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EDT No.: 611126

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FEB 17 1995

ENGINEERING DATA TRANSMITTAL

Page 1 of 1
1. EDT No 611126

2. To: (Receiving Organization) Effluent Monitoring	3. From: (Originating Organization) Near-Field Monitoring	4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.: PSO/ES/EM	6. Cog. Engr.: J.W. Schmidt, B.P. Gleckler	7. Purchase Order No.: N/A
8. Originator Remarks: This is the final report for test plan number WHC-SD-WM-TP-252. The test plan's objective was to study and evaluate diffuse emissions from selected Hanford waste sites.		9. Equip./Component No.: N/A
11. Receiver Remarks:		10. System/Bldg./Facility: N/A
		12. Major Assm. Dwg. No.: N/A
		13. Permit/Permit Application No.: N/A
		14. Required Response Date: 2/01/95

15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approva l Desig- nator	Reason for Trans- mittal	Originator Dispo- sition	Receiver Dispo- sition
1	WHC-SD-WM-TRP-227		0	Final Report of Fugitive and Diffuse Emissions Evaluationsat the Hanford Site, CY 1994	E	1	1	1

16. KEY		
Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)	1. Approval 4. Review 2. Release 5. Post-Review 3. Information6. Dist. (Receipt Acknow. Required)	1. Approved 4. Reviewed no/comment 2. Approved w/comment 5. Reviewed w/comment 3. Disapproved w/comment6. Receipt acknowledged

(G)	(H)	17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)						(G)	(H)
Rea- son	Dis- p.	(J) Name	(K) Signature (M) MSIN	(L) Date	(J) Name	(K) Signature (M) MSIN	(L) Date	Rea- son	Dis- p.
1	1	Cog.Eng. J.W. Schmidt		1/31/95	Cog.Eng. B.P. Gleckler		1/31/95	1	1
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1	1	Env. W.E. Davis		1/31/95					

18. B.P. Gleckler 1/31/95 Signature of EDT Date Originator	19. L.P. Diediker 2-1-95 Authorized Representative Date for Receiving Organization	20. J.J. Dorian 1/31/95 Cognizant Manager Date	21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments
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RELEASE AUTHORIZATION

Document Number: WHC-SD-WM-TRP-227, REV 0

Document Title: Final Report of Fugitive and Diffuse Emissions
Evaluations at the Hanford Site, CY 1994

Release Date: 2/15/95

**This document was reviewed following the
procedures described in WHC-CM-3-4 and is:**

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

Kara M. Broz

February 15, 1995

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SUPPORTING DOCUMENT

1. Total Pages **81**

2. Title

Final Report of Fugitive and Diffuse Emissions Evaluations at the Hanford Site, CY 1994

3. Number

WHC-SD-WM-TRP-227

4. Rev No.

0

5. Key Words

diffuse, fugitive, resuspension, suspension, airborne emissions, NESHAP, emissions, environmental monitoring.

6. Author

Name: B.P. Gleckler
J.W. Schmidt

B.P. Gleckler 2/02/95
Signature

Organization/Charge Code 018C0/R43U1

7. Abstract

This is the final report for test plan WHC-SD-WM-TP-252 Rev.0. The intention of this study was to evaluate diffuse emissions sites and the effectiveness of the existing near-field monitoring network. All emissions measured were nearly undetectable and well below action levels.

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**Final Report of
Fugitive and Diffuse Emissions
Evaluations at the
Hanford Site, CY 1994**

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January 1995

MASTER

ACKNOWLEDGMENTS

The authors of this document would like to thank the following persons for their support during this study: B. M. Markes for graphics support, M. P. Curry for graphics layout, K. Rhoads of Pacific Northwest Laboratory for dose calculations, K. W. Burk of Pacific Northwest Laboratory for wind roses, wind speed histograms and meteorological data, R. L. Bumgarner and D. L. Ellingson for field support, and W. E. Davis for technical direction.

EXECUTIVE SUMMARY

The objective of this study was to evaluate several of Hanford's major diffuse emission sources and evaluate the effectiveness of monitoring these sources individually versus collectively. The results from this evaluation may also be utilized to demonstrate Westinghouse's compliance status with the applicable air emissions regulations and determine if additional studies and/or evaluations are necessary.

A detailed study of diffuse emissions is currently not justified, because the existing air sample data indicate that these emission sources contribute to much less than 0.1 mrem/yr total effective dose equivalent (TEDE) to the maximum exposed individual (MEI). It was estimated for 1992 and 1993 the effective dose equivalent (EDE) caused by emissions from diffuse sources were 0.035 and 0.028 mrem/y, respectively, for the MEI (References 12 and 13).

Air sampling results from four waste handling and storage facilities were collected for a one week period and analyzed. The following is a list of the selected sampling sites.

Plutonium Finishing Plant
241-BY Tank Farm
1301-N Trench
300 Area Trenches and North Ponds

These sites were chosen as being representative of most of the Hanford waste sites, which are known to be diffuse emission sites. The sites were evaluated on the following criteria: physical size, surface contamination levels, geology, vegetation density, surface cover, potential for occupational exposure, and potential for public exposure. The selected sites vary greatly with the selection criteria parameters, and as a result should provide representative data for most of Hanford's waste sites.

Both the total alpha and beta analytical results and the isotopic analytical results indicate that the emissions from these selected diffuse sources were below or slightly above the minimum detection limits of the analytical processes used. In most cases, the analytical results for samples collected downwind were not statistically different than those collected upwind which would indicate that for the meteorological conditions during sampling, emissions from these diffuse sources were not measurable. In two cases ($^{239/40}\text{Pu}$ at PFP and ^{60}Co at 1301-N) the downwind samples were statistically higher than those samples considered to be upwind. In these two cases, the isotopes were well below the Derived Concentration Guides (DCGs). DCGs are concentration values of a radionuclide in air or water that,

under conditions of continuous exposure for one year by one exposure mode (i.e., ingestion of water, submersion in air, or inhalation), would result in an effective dose equivalent of 100 mrem, 0.1 rem (1 mSv) to reference man.

As a result of this study, it is recommended that a longer duration of samples be collected using a larger diffuse source as an emission point (i.e., 200 East Area). These longer duration of samples would allow the collection of data that would be comparable to the existing monitoring system and would help evaluate the effectiveness of monitoring these sources collectively.

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1.0 INTRODUCTION

The Hanford Site contains a number of facilities and waste sites with diffuse and fugitive radioactive emissions. Diffuse and fugitive emissions are recognized as a potential pathway for human intake from the inhalation and ingestion of resuspended contaminants.

Diffuse emissions or emissions from non-point sources are defined as radioactive emissions originating from an area whose extent may or may not be well defined, such as contaminated ground above a near-surface waste disposal unit. Fugitive emissions are defined as radioactive air emissions which do not and could not reasonably be exhausted through a stack, vent, or other functionally equivalent structure, and which are not feasible to directly measure and quantify. Diffuse emissions, emissions from non-point sources, and fugitive emissions shall be referred to as "diffuse emissions" for the remainder of this document.

40 CFR 61, Subpart H, of the National Emission Standards for Hazardous Air Pollutants (NESHAP) and Washington Administrative Code (WAC) 246-247 titled Radiation Protection - Air Emissions require the dose to the maximally exposed individual living off-site to be calculated annually, which must be below 10 mrem/yr. Dose calculations for the maximally exposed individual currently rely on the results of the Hanford Site air monitoring network. The Hanford Site air monitoring network consists of 50 sampling stations operated by the Pacific Northwest Laboratory's (PNL) Site Environmental Monitoring Program and 45 sampling stations operated by the Westinghouse Hanford Company's (WHC) Operational Environmental Monitoring Program. The PNL sampling stations are located as follows: 23 are on the Site, 13 at the Site perimeter, 11 in nearby communities, and 3 in distant communities. The WHC sampling stations are located as follows: 4 at 100-K, 4 at 100-N, 35 at the 200-Areas, 1 at the Wye Barricade, and 1 at the 300 Area. Hanford's air monitoring network is currently setup to monitor for diffuse emissions collectively or on a site-wide basis.

Washington Administrative Code (WAC) 246-247-075 requires that "Facilities shall monitor non-point and fugitive emissions of radioactive material." WAC 246-247-075 also states "The department may also require the operator of any emission unit to conduct stack sampling, ambient air monitoring, or other testing as necessary to demonstrate compliance with the standards in WAC 246-247-040." This document provides a plan to provide confirmatory measurements of Hanford's diffuse emissions sites, to demonstrate compliance to WAC 246-247-075 and 40 CFR 61, Subpart H.

The Department of Energy (DOE) and the Environmental Protection Agency (EPA) are attempting to develop a Memorandum Of Understanding (MOU), since there is no guidance on demonstrating compliance with NESHAP regulations for diffuse emissions. The EPA is currently developing a guidance on how facilities with diffuse emissions can demonstrate compliance, but initial draft guidances have been met with much resistance. In the sixth draft of the MOU, DOE made a commitment to collect data on diffuse sources to assist the EPA in developing this guidance.

This study is an evaluation of Hanford's major diffuse emission sources to support WHC, DOE and the EPA in developing guidance on demonstrating compliance with NESHAP regulations from facilities with diffuse emissions. Data from this study may also be utilized for the Air Emissions Inventory.

2.0 OBJECTIVE

The objective of this study was to evaluate several of Hanford's major diffuse emission sources and evaluate the effectiveness of monitoring these sources individually versus collectively. The results from this evaluation may also be utilized to demonstrate Westinghouse's compliance status with the applicable air emissions regulations and determine if additional studies and/or evaluations are necessary.

A detailed study of diffuse emissions is currently not justified, because the existing air sample data indicate that these emission sources contribute to much less than 0.1 mrem/yr total effective dose equivalent (TEDE) to the maximum exposed individual (MEI). It was estimated for 1992 and 1993 the effective dose equivalent (EDE) caused by emissions from diffuse sources were 0.035 and 0.028 mrem/y, respectively, for the MEI (References 12 and 13).

3.0 SCOPE

Air sampling results from four waste handling and storage facilities were collected and analyzed. The following is a list of the selected sampling sites.

Plutonium Finishing Plant
241-BY Tank Farm
1301-N Trench
300 Area Trenches and Process Ponds

These sites were chosen as being representative of most of the Hanford waste sites, which are known to be diffuse emission sites. The sites were evaluated on the following criteria: physical size, surface contamination levels, geology, vegetation density, surface cover, potential for occupational exposure, and potential for public exposure. The selected sites vary greatly with the selection criteria parameters, and as a result should provide representative data for most of Hanford's waste sites, see Table 3-1.

This study took place during June and July of 1994. The time period for the study enabled the collection of enough data to assess the radionuclide emissions from the selected waste sites.

Table 3-1
SITES SELECTED TO EVALUATE EMISSIONS FROM DIFFUSE SOURCES

SITE	SIZE	CONTAMINATION	GEOLOGICAL DESCRIPTION	VEGETATION DENSITY	SURFACE COVER	POPULATION EXPOSURE OCCUPATIONAL ¹	POPULATION EXPOSURE PUBLIC ¹
Plutonium Finishing Plant (PFP)	M	LOW	FLAT	LOW	SAND/GRASS BRUSH/COBBLE	LOW	LOW
241-BY Tank Farm	S	HIGH	FLAT	NONE	MEDIUM GRAVEL	HIGH	LOW
1301-N Trench	M	MEDIUM (ISOLATED HIGH)	HILLY	HIGH	SAND/GRASS/ BRUSH	MEDIUM	MEDIUM
300 Area Trenches & North Ponds	XL	MEDIUM (ISOLATED HIGH)	PARTIALLY BELOW GRADE	MEDIUM/HIGH	SAND/GRASS/ BRUSH/COBBLE	MEDIUM	MEDIUM/HIGH

1 - These comparisons are relative to other waste sites existing on the Hanford Site. The dose to the public due to all of the waste sites combined is very low.

4.0 DESCRIPTION OF TEST

4.1 TEST ITEM

The previously listed sites were the only sites tested within the scope of this evaluation.

Air samples were collected during the months June and July. All ambient samples were submitted to the 222-S Analytical Laboratory's routine air filter sample analysis program, for an initial non-destructive analysis. The 222-S Analytical Laboratory will perform non-destructive gross alpha and gross beta analyses on all samples. The gross alpha and beta analysis data along with wind telemetry data were utilized to determine which samples are downwind and upwind samples. No samples were composited.

When sampling at a specific waste site or facility was completed, the ambient air samples were submitted to International Technology Corporation (IT) for isotopic analyses. Upon receipt of the analyses the airborne concentrations of radionuclides were then be calculated for each sampling period and location.

Radioactive air and soil contamination concentration levels from the four sites were collected and evaluated. This study utilized existing air data when possible. Additional data collection was performed when existing data is insufficient or unavailable.

The prevailing wind directions for the waste sites was determined from Pacific Northwest Laboratory's (PNL) meteorological data. One to five air samplers were located downwind of each waste site. One to two background air samplers were located upwind of the waste site.

4.2 TEST ENVIRONMENT

The test locations are predominately contaminated with isotopes of ^{60}Co , ^{137}Cs and ^{90}Sr . Other radiological contaminants may include: ^{134}Cs , ^{154}Eu , ^{155}Eu , ^{129}I , ^{210}Pb , ^{212}Pb , ^{214}Pb , ^{238}Pu , $^{239/240}\text{Pu}$, ^{226}Ra , ^{106}Ru , ^{125}Sb , ^{235}U , and ^{238}U (Reference 14). Contamination levels at several locations within some of the waste sites exceed 1×10^6 dpm/100 cm^2 for beta and gamma emissions as indicated by the most recent radiological surveys.

5.0 RESULTS

Different analytical laboratories were utilized for total alpha/beta and specific radionuclide analyses. The 222-S Analytical Laboratory performed the total alpha and total beta analyses. The International Technology Analytical Services - Richland Laboratory performed the specific radionuclide analyses, under contract 163589-A-M1. The results from the two laboratories can not be readily compared, due to differences in their instrumentation, analysis procedures and calibration standards.

The dose limit for the Maximally Exposed Individual (MEI), located outside the Hanford site, in which emissions monitoring requirements become more stringent is 0.1 mrem/y. Air concentrations, resulting in an annual dose of 0.1 mrem to the MEI, were calculated for each sampling site, utilizing the CAP-88 atmospheric dispersion code. The annual dose limit for non-radiological workers inside or outside the Hanford site is 100 mrem.

Concentrations for limited exposures to non-radiological workers at a sampling site were calculated by adjusting the DCG for a 2000 hour exposure period per year, rather than a 8760 hour exposure period. Plutonium-239 and strontium-90 were used for alpha and beta emitters to provide the most conservative concentrations. Table 5-1 contains the Derived Air Concentrations (DAC) and Derived Concentration Guidelines (DCG) in addition to the calculated on site concentrations of concern.

A map depicting the locations of Hanford's meteorological stations is included in Appendix E. Data collected and evaluated included data on wind telemetry, atmospheric stability, atmospheric mixing height, temperature, solar radiation, precipitation, humidity and barometric pressure.

Table 5-1

RADIONUCLIDE AIR CONCENTRATION LIMITS			
Isotope	Derived Air Concentration ¹ (pCi/mL)	Derived Concentration Guideline ² (pCi/mL)	Limited Exposure Concentration ³ (pCi/m ³)
²³⁹ Pu	2.0 E+00	2.0 E-02	7.0 E-02
⁹⁰ Sr	2.0 E+03	9.0 E+00	3.1 E+01

- 1 The Derived Air Concentration (DAC) is the airborne concentration that equals the Annual Limit of Intake (ALI) divided by the volume of air breathed by an average worker for a 2000 hour working year. The ALI is the amount of radioactive material taken into the body of an adult worker resulting in either a committed effective dose equivalent of 0.05 Sv (5 rem) or a committed dose equivalent of 0.5 Sv (50 rem).
- 2 The Derived Concentration Guideline (DCG) is the concentration of radionuclide in air that, under conditions of continuous exposure (8760 h/y), would result in an committed effective dose equivalent of 0.001 Sv (0.1 rem)
- 3 Limited exposure concentrations apply to non-radiological workers on the Hanford Site. These values are the DCG adjusted such that a 100 mrem dose will be received from a 2000 hour exposure.

$$1 \text{ pCi/m}^3 = 1.0\text{E-}12 \text{ } \mu\text{Ci/ml}$$

5.1 PLUTONIUM FINISHING PLANT

5.1.1 Site Description

The Plutonium Finishing Plant (PFP) is located in the western end of the 200 West Area. This facility is used to recover, stabilize, and store plutonium and has been on standby since 1992. Plutonium nitrate solutions from the PUREX Plant are reduced to plutonium oxide or plutonium metal. The major isotopes of concern at PFP include ^{239,240}Pu, ²⁴¹Pu, and ²⁴¹Am.

In addition to the main structure, 234-5Z, PFP comprises of many small support structures. 234-5Z and most of its support structures have potential for diffuse emissions. Potential diffuse emission release points from PFP and its support structures include: inlet-exhaust ventilation systems, access doors, and outdoor contamination areas. Appendix A contains a detailed map of PFP with its support structures. Sparse vegetation surrounds the plant and its support structures. Surface contaminated soil is covered by gravel.

5.1.2 Air Sample Results

Two samples were collected at each location and composited for analysis. A volume of approximately 2300 m³ of air was sampled for the period of 14:00 5/09/94 through 13:00 6/07/94 (29 days). The upwind and downwind ^{239,240}Pu results were both above the MDC and had overall errors less than 100%. However, the measured concentrations were still of no concern since, they were 100 times less than the limited exposure concentration of 7.0E-02 pCi/m³ (7.0E-14 μ Ci/mL). The air sample results are provided in Table 5-2. A listing of all radionuclide results can be found in Appendix E.

Unfortunately, the air samples were not analyzed for two of PFP's predominant isotopes, ²⁴¹Pu and ²⁴¹Am. Plutonium-241 results are normally calculated from ²⁴¹Am, since it is difficult to detect and contributes little to the dose received. Americium-241 analysis for air filters is not included in the contract for the analytical lab, contract 163589-A-M1, and as a result the samples were not analyzed for this isotope. In the 1993 Radionuclide Air Emissions report ²⁴¹Am emissions from PFP did not exceed 88% of the ^{239/240}Pu emissions. If ²⁴¹Am concentrations were assumed to be equal to the ^{239/240}Pu concentrations the dose to the MEI would be 1.5 times the dose due to ^{239/240}Pu, since ²⁴¹Am is a greater contributor to the dose.

Table 5-2

PLUTONIUM FINISHING PLANT					
EDP Code	Isotope	Concentration (pCi/m ³)	Overall Error (pCi/m ³)	MDC ¹ (pCi/m ³)	Sample Volume (m ³)
N190	^{239/240} Pu	2.00E-04	4.22E-05	5.00E-06	2.39E + 03
	²³⁸ Pu	8.81E-07	5.69E-06	5.00E-06	
N191	^{239/240} Pu	3.60E-05	1.46E-05	5.00E-06	2.36E + 03
	²³⁸ Pu	4.46E-07	5.44E-06	5.00E-06	

1 Contractual MDC values, contract number 163589-A-M1.

1 pCi/m³ = 1.0E-12 μ Ci/ml

5.1.3 Meteorological Conditions

Meteorological data was collected and evaluated from the nearest available meteorological station (Station 19) for the period of 5/09/94 through 6/07/94. Graphs depicting the data collected for the sampling periods are included in Appendix A.

An analysis of the wind telemetry data indicating the frequency that the wind was blowing across the waste site towards the sampler is provided in Table 5-3.

Table 5-3

PLUTONIUM FINISHING PLANT WIND TO SAMPLER FREQUENCY DATA	
Sampler Location	Percent of Sampling Period
N190	56.2
N191	10.9

Wind telemetry data for the sample period was compared to the May historical data for Station 7, contained in PNL's 1993 climatological data summary (PNL-9809). Station 7 was used for the comparison, since Station 19 was relocated to PFP in 1993. The comparison of the wind roses and histograms indicate that wind speeds and directions for the sampling period were generally representative of those for PFP during the month of May, averaging 3.8 m/s (8.5 mph). The wind speed range of 5.8-8.1 m/s (13-18 mph) was under represented by approximately 6%. The wind speed ranges of 8.5-10.7 and 11.2-13.9 m/s (19-24 and 25-31 mph) were not represented for the sampling period, however these combined only account for approximately 5% of the month. The wind telemetry data and excerpts of PNL's 1993 climatological summary are included in Appendix A.

The daily average for the atmospheric mixing height was above 500 m for 24 days, between 300 m to 500 m for four days, and 219 m for one day of the 29 sampling days. A plot of the daily atmospheric mixing height data is included in Appendix A.

Atmospheric stability was generally neutral during daytime hours and slightly stable during the evenings. No unusual trends were noticed in the atmospheric stability patterns. Frequency data for stability classes was compiled and is provided in Appendix A.

The average temperature for the sampling period was 18.4 C (65.2°F), which is 2.1 C (3.9°F) above the normal temperature of 16.3 C (61.3°F) for the month of May. Temperatures ranged from 6.7 C (44°F) to 33.9 C (93°F) during the sampling period. Daily solar radiation was measured in Langleys (g Cal/cm²) and averaged 492.0 Langleys, which is 66 Langleys less than the average of 455 Langleys for the month of May. Daily solar radiation measurements ranged from 169 to 697 Langleys during the sampling period.

Precipitation was minimal prior to sampling, 0.1 cm (0.02 in) of precipitation were received during the 14 days prior to sampling. The 3.9 cm (1.53 in) of precipitation during sampling was triple the normal amount of 1.3

cm (0.51 in). Relative humidity averaged 43.9% for the sampling period, deviating only 1.2% from the average of 42.7%. Daily relative humidity values ranged between 28% and 73%.

5.1.4 Results Summary

Wind conditions during the sampling period were very typical for the month of May. No unusual atmospheric mixing and humidity trends occurred during this period. However, solar radiation was lower than normal and precipitation was significantly higher than normal. These conditions would indicate that a portion of emissions, due to suspension, were minimal rather than being representative.

When this study's total alpha and beta results were compared to those of nearby permanent ambient air samplers, see table in Appendix A and map in Appendix E, no significant differences were observed. The results from this study were 100 times less than the limited exposure concentration.

A dose of 10 mSv/y (0.1 mrem/yr) to the maximally exposed individual (MEI) could only occur if PFP's diffuse emissions would produce an airborne plutonium concentration of $2.52\text{E-}02 \text{ pCi/m}^3$ ($2.52\text{E-}14 \text{ }\mu\text{Ci/mL}$) at the source of emissions. The results from this preliminary study indicate that the diffuse emissions from PFP during a typical May would need to be 100 times greater for the MEI to receive 10 mSv (0.1 mrem) per year.

5.2 241-BY TANK FARM

5.2.1 Site Description

The 241-BY Tank Farm is located inside the northern boundary of the 200 East Area. The underground tanks contain liquid wastes from chemical processing operations, which contain high concentrations of radionuclides. Surface contamination levels in the 241-BY Tank Farm range into the millions of dpm/100 cm² gross beta/gamma. The predominant isotopes in 241-BY include ³H, ¹⁴C, ⁹⁰Sr, ¹²⁵Sb, ¹³⁷Cs, ^{239,240}Pu, and ²⁴¹Am. Diffuse emission release locations include surface contamination areas, vents, risers, access hole covers, inlet-exhaust ventilation systems, diversion boxes, transfer lines, and storage vaults.

The surfaces of the 241-BY Tank Farm are generally flat. The surface contamination area is vegetation free, has many small obstructions, and a few buildings. The entire tank farm surface is covered with stone, which is partially mixed with sand. A detailed map of the 241-BY Tank Farm is provided in Appendix B.

5.2.2 Air Sample Results

Five samplers were used to monitor diffuse emissions from the tank farm. Samples were taken for a period of one week, prior to the scheduled application of contamination fixative to the tank farm surfaces. A volume of approximately 663 m³ of air was sampled for the period of 14:00 6/13/94 through 13:00 6/21/94 (8 days). Only one result was above the MDC, 1.14E-05 pCi/m³ (1.14E-17 μ Ci/mL) ^{239/240}Pu at N415, however the overall error of 143.8% made it undistinguishable from background activity. Ignoring the overall error, the measured concentration was 1000 times less than the limited exposure concentration for ²³⁹Pu, 7.0E-02 pCi/m³ (7.0E-14 μ Ci/mL). The air sample results are provided in Table 5-3. A listing of all radionuclide results can be found in Appendix E.

Table 5-3

241-BY TANK FARM					
EDP Code	Isotope	Concentration (pCi/m ³)	Overall Error (pCi/m ³)	MDC ¹ (pCi/m ³)	Sample Volume (m ³)
N412	^{239/240} Pu	-3.32E-07	1.53E-05	5.00E-06	6.63E + 02
	²³⁸ Pu	-1.27E-05	1.44E-05	5.00E-06	
	²³⁸ U	-7.27E-05	4.68E-05	5.00E-05	
	²³⁵ U	1.99E-05	4.39E-05	5.00E-05	
	⁹⁰ Sr	5.79E-06	4.77E-04	1.00E-04	
	¹³⁷ Cs	5.81E-04	2.62E-03	1.00E-02	
	⁶⁰ Co	-4.34E-03	3.38E-03	1.00E-02	
N413	^{239/240} Pu	-1.34E-05	1.55E-05	5.00E-06	6.63E + 02
	²³⁸ Pu	-2.71E-06	1.33E-05	5.00E-06	
	²³⁸ U	-6.79E-05	5.83E-05	5.00E-05	
	²³⁵ U	-1.14E-05	1.33E-05	5.00E-05	
	⁹⁰ Sr	9.49E-05	5.07E-04	1.00E-04	
	¹³⁷ Cs	1.66E-03	2.20E-03	1.00E-02	
	⁶⁰ Co	3.20E-03	2.44E-03	1.00E-02	
N414	^{239/240} Pu	2.28E-06	9.90E-06	5.00E-06	6.63E + 02
	²³⁸ Pu	-6.20E-06	5.41E-06	5.00E-06	
	²³⁸ U	1.44E-05	8.48E-05	5.00E-05	
	²³⁵ U	1.14E-06	4.86E-05	5.00E-05	
	⁹⁰ Sr	1.34E-04	5.29E-04	1.00E-04	
	¹³⁷ Cs	5.98E-03	3.97E-03	1.00E-02	
	⁶⁰ Co	-2.28E-04	4.33E-03	1.00E-02	
N415	^{239/240} Pu	1.14E-05	1.64E-05	5.00E-06	6.63E + 02
	²³⁸ Pu	-4.52E-06	4.24E-06	5.00E-06	
	²³⁸ U	-5.45E-05	6.44E-05	5.00E-05	
	²³⁵ U	3.90E-05	6.37E-05	5.00E-05	
	⁹⁰ Sr	-1.20E-04	4.70E-04	1.00E-04	
	¹³⁷ Cs	2.37E-03	2.67E-03	1.00E-02	
	⁶⁰ Co	3.35E-03	4.43E-03	1.00E-02	
N416	^{239/240} Pu	3.56E-06	8.43E-06	5.00E-06	6.63E + 02
	²³⁸ Pu	-6.62E-06	8.12E-06	5.00E-06	
	²³⁸ U	-6.87E-05	4.52E-05	5.00E-05	
	²³⁵ U	1.92E-05	4.27E-05	5.00E-05	
	⁹⁰ Sr	3.21E-05	5.13E-04	1.00E-04	
	¹³⁷ Cs	2.37E-03	2.47E-03	1.00E-02	
	⁶⁰ Co	-3.35E-03	3.93E-03	1.00E-02	
N417	^{239/240} Pu	-3.32E-07	1.50E-05	5.00E-06	6.63E + 02
	²³⁸ Pu	-7.60E-06	1.00E-05	5.00E-06	
	²³⁸ U	-3.94E-05	6.43E-05	5.00E-05	
	²³⁵ U	-1.22E-05	1.19E-05	5.00E-05	
	⁹⁰ Sr	-1.59E-04	4.53E-04	1.00E-04	
	¹³⁷ Cs	1.83E-03	2.85E-03	1.00E-02	
	⁶⁰ Co	7.61E-05	2.56E-03	1.00E-02	

¹ Contractual MDC values, contract number 163589-A-M1.

1 pCi/m³ = 1.0E-12 μ Ci/ml

5.2.3 Meteorological Conditions

Meteorological data was collected and evaluated from the nearest available meteorological station (Station 6) for the period of 6/13/94 through 6/21/94. Graphs depicting the data collected for the sampling periods are included in Appendix B.

An analysis of the wind telemetry data indicating the frequency that the wind was blowing across the waste site towards the sampler is provided in Table 5-4.

Table 5-4

241-BY TANK FARM WIND TO SAMPLER FREQUENCY DATA	
Sampler Location	Percent of Sampling Period
N412	15.3
N413	75.1
N414	75.1
N415	29.7
N416	27.0
N417	27.0

Wind telemetry data for the sample period was compared to the July historical data for Station 6, contained in PNL's 1993 climatological data summary (PNL-9809). The comparison of the wind roses and histograms indicate that wind speeds and directions for the sampling period were generally representative of those for 241-BY Tank Farm during the month of July. The average wind speed for the sampling period was 3.9 m/s (8.7 mph). The wind speed ranges of 0.5-1.4 m/s (1-3 mph), 1.8-3.2 m/s (4-7 mph), and 11.2-13.9 m/s (19-24 mph) were only under represented by as much as 4.5%. The wind speed ranges of 3.6-5.4 m/s (8-12 mph) and 5.8-8.1 m/s (13-18 mph) were only over represented by as much as 4.4%. The wind telemetry data and excerpts of PNL's 1993 climatological summary are included in Appendix A.

The daily average for the atmospheric mixing height was above 500 m all 9 sampling days. A plot of the daily atmospheric mixing height data is included in Appendix B.

Atmospheric stability was extremely to slightly unstable during daytime hours and slightly stable during the evenings. No unusual trends were noticed in the atmospheric stability patterns. Frequency data for stability classes was compiled and is provided in Appendix B.

The average temperature for the sampling period was 19.8 C (67.6°F), which is 1.2 C (2.1°F) below the normal temperature of 21.0 C (69.7°F) for the month of June. Temperatures ranged from 7.8 C (46°F) to 36.1 C (97°F) during the sampling period. Daily solar radiation was measured in Langleys (g Cal/cm²) and averaged 587.0 Langleys, which is 25 Langleys less than the average of 612 Langleys for the month of June. Daily solar radiation measurements ranged from 442 to 712 Langleys during the sampling period.

Precipitation was minimal prior to sampling, 0.7 cm (0.28 in) of precipitation were received during the 14 days prior to sampling. The 0.23 cm (0.09 in) of precipitation during sampling was below normal, 2.4 cm (0.95 in), for an average week in June. Relative humidity averaged 35.6% for the sampling period, deviating only 3.9% from the average of 39.5%. Daily relative humidity values ranged between 25% and 47%.

5.2.4 Results Summary

Wind directions during the sampling period were very typical and wind speeds were slightly elevated for the month of June. No unusual trends in atmospheric mixing, relative humidity, precipitation, and solar radiation occurred during this period.

When this study's total alpha and beta results were compared to those of nearby permanent ambient air samplers, see table in Appendix B and map in Appendix E, no significant differences were observed. All results from this study were at least 100 times less than the limited exposure concentrations.

A dose of 10 mSv/y (0.1 mrem/yr) to the maximally exposed individual (MEI) could only occur if 241-BY's diffuse emissions would produce a combined airborne concentration, consisting of ⁹⁰Sr, ¹³⁷Cs, and ^{137m}Ba, of 6.57E+01 pCi/m³ (6.57E-11 µCi/mL) at the source of emissions. The results from this preliminary study indicate that the diffuse emissions from 241-BY Tank Farm during a typical June would need to be 10,000 times greater for the MEI to receive 10 mSv (0.1 mrem) per year.

5.3 1301-N TRENCH

5.3.1 Site Description

The 1301-N Trench is located at the northeast corner of the 100-N Area. The trench received radioactive water containing activation and fission products along with small quantities of corrosive liquids and laboratory chemicals. The trench received radioactive effluent streams from 105-N and 109-N at an average flow rate of 5,700 l/min. These effluents to the trench ceased in 1985. Potential diffuse emissions are produced solely from suspension.

The 1301-N Trench is a 526-m long and 15-m wide rectangular basin covered with concrete slabs. The surrounding terrain is extremely uneven and hilly. Appendix C provides a detailed map of the 1301-N Trench. The 1301-N Trench was selected for two reasons. The first is that the airborne concentrations of ^{60}Co are the highest on the site, for this radionuclide, and is the waste site closest to general public access from the Columbia River. The vegetation near the ditch is dense sagebrush and sparse grass.

5.3.2 Air Sample Results

Five samplers were used to monitor diffuse emissions from the ditch. Samples were taken for a period of two weeks. A volume of approximately 1000 m^3 of air was sampled for the period of 11:00 7/04/94 through 8:00 7/18/94 (15 days). Results above the MDC were obtained at two sampler locations, N419 and N422, however all results had overall errors greater than 100% making them undistinguishable from background activity. Ignoring the overall errors, the measured concentration, were five orders of magnitude less than the limited exposure concentration for ^{90}Sr , $3.1\text{E}+01 \text{ pCi/m}^3$ ($3.1\text{E}-11 \text{ }\mu\text{Ci/mL}$), and ^{239}Pu , $7.0\text{E}-02 \text{ pCi/m}^3$ ($7.01\text{E}-14 \text{ }\mu\text{Ci/mL}$). The air sample results are provided in Table 5-5. A listing of all radionuclide results can be found in Appendix E.

Table 5-5

1301-N TRENCH					
EDP Code	Isotope	Concentration (pCi/m ³)	Overall Error (pCi/m ³)	MDC* (pCi/m ³)	Sample Volume (m ³)
N418	^{239/240} Pu	2.97E-06	8.84E-06	5.00E-06	1.13E+03
	²³⁸ Pu	-2.95E-06	5.95E-06	5.00E-06	
	²³⁸ U	-3.17E-05	3.94E-05	5.00E-05	
	²³⁵ U	1.35E-05	2.84E-05	5.00E-05	
	⁹⁰ Sr	2.37E-05	3.26E-04	1.00E-04	
	¹³⁷ Cs	3.03E-03	1.55E-03	1.00E-02	
	⁶⁰ Co	-2.21E-04	1.39E-03	1.00E-02	
N419	^{239/240} Pu	9.29E-06	1.09E-04	5.00E-06	1.13E+03
	²³⁸ Pu	-2.06E-05	3.83E-05	5.00E-06	
	²³⁸ U	-5.80E-06	4.71E-05	5.00E-05	
	²³⁵ U	7.81E-07	1.90E-05	5.00E-05	
	⁹⁰ Sr	1.39E-04	3.04E-04	1.00E-04	
	¹³⁷ Cs	-1.07E-03	1.92E-03	1.00E-02	
	⁶⁰ Co	1.59E-03	1.31E-03	1.00E-02	
N420	^{239/240} Pu	3.14E-06	1.24E-05	5.00E-06	9.07E+02
	²³⁸ Pu	-3.11E-06	1.38E-05	5.00E-06	
	²³⁸ U	-2.15E-06	6.05E-05	5.00E-05	
	²³⁵ U	8.51E-06	3.13E-05	5.00E-05	
	⁹⁰ Sr	-1.31E-04	3.61E-04	1.00E-04	
	¹³⁷ Cs	7.88E-04	1.98E-03	1.00E-02	
	⁶⁰ Co	2.65E-03	1.89E-03	1.00E-02	
N421	^{239/240} Pu	2.42E-06	5.64E-06	5.00E-06	1.08E+03
	²³⁸ Pu	-3.11E-06	8.11E-06	5.00E-06	
	²³⁸ U	-2.15E-06	2.61E-05	5.00E-05	
	²³⁵ U	-9.34E-06	8.18E-06	5.00E-05	
	⁹⁰ Sr	4.42E-05	3.07E-04	1.00E-04	
	¹³⁷ Cs	-1.38E-03	1.65E-03	1.00E-02	
	⁶⁰ Co	1.72E-03	2.08E-03	1.00E-02	
N422	^{239/240} Pu	4.15E-06	8.99E-06	5.00E-06	1.02E+03
	²³⁸ Pu	6.98E-06	1.25E-05	5.00E-06	
	²³⁸ U	1.15E-05	4.91E-05	5.00E-05	
	²³⁵ U	-8.70E-06	7.61E-06	5.00E-05	
	⁹⁰ Sr	1.56E-04	3.62E-04	1.00E-04	
	¹³⁷ Cs	6.47E-04	2.10E-03	1.00E-02	
	⁶⁰ Co	-3.53E-03	3.45E-03	1.00E-02	

* Contractual MDC values, contract number 163589-A-M1.

1 pCi/m³ = 1.0E-12 μ Ci/ml

5.3.3 Meteorological Conditions

Meteorological data was collected and evaluated from the nearest available meteorological station (Station 6) for the period of 7/04/94 through 7/18/94. Graphs depicting the data collected for the sampling periods are included in Appendix C.

An analysis of the wind telemetry data indicating the frequency that the wind was blowing across the waste site towards the sampler is provided in Table 5-6.

Table 5-6

1301-N TRENCH WIND TO SAMPLER FREQUENCY DATA	
Sampler Location	Percent of Sampling Period
N418	23.7
N419	53.7
N420	59.6
N421	56.0
N422	21.2

Wind telemetry data for the sample period was compared to the July historical data for Station 13, contained in PNL's 1993 climatological data summary (PNL-9809). The comparison of the wind roses and histograms indicate that wind speeds and directions for the sampling period were generally representative of those for 1301-N Trench Farm during the month of July, averaging 3.8 m/s (8.5 mph). The wind speed ranges of 0.5-1.4 m/s (1-3 mph), 1.8-3.2 m/s (4-7 mph), and 5.8-8.1 m/s (13-18 mph) were under represented by only 1.4%. The wind speed ranges of 3.6-5.4 m/s (8-12 mph) and 11.2-13.9 m/s (19-24 mph) were over represented by only 4.0%. The wind telemetry data and excerpts of PNL's 1993 climatological summary are included in Appendix C.

The daily average for the atmospheric mixing height was above 500 m 13 days and between 300 m and 500 m for two days of the 15 day sampling period. A plot of the daily atmospheric mixing height data is included in Appendix C.

Atmospheric stability was moderately unstable during daytime hours and slightly stable during the evenings. No unusual trends were noticed in the atmospheric stability patterns. Frequency data for stability classes was compiled and is provided in Appendix C.

The average temperature for the sampling period was 26.7 C (80.1°F), which is 2.1 C (3.9°F) above the normal temperature of 24.6 C (76.2°F) for the month of July. Temperatures ranged from 11.1 C (52°F) to 40.0 C (104°F) during the sampling period. Daily solar radiation was measured in Langleys (g Cal/cm²) and averaged 632.2 Langleys, which is 1.8 Langleys less than the average of 634 Langleys for the month of July. Daily solar radiation measurements ranged from 272 to 705 Langleys during the sampling period.

Precipitation was minimal prior to sampling, 0.1 cm (0.02 in) of precipitation were received during the 14 days prior to sampling. The 0.4 cm (0.15 in) of precipitation during sampling was higher than normal, 0.2 cm (0.09 in), for an average two week period in July. Relative humidity averaged 30.7% for the sampling period, deviating only 2.6% from the average of 33.3. Daily relative humidity values ranged between 18% and 71%.

5.3.4 Results Summary

Wind directions during the sampling period were very typical and wind speeds were slightly elevated for the month of July. No unusual trends in atmospheric mixing, relative humidity, and solar radiation occurred during this period. However, the entire month's precipitation was received during the second day of sampling. The effect the precipitation had on the suspension of contaminant was probably minimal, due to the hot dry weather that occurred immediately afterwards. These conditions would indicate that emissions from sources were representative.

When this study's total alpha and beta results were compared to those of nearby permanent ambient air samplers, see table in Appendix C and map in Appendix E, no significant differences were observed, even though the permanent samplers were closer to contamination source terms. The total alpha results from this study were 10 times less than the limited exposure concentration. All specific radionuclide results for alpha emitters were 10,000 times less than the limited exposure concentration. All beta emitter results from this study were 1000 times less than the limited exposure concentration.

A dose of 10 mSv/y (0.1 mrem/yr) to the maximally exposed individual (MEI) could only occur if the 1301-N Trench's diffuse emissions would produce an airborne ⁶⁰Co concentration of 7.88E-01 pCi/m³ at the source of emissions. The results from this preliminary study indicate that the diffuse emissions of ⁶⁰Co from the 1301-N Trench during a typical July would need to be 100 times greater for the MEI to receive 10 mSv (0.1 mrem) per year.

5.4 300 AREA TRENCHES & NORTH PONDS

5.4.1 Site Description

The 316-5 Trenches and 316-2 North Process Ponds are part of operable unit 300-FF-1 and are located at the north end of the 300 Area. The 316-5 Trenches received wastes containing radioactive material from the 300 Area Process Sewer System. The 316-2 North Process Ponds received low-level radioactive wastes and cooling water from the 3706 and 321 Buildings, along with aqueous wastes containing unirradiated uranium from the Hot Semi-Works Laboratory and 303 Building. Potential diffuse emissions are produced solely from suspension.

The 316-5 Trenches are two north and south oriented trenches, which are 1.8 m apart. Each trench is 468 m long, 3 m wide, and 3.7 m deep, with a side slope of 1:1.5.

The 316-2 North Process Ponds consists of seven different subsections separated by 3.7-m wide dikes. The ponds occupies an area of approximately 4-ha and is surrounded by a 3-m high and 4.6-m wide dike.

The area around the 316-5 Trenches and 316-2 North Process Ponds is partially below grade and contains a medium to high vegetation density. The soil in the area consists of a sand and cobble mixture. Appendix D provides a detailed map of the 316-5 Trenches and 316-2 North Process Ponds. The vegetation in and near the trenches and ponds is sparse grass and sagebrush.

5.4.2 Air Sample Results

Nine samplers were used to monitor diffuse emissions from the trenches and ponds. Air samples were collected for a period of 14 days. A volume of approximately 1070 m³ of air was sampled for the period of 15:00 7/25/94 through 11:00 8/08/94 (14 days). Results above the MDC were obtained at four of the sampler locations, N423, N424, N429, and N430, however all results had overall errors greater than 94%, making them nearly undistinguishable from background activity. Ignoring the overall errors, the measured concentration was 1000 times less than the limited exposure concentration for alpha emitters 7.0E-02 pCi/m³ (7.01E-14 μ Ci/mL). The air sample results are provided in Table 5-7. A listing of all radionuclide results can be found in Appendix E.

Table 5-7

300 AREA TRENCHES AND NORTH PONDS					
EDP Code	Isotope	Concentration (pCi/m ³)	Overall Error (pCi/m ³)	MDC ¹ (pCi/m ³)	Sample Volume (m ³)
N423	²³⁸ U	1.15E-05	5.84E-05	5.00E-05	1.13E + 03
	²³⁵ U	1.72E-06	3.55E-05	5.00E-05	
	²³⁴ U	6.05E-05	8.21E-05	5.00E-05	
N424	²³⁸ U	4.10E-05	6.44E-05	5.00E-05	1.13E + 03
	²³⁵ U	2.17E-05	4.26E-05	5.00E-05	
	²³⁴ U	8.04E-05	7.88E-05	5.00E-05	
N425	²³⁸ U	2.75E-05	5.83E-05	5.00E-05	9.74E + 02
	²³⁵ U	1.97E-05	3.39E-05	5.00E-05	
	²³⁴ U	2.53E-05	6.94E-05	5.00E-05	
N426	²³⁸ U	3.84E-05	6.52E-05	5.00E-05	9.74E + 02
	²³⁵ U	-2.41E-06	2.07E-05	5.00E-05	
	²³⁴ U	2.73E-06	6.16E-05	5.00E-05	
N427	²³⁸ U	-9.00E-06	4.29E-05	5.00E-05	1.13E + 03
	²³⁵ U	2.68E-05	3.06E-05	5.00E-05	
	²³⁴ U	-1.79E-05	4.65E-05	5.00E-05	
N428	²³⁸ U	1.05E-06	4.93E-05	5.00E-05	1.07E + 03
	²³⁵ U	2.10E-05	3.68E-05	5.00E-05	
	²³⁴ U	-4.21E-06	5.48E-05	5.00E-05	
N429	²³⁸ U	5.87E-05	5.57E-05	5.00E-05	1.13E + 03
	²³⁵ U	3.99E-06	2.12E-05	5.00E-05	
	²³⁴ U	3.72E-05	5.72E-05	5.00E-05	
N430	²³⁸ U	2.81E-05	5.01E-05	5.00E-05	1.07E + 03
	²³⁵ U	1.56E-05	2.58E-05	5.00E-05	
	²³⁴ U	5.95E-05	6.45E-05	5.00E-05	
N431	²³⁸ U	4.56E-05	5.58E-05	5.00E-05	0.00E + 00
	²³⁵ U	2.63E-06	1.38E-05	5.00E-05	
	²³⁴ U	1.77E-05	5.37E-05	5.00E-05	
N432	²³⁸ U	1.02E-05	4.09E-05	5.00E-05	1.18E + 03
	²³⁵ U	3.51E-07	1.13E-05	5.00E-05	
	²³⁴ U	2.96E-06	4.34E-05	5.00E-05	

1 Contractual MDC values, contract number 163589-A-M1.

1 pCi/m³ = 1.0E-12 μ Ci/ml

5.4.3 Meteorological Conditions

Meteorological data was collected and evaluated from the nearest available meteorological station (Station 11) for the period of 7/25/94 through 8/08/94. Graphs depicting the data collected for the sampling periods are included in Appendix D.

An analysis of the wind telemetry data indicating the frequency that the wind was blowing across the waste site towards the sampler is provided in Table 5-8.

Table 5-8

300 AREA TRENCHES & NORTH PONDS WIND TO SAMPLER FREQUENCY DATA	
Sampler Location	Percent of Sampling Period
N423	19.9
N424	19.4
N425	50.4
N426	47.7
N427	32.6
N428	46.3
N429	38.8
N430	41.6
N431	10.3

Wind telemetry data for the sample period was compared to the July historical data for Station 11, contained in PNL's 1993 climatological data summary (PNL-9809). The comparison of the wind roses and histograms indicate that northern and western winds for the sampling period were not as representative of the month of July, for 300 Area Trenches & North Ponds. Winds averaged 3.6 m/s (8.0 mph). The wind speed ranges of 0.5-1.4 m/s (1-3 mph), 3.6-5.4 m/s (8-12 mph), 5.8-8.1 m/s (13-18 mph), and 11.2-13.9 m/s (19-24 mph) were only under represented by as much as 2.3%. The wind speed range of 1.8-3.2 m/s (4-7 mph) was only over represented by 4.4%. The wind telemetry data and excerpts of PNL's 1993 climatological summary are included in Appendix C.

The daily average for the atmospheric mixing height was above 500 m for all 14 sampling days. A plot of the daily atmospheric mixing height data is included in Appendix D.

Atmospheric stability fluctuated between extremely unstable to neutral during daytime hours and between slightly to extremely stable during the evenings. No unusual trends were noticed in the atmospheric stability patterns. Frequency data for stability classes was compiled and is provided in Appendix D.

The average temperature for the sampling period was 27.4 C (81.3°F), which is 2.8 C (5.1°F) above the normal temperature of 24.6 C (76.2°F) for the month of July. Temperatures ranged from 14.4 C (58°F) to 41.1 C (106°F) during the sampling period. Daily solar radiation was measured in Langleys (g Cal/cm²) and averaged 593.7 Langleys, which is 40.3 Langleys less than the average of 634 Langleys for the month of July. Daily solar radiation measurements ranged from 506 to 633 Langleys during the sampling period.

Precipitation was minimal prior to sampling, 0.0 cm (0.0 in) of precipitation were received during the 14 days prior to sampling. The 0.15 cm (0.06 in) of precipitation during sampling was slightly less than the normal, 0.23 cm (0.09 in), for an average two weeks in July. Relative humidity averaged 30.0% for the sampling period, deviating only 3.3% from the average of 33.3%. Daily relative humidity values ranged between 21% and 43%.

5.4.4 Results Summary

Wind directions during the sampling period were not as representative. However the average wind speed was typical for the month of July. No unusual trends in atmospheric mixing, relative humidity, and solar radiation occurred during this period. These conditions would indicate that emissions from sources were representative for only a portion of the samplers.

All total alpha results were 10 times less than the limited exposure concentration. All total beta results were 1,000 times less than the limited exposure concentration. All uranium results from this study were 1000 times less than the limited exposure concentration.

A dose of 10 mSv/y (0.1 mrem/yr) to the maximally exposed individual (MEI) could only occur if the 300 Area trenches and north ponds diffuse emissions would produce a combined airborne concentration, consisting of ²³⁴U, ²³⁵U, ²³⁸U, ²³⁴Pa and ²³⁴Th, of 1.47E+00 pCi/m³ at the source of emissions. The results from this preliminary study indicate that the diffuse emissions from trenches and north ponds during these meteorological conditions would need to be 100,000 times greater for the MEI to receive 10 mSv (0.1 mrem) per year.

6.0 CONCLUSIONS

Diffuse emissions measured during this study, which were collected during typical meteorological conditions, were sometimes measurable but not significant.

As a result of this study, it is recommended that additional sampling and characterization of diffuse emissions be performed. It is also recommended that a longer duration of samples be collected using a larger diffuse source as an emission point (i.e, 200 East Area). These longer duration of samples would allow the collection of data that would be comparable to the existing monitoring system and would help evaluate the effectiveness of monitoring these sources collectively. The completion of additional studies may be utilized to help verify the adequacy of the existing ambient air monitoring system, by helping identifying trends and characterizing diffuse emissions.

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- (13) DOE/RL-94-51, Radionuclide Air Emissions Report for the Hanford Site, CY 1993, June 1994.
- (14) WHC-EP-0573-2 Rev. 0, Westinghouse Hanford Company Operational Environmental Monitoring Annual Report -- CY 1993, 1994.
- (15) WHC-EP-0538-1 Rev. 1, Operational Environmental Monitoring Program Quality Assurance Project Plan, January 1993.
- (16) WHC-SD-WM-TP-252 Rev. 0, An Initial Study and Evaluation of Fugitive and Diffuse Emissions at the Hanford Site, July 1994.
- (17) Contract No. 163589-A-M1, Battelle Memorial Institute, Pacific Northwest Laboratories.

- (18) ASTM D 1357, Standard Practice for Planning the Sampling of the Ambient Atmosphere, Reapproved 1989.
- (19) Personal Communication, K. Rhoads to W. E. Davis, Re: CAP88 Dose Calculations for 4 Areas, dated 1/24/95.

APPENDIX A
PLUTONIUM FINISHING PLANT DATA

PLUTONIUM FINISHING PLANT SITE MAP AND AIR SAMPLER LOCATIONS

**PLUTONIUM FINISHING PLANT WIND TELEMETRY DATA
(Station 19)**

HISTORICAL PLUTONIUM FINISHING PLANT WIND TELEMETRY DATA
(Station 7)

PLUTONIUM FINISHING PLANT ATMOSPHERIC STABILITY DATA		
Stability Class	Hours Occurring During Sampling Period	Percent of Sampling Period
A	34	5.1
B	28	4.2
C	55	8.2
D	218	32.5
E	243	36.2
F	72	10.7
G	21	3.1
SUM	671	100.0

PLUTONIUM FINISHING PLANT METEOROLOGICAL DATA

Barometric Pressure
Period: 5/09/94 - 6/07/94

Temperature
Period: 5/09/94 - 6/07/94

Wind Speed
Period: 5/09/94 - 6/07/94

Atmospheric Mixing Height
Period: 5/09/94 - 6/07/94

APPENDIX B
241-BY TANK FARM DATA

241-BY TANK FARM
SITE MAP AND AIR SAMPLER LOCATIONS

241-BY TANK FARM WIND TELEMETRY DATA
(Station 6)

HISTORICAL 241-BY TANK FARM WIND TELEMETRY DATA (Station 6)

(a) Wind Rose

June Data
Period: 1982 - 1993

(b) Wind Speed Histogram

241-BY TANK FARM ATMOSPHERIC STABILITY DATA		
Stability Class	Hours Occurring During Sampling Period	Percent of Sampling Period
A	13	6.7
B	15	7.7
C	29	14.7
D	52	26.5
E	69	35.2
F	11	5.6
G	7	3.6
SUM	196	100.0

Barometric Pressure
Period: 6/13/94 - 6/21/94

Wind Speed
Period: 6/13/94 - 6/21/94

Temperature
Period: 6/13/94 - 6/21/94

Atmospheric Mixing Height
Period: 6/13/94 - 6/21/94

APPENDIX C
1301-N TRENCH DATA

1301-N TRENCH SITE MAP AND AIR SAMPLER LOCATIONS

1301-N TRENCH WIND TELEMETRY DATA
(Station 13)

**HISTORICAL 1301-N TRENCH WIND TELEMETRY DATA
(Station 13)**

1301-TRENCH ATMOSPHERIC STABILITY DATA		
Stability Class	Hours Occurring During Sampling Period	Percent of Sampling Period
A	21	6.3
B	43	12.8
C	49	14.7
D	80	24.0
E	87	26.0
F	49	14.7
G	5	1.5
SUM	334	100.0

Barometric Pressure

Period: 7/04/94 - 7/18/94

Days

— Average - - Minimum . . Maximum

Temperature

Period: 7/04/94 - 7/18/94

Days

— Average - - Minimum . . Maximum

Wind Speed

Period: 7/07/94 - 7/18/94

Days

Atmospheric Mixing Height

Period: 7/04/94 - 7/18/94

Days

— Minimum - - Maximum . . Average

1301-N TRENCH METEOROLOGICAL DATA

1301-N TRENCH METEOROLOGICAL DATA

1301-N TRENCH TOTAL ALPHA AND BETA RESULTS				
EDP Code	Sample ON Date	Alpha Concentration (pCi/m ³)	Beta Concentration (pCi/m ³)	Sample Volume (m ³)
N418	7/04/94	4.5E-04 ± 8.2E-04	1.1E-02 ± 2.3E-03	1.13E+03
N419	7/04/94	2.0E-03 ± 9.8E-04	1.8E-02 ± 3.1E-03	1.13E+03
N420	7/04/94	1.6E-03 ± 1.0E-03	1.7E-02 ± 3.2E-03	9.07E+02
N421	7/04/94	6.5E-04 ± 9.0E-04	1.8E-02 ± 3.1E-03	1.08E+03
N422	7/04/94	5.0E-04 ± 9.1E-04	2.0E-02 ± 3.4E-03	1.02E+03
N101	7/08/94	1.2E-03 ± 8.4E-04	2.2E-02 ± 3.5E-03	1.06E+03
N105	7/08/94	7.0E-04 ± 9.7E-04	1.9E-02 ± 3.2E-03	1.00E+03

$$1 \text{ pCi/m}^3 = 1.0\text{E-}12 \text{ } \mu\text{Ci/ml}$$

APPENDIX D

300 AREA TRENCHES & NORTH PONDS DATA

300 AREA TRENCHES & NORTH PONDS DATA SITE MAP AND AIR SAMPLER LOCATIONS

300 AREA TRENCHES & NORTH PONDS WIND TELEMETRY DATA (Station 11)

HISTORICAL 300 AREA TRENCHES & NORTH PONDS WIND TELEMETRY DATA (Station 11)

300 AREA TRENCHES & NORTH PONDS ATMOSPHERIC STABILITY DATA		
Stability Class	Hours Occurring During Sampling Period	Percent of Sampling Period
A	13	4.0
B	42	12.6
C	38	11.4
D	79	23.7
E	104	31.2
F	48	14.4
G	9	2.7
SUM	333	100.0

Barometric Pressure
Period: 7/25/94 - 8/08/94

Wind Speed
Period: 7/25/94 - 8/08/94

Temperature
Period: 7/25/94 - 8/08/94

Atmospheric Mixing Height
Period: 7/25/94 - 8/08/94

300 AREA TRENCHES & NORTH PONDS METEOROLOGICAL DATA

Humidity

Period: 7/25/94 - 8/08/94

Solar Radiation

Period: 7/25/94 - 8/08/94

300 AREA TRENCHES & NORTH PONDS TOTAL ALPHA AND BETA RESULTS				
EDP Code	Sample ON Date	Alpha Concentration (pCi/m ³)	Beta Concentration (pCi/m ³)	Sample Volume (m ³)
N423	7/25/94	5.1E-04 ± 2.5E-04	1.1E-02 ± 1.6E-03	1.13E+03
N424	7/25/94	6.1E-04 ± 2.7E-04	1.2E-02 ± 1.6E-03	1.13E+03
N425	7/25/94	1.0E-03 ± 3.8E-04	1.2E-02 ± 1.7E-03	9.74E+02
N426	7/25/94	6.7E-04 ± 3.0E-04	9.0E-03 ± 1.5E-03	9.74E+02
N427	7/25/94	5.4E-04 ± 2.6E-04	1.1E-02 ± 1.5E-03	1.13E+03
N428	7/25/94	6.9E-04 ± 3.0E-04	1.1E-02 ± 1.6E-03	1.08E+03
N429	7/25/94	7.6E-04 ± 3.0E-04	8.7E-03 ± 1.4E-03	1.13E+03
N430	7/25/94	9.3E-04 ± 3.4E-04	9.8E-03 ± 1.5E-03	1.07E+03
N431	7/25/94	9.9E-04 ± 3.5E-04	1.2E-02 ± 1.7E-03	1.07E+03
N432	7/25/94	8.9E-04 ± 3.1E-04	1.0E-02 ± 1.5E-03	1.18E+03

1 pCi/m³ = 1.0E-12 µCi/ml

APPENDIX E
MISCELLANEOUS DATA AND INFORMATION

HANFORD METEOROLOGICAL STATIONS

WHC PERMANENT AMBIENT AIR MONITORING STATIONS

WHC PERMANENT AMBIENT AIR MONITORING STATIONS

WHC PERMANENT AMBIENT AIR MONITORING STATIONS

WHC PERMANENT AMBIENT AIR MONITORING STATIONS

23-Sep-94 01:54 PM

IT ANALYTICAL SERVICES
2800 GEORGE WASHINGTON WAY, RICHLAND, WA
RADIOCHEMICAL ANALYSIS REPORT Contract no. 163589-A-M1
PNA Account(s) Listed
Results reported on 940923

page 1

SAMPLE TYPE	LOCATION	ISOTOPE	CUST	RESULT	COUNTING ERROR	OVERALL ERROR	SAMPLE DATE	TIME	ON DATE	PERCENT TIME	ANALYSIS MOIST	U SIZE	C GROUP	ITASH
** Reported => 940923														
PARTICLE FI		K-40	009 N190	3.14E-02 PCI/C	1.58E-02	1.61E-02	940607	1305	940509	1400	2.39E+03CM	1 402	408633016	
PARTICLE FI		CD-60	010 N190	*-6.39E-05 PCI/C	1.21E-03	1.21E-03	940607	1305	940509	1400	2.39E+03CM	1 402	408633016	
PARTICLE FI		ZN-65	012 N190	*-1.00E-03 PCI/C	2.40E-03	2.40E-03	940607	1305	940509	1400	2.39E+03CM	1 402	408633016	
PARTICLE FI		ZRNB-95	022 N190	*-2.94E-03 PCI/C	5.55E-03	5.56E-03	940607	1305	940509	1400	2.39E+03CM	1 402	408633016	
PARTICLE FI		CS-137DA024	N190	* 3.00E-04 PCI/C	7.54E-04	7.54E-04	940607	1305	940509	1400	2.39E+03CM	1 402	408633016	
PARTICLE FI		CS-134	027 N190	* 4.43E-04 PCI/C	8.47E-04	8.48E-04	940607	1305	940509	1400	2.39E+03CM	1 402	408633016	
PARTICLE FI		RU-106DA034	N190	*-7.04E-04 PCI/C	8.08E-03	8.08E-03	940607	1305	940509	1400	2.39E+03CM	1 402	408633016	
PARTICLE FI		SD-125	037 N190	* 6.08E-04 PCI/C	1.87E-03	1.87E-03	940607	1305	940509	1400	2.39E+03CM	1 402	408633016	
PARTICLE FI		CEPR-144050	N190	*-1.44E-03 PCI/C	7.36E-03	7.36E-03	940607	1305	940509	1400	2.39E+03CM	1 402	408633016	
PARTICLE FI		EU-155	071 N190	* 5.07E-04 PCI/C	1.24E-03	1.24E-03	940607	1305	940509	1400	2.39E+03CM	1 402	408633016	
PARTICLE FI		BE-7	075 N190	5.64E-02 PCI/C	3.83E-02	3.88E-02	940607	1305	940509	1400	2.39E+03CM	1 402	408633016	
PARTICLE FI		EU-154	080 N190	2.04E-03 PCI/C	1.67E-03	1.68E-03	940607	1305	940509	1400	2.39E+03CM	1 402	408633016	
PARTICLE FI		GAMMA	998 N190				940607	1305	940509	1400	0.00E+00	1 402	408633016	
PARTICLE FI		K-40	009 N191	1.96E-02 PCI/C	1.39E-02	1.40E-02	940607	1245	940509	1345	2.36E+03CM	1 402	408633026	
PARTICLE FI		CD-60	010 N191	*-4.22E-04 PCI/C	1.16E-03	1.16E-03	940607	1245	940509	1345	2.36E+03CM	1 402	408633026	
PARTICLE FI		ZN-65	012 N191	* 1.09E-03 PCI/C	2.67E-03	2.67E-03	940607	1245	940509	1345	2.36E+03CM	1 402	408633026	
PARTICLE FI		ZRNB-95	022 N191	*-2.70E-04 PCI/C	6.69E-03	6.69E-03	940607	1245	940509	1345	2.36E+03CM	1 402	408633026	
PARTICLE FI		CS-137DA024	N191	* 1.15E-04 PCI/C	9.76E-04	9.76E-04	940607	1245	940509	1345	2.36E+03CM	1 402	408633026	
PARTICLE FI		CS-134	027 N191	*-8.96E-04 PCI/C	1.00E-03	1.01E-03	940607	1245	940509	1345	2.36E+03CM	1 402	408633026	
PARTICLE FI		RU-106DA034	N191	* 5.61E-03 PCI/C	8.98E-03	9.00E-03	940607	1245	940509	1345	2.36E+03CM	1 402	408633026	
PARTICLE FI		SD-125	037 N191	*-1.07E-03 PCI/C	2.77E-03	2.77E-03	940607	1245	940509	1345	2.36E+03CM	1 402	408633026	
PARTICLE FI		CEPR-144050	N191	*-3.58E-03 PCI/C	8.80E-03	8.80E-03	940607	1245	940509	1345	2.36E+03CM	1 402	408633026	
PARTICLE FI		EU-155	071 N191	* 2.75E-04 PCI/C	2.13E-03	2.13E-03	940607	1245	940509	1345	2.36E+03CM	1 402	408633026	
PARTICLE FI		BE-7	075 N191	1.32E-01 PCI/C	4.07E-02	4.28E-02	940607	1245	940509	1345	2.36E+03CM	1 402	408633026	
PARTICLE FI		EU-154	080 N191	* 2.98E-03 PCI/C	3.16E-03	3.18E-03	940607	1245	940509	1345	2.36E+03CM	1 402	408633026	
PARTICLE FI		GAMMA	998 N191				940607	1245	940509	1345	0.00E+00	1 402	408633026	
PARTICLE FI		K-40	009 N412	6.86E-02 PCI/C	4.95E-02	5.00E-02	940621	1300	940613	1000	6.63E+02CM	1 402	408633036	
PARTICLE FI		CD-60	010 N412	*-4.34E-03 PCI/C	3.36E-03	3.38E-03	940621	1300	940613	1000	6.63E+02CM	1 402	408633036	
PARTICLE FI		ZN-65	012 N412	* 1.45E-03 PCI/C	9.19E-03	9.19E-03	940621	1300	940613	1000	6.63E+02CM	1 402	408633036	
PARTICLE FI		ZRNB-95	022 N412	1.92E-02 PCI/C	1.25E-02	1.26E-02	940621	1300	940613	1000	6.63E+02CM	1 402	408633036	
PARTICLE FI		CS-137DA024	N412	* 5.81E-04 PCI/C	2.62E-03	2.62E-03	940621	1300	940613	1000	6.63E+02CM	1 402	408633036	
PARTICLE FI		CS-134	027 N412	* 1.46E-04 PCI/C	3.31E-03	3.31E-03	940621	1300	940613	1000	6.63E+02CM	1 402	408633036	
PARTICLE FI		RU-106DA034	N412	* 0.00E+00 PCI/C	2.84E-02	2.84E-02	940621	1300	940613	1000	6.63E+02CM	1 402	408633036	
PARTICLE FI		SD-125	037 N412	* 1.71E-03 PCI/C	7.06E-03	7.06E-03	940621	1300	940613	1000	6.63E+02CM	1 402	408633036	
PARTICLE FI		CEPR-144050	N412	* 1.33E-02 PCI/C	2.29E-02	2.29E-02	940621	1300	940613	1000	6.63E+02CM	1 402	408633036	
PARTICLE FI		EU-155	071 N412	* 5.09E-03 PCI/C	4.50E-03	4.53E-03	940621	1300	940613	1000	6.63E+02CM	1 402	408633036	
PARTICLE FI		BE-7	075 N412	* 5.33E-02 PCI/C	7.40E-02	7.42E-02	940621	1300	940613	1000	6.63E+02CM	1 402	408633036	
PARTICLE FI		EU-154	080 N412	*-3.05E-03 PCI/C	1.11E-02	1.11E-02	940621	1300	940613	1000	6.63E+02CM	1 402	408633036	
PARTICLE FI		GAMMA	998 N412				940621	1300	940613	1000	0.00E+00	1 402	408633036	
PARTICLE FI		K-40	009 N413	1.13E-01 PCI/C	5.71E-02	5.82E-02	940621	1300	940613	1000	6.63E+02CM	1 402	408633046	
PARTICLE FI		CD-60	010 N413	3.20E-03 PCI/C	2.42E-03	2.44E-03	940621	1300	940613	1000	6.63E+02CM	1 402	408633046	

* Denotes a result less than the overall error; (nS) specifies the level of error, 1 sigma or 2 sigma

GAMMA ENERGY ANALYSIS RESULTS

MHC-SD-WM-TRP-227 Rev. 0

E-7

23-Sep-94 01:54 PM

IT ANALYTICAL SERVICES
2800 GEORGE WASHINGTON WAY, RICHLAND, WA
RADIOCHEMICAL ANALYSIS REPORT Contract no. 163589-A-M1
PNA Account(s) Listed
Results reported on 940923

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SAMPLE TYPE	LOCATION	ISOTOPE	CUST	RESULT	COUNTING ERROR	OVERALL ERROR	SAMPLE DATE	TIME	ON DATE	PERCENT TIME MOIST	ANALYSIS SIZE	U C	GROUP	ITAS#
PARTICLE FI		ZN-65	012 N413	*-4.36E-03	PCI/C	7.87E-03	7.88E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633040
PARTICLE FI		ZRNB-95	022 N413	1.23E-02	PCI/C	1.08E-02	1.09E-02	940621	1300	940613	1000	6.63E+02CM	I 402	408633040
PARTICLE FI		CS-137DA024	N413	• 1.66E-03	PCI/C	2.19E-03	2.20E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633040
PARTICLE FI		CS-134	027 N413	*-4.00E-04	PCI/C	2.69E-03	2.69E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633040
PARTICLE FI		RU-106DA034	N413	* 1.62E-02	PCI/C	2.64E-02	2.64E-02	940621	1300	940613	1000	6.63E+02CM	I 402	408633040
PARTICLE FI		SB-125	037 N413	1.12E-02	PCI/C	7.10E-03	7.19E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633040
PARTICLE FI		CEPR-144050	N413	• 1.60E-02	PCI/C	2.26E-02	2.26E-02	940621	1300	940613	1000	6.63E+02CM	I 402	408633040
PARTICLE FI		EU-155	071 N413	• 1.04E-03	PCI/C	4.69E-03	4.69E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633040
PARTICLE FI		BE-7	075 N413	* 4.64E-02	PCI/C	6.40E-02	6.42E-02	940621	1300	940613	1000	6.63E+02CM	I 402	408633040
PARTICLE FI		EU-154	080 N413	* 2.65E-03	PCI/C	7.66E-03	7.66E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633040
PARTICLE FI		GAMMA	998 N413					940621	1300	940613	1000	0.00E+00	I 402	408633040
PARTICLE FI		K-40	009 N414	1.44E-01	PCI/C	5.65E-02	5.83E-02	940621	1300	940613	1000	6.63E+02CM	I 402	408633050
PARTICLE FI		CD-60	010 N414	*-2.28E-04	PCI/C	4.33E-03	4.33E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633050
PARTICLE FI		ZN-65	012 N414	*-1.07E-02	PCI/C	7.99E-03	8.06E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633050
PARTICLE FI		ZRNB-95	022 N414	1.23E-02	PCI/C	1.08E-02	1.09E-02	940621	1300	940613	1000	6.63E+02CM	I 402	408633050
PARTICLE FI		CS-137DA024	N414	5.98E-03	PCI/C	3.92E-03	3.97E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633050
PARTICLE FI		CS-134	027 N414	3.79E-03	PCI/C	2.34E-03	2.37E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633050
PARTICLE FI		RU-106DA034	N414	• 1.14E-02	PCI/C	2.54E-02	2.55E-02	940621	1300	940613	1000	6.63E+02CM	I 402	408633050
PARTICLE FI		SB-125	037 N414	• 1.44E-03	PCI/C	5.43E-03	5.43E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633050
PARTICLE FI		CEPR-144050	N414	* 1.97E-02	PCI/C	2.70E-02	2.71E-02	940621	1300	940613	1000	6.63E+02CM	I 402	408633050
PARTICLE FI		EU-155	071 N414	*-2.46E-03	PCI/C	5.37E-03	5.37E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633050
PARTICLE FI		BE-7	075 N414	* 4.38E-02	PCI/C	7.70E-02	7.71E-02	940621	1300	940613	1000	6.63E+02CM	I 402	408633050
PARTICLE FI		EU-154	080 N414	• 4.07E-04	PCI/C	9.66E-03	9.66E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633050
PARTICLE FI		GAMMA	998 N414					940621	1300	940613	1000	0.00E+00	I 402	408633050
PARTICLE FI		K-40	009 N415	1.18E-01	PCI/C	5.78E-02	5.90E-02	940621	1300	940613	1000	6.63E+02CM	I 402	408633060
PARTICLE FI		CD-60	010 N415	*-3.35E-03	PCI/C	4.41E-03	4.43E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633060
PARTICLE FI		ZN-65	012 N415	7.76E-03	PCI/C	5.49E-03	5.54E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633060
PARTICLE FI		ZRNB-95	022 N415	*-4.18E-03	PCI/C	1.65E-02	1.65E-02	940621	1300	940613	1000	6.63E+02CM	I 402	408633060
PARTICLE FI		CS-137DA024	N415	* 2.37E-03	PCI/C	2.66E-03	2.67E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633060
PARTICLE FI		CS-134	027 N415	*-2.40E-03	PCI/C	3.30E-03	3.31E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633060
PARTICLE FI		RU-106DA034	N415	• 1.87E-02	PCI/C	2.68E-02	2.69E-02	940621	1300	940613	1000	6.63E+02CM	I 402	408633060
PARTICLE FI		SB-125	037 N415	*-3.69E-03	PCI/C	8.82E-03	8.83E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633060
PARTICLE FI		CEPR-144050	N415	*-1.50E-02	PCI/C	2.35E-02	2.35E-02	940621	1300	940613	1000	6.63E+02CM	I 402	408633060
PARTICLE FI		EU-155	071 N415	*-2.42E-03	PCI/C	4.55E-03	4.56E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633060
PARTICLE FI		BE-7	075 N415	• 5.35E-02	PCI/C	7.42E-02	7.44E-02	940621	1300	940613	1000	6.63E+02CM	I 402	408633060
PARTICLE FI		EU-154	080 N415	9.77E-03	PCI/C	6.91E-03	6.98E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633060
PARTICLE FI		GAMMA	998 N415					940621	1300	940613	1000	0.00E+00	I 402	408633060
PARTICLE FI		K-40	009 N416	6.32E-02	PCI/C	5.74E-02	5.78E-02	940621	1300	940613	1000	6.63E+02CM	I 402	408633070
PARTICLE FI		CD-60	010 N416	*-2.06E-03	PCI/C	3.93E-03	3.93E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633070
PARTICLE FI		ZN-65	012 N416	*-6.30E-03	PCI/C	1.04E-02	1.04E-02	940621	1300	940613	1000	6.63E+02CM	I 402	408633070
PARTICLE FI		ZRNB-95	022 N416	* 6.04E-03	PCI/C	1.52E-02	1.52E-02	940621	1300	940613	1000	6.63E+02CM	I 402	408633070
PARTICLE FI		CS-137DA024	N416	2.91E-03	PCI/C	2.46E-03	2.47E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633070
PARTICLE FI		CS-134	027 N416	*-1.93E-03	PCI/C	2.43E-03	2.43E-03	940621	1300	940613	1000	6.63E+02CM	I 402	408633070
PARTICLE FI		RU-106DA034	N416	*-2.51E-02	PCI/C	3.31E-02	3.32E-02	940621	1300	940613	1000	6.63E+02CM	I 402	408633070

• Denotes a result less than the overall error; (nS) specifies the level of error, 1 sigma or 2 sigma

GAMMA ENERGY ANALYSIS RESULTS

23-Sep-94 01:54 PM

IT ANALYTICAL SERVICES
2800 GEORGE WASHINGTON WAY, RICHLAND, WA
RADIOCHEMICAL ANALYSIS REPORT Contract no. 163589-A-M1
PNA Account(s) Listed
Results reported on 940923

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	SAMPLE	TYPE	LOCATION	ISOTOPE	CUST	RESULT	COUNTING ERROR	OVERALL ERROR	SAMPLE DATE	TIME	ON DATE	PERCENT TIME	ANALYSIS MOIST	U SIZE	C GROUP	ITAS#
	PARTICLE	FI		SB-125	037 N416	*-1.98E-03	PCI/C	6.97E-03	6.97E-03	940621	1300	940613	1000	6.63E+02CM	I	402 408633070
	PARTICLE	FI		CEPR-144050	N416	*-3.85E-03	PCI/C	2.22E-02	2.22E-02	940621	1300	940613	1000	6.63E+02CM	I	402 408633070
	PARTICLE	FI		EU-155	071 N416	6.08E-03	PCI/C	4.09E-03	4.14E-03	940621	1300	940613	1000	6.63E+02CM	I	402 408633070
	PARTICLE	FI		BE-7	075 N416	* 1.76E-02	PCI/C	7.34E-02	7.35E-02	940621	1300	940613	1000	6.63E+02CM	I	402 408633070
	PARTICLE	FI		EU-154	080 N416	7.33E-03	PCI/C	5.98E-03	6.03E-03	940621	1300	940613	1000	6.63E+02CM	I	402 408633070
	PARTICLE	FI		GAMMA	998 N416					940621	1300	940613	1000	0.00E+00	I	402 408633070
	PARTICLE	FI		K-40	009 N417	9.10E-02	PCI/C	5.34E-02	5.42E-02	940621	1300	940613	1000	6.63E+02CM	I	402 408633080
	PARTICLE	FI		CD-60	010 N417	* 7.61E-05	PCI/C	2.56E-03	2.56E-03	940621	1300	940613	1000	6.63E+02CM	I	402 408633080
	PARTICLE	FI		ZN-65	012 N417	* 9.71E-04	PCI/C	7.52E-03	7.52E-03	940621	1380	940613	1000	6.63E+02CM	I	402 408633080
	PARTICLE	FI		ZRNB-95	022 N417	*-1.68E-02	PCI/C	1.43E-02	1.44E-02	940621	1300	940613	1000	6.63E+02CM	I	402 408633080
	PARTICLE	FI		CS-137DA024	N417	* 1.83E-03	PCI/C	2.85E-03	2.85E-03	940621	1300	940613	1000	6.63E+02CM	I	402 408633080
	PARTICLE	FI		CS-134	027 N417	* 1.75E-03	PCI/C	2.83E-03	2.84E-03	940621	1300	940613	1000	6.63E+02CM	I	402 408633080
	PARTICLE	FI		RU-106DA034	N417	* 8.52E-03	PCI/C	2.20E-02	2.21E-02	940621	1300	940613	1000	6.63E+02CM	I	402 408633080
	PARTICLE	FI		SB-125	037 N417	*-1.80E-03	PCI/C	7.88E-03	7.89E-03	940621	1300	940613	1000	6.63E+02CM	I	402 408633080
	PARTICLE	FI		CEPR-144050	N417	*-4.28E-04	PCI/C	2.00E-02	2.00E-02	940621	1300	940613	1000	6.63E+02CM	I	402 408633080
	PARTICLE	FI		EU-155	071 N417	* 1.81E-03	PCI/C	4.77E-03	4.78E-03	940621	1300	940613	1000	6.63E+02CM	I	402 408633080
	PARTICLE	FI		BE-7	075 N417	* 6.44E-02	PCI/C	7.61E-02	7.64E-02	940621	1300	940613	1000	6.63E+02CM	I	402 408633080
	PARTICLE	FI		EU-154	080 N417	1.10E-02	PCI/C	7.33E-03	7.41E-03	940621	1300	940613	1000	6.63E+02CM	I	402 408633080
	PARTICLE	FI		GAMMA	998 N417					940621	1300	940613	1000	0.00E+00	I	402 408633080
	PARTICLE	FI		K-40	009 N418	5.06E-02	PCI/C	3.08E-02	3.12E-02	940718	0810	940704	1032	1.13E+03CM	I	402 408633090
	PARTICLE	FI		CD-60	010 N418	*-2.21E-04	PCI/C	1.39E-03	1.39E-03	940718	0810	940704	1032	1.13E+03CM	I	402 408633090
	PARTICLE	FI		ZN-65	012 N418	*-1.86E-03	PCI/C	4.44E-03	4.45E-03	940718	0810	940704	1032	1.13E+03CM	I	402 408633090
	PARTICLE	FI		ZRNB-95	022 N418	6.23E-03	PCI/C	5.10E-03	5.13E-03	940718	0810	940704	1032	1.13E+03CM	I	402 408633090
	PARTICLE	FI		CS-137DA024	N418	3.03E-03	PCI/C	1.52E-03	1.55E-03	940718	0810	940704	1032	1.13E+03CM	I	402 408633090
	PARTICLE	FI		CS-134	027 N418	*-9.59E-04	PCI/C	1.54E-03	1.54E-03	940718	0810	940704	1032	1.13E+03CM	I	402 408633090
	PARTICLE	FI		RU-106DA034	N418	*-1.66E-02	PCI/C	1.93E-02	1.94E-02	940718	0810	940704	1032	1.13E+03CM	I	402 408633090
	PARTICLE	FI		SB-125	037 N418	* 7.25E-04	PCI/C	4.29E-03	4.29E-03	940718	0810	940704	1032	1.13E+03CM	I	402 408633090
	PARTICLE	FI		CEPR-144050	N418	* 2.84E-03	PCI/C	1.28E-02	1.28E-02	940718	0810	940704	1032	1.13E+03CM	I	402 408633090
	PARTICLE	FI		EU-155	071 N418	* 5.75E-04	PCI/C	2.33E-03	2.33E-03	940718	0810	940704	1032	1.13E+03CM	I	402 408633090
	PARTICLE	FI		BE-7	075 N418	* 9.51E-02	PCI/C	3.81E-02	3.92E-02	940718	0810	940704	1032	1.13E+03CM	I	402 408633090
	PARTICLE	FI		EU-154	080 N418	* 2.25E-03	PCI/C	4.68E-03	4.68E-03	940718	0810	940704	1032	1.13E+03CM	I	402 408633090
	PARTICLE	FI		GAMMA	998 N418					940718	0810	940704	1032	0.00E+00	I	402 408633090
	PARTICLE	FI		K-40	009 N419	6.59E-02	PCI/C	3.00E-02	3.07E-02	940718	0820	940704	1152	1.13E+03CM	I	402 408633100
	PARTICLE	FI		CD-60	010 N419	1.59E-03	PCI/C	1.30E-03	1.31E-03	940718	0820	940704	1152	1.13E+03CM	I	402 408633100
	PARTICLE	FI		ZN-65	012 N419	* 1.59E-03	PCI/C	4.38E-03	4.38E-03	940718	0820	940704	1152	1.13E+03CM	I	402 408633100
	PARTICLE	FI		ZRNB-95	022 N419	*-1.27E-03	PCI/C	7.61E-03	7.61E-03	940718	0820	940704	1152	1.13E+03CM	I	402 408633100
	PARTICLE	FI		CS-137DA024	N419	*-1.07E-03	PCI/C	1.92E-03	1.92E-03	940718	0820	940704	1152	1.13E+03CM	I	402 408633100
	PARTICLE	FI		CS-134	027 N419	*-6.67E-04	PCI/C	1.79E-03	1.79E-03	940718	0820	940704	1152	1.13E+03CM	I	402 408633100
	PARTICLE	FI		RU-106DA034	N419	* 6.58E-03	PCI/C	1.57E-02	1.57E-02	940718	0820	940704	1152	1.13E+03CM	I	402 408633100
	PARTICLE	FI		SB-125	037 N419	* 3.42E-03	PCI/C	4.17E-03	4.18E-03	940718	0820	940704	1152	1.13E+03CM	I	402 408633100
	PARTICLE	FI		CEPR-144050	N419	1.57E-02	PCI/C	1.19E-02	1.20E-02	940718	0820	940704	1152	1.13E+03CM	I	402 408633100
	PARTICLE	FI		EU-155	071 N419	*-3.48E-03	PCI/C	2.77E-03	2.79E-03	940718	0820	940704	1152	1.13E+03CM	I	402 408633100
	PARTICLE	FI		BE-7	075 N419	1.47E-01	PCI/C	4.39E-02	4.63E-02	940718	0820	940704	1152	1.13E+03CM	I	402 408633100
	PARTICLE	FI		EU-154	080 N419	8.53E-03	PCI/C	4.92E-03	5.00E-03	940718	0820	940704	1152	1.13E+03CM	I	402 408633100

• Denotes a result less than the overall error; (nS) specifies the level of error, 1 sigma or 2 sigma

GAMMA ENERGY ANALYSIS RESULTS

23-Sep-94 01:54 PM

IT ANALYTICAL SERVICES
2800 GEORGE WASHINGTON WAY, RICHLAND, WA
RADIOCHEMICAL ANALYSIS REPORT Contract no. 1635B9-A-M1
PNA Account(s) Listed
Results reported on 940923

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SAMPLE TYPE	LOCATION	ISOTOPE	CUST	RESULT	COUNTING ERROR	OVERALL ERROR	SAMPLE DATE	TIME	ON DATE	PERCENT TIME	ANALYSIS MOIST	U C	GROUP	ITAS#	
PARTICLE FI		GAMMA	998 N419				940718	0820	940704	1152	0.00E+00	I	402	408633100	
PARTICLE FI		K-40	009 N420	• 2.18E-03	PC1/C	3.66E-02	3.66E-02	940718	0825	940704	1138	9.07E+02CM	I	402	408633110
PARTICLE FI		CO-60	010 N420	• 2.65E-03	PC1/C	1.87E-03	1.87E-03	940718	0825	940704	1138	9.07E+02CM	I	402	408633110
PARTICLE FI		ZN-65	012 N420	• 5.34E-03	PC1/C	5.97E-03	5.99E-03	940718	0825	940704	1138	9.07E+02CM	I	402	408633110
PARTICLE FI		ZRNB-95	022 N420	• 4.05E-03	PC1/C	9.30E-03	9.31E-03	940718	0825	940704	1138	9.07E+02CM	I	402	408633110
PARTICLE FI		CS-137DA024	N420	• 7.88E-04	PC1/C	1.98E-03	1.98E-03	940718	0825	940704	1138	9.07E+02CM	I	402	408633110
PARTICLE FI		CS-134	027 N420	• 2.30E-03	PC1/C	1.91E-03	1.93E-03	940718	0825	940704	1138	9.07E+02CM	I	402	408633110
PARTICLE FI		RU-106DA034	N420	• 9.68E-03	PC1/C	1.82E-02	1.82E-02	940718	0825	940704	1138	9.07E+02CM	I	402	408633110
PARTICLE FI		SB-125	037 N420	• 2.27E-03	PC1/C	4.54E-03	4.55E-03	940718	0825	940704	1138	9.07E+02CM	I	402	408633110
PARTICLE FI		CEPR-144050	N420	• 1.04E-03	PC1/C	1.60E-02	1.60E-02	940718	0825	940704	1138	9.07E+02CM	I	402	408633110
PARTICLE FI		EU-155	071 N420	• 1.88E-04	PC1/C	3.34E-03	3.34E-03	940718	0825	940704	1138	9.07E+02CM	I	402	408633110
PARTICLE FI		BE-7	075 N420	• 1.64E-01	PC1/C	7.03E-02	7.22E-02	940718	0825	940704	1138	9.07E+02CM	I	402	408633110
PARTICLE FI		EU-154	080 N420	• 3.70E-03	PC1/C	6.11E-03	6.12E-03	940718	0825	940704	1138	9.07E+02CM	I	402	408633110
PARTICLE FI		GAMMA	998 N420				940718	0825	940704	1138	0.00E+00	I	402	408633110	
PARTICLE FI		K-40	009 N421	• 9.14E-02	PC1/C	3.52E-02	3.64E-02	940718	0830	940704	1138	1.08E+03CM	I	402	408633120
PARTICLE FI		CO-60	010 N421	• 1.72E-03	PC1/C	2.07E-03	2.08E-03	940718	0830	940704	1138	1.08E+03CM	I	402	408633120
PARTICLE FI		ZN-65	012 N421	• 6.16E-03	PC1/C	4.62E-03	4.66E-03	940718	0830	940704	1138	1.08E+03CM	I	402	408633120
PARTICLE FI		ZRNB-95	022 N421	• 6.07E-03	PC1/C	7.26E-03	7.28E-03	940718	0830	940704	1138	1.08E+03CM	I	402	408633120
PARTICLE FI		CS-137DA024	N421	• 1.38E-03	PC1/C	1.65E-03	1.65E-03	940718	0830	940704	1138	1.08E+03CM	I	402	408633120
PARTICLE FI		CS-134	027 N421	• 5.27E-04	PC1/C	1.62E-03	1.63E-03	940718	0830	940704	1138	1.08E+03CM	I	402	408633120
PARTICLE FI		RU-106DA034	N421	• 3.11E-03	PC1/C	1.86E-02	1.86E-02	940718	0830	940704	1138	1.08E+03CM	I	402	408633120
PARTICLE FI		SB-125	037 N421	• 2.18E-03	PC1/C	3.54E-03	3.55E-03	940718	0830	940704	1138	1.08E+03CM	I	402	408633120
PARTICLE FI		CEPR-144050	N421	• 1.50E-03	PC1/C	1.30E-02	1.30E-02	940718	0830	940704	1138	1.08E+03CM	I	402	408633120
PARTICLE FI		EU-155	071 N421	• 7.37E-04	PC1/C	3.02E-03	3.02E-03	940718	0830	940704	1138	1.08E+03CM	I	402	408633120
PARTICLE FI		BE-7	075 N421	• 2.28E-01	PC1/C	6.30E-02	6.70E-02	940718	0830	940704	1138	1.08E+03CM	I	402	408633120
PARTICLE FI		EU-154	080 N421	• 4.49E-03	PC1/C	3.66E-03	3.69E-03	940718	0830	940704	1138	1.08E+03CM	I	402	408633120
PARTICLE FI		GAMMA	998 N421				940718	0830	940704	1138	0.00E+00	I	402	408633120	
PARTICLE FI		K-40	009 N422	• 7.90E-02	PC1/C	3.43E-02	3.52E-02	940718	0835	940704	1102	1.02E+03CM	I	402	408633130
PARTICLE FI		CO-60	010 N422	• 3.53E-03	PC1/C	3.43E-03	3.45E-03	940718	0835	940704	1102	1.02E+03CM	I	402	408633130
PARTICLE FI		ZN-65	012 N422	• 2.96E-03	PC1/C	5.16E-03	5.17E-03	940718	0835	940704	1102	1.02E+03CM	I	402	408633130
PARTICLE FI		ZRNB-95	022 N422	• 6.30E-03	PC1/C	5.55E-03	5.59E-03	940718	0835	940704	1102	1.02E+03CM	I	402	408633130
PARTICLE FI		CS-137DA024	N422	• 6.47E-04	PC1/C	2.10E-03	2.10E-03	940718	0835	940704	1102	1.02E+03CM	I	402	408633130
PARTICLE FI		CS-134	027 N422	• 3.48E-04	PC1/C	1.94E-03	1.94E-03	940718	0835	940704	1102	1.02E+03CM	I	402	408633130
PARTICLE FI		RU-106DA034	N422	• 1.26E-02	PC1/C	1.97E-02	1.98E-02	940718	0835	940704	1102	1.02E+03CM	I	402	408633130
PARTICLE FI		SB-125	037 N422	• 1.90E-03	PC1/C	4.66E-03	4.66E-03	940718	0835	940704	1102	1.02E+03CM	I	402	408633130
PARTICLE FI		CEPR-144050	N422	• 6.85E-03	PC1/C	1.47E-02	1.47E-02	940718	0835	940704	1102	1.02E+03CM	I	402	408633130
PARTICLE FI		EU-155	071 N422	• 8.34E-05	PC1/C	2.68E-03	2.68E-03	940718	0835	940704	1102	1.02E+03CM	I	402	408633130
PARTICLE FI		BE-7	075 N422	• 1.51E-01	PC1/C	6.26E-02	6.44E-02	940718	0835	940704	1102	1.02E+03CM	I	402	408633130
PARTICLE FI		EU-154	080 N422	• 4.67E-03	PC1/C	8.96E-03	8.97E-03	940718	0835	940704	1102	1.02E+03CM	I	402	408633130
PARTICLE FI		GAMMA	998 N422				940718	0835	940704	1102	0.00E+00	I	402	408633130	

169 Records listed

• Denotes a result less than the overall error; (nS) specifies the level of error, 1 sigma or 2 sigma

GAMMA ENERGY ANALYSIS RESULTS

12-Sep-94 02:32 PM

IT ANALYTICAL SERVICES
2800 GEORGE WASHINGTON WAY, RICHLAND, WA
RADIOCHEMICAL ANALYSIS REPORT Contract no. 163589-A-M1
PNA Account(s) Listed
Results reported on 940912

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SAMPLE TYPE	LOCATION	ISOTOPE	CUST	RESULT	COUNTING ERROR	OVERALL ERROR	SAMPLE DATE	ON TIME	PERCENT ANALYSIS	U MOIST	SIZE	C GROUP	ITAS#
** Reported => 940912													
PARTICLE FI		K-40	009 N423	5.84E-02	PC1/C	2.88E-02	2.93E-02	940808	1000	940725	1430	1.13E+03CH	1 402 408320010
PARTICLE FI		CO-60	010 N423	* 1.14E-03	PC1/C	2.34E-03	2.34E-03	940808	1000	940725	1430	1.13E+03CH	1 402 408320010
PARTICLE FI		ZN-65	012 N423	* -2.42E-03	PC1/C	5.89E-03	5.89E-03	940808	1000	940725	1430	1.13E+03CH	1 402 408320010
PARTICLE FI		ZRNB-95	022 N423	* -1.46E-03	PC1/C	6.03E-03	6.03E-03	940808	1000	940725	1430	1.13E+03CH	1 402 408320010
PARTICLE FI		CS-137DA024	N423	* 9.25E-04	PC1/C	1.64E-03	1.65E-03	940808	1000	940725	1430	1.13E+03CH	1 402 408320010
PARTICLE FI		CS-134	027 N423	* -1.64E-03	PC1/C	1.49E-03	1.50E-03	940808	1000	940725	1430	1.13E+03CH	1 402 408320010
PARTICLE FI		RU-106DA034	N423	* -2.54E-02	PC1/C	1.81E-02	1.83E-02	940808	1000	940725	1430	1.13E+03CH	1 402 408320010
PARTICLE FI		SB-125	037 N423	* 3.71E-03	PC1/C	4.39E-03	4.41E-03	940808	1000	940725	1430	1.13E+03CH	1 402 408320010
PARTICLE FI		CEPR-144050	N423	* 2.84E-03	PC1/C	1.12E-02	1.13E-02	940808	1000	940725	1430	1.13E+03CH	1 402 408320010
PARTICLE FI		EU-155	071 N423	* 9.19E-04	PC1/C	2.59E-03	2.60E-03	940808	1000	940725	1430	1.13E+03CH	1 402 408320010
PARTICLE FI		BE-7	075 N423	1.31E-01	PC1/C	3.69E-02	3.92E-02	940808	1000	940725	1430	1.13E+03CH	1 402 408320010
PARTICLE FI		EU-154	080 N423	* 9.46E-04	PC1/C	5.79E-03	5.79E-03	940808	1000	940725	1430	1.13E+03CH	1 402 408320010
PARTICLE FI		GAMMA	998 N423					940808	1000	940725	1430	0.00E+00	1 402 408320010
PARTICLE FI		K-40	009 N424	6.93E-02	PC1/C	3.40E-02	3.47E-02	940808	1005	940725	1435	1.13E+03CH	1 402 408320020
PARTICLE FI		CO-60	010 N424	* 4.39E-05	PC1/C	1.47E-03	1.47E-03	940808	1005	940725	1435	1.13E+03CH	1 402 408320020
PARTICLE FI		ZN-65	012 N424	* -8.73E-03	PC1/C	4.75E-03	4.83E-03	940808	1005	940725	1435	1.13E+03CH	1 402 408320020
PARTICLE FI		ZRNB-95	022 N424	* -5.01E-03	PC1/C	5.55E-03	5.57E-03	940808	1005	940725	1435	1.13E+03CH	1 402 408320020
PARTICLE FI		CS-137DA024	N424	* 7.79E-04	PC1/C	1.62E-03	1.62E-03	940808	1005	940725	1435	1.13E+03CH	1 402 408320020
PARTICLE FI		CS-134	027 N424	* 6.50E-04	PC1/C	1.74E-03	1.74E-03	940808	1005	940725	1435	1.13E+03CH	1 402 408320020
PARTICLE FI		RU-106DA034	N424	* 6.43E-04	PC1/C	1.84E-02	1.84E-02	940808	1005	940725	1435	1.13E+03CH	1 402 408320020
PARTICLE FI		SB-125	037 N424	* 1.02E-03	PC1/C	4.26E-03	4.26E-03	940808	1005	940725	1435	1.13E+03CH	1 402 408320020
PARTICLE FI		CEPR-144050	N424	* -1.31E-03	PC1/C	1.14E-02	1.15E-02	940808	1005	940725	1435	1.13E+03CH	1 402 408320020
PARTICLE FI		EU-155	071 N424	* 1.49E-03	PC1/C	2.60E-03	2.60E-03	940808	1005	940725	1435	1.13E+03CH	1 402 408320020
PARTICLE FI		BE-7	075 N424	1.75E-01	PC1/C	3.87E-02	4.25E-02	940808	1005	940725	1435	1.13E+03CH	1 402 408320020
PARTICLE FI		EU-154	080 N424	* -2.60E-03	PC1/C	4.85E-03	4.85E-03	940808	1005	940725	1435	1.13E+03CH	1 402 408320020
PARTICLE FI		GAMMA	998 N424					940808	1005	940725	1435	0.00E+00	1 402 408320020
PARTICLE FI		K-40	009 N425	6.45E-02	PC1/C	3.27E-02	3.33E-02	940808	1010	940725	1440	9.74E+02CH	1 402 408320030
PARTICLE FI		CO-60	010 N425	* -1.68E-03	PC1/C	2.55E-03	2.55E-03	940808	1010	940725	1440	9.74E+02CH	1 402 408320030
PARTICLE FI		ZN-65	012 N425	* 5.61E-04	PC1/C	4.35E-03	4.35E-03	940808	1010	940725	1440	9.74E+02CH	1 402 408320030
PARTICLE FI		ZRNB-95	022 N425	* 3.94E-03	PC1/C	4.63E-03	4.65E-03	940808	1010	940725	1440	9.74E+02CH	1 402 408320030
PARTICLE FI		CS-137DA024	N425	* 2.08E-03	PC1/C	2.07E-03	2.08E-03	940808	1010	940725	1440	9.74E+02CH	1 402 408320030
PARTICLE FI		CS-134	027 N425	* -2.00E-03	PC1/C	1.96E-03	1.97E-03	940808	1010	940725	1440	9.74E+02CH	1 402 408320030
PARTICLE FI		RU-106DA034	N425	* -1.31E-02	PC1/C	1.65E-02	1.66E-02	940808	1010	940725	1440	9.74E+02CH	1 402 408320030
PARTICLE FI		SB-125	037 N425	* -1.18E-03	PC1/C	5.16E-03	5.16E-03	940808	1010	940725	1440	9.74E+02CH	1 402 408320030
PARTICLE FI		CEPR-144050	N425	* 5.70E-03	PC1/C	1.29E-02	1.30E-02	940808	1010	940725	1440	9.74E+02CH	1 402 408320030
PARTICLE FI		EU-155	071 N425	* 1.44E-04	PC1/C	2.74E-03	2.74E-03	940808	1010	940725	1440	9.74E+02CH	1 402 408320030
PARTICLE FI		BE-7	075 N425	1.19E-01	PC1/C	4.88E-02	5.02E-02	940808	1010	940725	1440	9.74E+02CH	1 402 408320030
PARTICLE FI		EU-154	080 N425	* 2.74E-03	PC1/C	7.09E-03	7.10E-03	940808	1010	940725	1440	9.74E+02CH	1 402 408320030
PARTICLE FI		GAMMA	998 N425					940808	1010	940725	1440	0.00E+00	1 402 408320030
PARTICLE FI		K-40	009 N426	* 1.78E-02	PC1/C	4.21E-02	4.22E-02	940808	1015	940725	1445	9.74E+02CH	1 402 408320040
PARTICLE FI		CO-60	010 N426	* 9.65E-04	PC1/C	2.01E-03	2.01E-03	940808	1015	940725	1445	9.74E+02CH	1 402 408320040

* Denotes a result less than the overall error; (nS) specifies the level of error, 1 sigma or 2 sigma

GAMMA ENERGY ANALYSIS RESULTS

E-11

12-Sep-94 02:32 PM

IT ANALYTICAL SERVICES
2800 GEORGE WASHINGTON WAY, RICHLAND, WA
RADIOCHEMICAL ANALYSIS REPORT Contract no. 163589-A-M1
PNA Account(s) Listed
Results reported on 940912

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SAMPLE TYPE	LOCATION	ISOTOPE	CUST	RESULT	COUNTING ERROR	OVERALL ERROR	SAMPLE DATE	ON TIME	PERCENT MOIST	ANALYSIS SIZE	U C	GROUP	ITAS#
PARTICLE FI		ZN-65 012	N426	* 0.00E+00	PCI/C	5.95E-03	5.95E-03	940808	1015	940725	1445	9.74E+02CH	I 402 408320040
PARTICLE FI		ZRNB-95 022	N426	* 1.81E-03	PCI/C	4.90E-03	4.91E-03	940808	1015	940725	1445	9.74E+02CH	I 402 408320040
PARTICLE FI		CS-137DA024	N426	*-2.62E-03	PCI/C	2.18E-03	2.19E-03	940808	1015	940725	1445	9.74E+02CH	I 402 408320040
PARTICLE FI		CS-134 027	N426	2.49E-03	PCI/C	1.79E-03	1.81E-03	940808	1015	940725	1445	9.74E+02CH	I 402 408320040
PARTICLE FI		RU-106DA034	N426	* 4.22E-03	PCI/C	1.66E-02	1.66E-02	940808	1015	940725	1445	9.74E+02CH	I 402 408320040
PARTICLE FI		SB-125 037	N426	*-1.59E-03	PCI/C	5.02E-03	5.03E-03	940808	1015	940725	1445	9.74E+02CH	I 402 408320040
PARTICLE FI		CEPR-144050	N426	*-2.66E-03	PCI/C	1.42E-02	1.42E-02	940808	1015	940725	1445	9.74E+02CH	I 402 408320040
PARTICLE FI		EU-155 071	N426	* 0.00E+00	PCI/C	3.24E-03	3.24E-03	940808	1015	940725	1445	9.74E+02CH	I 402 408320040
PARTICLE FI		BE-7 075	N426	1.30E-01	PCI/C	3.78E-02	4.00E-02	940808	1015	940725	1445	9.74E+02CH	I 402 408320040
PARTICLE FI		EU-154 080	N426	*-2.87E-03	PCI/C	7.25E-03	7.26E-03	940808	1015	940725	1445	9.74E+02CH	I 402 408320040
PARTICLE FI		GAMMA 998	N426					940808	1015	940725	1445	0.00E+00	I 402 408320040
PARTICLE FI		K-40 009	N427	5.05E-02	PCI/C	2.73E-02	2.77E-02	940808	1020	940725	1450	1.13E+03CH	I 402 408320050
PARTICLE FI		CU-60 010	N427	2.42E-03	PCI/C	2.16E-03	2.18E-03	940808	1020	940725	1450	1.13E+03CH	I 402 408320050
PARTICLE FI		ZN-65 012	N427	* 1.46E-03	PCI/C	4.01E-03	4.01E-03	940808	1020	940725	1450	1.13E+03CH	I 402 408320050
PARTICLE FI		ZRNB-95 022	N427	* 1.04E-03	PCI/C	4.71E-03	4.71E-03	940808	1020	940725	1450	1.13E+03CH	I 402 408320050
PARTICLE FI		CS-137DA024	N427	*-7.79E-04	PCI/C	1.97E-03	1.97E-03	940808	1020	940725	1450	1.13E+03CH	I 402 408320050
PARTICLE FI		CS-134 027	N427	*-1.46E-03	PCI/C	1.83E-03	1.83E-03	940808	1020	940725	1450	1.13E+03CH	I 402 408320050
PARTICLE FI		RU-106DA034	N427	* 1.27E-02	PCI/C	1.59E-02	1.60E-02	940808	1020	940725	1450	1.13E+03CH	I 402 408320050
PARTICLE FI		SB-125 037	N427	* 1.83E-03	PCI/C	4.14E-03	4.15E-03	940808	1020	940725	1450	1.13E+03CH	I 402 408320050
PARTICLE FI		CEPR-144050	N427	*-7.57E-03	PCI/C	1.35E-02	1.35E-02	940808	1020	940725	1450	1.13E+03CH	I 402 408320050
PARTICLE FI		EU-155 071	N427	*-6.71E-04	PCI/C	2.90E-03	2.90E-03	940808	1020	940725	1450	1.13E+03CH	I 402 408320050
PARTICLE FI		BE-7 075	N427	1.72E-01	PCI/C	3.48E-02	3.88E-02	940808	1020	940725	1450	1.13E+03CH	I 402 408320050
PARTICLE FI		EU-154 080	N427	* 1.18E-04	PCI/C	3.97E-03	3.97E-03	940808	1020	940725	1450	1.13E+03CH	I 402 408320050
PARTICLE FI		GAMMA 998	N427					940808	1020	940725	1450	0.00E+00	I 402 408320050
PARTICLE FI		K-40 009	N428	5.04E-02	PCI/C	2.82E-02	2.86E-02	940808	1025	940725	1455	1.07E+03CH	I 402 408320060
PARTICLE FI		CU-60 010	N428	* 3.24E-04	PCI/C	1.65E-03	1.65E-03	940808	1025	940725	1455	1.07E+03CH	I 402 408320060
PARTICLE FI		ZN-65 012	N428	* 5.12E-04	PCI/C	3.97E-03	3.97E-03	940808	1025	940725	1455	1.07E+03CH	I 402 408320060
PARTICLE FI		ZRNB-95 022	N428	*-8.25E-03	PCI/C	5.92E-03	5.98E-03	940808	1025	940725	1455	1.07E+03CH	I 402 408320060
PARTICLE FI		CS-137DA024	N428	* 1.10E-03	PCI/C	1.92E-03	1.92E-03	940808	1025	940725	1455	1.07E+03CH	I 402 408320060
PARTICLE FI		CS-134 027	N428	2.38E-03	PCI/C	1.53E-03	1.55E-03	940808	1025	940725	1455	1.07E+03CH	I 402 408320060
PARTICLE FI		RU-106DA034	N428	*-6.55E-03	PCI/C	1.60E-02	1.60E-02	940808	1025	940725	1455	1.07E+03CH	I 402 408320060
PARTICLE FI		SB-125 037	N428	* 1.29E-03	PCI/C	3.75E-03	3.75E-03	940808	1025	940725	1455	1.07E+03CH	I 402 408320060
PARTICLE FI		CEPR-144050	N428	* 8.66E-03	PCI/C	1.22E-02	1.22E-02	940808	1025	940725	1455	1.07E+03CH	I 402 408320060
PARTICLE FI		EU-155 071	N428	*-2.20E-03	PCI/C	2.70E-03	2.71E-03	940808	1025	940725	1455	1.07E+03CH	I 402 408320060
PARTICLE FI		BE-7 075	N428	1.44E-01	PCI/C	4.70E-02	4.91E-02	940808	1025	940725	1455	1.07E+03CH	I 402 408320060
PARTICLE FI		EU-154 080	N428	*-7.60E-03	PCI/C	7.93E-03	7.97E-03	940808	1025	940725	1455	1.07E+03CH	I 402 408320060
PARTICLE FI		GAMMA 998	N428					940808	1025	940725	1455	0.00E+00	I 402 408320060
PARTICLE FI		K-40 009	N429	4.04E-02	PCI/C	2.92E-02	2.94E-02	940808	1030	940725	1500	1.13E+03CH	I 402 408320070
PARTICLE FI		CU-60 010	N429	*-9.22E-04	PCI/C	2.33E-03	2.33E-03	940808	1030	940725	1500	1.13E+03CH	I 402 408320070
PARTICLE FI		ZN-65 012	N429	*-2.92E-03	PCI/C	4.57E-03	4.58E-03	940808	1030	940725	1500	1.13E+03CH	I 402 408320070
PARTICLE FI		ZRNB-95 022	N429	*-6.73E-04	PCI/C	3.75E-03	3.75E-03	940808	1030	940725	1500	1.13E+03CH	I 402 408320070
PARTICLE FI		CS-137DA024	N429	* 2.19E-04	PCI/C	1.32E-03	1.32E-03	940808	1030	940725	1500	1.13E+03CH	I 402 408320070
PARTICLE FI		CS-134 027	N429	*-6.31E-04	PCI/C	1.85E-03	1.85E-03	940808	1030	940725	1500	1.13E+03CH	I 402 408320070
PARTICLE FI		RU-106DA034	N429	*-7.73E-03	PCI/C	1.36E-02	1.37E-02	940808	1030	940725	1500	1.13E+03CH	I 402 408320070

* Denotes a result less than the overall error; (nS) specifies the level of error, 1 sigma or 2 sigma

GAMMA ENERGY ANALYSIS RESULTS

12-Sep-94 02:32 PM

IT ANALYTICAL SERVICES
2800 GEORGE WASHINGTON WAY, RICHLAND, WA
RADIOCHEMICAL ANALYSIS REPORT Contract no. 163589-A-M1
PNA Account(s) Listed
Results reported on 940912

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SAMPLE TYPE	LOCATION	ISOTOPE	CUST	RESULT	COUNTING ERROR	OVERALL ERROR	SAMPLE DATE	TIME	ON DATE	PERCENT TIME	ANALYSIS MOIST	U SIZE	C	GROUP	ITASM
PARTICLE FI		SB-125 037 N429		• 2.29E-03	PCI/C	3.98E-03	3.99E-03	940808	1030	940725	1500	1.13E+03CM	I	402	408320076
PARTICLE FI		CEPR-144050 N429		1.47E-02	PCI/C	1.07E-02	1.08E-02	940808	1030	940725	1500	1.13E+03CM	I	402	408320076
PARTICLE FI		EU-155 071 N429		*-2.48E-04	PCI/C	2.52E-03	2.52E-03	940808	1030	940725	1500	1.13E+03CM	I	402	408320076
PARTICLE FI		BE-7 075 N429		1.44E-01	PCI/C	3.20E-02	3.50E-02	940808	1030	940725	1500	1.13E+03CM	I	402	408320076
PARTICLE FI		EU-154 080 N429		• 1.78E-03	PCI/C	7.17E-03	7.17E-03	940808	1030	940725	1500	1.13E+03CM	I	402	408320076
PARTICLE FI		GAMMA 998 N429						940808	1030	940725	1500	0.00E+00	I	402	408320076
PARTICLE FI		K-40 009 N430		8.64E-02	PCI/C	3.45E-02	3.56E-02	940808	1035	940725	1505	1.07E+03CM	I	402	408320080
PARTICLE FI		CD-60 010 N430		*-1.85E-04	PCI/C	2.12E-03	2.12E-03	940808	1035	940725	1505	1.07E+03CM	I	402	408320080
PARTICLE FI		ZN-65 012 N430		*-2.56E-04	PCI/C	4.64E-03	4.64E-03	940808	1035	940725	1505	1.07E+03CM	I	402	408320080
PARTICLE FI		ZRNB-95 022 N430		*-5.82E-03	PCI/C	5.85E-03	5.88E-03	940808	1035	940725	1505	1.07E+03CM	I	402	408320080
PARTICLE FI		CS-137DA024 N430		• 8.20E-04	PCI/C	1.70E-03	1.70E-03	940808	1035	940725	1505	1.07E+03CM	I	402	408320080
PARTICLE FI		CS-134 027 N430		*-7.50E-04	PCI/C	1.49E-03	1.50E-03	940808	1035	940725	1505	1.07E+03CM	I	402	408320080
PARTICLE FI		RU-106DA034 N430		*-1.29E-02	PCI/C	1.75E-02	1.75E-02	940808	1035	940725	1505	1.07E+03CM	I	402	408320080
PARTICLE FI		SB-125 037 N430		*-6.43E-04	PCI/C	4.46E-03	4.46E-03	940808	1035	940725	1505	1.07E+03CM	I	402	408320080
PARTICLE FI		CEPR-144050 N430		• 3.47E-04	PCI/C	1.33E-02	1.33E-02	940808	1035	940725	1505	1.07E+03CM	I	402	408320080
PARTICLE FI		EU-155 071 N430		• 9.42E-04	PCI/C	2.66E-03	2.67E-03	940808	1035	940725	1505	1.07E+03CM	I	402	408320080
PARTICLE FI		BE-7 075 N430		1.09E-01	PCI/C	3.29E-02	3.47E-02	940808	1035	940725	1505	1.07E+03CM	I	402	408320080
PARTICLE FI		EU-154 080 N430		*-6.23E-03	PCI/C	7.06E-03	7.09E-03	940808	1035	940725	1505	1.07E+03CM	I	402	408320080
PARTICLE FI		GAMMA 998 N430						940808	1035	940725	1505	0.00E+00	I	402	408320080
PARTICLE FI		K-40 009 N431		• 3.97E-02	PCI/C	3.02E-02	3.05E-02	940808	1040	940725	1510	1.07E+03CM	I	402	408320090
PARTICLE FI		CD-60 010 N431		*-1.53E-03	PCI/C	2.32E-03	2.33E-03	940808	1040	940725	1510	1.07E+03CM	I	402	408320090
PARTICLE FI		ZN-65 012 N431		* 5.13E-04	PCI/C	3.97E-03	3.97E-03	940808	1040	940725	1510	1.07E+03CM	I	402	408320090
PARTICLE FI		ZRNB-95 022 N431		*-7.88E-04	PCI/C	4.60E-03	4.60E-03	940808	1040	940725	1510	1.07E+03CM	I	402	408320090
PARTICLE FI		CS-137DA024 N431		*-1.74E-03	PCI/C	1.93E-03	1.94E-03	940808	1040	940725	1510	1.07E+03CM	I	402	408320090
PARTICLE FI		CS-134 027 N431		*-7.93E-04	PCI/C	1.93E-03	1.93E-03	940808	1040	940725	1510	1.07E+03CM	I	402	408320090
PARTICLE FI		RU-106DA034 N431		* 1.45E-02	PCI/C	1.57E-02	1.57E-02	940808	1040	940725	1510	1.07E+03CM	I	402	408320090
PARTICLE FI		SB-125 037 N431		6.60E-03	PCI/C	3.83E-03	3.89E-03	940808	1040	940725	1510	1.07E+03CM	I	402	408320090
PARTICLE FI		CEPR-144050 N431		* 4.05E-03	PCI/C	1.30E-02	1.30E-02	940808	1040	940725	1510	1.07E+03CM	I	402	408320090
PARTICLE FI		EU-155 071 N431		2.30E-03	PCI/C	2.25E-03	2.26E-03	940808	1040	940725	1510	1.07E+03CM	I	402	408320090
PARTICLE FI		BE-7 075 N431		1.86E-01	PCI/C	4.05E-02	4.45E-02	940808	1040	940725	1510	1.07E+03CM	I	402	408320090
PARTICLE FI		EU-154 080 N431		* 2.49E-04	PCI/C	5.92E-03	5.92E-03	940808	1040	940725	1510	1.07E+03CM	I	402	408320090
PARTICLE FI		GAMMA 998 N431						940808	1040	940725	1510	0.00E+00	I	402	408320090
PARTICLE FI		K-40 009 N432		4.89E-02	PCI/C	3.27E-02	3.31E-02	940808	1045	940725	1515	1.18E+03CM	I	402	408320100
PARTICLE FI		CD-60 010 N432		* 5.02E-04	PCI/C	7.10E-04	7.11E-04	940808	1045	940725	1515	1.18E+03CM	I	402	408320100
PARTICLE FI		ZN-65 012 N432		*-6.28E-03	PCI/C	5.54E-03	5.57E-03	940808	1045	940725	1515	1.18E+03CM	I	402	408320100
PARTICLE FI		ZRNB-95 022 N432		* 3.31E-03	PCI/C	3.89E-03	3.90E-03	940808	1045	940725	1515	1.18E+03CM	I	402	408320100
PARTICLE FI		CS-137DA024 N432		* 3.48E-04	PCI/C	1.29E-03	1.29E-03	940808	1045	940725	1515	1.18E+03CM	I	402	408320100
PARTICLE FI		CS-134 027 N432		*-9.70E-05	PCI/C	1.45E-03	1.45E-03	940808	1045	940725	1515	1.18E+03CM	I	402	408320100
PARTICLE FI		RU-106DA034 N432		* 2.05E-04	PCI/C	1.39E-02	1.39E-02	940808	1045	940725	1515	1.18E+03CM	I	402	408320100
PARTICLE FI		SB-125 037 N432		*-1.65E-03	PCI/C	3.67E-03	3.67E-03	940808	1045	940725	1515	1.18E+03CM	I	402	408320100
PARTICLE FI		CEPR-144050 N432		*-3.56E-03	PCI/C	1.19E-02	1.19E-02	940808	1045	940725	1515	1.18E+03CM	I	402	408320100
PARTICLE FI		EU-155 071 N432		*-2.53E-03	PCI/C	2.78E-02	2.79E-02	940808	1045	940725	1515	1.18E+03CM	I	402	408320100
PARTICLE FI		BE-7 075 N432		1.45E-01	PCI/C	4.52E-02	4.75E-02	940808	1045	940725	1515	1.18E+03CM	I	402	408320100
PARTICLE FI		EU-154 080 N432		• 7.89E-04	PCI/C	4.02E-03	4.02E-03	940808	1045	940725	1515	1.18E+03CM	I	402	408320100

• Denotes a result less than the overall error; (nS) specifies the level of error, 1 sigma or 2 sigma

GAMMA ENERGY ANALYSIS RESULTS

E-13

WHC-SD-WM-TRP-227 Rev. 0

19-Oct-94 07:40 AM

IT ANALYTICAL SERVICES
2800 GEORGE WASHINGTON WAY, RICHLAND, WA
RADIOCHEMICAL ANALYSIS REPORT Contract no. 163589-A-M1
PNA Account(s) Listed
Results reported on 941019

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SAMPLE TYPE	LOCATION	ISOTOPE	CUST	RESULT	COUNTING ERROR	OVERALL ERROR	SAMPLE DATE TIME	ON DATE TIME	PERCENT MOIST	ANALYSIS SIZE	U C GROUP	ITAS#
** Reported => 941019												
PARTICLE FI		SR-90	121 N190	* 1.07E-04 PCI/C	1.58E-04	1.65E-04	940607 1305	940509 1400		1.59E+03CM	I 402	40863501
PARTICLE FI		SR-90	121 N191	* 6.48E-05 PCI/C	1.37E-04	1.43E-04	940607 1245	940509 1345		1.57E+03CM	I 402	40863502
PARTICLE FI		SR-90	121 N412	* 5.79E-05 PCI/C	4.62E-04	4.77E-04	940621 1300	940613 1000		4.42E+02CM	I 402	40863503
PARTICLE FI		SR-90	121 N413	* 9.49E-05 PCI/C	4.90E-04	5.07E-04	940621 1300	940613 1000		4.42E+02CM	I 402	40863504
PARTICLE FI		SR-90	121 N414	* 1.34E-04 PCI/C	5.01E-04	5.29E-04	940621 1300	940613 1000		4.42E+02CM	I 402	40863505
PARTICLE FI		SR-90	121 N415	* 1.20E-04 PCI/C	4.56E-04	4.70E-04	940621 1300	940613 1000		4.42E+02CM	I 402	40863506
PARTICLE FI		SR-90	121 N416	* 3.21E-05 PCI/C	4.97E-04	5.13E-04	940621 1300	940613 1000		4.42E+02CM	I 402	40863507
PARTICLE FI		SR-90	121 N417	* 1.59E-04 PCI/C	4.38E-04	4.53E-04	940621 1300	940613 1000		4.42E+02CM	I 402	40863508
PARTICLE FI		SR-90	121 N418	* 2.37E-05 PCI/C	3.18E-04	3.26E-04	940718 0810	940704 1032		7.55E+02CM	I 402	40863509
PARTICLE FI		SR-90	121 N419	* 1.39E-04 PCI/C	2.91E-04	3.04E-04	940718 0820	940704 1152		7.55E+02CM	I 402	40863510
PARTICLE FI		SR-90	121 N420	* 1.31E-04 PCI/C	3.51E-04	3.61E-04	940718 0825	940704 1138		6.04E+02CM	I 402	40863511
PARTICLE FI		SR-90	121 N421	* 4.42E-05 PCI/C	2.97E-04	3.07E-04	940718 0830	940704 1138		7.17E+02CM	I 402	40863512
PARTICLE FI		SR-90	121 N422	* 1.56E-04 PCI/C	3.49E-04	3.62E-04	940718 0835	940704 1102		6.79E+02CM	I 402	40863513

13 Records listed

* Denotes a result less than the overall error; (nS) specifies the level of error, 1 sigma or 2 sigma

90Sr ANALYSIS RESULTS

E-14

05-Oct-94 07 51 AM

IT ANALYTICAL SERVICES
2800 GEORGE WASHINGTON WAY, RICHLAND, WA
RADIOCHEMICAL ANALYSIS REPORT Contract no. 163589-A-M1
PNA Account(s) Listed
Results reported on 941005

Page 1

SAMPLE TYPE	LOCATION	ISOTOPE	CUST	RESULT	COUNTING ERROR	OVERALL ERROR	SAMPLE DATE TIME	ON DATE TIME	PERCENT MOIST	ANALYSIS SIZE	U C GROUP	ITASH
** Reported => 941005												
PARTICLE FI		SR-90	121 N423	* 5.40E-05 PCI/C	2.90E-04	3.00E-04	940808 1000	940725 1430		7.50E+02CM	I 402	40832201
PARTICLE FI		SR-90	121 N424	* 1.33E-04 PCI/C	3.14E-04	3.25E-04	940808 1005	940725 1435		7.50E+02CM	I 402	40832202
PARTICLE FI		SR-90	121 N425	* 1.55E-04 PCI/C	4.39E-04	4.45E-04	940808 1010	940725 1440		6.49E+02CM	I 402	40832203
PARTICLE FI		SR-90	121 N426	* 6.48E-05 PCI/C	3.91E-04	4.03E-04	940808 1015	940725 1445		6.49E+02CM	I 402	40832204
PARTICLE FI		SR-90	121 N427	* 5.61E-05 PCI/C	3.45E-04	3.54E-04	940808 1020	940725 1450		7.50E+02CM	I 402	40832205
PARTICLE FI		SR-90	121 N428	* 1.14E-05 PCI/C	4.35E-04	4.15E-04	940808 1025	940725 1455		7.13E+02CM	I 402	40832206
PARTICLE FI		SR-90	121 N429	* 9.06E-06 PCI/C	3.49E-04	3.77E-04	940808 1030	940725 1500		7.50E+02CM	I 402	40832207
PARTICLE FI		SR-90	121 N430	* 1.19E-04 PCI/C	3.72E-04	3.85E-04	940808 1035	940725 1505		7.13E+02CM	I 402	40832208
PARTICLE FI		SR-90	121 N431	* 1.37E-07 PCI/C	3.73E-04	3.83E-04	940808 1040	940725 1510		7.13E+02CM	I 402	40832209
PARTICLE FI		SR-90	121 N432	* 1.21E-04 PCI/C	3.92E-04	4.02E-04	940808 1045	940725 1515		7.88E+02CM	I 402	40832210

10 Records listed

90Sr ANALYSIS RESULTS

* Denotes a result less than the overall error. (ns) specifies the level of error, 1 sigma or 2 sigma

30-Sep-94 03:07 PM

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IT ANALYTICAL SERVICES
2800 GEORGE WASHINGTON WAY, RICHLAND, WA
RADIOCHEMICAL ANALYSIS REPORT Contract no. 163589-A-M1
PNA Account(s) Listed
Results reported on 940930

SAMPLE TYPE	LOCATION	ISOTOPE	CUST	RESULT	COUNTING ERROR	OVERALL ERROR	SAMPLE DATE	ON TIME	PERCENT DATE	ANALYSIS TIME	U C	GROUP	ITAS#
** Reported => 940930													
PARTICLE FI		PUR39/40100	N190	2.00E-04	PCI/C	3.61E-05	4.22E-05	940607	1305	940509	1400	1.59E+03CM	I 402 40863401P
PARTICLE FI		PU-238	102 N190	* 8.81E-07	PCI/C	5.66E-06	5.67E-06	940607	1305	940509	1400	1.59E+03CM	I 402 40863401P
PARTICLE FI		U-234	183 N190	* 1.64E-05	PCI/C	3.20E-05	3.40E-05	940607	1305	940509	1400	7.96E+02CM	I 402 40863401U
PARTICLE FI		U-235	184 N190	* 2.47E-06	PCI/C	1.62E-05	1.64E-05	940607	1305	940509	1400	7.96E+02CM	I 402 40863401U
PARTICLE FI		U-238DA	185 N190	*-6.30E-06	PCI/C	2.35E-05	2.51E-05	940607	1305	940509	1400	7.96E+02CM	I 402 40863401U
PARTICLE FI		PUR39/40100	N191	3.60E-05	PCI/C	1.40E-05	1.46E-05	940607	1245	940509	1345	1.57E+03CM	I 402 40863402P
PARTICLE FI		PU-238	102 N191	* 4.46E-07	PCI/C	5.40E-06	5.44E-06	940607	1245	940509	1345	1.57E+03CM	I 402 40863402P
PARTICLE FI		U-234	183 N191	*-2.64E-05	PCI/C	1.50E-05	1.81E-05	940607	1245	940509	1345	7.87E+02CM	I 402 40863402U
PARTICLE FI		U-235	184 N191	* 4.65E-07	PCI/C	8.57E-06	8.87E-06	940607	1245	940509	1345	7.87E+02CM	I 402 40863402U
PARTICLE FI		U-238DA	185 N191	*-7.22E-06	PCI/C	1.58E-05	1.82E-05	940607	1245	940509	1345	7.87E+02CM	I 402 40863402U
PARTICLE FI		PUR39/40100	N412	*-3.32E-07	PCI/C	1.41E-05	1.53E-05	940621	1300	940613	1000	4.42E+02CM	I 402 40863403P
PARTICLE FI		PU-238	102 N412	*-1.27E-05	PCI/C	1.41E-05	1.44E-05	940621	1300	940613	1000	4.42E+02CM	I 402 40863403P
PARTICLE FI		U-234	183 N412	* 2.28E-06	PCI/C	8.00E-05	8.87E-05	940621	1300	940613	1000	2.21E+02CM	I 402 40863403U
PARTICLE FI		U-235	184 N412	* 1.99E-05	PCI/C	4.30E-05	4.39E-05	940621	1300	940613	1000	2.21E+02CM	I 402 40863403U
PARTICLE FI		U-238DA	185 N412	*-7.27E-05	PCI/C	3.47E-05	4.68E-05	940621	1300	940613	1000	2.21E+02CM	I 402 40863403U
PARTICLE FI		PUR39/40100	N413	*-1.34E-05	PCI/C	1.51E-05	1.55E-05	940621	1300	940613	1000	4.42E+02CM	I 402 40863404P
PARTICLE FI		PU-238	102 N413	*-2.71E-06	PCI/C	0.00E+00	1.33E-05	940621	1300	940613	1000	4.42E+02CM	I 402 40863404P
PARTICLE FI		U-234	183 N413	*-5.55E-05	PCI/C	6.79E-05	7.72E-05	940621	1300	940613	1000	2.21E+02CM	I 402 40863404U
PARTICLE FI		U-235	184 N413	*-1.14E-05	PCI/C	1.05E-05	1.33E-05	940621	1300	940613	1000	2.21E+02CM	I 402 40863404U
PARTICLE FI		U-238DA	185 N413	*-6.79E-05	PCI/C	4.91E-05	5.83E-05	940621	1300	940613	1000	2.21E+02CM	I 402 40863404U
PARTICLE FI		PUR39/40100	N414	* 2.28E-06	PCI/C	9.37E-06	9.90E-06	940621	1300	940613	1000	4.42E+02CM	I 402 40863405P
PARTICLE FI		PU-238	102 N414	*-6.20E-06	PCI/C	4.93E-06	5.41E-06	940621	1300	940613	1000	4.42E+02CM	I 402 40863405P
PARTICLE FI		U-234	183 N414	* 3.11E-05	PCI/C	9.27E-05	1.01E-04	940621	1300	940613	1000	2.21E+02CM	I 402 40863405U
PARTICLE FI		U-235	184 N414	* 1.14E-06	PCI/C	4.80E-05	4.86E-05	940621	1300	940613	1000	2.21E+02CM	I 402 40863405U
PARTICLE FI		U-238DA	185 N414	* 1.44E-05	PCI/C	7.50E-05	8.48E-05	940621	1300	940613	1000	2.21E+02CM	I 402 40863405U
PARTICLE FI		PUR39/40100	N415	* 1.14E-05	PCI/C	1.60E-05	1.64E-05	940621	1300	940613	1000	4.42E+02CM	I 402 40863406P
PARTICLE FI		PU-238	102 N415	*-4.52E-06	PCI/C	3.62E-06	4.24E-06	940621	1300	940613	1000	4.42E+02CM	I 402 40863406P
PARTICLE FI		U-234	183 N415	*-8.43E-05	PCI/C	6.56E-05	7.50E-05	940621	1300	940613	1000	2.21E+02CM	I 402 40863406U
PARTICLE FI		U-235	184 N415	* 3.90E-05	PCI/C	6.30E-05	6.37E-05	940621	1300	940613	1000	2.21E+02CM	I 402 40863406U
PARTICLE FI		U-238DA	185 N415	*-5.45E-05	PCI/C	5.61E-05	6.44E-05	940621	1300	940613	1000	2.21E+02CM	I 402 40863406U
PARTICLE FI		PUR39/40100	N416	* 3.56E-06	PCI/C	7.79E-06	8.43E-06	940621	1300	940613	1000	4.42E+02CM	I 402 40863407P
PARTICLE FI		PU-238	102 N416	*-6.62E-06	PCI/C	7.81E-06	8.12E-06	940621	1300	940613	1000	4.42E+02CM	I 402 40863407P
PARTICLE FI		U-234	183 N416	*-6.29E-05	PCI/C	5.91E-05	6.95E-05	940621	1300	940613	1000	2.21E+02CM	I 402 40863407U
PARTICLE FI		U-235	184 N416	* 1.92E-05	PCI/C	4.18E-05	4.27E-05	940621	1300	940613	1000	2.21E+02CM	I 402 40863407U
PARTICLE FI		U-238DA	185 N416	* 3.25E-05	PCI/C	4.52E-05	4.52E-05	940621	1300	940613	1000	2.21E+02CM	I 402 40863407U
PARTICLE FI		PUR39/40100	N417	*-3.32E-07	PCI/C	1.38E-05	1.50E-05	940621	1300	940613	1000	4.42E+02CM	I 402 40863408P
PARTICLE FI		PU-238	102 N417	*-7.60E-06	PCI/C	9.77E-06	1.00E-05	940621	1300	940613	1000	4.42E+02CM	I 402 40863408P
PARTICLE FI		U-234	183 N417	*-2.44E-05	PCI/C	7.03E-05	7.96E-05	940621	1300	940613	1000	2.21E+02CM	I 402 40863408U
PARTICLE FI		U-235	184 N417	*-1.22E-05	PCI/C	8.68E-06	1.19E-05	940621	1300	940613	1000	2.21E+02CM	I 402 40863408U
PARTICLE FI		U-238DA	185 N417	*-3.94E-05	PCI/C	5.59E-05	6.43E-05	940621	1300	940613	1000	2.21E+02CM	I 402 40863408U
PARTICLE FI		PUR39/40100	N418	* 2.97E-06	PCI/C	8.63E-06	8.84E-06	940718	0810	940704	1032	7.55E+02CM	I 402 40863409P

* Denotes a result less than the overall error; (nS) specifies the level of error, 1 sigma or 2 sigma

ALPHA ENERGY ANALYSIS RESULTS

ALPHA ENERGY ANALYSIS RESULTS

30-Sep-94 03.07 PM

IT ANALYTICAL SERVICES
2800 GEORGE WASHINGTON WAY, RICHLAND, WA
RADIOCHEMICAL ANALYSIS REPORT Contract no. 163589-A-11
PMA Account(s) Listed
Results reported on 940930

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SAMPLE TYPE	LOCATION	ISOTOPE	CUST	RESULT	COUNTING ERROR	OVERALL ERROR	SAMPLE DATE	ON DATE	PERCENT ANALYSIS	U	C	GROUP	ITASH
PARTICLE FI		PU-238	103 N418	*-2.95E-06	PC1/C	5.30E-06	5.95E-06	940718	0810	940704	1032	7.55E+02CM	1 402 40863409P
PARTICLE FI		U-234	183 N418	*-4.43E-05	PC1/C	3.48E-05	4.08E-05	940718	0810	940704	1032	3.77E+02CM	1 402 40863409U
PARTICLE FI		U-235	184 N418	*-1.35E-05	PC1/C	2.50E-05	2.84E-05	940718	0810	940704	1032	3.77E+02CM	1 402 40863409U
PARTICLE FI		U-238DA	185 N418	*-3.17E-05	PC1/C	3.48E-05	3.94E-05	940718	0810	940704	1032	3.77E+02CM	1 402 40863409P
PARTICLE FI		PU-239/40100	N419	*-9.29E-06	PC1/C	1.09E-04	1.09E-04	940718	0820	940704	1152	7.55E+02CM	1 402 40863410P
PARTICLE FI		PU-238	102 N419	*-2.06E-05	PC1/C	3.80E-05	3.83E-05	940718	0820	940704	1152	7.55E+02CM	1 402 40863410P
PARTICLE FI		U-234	183 N419	*-4.48E-05	PC1/C	3.66E-05	4.24E-05	940718	0820	940704	1152	3.77E+02CM	1 402 40863410U
PARTICLE FI		U-235	184 N419	*-7.81E-07	PC1/C	1.84E-05	1.90E-05	940718	0820	940704	1152	3.77E+02CM	1 402 40863410U
PARTICLE FI		U-238DA	185 N419	*-5.80E-06	PC1/C	4.30E-05	4.71E-05	940718	0820	940704	1152	3.77E+02CM	1 402 40863410P
PARTICLE FI		PU-239/40100	N420	*-3.14E-06	PC1/C	1.23E-05	1.24E-05	940718	0825	940704	1138	6.04E+02CM	1 402 40863411P
PARTICLE FI		U-238	102 N420	*-3.11E-06	PC1/C	1.37E-05	1.38E-05	940718	0825	940704	1138	3.02E+02CM	1 402 40863411U
PARTICLE FI		U-234	183 N420	*-1.55E-05	PC1/C	5.54E-05	6.18E-05	940718	0825	940704	1138	3.02E+02CM	1 402 40863411U
PARTICLE FI		U-235	184 N420	*-8.51E-06	PC1/C	3.07E-05	3.13E-05	940718	0825	940704	1138	3.02E+02CM	1 402 40863411U
PARTICLE FI		U-238DA	185 N420	*-2.13E-06	PC1/C	5.56E-05	6.05E-05	940718	0825	940704	1138	7.17E+02CM	1 402 40863412P
PARTICLE FI		PU-239/40100	N421	*-2.43E-06	PC1/C	5.24E-06	5.60E-06	940718	0830	940704	1138	3.59E+02CM	1 402 40863412U
PARTICLE FI		U-238	102 N421	*-1.48E-06	PC1/C	7.95E-06	8.11E-06	940718	0830	940704	1138	3.59E+02CM	1 402 40863412U
PARTICLE FI		U-234	183 N421	*-1.40E-05	PC1/C	4.25E-05	4.82E-05	940718	0830	940704	1138	3.59E+02CM	1 402 40863412U
PARTICLE FI		U-235	184 N421	*-9.34E-06	PC1/C	6.45E-06	6.19E-06	940718	0830	940704	1138	3.59E+02CM	1 402 40863412U
PARTICLE FI		U-238DA	185 N421	*-6.01E-05	PC1/C	1.79E-05	2.61E-05	940718	0835	940704	1102	6.79E+02CM	1 402 40863413P
PARTICLE FI		PU-239/40100	N422	*-4.15E-05	PC1/C	8.73E-06	8.99E-06	940718	0835	940704	1102	3.40E+02CM	1 402 40863413U
PARTICLE FI		U-238	102 N422	*-6.98E-06	PC1/C	1.24E-05	1.25E-05	940718	0835	940704	1102	3.40E+02CM	1 402 40863413U
PARTICLE FI		U-234	183 N422	*-5.01E-05	PC1/C	2.91E-05	3.75E-05	940718	0835	940704	1102	3.40E+02CM	1 402 40863413U
PARTICLE FI		U-235	184 N422	*-8.70E-06	PC1/C	5.47E-06	7.61E-06	940718	0835	940704	1102	3.40E+02CM	1 402 40863413U
PARTICLE FI		U-238DA	185 N422	*-1.15E-05	PC1/C	4.41E-05	4.91E-05	940718	0835	940704	1102	3.40E+02CM	1 402 40863413U

65 Records listed

* Denotes a result less than the overall error: (nS) specifies the level of error, 1 sigma or 2 sigma

12-Oct-94 08:36 AM

IT ANALYTICAL SERVICES
2800 GEORGE WASHINGTON WAY, RICHLAND, WA
RADIOCHEMICAL ANALYSIS REPORT Contract no. 163589-A-M1
PNA Account(s) Listed
Results reported on 941011

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SAMPLE TYPE	LOCATION	ISOTOPE	CUST	RESULT	COUNTING ERROR	OVERALL ERROR	SAMPLE DATE	TIME	ON DATE	PERCENT TIME	ANALYSIS MOIST	U SIZE	C GROUP	ITAS#
** Reported => 941011														
PARTICLE FI		PU239/40100	N423	*-2.61E-06	PCI/C	7.52E-06	7.74E-06	940808	1000	940725	1430	7.50E+02CM	I 402	40832101P
PARTICLE FI		PU-238	102 N423	*-7.09E-06	PCI/C	4.71E-06	5.59E-06	940808	1000	940725	1430	7.50E+02CM	I 402	40832101P
PARTICLE FI		U-234	183 N423	* 6.05E-05	PCI/C	7.79E-05	8.21E-05	940808	1000	940725	1430	3.75E+02CM	I 402	40832101U
PARTICLE FI		U-235	184 N423	* 1.72E-06	PCI/C	3.52E-05	3.55E-05	940808	1000	940725	1430	3.75E+02CM	I 402	40832101U
PARTICLE FI		U-238DA	185 N423	* 1.15E-05	PCI/C	5.49E-05	5.84E-05	940808	1000	940725	1430	3.75E+02CM	I 402	40832101U
PARTICLE FI		PU239/40100	N424	*-3.45E-06	PCI/C	3.58E-06	4.11E-06	940808	1005	940725	1435	7.50E+02CM	I 402	40832102P
PARTICLE FI		PU-238	102 N424	*-3.69E-06	PCI/C	2.60E-06	3.96E-06	940808	1005	940725	1435	7.50E+02CM	I 402	40832102P
PARTICLE FI		U-234	183 N424	* 8.04E-05	PCI/C	7.41E-05	7.88E-05	940808	1005	940725	1435	3.75E+02CM	I 402	40832102U
PARTICLE FI		U-235	184 N424	* 2.17E-05	PCI/C	4.22E-05	4.26E-05	940808	1005	940725	1435	3.75E+02CM	I 402	40832102U
PARTICLE FI		U-238DA	185 N424	* 4.10E-05	PCI/C	6.09E-05	6.44E-05	940808	1005	940725	1435	3.75E+02CM	I 402	40832102U
PARTICLE FI		PU239/40100	N425	* 7.71E-06	PCI/C	1.19E-05	1.21E-05	940808	1010	940725	1440	6.49E+02CM	I 402	40832103P
PARTICLE FI		PU-238	102 N425	* 6.78E-06	PCI/C	4.44E-06	5.80E-06	940808	1010	940725	1440	6.49E+02CM	I 402	40832103P
PARTICLE FI		U-234	183 N425	* 2.53E-05	PCI/C	6.40E-05	6.94E-05	940808	1010	940725	1440	3.24E+02CM	I 402	40832103U
PARTICLE FI		U-235	184 N425	* 1.97E-05	PCI/C	3.34E-05	3.39E-05	940808	1010	940725	1440	3.24E+02CM	I 402	40832103U
PARTICLE FI		U-238DA	185 N425	* 2.78E-05	PCI/C	5.34E-05	5.83E-05	940808	1010	940725	1440	3.24E+02CM	I 402	40832103U
PARTICLE FI		PU239/40100	N426	*-9.84E-07	PCI/C	0.00E+00	8.29E-06	940808	1015	940725	1445	6.49E+02CM	I 402	40832104P
PARTICLE FI		PU-238	102 N426	* 4.55E-07	PCI/C	8.16E-06	8.86E-06	940808	1015	940725	1445	6.49E+02CM	I 402	40832104P
PARTICLE FI		U-234	183 N426	* 2.78E-06	PCI/C	5.58E-06	6.16E-06	940808	1015	940725	1445	3.24E+02CM	I 402	40832104U
PARTICLE FI		U-235	184 N426	*-2.41E-06	PCI/C	2.00E-05	2.07E-05	940808	1015	940725	1445	3.24E+02CM	I 402	40832104U
PARTICLE FI		U-238DA	185 N426	* 3.84E-05	PCI/C	6.06E-05	6.52E-05	940808	1015	940725	1445	3.24E+02CM	I 402	40832104U
PARTICLE FI		PU239/40100	N427	* 3.65E-06	PCI/C	6.37E-06	6.64E-06	940808	1020	940725	1450	7.50E+02CM	I 402	40832105P
PARTICLE FI		PU-238	102 N427	*-6.90E-06	PCI/C	9.02E-06	9.51E-06	940808	1020	940725	1450	7.50E+02CM	I 402	40832105P
PARTICLE FI		U-234	183 N427	*-1.79E-05	PCI/C	4.10E-05	4.65E-05	940808	1020	940725	1450	3.75E+02CM	I 402	40832105U
PARTICLE FI		U-235	184 N427	* 3.68E-05	PCI/C	3.00E-05	3.06E-05	940808	1020	940725	1450	3.75E+02CM	I 402	40832105U
PARTICLE FI		U-238DA	185 N427	*-9.00E-06	PCI/C	3.85E-05	4.29E-05	940808	1020	940725	1450	3.75E+02CM	I 402	40832105U
PARTICLE FI		PU239/40100	N428	* 1.84E-06	PCI/C	9.47E-06	9.66E-06	940808	1025	940725	1455	7.13E+02CM	I 402	40832106P
PARTICLE FI		PU-238	102 N428	*-2.51E-06	PCI/C	1.10E-05	1.14E-05	940808	1025	940725	1455	7.13E+02CM	I 402	40832106P
PARTICLE FI		U-234	183 N428	*-4.21E-06	PCI/C	4.96E-05	5.48E-05	940808	1025	940725	1455	3.56E+02CM	I 402	40832106U
PARTICLE FI		U-235	184 N428	* 2.10E-05	PCI/C	3.63E-05	3.68E-05	940808	1025	940725	1455	3.56E+02CM	I 402	40832106U
PARTICLE FI		U-238DA	185 N428	* 1.05E-04	PCI/C	4.49E-05	4.93E-05	940808	1025	940725	1455	3.56E+02CM	I 402	40832106U
PARTICLE FI		PU239/40100	N429	*-3.39E-06	PCI/C	5.07E-06	5.39E-06	940808	1030	940725	1500	7.50E+02CM	I 402	40832107P
PARTICLE FI		PU-238	102 N429	*-7.46E-06	PCI/C	7.18E-06	7.79E-06	940808	1030	940725	1500	7.50E+02CM	I 402	40832107P
PARTICLE FI		U-234	183 N429	* 3.72E-05	PCI/C	5.21E-05	5.72E-05	940808	1030	940725	1500	3.75E+02CM	I 402	40832107U
PARTICLE FI		U-235	184 N429	* 3.99E-06	PCI/C	2.07E-05	2.12E-05	940808	1030	940725	1500	3.75E+02CM	I 402	40832107U
PARTICLE FI		U-238DA	185 N429	* 5.87E-05	PCI/C	5.13E-05	5.57E-05	940808	1030	940725	1500	3.75E+02CM	I 402	40832107U
PARTICLE FI		PU239/40100	N430	*-4.40E-06	PCI/C	1.57E-05	1.58E-05	940808	1035	940725	1505	7.13E+02CM	I 402	40832108P
PARTICLE FI		PU-238	102 N430	* 9.98E-07	PCI/C	7.02E-06	7.70E-06	940808	1035	940725	1505	7.13E+02CM	I 402	40832108P
PARTICLE FI		U-234	183 N430	* 5.95E-05	PCI/C	5.90E-05	6.45E-05	940808	1035	940725	1505	3.56E+02CM	I 402	40832108U
PARTICLE FI		U-235	184 N430	* 1.56E-05	PCI/C	2.52E-05	2.58E-05	940808	1035	940725	1505	3.56E+02CM	I 402	40832108U
PARTICLE FI		U-238DA	185 N430	* 2.81E-05	PCI/C	4.54E-05	5.01E-05	940808	1035	940725	1505	3.56E+02CM	I 402	40832108U
PARTICLE FI		PU239/40100	N431	*-3.47E-06	PCI/C	5.15E-06	5.50E-06	940808	1040	940725	1510	7.13E+02CM	I 402	40832109P

* Denotes a result less than the overall error; (nS) specifies the level of error, 1 sigma or 2 sigma

ALPHA ENERGY ANALYSIS RESULTS

E-18

12-Oct-94 08:36 AM

IT ANALYTICAL SERVICES
2800 GEORGE WASHINGTON WAY, RICHLAND, WA
RADIOCHEMICAL ANALYSIS REPORT Contract no. 163589-A-M1
PNA Account(s) Listed
Results reported on 941011

page 2

SAMPLE TYPE	LOCATION	ISOTOPE	CUST	RESULT	COUNTING ERROR	OVERALL ERROR	SAMPLE DATE	TIME	DN DATE	PERCENT TIME MOIST	ANALYSIS SIZE	U C GROUP	ITASH
PARTICLE FI		PU-238	102 N431	* 6.81E-08 PCI/C	5.16E-06	6.04E-06	940808	1040	940725	1510	7.13E+02CM	I 402	40832109P
PARTICLE FI		U-234	183 N431	* 1.77E-05 PCI/C	4.80E-05	5.37E-05	940808	1040	940725	1510	3.56E+02CM	I 402	40832109U
PARTICLE FI		U-235	184 N431	* 2.83E-06 PCI/C	1.28E-05	1.38E-05	940808	1040	940725	1510	3.36E+02CM	I 402	40832109U
PARTICLE FI		U-238DA	185 N431	* 4.56E-05 PCI/C	5.12E-05	5.58E-05	940808	1040	940725	1510	3.56E+02CM	I 402	40832109U
PARTICLE FI		PU239/40100	N432	*-8.10E-07 PCI/C	0.00E+00	7.16E-06	940808	1045	940725	1515	7.88E+02CM	I 402	40832110P
PARTICLE FI		PU-238	102 N432	* 1.39E-05 PCI/C	1.04E-05	1.08E-05	940808	1045	940725	1515	7.88E+02CM	I 402	40832110P
PARTICLE FI		U-234	183 N432	* 2.96E-06 PCI/C	3.78E-05	4.34E-05	940808	1045	940725	1515	3.94E+02CM	I 402	40832110U
PARTICLE FI		U-235	184 N432	* 3.51E-07 PCI/C	1.04E-05	1.13E-05	940808	1045	940725	1515	3.94E+02CM	I 402	40832110U
PARTICLE FI		U-238DA	185 N432	* 1.02E-05 PCI/C	3.55E-05	4.09E-05	940808	1045	940725	1515	3.94E+02CM	I 402	40832110U

50 Records listed

* Denotes a result less than the overall error; (nS) specifies the level of error; 1 sigma or 2 sigma

ALPHA ENERGY ANALYSIS RESULTS

WHC-SD-WM-TRP-227 Rev. 0