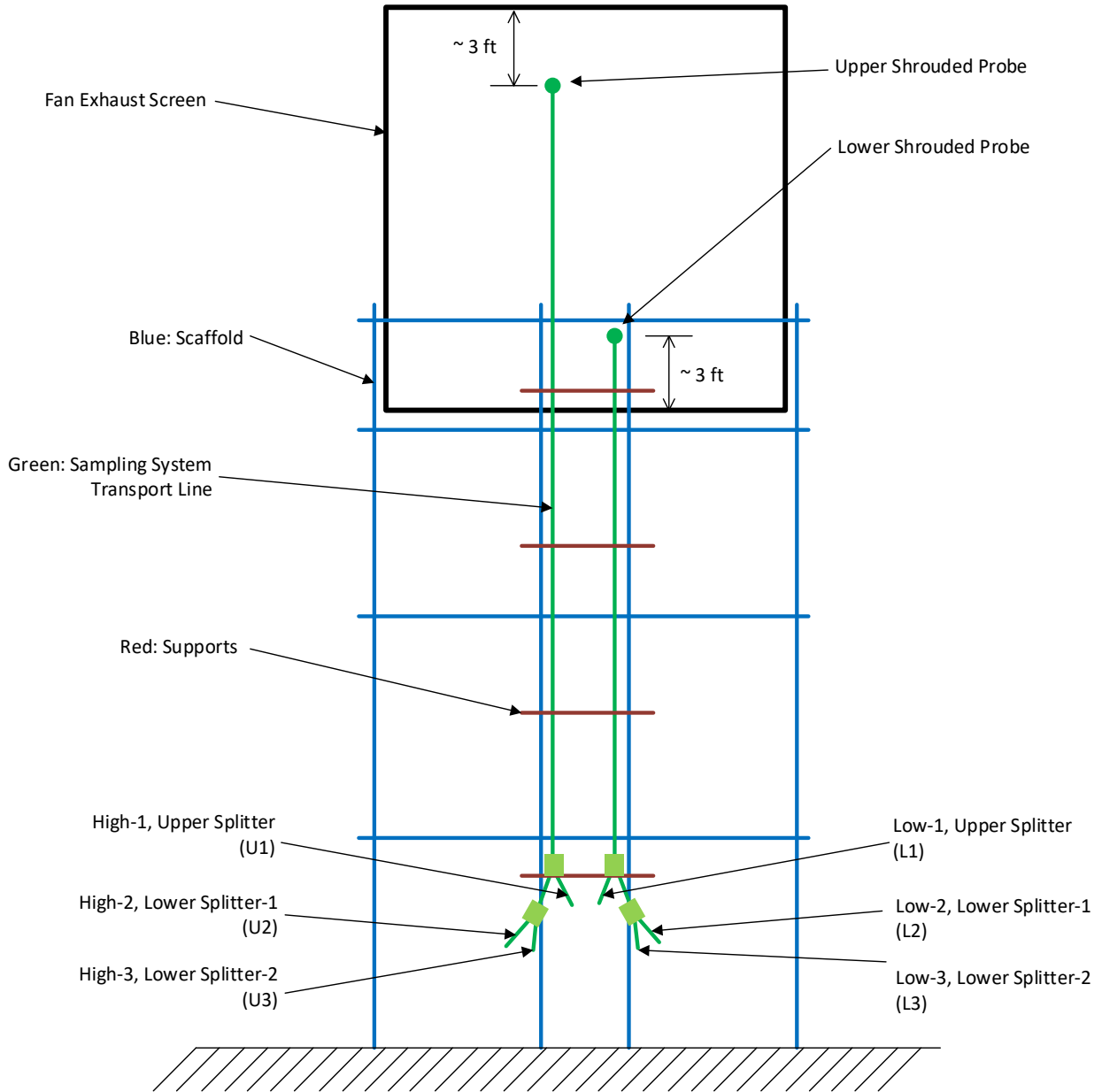
N/A not applicable

Note: Data for the U2 and L1 samples were adjusted based on their respective transmission factor as identified in Section 9.0. Filters from the test have been combined into a single composite sample.

Attachment C Figures



700-C Fan and Sampling Locations



Station H Sampling System